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Factors Affecting Cost Escalation in Construction Projects in Gaza Strip

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ABSTRACT

Cost escalation is one of serious difficulties that facing the construction industry. The construction sector suffers from ever-increasing cost of raw materials, construction inputs and inflation in domestic and international markets. The aim of this paper is to identify factors affecting the cost escalation in construction projects in the Gaza Strip. This will help the contractors to create awareness so that timely remedial measures can be taken to mitigate the resulting problems. A total of 36 cost escalation factors related to project, supervisor, activity, owner, labour and equipment and materials were identified through extensive literature review which were supported by panel of experts and pilot study. A structured questionnaire was used to collect primary data. A total of 120 questionnaires were distributed randomly to owners, consultants and contractors working in the construction sector in the Gaza Strip to collect their views about the factors affecting cost escalation. The questionnaire was divided into two parts. The first part is general information and the second is factors affecting cost escalation. The results revealed that the cost of building materials, permits and approvals, the availability of an effective supervisory system, the improper cost estimate, the changes in project, the quality of work, the machinery and equipment required to carry out the tasks and activities required for the project completion are the most common factors leading to the cost escalation of construction projects in the Gaza Strip..

Keywords— Cost Escalation, Contractors, Factors, Owners

I. BACKGROUND AND CONTEXT

Construction projects are known for their bad reputation in increasing the budget, the delay in time, the low quality in addition to poor communication between the project parties. All these problems occur in projects. Therefore, the administration needs to continue monitoring the project in all stages (Guérin2012).

The main objective of the contractor is to deliver the project on time, within budget and to make profit. A culture of mutual trust between the parties in project is a key to the success of the project, which contributes to work in a homogeneous manner.

Project's construction cost has a significant role that affect the overall construction industry of a country. The construction industry has a great impact on the economy of a country. In the present situation, the sector suffers from many problems, such as the reduction of domestic investments in construction due to poor economic conditions, absence of laws and regulations, weak research and studies related to construction, the absence of a national database for the construction sector, the low use of modern technologies in the management of the construction sector, the lack of equipment. Contractors in the Gaza Strip are unable to continue to have new works. The erosion of capital due to the accumulation of losses without compensation and the existence of fierce competition, lead some companies to bankruptcy (Fiad 2013). The construction sector is a fundamental pillar of the composition of the economy in the Gaza Strip. It contributes about 35 percent of the GDP of the sector, and the number of workers is estimated at 80 thousand workers. If the projects stop, accession of tens of thousands to ranks of the unemployed. The Gaza Strip suffers from severe liquidity weakness, especially in the dollar category, prompting the banks to put financial restrictions to protect themselves from the possibility of failure of the contractor to pay the bank's debts to the projects under his supervision (Samhouri 2017).

The aim of this paper is to assess factors that affect cost escalation in construction project in the Gaza strip. There is great importance to the problem of cost escalation in the construction projects, resulting in significant damage to owners and contractors, as well as the construction sector. Construction cost escalation of

projects over the past years is believed to have caused considerable budget constraints on construction sector development. The uncontrolled rise of these cost has negatively influenced budgetary planning of construction programs by owner in adhering to the strict policies of the funding agencies like International Banks. Therefore, cost escalation is a great challenge in construction sector. The construction sector has faced many obstacles that prevented the actual management of the crisis. The most important of these obstacles are the absence of basic materials necessary for construction, lack of human capacity and lack of cadres, skills and technical experts and managers to carry out the required activities may hinder their development and the absence of strategic planning and development by the companies (Farwana & Al Deeb 2016).

II. COST ESCALATION

Cost escalation reflects changes in the price drivers of projects such as technology, productivity and changes in local market forces such as lack of skilled labour, high demand for materials (Hollmann 2007). The term "cost escalation" reflects the expected rise in the prices of basic inputs in construction projects - materials, labour, equipment, etc., as well as inflation in the market over time. It is used in project construction cost estimation to convert current dollars to outturn dollars for budgeting purposes (Raniga 2015); (Department of Housing and Public Works 2008).

Factors responsible for the cost escalation of civil and building engineering projects were identified. They are: Fluctuation of material prices, Variation, Government policies, Change of Government and political instability, Wrong method of estimation, Poor financial control on site, Long period between design and tendering time, Design errors, Lack of coordination between contractors and consultant, Poor supervision and Liquidation damages, Previous experience of contract, Inadequate production of raw materials, Effect of weather and Absence of construction cost data, Inaccurate projects cost estimation (Muhammad et al. 2015; Knight & Fayek, 2000). There are other factors that lead to escalating costs such as: project size, project scope, inflation cost, completion project time, incompleteness of preliminary quantity surveys, engineering uncertainties, delays, complexities of administrative structures, and inexperience of administrative personnel. Furthermore, project conditions, project location, suspension of works, environmental costs, strikes, poor coordination on site, bid expiry, local government pressures, political condition and transportation problems are affecting cost escalation (Kaliba et al. 2009; Renuka et al. 2014).

Factor that directly affect cost estimate of project can be gathered into two groups: estimate specific, design and project specific factors. Increased costs and time in construction projects are the result of material selection time and time of purchase, their availability in the local market and the presence of the supervising engineer. It is also important to estimate the duration of activities according to the available workers and the equipment used, taking into consideration unexpected events and errors that may occur at the time of implementation of these activities. Delays in construction projects have negative effects on the contractor, leading to conflicts, problems, low productivity, increasing construction costs and thus impact on project objectives (Abedi & Fathi 2011).

The key parameters which significantly impact cost overruns are: Morale/motivation, Social influence, Feedback procedure, Improper supervision, Lack of supervision, Inexperienced management, Unknown field condition, Scope changes, Design changes, Activity sequencing, Legal problems, Financial availability, Processing modification, Documentation, Estimate preparation, and Contingency allocation (EI-Choum et al. 1997).Common cost escalation factors identified across a number of projects list: Project acceleration requirement, Constructability difficulty costs, Design preload requirement, Initiative government, Condition latent, Contract failure and Remote location costs (Creedy 2006).

Six categories of reasons for increasing project costs are: Client causes delay in progress payments, frequent change orders, late in approving design documents construction; contractor causes financial difficulties; consultant causes mistakes and discrepancies in design documents; labour causes high cost of labour, overtime issues; material & equipment; external cases security. The unstable political situation represents a major threat to most projects that the owners wish to deliver in time and budget. The political situation is a major challenge for the construction stakeholders. As a result, most of projects are delayed which leads to cost increases. The delay in payments to the contractor is also a major factor in cost overruns (Niazi & Painting2017).

III. METHODOLOGY

The data collection approach adopted for conducting this research includes basic documents, respondents and archival documents, besides desk study as the primary data source for this research. Clients (project owners), contractors and consultants were the target groups included under the framework of the questionnaire. Contract documents, Tender documents, correspondence letters, bid documents, Civil engineering journals, Internet sources, as well as reviewing related archival documents were the main source of archival documents used to supplement the findings of this research.

The target population of this study is the contractors registered in the Palestinian Contractors Union (PCU), Public owners who working in construction industry and the consulting offices according to Syndicate

of Engineers registration. The sample size that represents the targeted population can be calculated from following equation formula:

$$n = \frac{n^1}{[1 + (n^1/N)]} \qquad Eq \ldots . (1)$$

Where:

- N = population number, n= sample size of population
- n' = sample size from infinite population $n^1 = \frac{S^2}{V^2}$

Where S^2 is the variance of population and V is a standard error in population sampling. (Usually S = 0.5 and V = 0.05).

Based on Palestinian Contractor Union, it is shown that there is (252) classified companies. The size of the sample calculated by using the equation (1),

$$n = \frac{0.5^2/0.5^2}{\left[1 + \left(\frac{0.5^2/0.5^2}{252}\right)\right]} = 67.75$$

The population of consultants = 69

$$n = \frac{0.5^2/0.5^2}{\left[1 + \left(\frac{0.5^2/0.5^2}{69}\right)\right]} = 30.22$$

The population of owners = 50

$$n = \frac{0.5^2/0.5^2}{\left[1 + \left(\frac{0.5^2/0.5^2}{50}\right)\right]} = 26.1$$

The pre-test phase of the questionnaire is an important stage to determine the validity and reliability of the data used in the questionnaire. The questionnaire was discussed with six experts who are working in construction companies. The pilot study led to some modification to the questions. Some other questions were added. Some questions have been rearranged to give a more relevant, consistent meaning and some redrafted questions.

The questionnaire was designed to obtain a response rate from the target group at high accuracy. A Likert's scale was used to determine the answers from 1 to 5, where 1 is very low important and 5 is very high important.

To determine the importance of each factor to the target parties, the Relative Importance Index (RII) was used as a tool. It is calculated by the following equation (Ugwu and Haupt, 2007):

$$RI = \frac{\sum w}{A \times N} \qquad \ldots\ldots eq\,(2)$$

Where:

- W is the weight given to each factor from 1 to 5
- A = 5
- N = total sample number

IV. DATA ANALYSIS AND DISCSSION

In this paper, 120 questionnaires were distributed, (82) questionnaires were returned showing (69 %) response rate divided as (30) contractors, (31) owners and (21) consultants, which is accepted in respect to the unstable construction industry conditions in the Gaza strip.

In Table I, the percentage of the owners was 37.8%, the contractors were 36.6% and the consultants were 25.6%. The reason for low response rate is that the contractors have frequent works to be done and are busy throughout the working hours in monitoring and following-up work and workers. It is found that 40.2 % (33) of respondents were project managers, 52.4 % (43) were site engineers, 7.3 % (6) were quantity surveyors. The proportion of project managers is large so that they will have significant impact on the results.

Furthermore, 3.7% (3) of the respondents have experience less than 5 years, 22% (18) between 5 to 10 years at construction works, 74.4% (61) have experience more than 10 years. The results show that most of the engineers who completed the questionnaire have a long history in construction and this is strengthen of the information collected through the questionnaire.

TABLE I
INFORMATION ABOUT RESPONDANTS

Information about respondents	Categories	Frequency	Percentage %
Respondent's organization work classification	Contractors	30	36.6
	Owners	31	37.8
	Consultant firms	21	25.6
Respondent's position in the organization	Project Engineer	33	40.2
	Site Engineer	43	52.4
	Quantity Surveyor	6	7.3
Respondent's years of experience	Less than 5 years	6	3.7
	From 5 to less than 10 years	21	22
	From 10 to less than 15 years	29	17.1
	More than 15 years	30	57.3

V. FACTORS INFLUENCING COST ESCALATION IN CONSTRUCTION PROJECTS

This section shows the results regarding the six groups that affect the cost escalation which are: Project level (7 factors), Supervisory level (3 factors), Activity level (7 factors), Owner level (4 factors), Labour level (9 factors) and Equipment and Material level (6 factors).

Project Level

Table II shows that owners, contractors and consultants participating in the survey classified "Regulatory approvals/Permits" in the first position with importance index (RII = 81.3 %), which indicates the importance of permits/regulatory approvals of the work

from the owner. Material that needs permits from the Gaza Reconstruction Mechanism (GRM). Israel imposes restrictions on the entry of construction materials into the Gaza Strip, identifying them as dual use items that can be used for military purposes. The Israeli authorities must agree to international traders, organizations and residents interested in rebuilding their homes before they can import building materials. In addition, regulatory agencies may have permit or approval authority over portions of the proposed project. If there are no permits for the project, the cost of the project will increase more than the estimation of the project and makes delay of all activities of the projects.

The second important factor rated by contractors was "Project location" with importance index (RII = 67.3 %). The importance of the location of the project in the identification of entrances and exits, the human resources and the necessary utilities for the site like water, electricity, sanitation and other necessary supplies. The contractors ranked "Weather conditions" with (RII=53.3 %) as the last factor because the weather don't have sever effect on cost as our area have a moderate climate condition. On the other hand, the owners and consultants in agreement with the contractors that the last important factor is Weather conditions.

TABLE II
FACTORS AFFECTING COST ESCALATION AT PROJECT LEVEL

Group	Contractor		Owner		Consultant		All respondents	
	RI	Rank	RI	Rank	RI	Rank	RI	Rank
Project size	0.667	3	0.735	1	0.657	4	0.690	2
Project location	0.673	2	0.574	4	0.581	6	0.612	4
Insufficient/ drawings	0.640	4	0.697	3	0.667	3	0.668	3
Permits/regulatory approvals	0.813	1	0.735	1	0.790	1	0.778	1
Ground conditions	0.580	5	0.568	5	0.610	5	0.583	6
Weather conditions	0.533	7	0.523	7	0.467	7	0.512	7
Unexpected utilities	0.580	5	0.555	6	0.743	2	0.612	4

Table II, the owners give the two factors the same important index. As the project size increases, the complexity of the project will often increase based on the total available financial resources, the number of team members participating and the time to submit. Kendall coefficient of concordance test was used to check the agreement between parties. The values of Kendall coefficient of concordance (W) and the significance level (p) are found to be 0.552 and 0.0007 respectively. This indicates that there is agreement among the parties concerning their opinion about cost escalation at project level. In the construction works that require the formation and approval of specific materials or equipment, the contractor shall move quickly to obtain such permits and approvals in order not to delay the work and to adopt any schemes requiring special permits, both at the work site and in the office. The contractor is responsible for obtaining the required permits and approvals where the work can be suspended unless the statements are obtained from the concerned authorities (Spot 1999).

Supervisory Level

Table III shows that contractors rated the "Inspection/testing time" in the highest rank with the importance index (RII = 87.3%).This means that the contractor knows that the establishment of bad relationships and disagreements with the supervisory staff will complicate all the project activities and delays to take the decisions to complete the work, tests and inspection, which will increase the costs of construction and increase the duration of the implementation of activities. While the highest important factor to owner was "Availability of supervision" on other hand the consultants believes that "Quality of supervision" is the most important one.

The owner was not in agreement with the consultants and contractors in rating "Availability of supervision" as the highest ranked factor. This result is identical need good supervision to make high quality of the projects. The owner must appoint administrative and technical staff once the project is granted to arrange for it to be completed within a specified time with the required quality and estimated cost. The requirements of the owner of the supervision team is to implement the project at the lowest cost, the best quality, the lowest possible time and implement the project according to the objectives of the owner (SGS Acquires the Assets of Geostrada 2017). The Kendall coefficient of concordance test shows that the values of Kendall coefficient of concordance (W) and the significance level (p) are found out to be 0.33 and 0.506 respectively. As the coefficient of concordance (W) is less than 0.5 and significance level (P) is more than 0.05, the agreement among the parties is not found and not acceptable with confidence level of less than 95%. It is clear that is contradiction of three parties resulted from there conflicting interest at supervisory level.

TABLE III
FACTORS AFFECTING COST ESCALATION AT SUPERVISORY LEVEL

Group	Contractor		Owner		Consultant		All respondents	
	RI	Rank	RI	Rank	RI	Rank	RI	Rank
Quality of supervision	0.773	3	0.768	2	0.705	1	0.755	2
Availability of supervision	0.827	2	0.774	1	0.678	2	0.767	1
Time to await inspections/ tests	0.873	1	0.542	3	0.619	3	0.683	3

Activity Level

Table IV shows that contractors ranked "Amount of rework" in the first position with importance index (RII =74 %), which indicates that the rework affect both cost and schedule performance throughout the construction industry that's need from contractor to pay more attention. Re-work is an activity or task more than once and is a waste of effort, time and money. Disposal of this phenomenon is impossible, but can be mitigated and minimized by the knowledge of the disadvantages of the adoption may be errors in design or lack of communication between the parties, the lack of information, the difficulty of implementation and complications in the work. The factor "Unrealistic schedule" (RII = 70.83 %) was ranked as the last factor to cause escalation at this group. The contractor doesn't give the schedule any importance in Gaza projects.

Meanwhile, owners ranked "Inaccurate estimate" (RII = 77.4%) as the first factor to cause escalation at this category, and the "Unrealistic schedule" (RII=77.4 %) with the same importance. This result is identical. The inaccurate estimate make owner at risk price forcing the owner to compensate these risks from the contingency.

The unrealistic schedule leads to escalation in project, noting that the owner needs to finish project as soon as possible. The owner must follow the basic steps to control the project during the life cycle of the project from the idea to the operation. The estimated budget of the project should be adopted early on the basis of its estimates taking into account the changes that may occur in stages. The use of detailed estimates used in the budget because they reflect the state of the project progress and points that need to be followed up and attention. During the construction phase, the owner must match the actual cost of the project with the estimated cost and available budget. Reviewing costs is a necessity as they may have been shown as a result of change orders by the owner or a rise in prices or a mistake in the budget estimate. Research has shown that project costs are constantly being depreciated (Flyvbje et al. 2002).

Respondents owners as shown in Table5 ranked the "Repetitiveness of activity" (RII=59.4 %) as the less important factor in this group.

On the other hand, that consultants ranked the "Construction methods" (RII=82.9 %) as the highest important factor causes escalating in this level. One of the most important things chosen by the consultant is the construction methods that's get most safe, lowest cost and quickly done. In the construction projects, it important to use different methods of implementation and comparison of many methods of implementation and choose the best of the most important factors that contribute to reduce the costs in construction of those projects (Ioannou & Martinez 1996).

Although the three parties are not in agreement of the highest important factor, they are in general agreement according to Kendall coefficient of concordance test. Whereas, the values of Kendall coefficient of concordance (W) and the significance level (p) are found out to be 0.527 and 0.0003 respectively. As the coefficient of concordance (W) is more than 0.5 and significance level (P) is less than 0.05, the agreement among the parties is found acceptable with confidence level of more than 95%.

TABLE IV
FACTORS AFFECTING COST ESCALATION AT ACTIVITY LEVEL

Group	Contractor		Owner		Consultant		All respondents	
	RI	Rank	RI	Rank	RI	Rank	RI	Rank
Sequence of activities	0.700	4	0.697	5	0.610	6	0.676	6
Repetitiveness of activity	0.713	3	0.594	7	0.552	7	0.627	7
Complexity of activity	0.727	2	0.748	3	0.667	4	0.720	3
Construction methods	0.680	5	0.748	3	0.829	1	0.744	1
Amount of rework	0.740	1	0.690	6	0.667	4	0.702	5
Inaccurate estimate	0.673	6	0.774	1	0.800	2	0.744	1
Unrealistic schedule	0.667	7	0.768	2	0.714	3	0.717	4

Owner Level

Table V shows that contractors ranked "Competence/knowledge of owner" in the first position with importance index (RII = 80%) while owners have ranked this factor the second important factor. The important thing for the contractor is the knowledge of the owner in the nature of the project and the methods of construction to avoid the changes. If the owner has properly prepared his documents, properly scoped the work and properly administer the contract, changes should be able to kept to minimum, all that depend in owner knowledge in project (Griffin 1993).

Owners ranked "Number of change/extra work orders"(RII = 75.3%) as the first factor to cause escalation. The changes and extra work that appear in the project are the most important factor that affects the escalation of costs for owner because they need additional costs and additional time and may result in problems between the owner and the contractor on the cost of implementing additional works. The main factors that are caused by the owner are the amendments in all its forms, whether adjustments in goals or modifications in the materials used or the replacement and addition of items and activities, where all these things result in an increase in costs (Knight & Fayek 2000).

Furthermore, consultants ranked the "Amount of interference or stop work orders"(RII = 76.2 %) as most important factor. The consultant's shows the interference demonstrated by stops workorder, retesting, withholding of payments, threatened loss of an early completion, and

other action geared to coerce the contractor to comply with the owners scheduling and rescheduling directives. The stop work orders of arrest appear when the supervisory team finds works or parts of the building that pose a danger and are incorrect (NASA Johnson Space Center 2010). The Kendall coefficient of concordance test results shows that the agreement among the parties is found acceptable with confidence level of more than 95%.

TABLE V
FACTORS AFFECTING COST ESCALATION AT OWNER LEVEL

Group	Contractor		Owner		Consultant		All respondents	
	RI	Rank	RI	Rank	RI	Rank	RI	Rank
Competence/knowledge of owner	0.800	1	0.761	2	0.619	4	0.739	3
Amount of interference or stop work orders	0.780	2	0.755	3	0.762	1	0.766	2
Number of change/extra work orders	0.753	3	0.819	1	0.743	2	0.776	1
Time required to make a decision by owner	0.753	3	0.710	4	0.638	3	0.707	4

Labour Level

Table VI shows that the contractors ranked "Subcontractors and suppliers" in the first position with importance index (82%). The result indicates that underperformance in projects caused by subcontractors and suppliers as poor quality, low productivity and more cost and time that make bad relationships between contractor and clients. An outstanding feature of the construction industry is the contracting between the general contractor, the subcontractor and the suppliers. In the construction project (57%) of the works and parts that are carried out in the project by the subcontractor either in new construction works or the maintenance of buildings. The larger and more complex the project, the more subcontractors will be subcontracted (Ajayi et al. 2010).

The second important factor ranked by respondents' contractors was the "Turnover and absenteeism" (RII = 80.7 %). One of the most important things for the contractor is the absence of workers, which leads to the interruption of some work and the processing of it until the return of workers or contracting with other people. Absenteeism hurts productivity and costs money. One of the main problems affecting the construction industry and its employees, especially the contractor, is the absence of workers and turnover. These factors have been found to be the most important factors affecting the rising costs of the contractor because workers working in projects make between 40 percent and 60 percent of project costs. Therefore, the contractor needs to pay attention to the employment available to him to avoid absence and turnover (Hanna 2006). As a result of the absence of workers in projects, the contractor costs a large amount of time and money lost, as the more absent workers the more time and cost. This result appears in areas with low working manpower is more influential than others. Where the replacement of absentee workers with new workers will need to re-train and explain the nature of the business where they are not familiar with the work. The impact of the absence of skilled workers and experienced may be four days delay for each worker is missing (Intergraph Corporation 2012).

Finally, the contractors ranked the "Amount of overtime worked" (RII = 61.3 %) as the least factor that cause escalation. Unfortunately, in the Gaza Strip, contractors do not care about the amount of work carried out by the workers and they do not have the outcome without the workers' rights being preserved. Due to the absence of the role of accountability for the rights of workers and work in the Palestinian market with the spread of unemployment in society.

Both owners and consultants are in agreement that the most important factor is "Quality of work" (RII = 81.9 %). The owner always cares about the quality of the product so the quality of the subcontractor was given the highest rating. The consultant's main tasks are to monitor the quality of the work and thus agree with the owner with this factor. The Kendall coefficient of concordance test shows that (W) and (p) are found out to be 0.586 and 0.0009 respectively. As the coefficient of concordance (W) is more than 0.5 and significance level (P) is less than 0.05, the agreement among the parties is found acceptable with confidence level of more than 95%.

TABLE VI
FACTORS AFFECTING COST ESCALATION AT LABOR LEVEL

Group	Contractor		Owner		Consultant		All respondents	
	RI	Rank	RI	Rank	RI	Rank	RI	Rank
How well crew works together	0.753	5	0.703	5	0.695	5	0.720	5
Morale/motivation of crew	0.720	7	0.639	7	0.619	7	0.663	7
Availability of skilled labour	0.800	3	0.768	2	0.762	2	0.778	2
Amount of work/workload	0.740	6	0.723	4	0.714	4	0.727	4
Overmanning and crowding	0.653	8	0.613	8	0.562	9	0.615	8
Amount of overtime worked	0.613	9	0.594	9	0.581	8	0.598	9
Subcontractors and suppliers	0.820	1	0.742	3	0.762	2	0.776	3
Quality of work	0.780	4	0.819	1	0.819	1	0.805	1
Turnover and absenteeism	0.807	2	0.684	6	0.629	6	0.715	6

Equipment and Material Level

Table VII shows that contractors ranked "Availability of equipment" in the first position with importance index (RII = 92.7 %).

Availability of equipment is important to the contractor in order to get the job done quickly. Lack of equipment causes many problems such as: dependence on labour rather than equipment, low productivity and difficulty of implementation. The main factors affecting construction costs are materials, labour, equipment, overhead and profit. The cost of equipment for the construction industry in construction projects is estimated to range from 25 to 40 percent of the total project cost (lseley & Gokhale 2003).

The second important factor was "Availability of materials" and significance coefficients (RII = 90.2%) while both owners and consultants ranked this factor as the most important one. This is the result of the financial and political instability in the Gaza Strip, the result of the frequent closure and closure of the crossings. In the event of closure of the crossings, the materials disappear from the market and double prices, which is a major obstacle to the contractor. In order for the contractor to have an effective role to make the project a success, he needs to have plans and scheduling for all the activities and actions he undertakes to avoid rising prices of materials that occur in the market. The new material planning distinguishes the contractor's ability from the other so that it becomes more competitive (WSDOT Projects 2008).

This result is identical in terms of arrangement with the contractor, although the owner cares about the quality of materials and the importance of matching these materials to the required specifications. The owner, the contractor and the consultant agreed on the importance of the availability of materials due to the problems of the interruption of materials in the Gaza Strip markets. The Kendall coefficient of concordance test shows that the agreement among the parties is found acceptable with confidence level of more than 95%.

TABLE VII
FACTORS AFFECTING COST ESCALATION AT EQUIPMENT AND MATERIAL LEVEL

Groups/Factors	Contractor		Owner		Consultant		All respondents	
	RI	Rank	RI	Rank	RI	Rank	RI	Rank
Equipment availability	0.927	1	0.768	3	0.819	3	0.845	2
Suitability	0.760	4	0.764	4	0.771	4	0.764	5
Materials availability	0.920	2	0.884	1	0.876	1	0.895	1
Accessibility on site	0.720	6	0.742	5	0.648	6	0.710	6
Material quality	0.753	5	0.806	2	0.848	2	0.798	3
Amount of waste	0.900	3	0.723	6	0.676	5	0.776	4

Tests for Agreements on Cost Escalation Factors

This section shows the testing of the correlation of the parties' responses as tested using Kendall coefficient to find out the difference in ranking between the three groups of respondent's owner, contractor and consultant. The purpose of the test of hypothesis is to be certain with the existence of factors affecting cost escalation in construction projects in Gaza strip and avoid any delusion of the chance of the occurrences of the variables and to have confidence that there is consensus among the various respondent. The Null Hypothesis (H0) is: *There is no agreement in the ranking of factors affecting cost escalation in construction projects in Gaza strip between groups of respondents*. The Alternative Hypothesis (HA) is: *There is an agreement in the ranking of factors affecting cost escalation in construction projects in Gaza strip between groups of respondents*.

For groups of project level, activity level, owner level, labour level, and Equipment and Material level, it is found that the values of p are less than 0.05 and here the null hypothesis is rejected that there is no agreement between the parties on the factors of cost escalation. Thus, the alternative hypothesis H1 is accepted. Therefore, it can be said that there is a great deal of agreement between owners, contractors and consultants related the factors affecting the cost escalation of construction projects in the Gaza Strip.

On the other hand, as shown in Table VIII, for the supervisory level, it is found that the value of p is greater than 0.05. In this case, H0 cannot be rejected and that there is no agreement of the target group of the sample and factors that affect cost escalation. It can be argued that there is insufficient evidence to support alternative hypothesis H1 and therefore there is little agreement between owners, contractors and consultants regarding the factors influencing the escalating costs of construction projects in the Gaza Strip regarding supervisory level.

TABLE VIII
SUMMARY OF CORRELATION TEST ON THE RANKING OF FACTORS AFFECTING COST ESCALATION

Field	W	Chi-Square	P-value	Decision
Project level	0.552	144.072	0.0007	Reject H0
Supervisory level	0.33	86.13	0.506	Don't reject H0
Activity level	0.527	137.547	0.0003	Reject H0
Owner level	0.537	140.157	0.0005	Reject H0
Labor level	0.586	152.946	0.0009	Reject H0
Equipment and Material level	0.507	132.327	0.001	Reject H0

Relationship between Population Characteristics and Main Groups

The One-Way ANOVA (Analysis of Variance) test was used to test the relationship between population characteristics and main groups.

The Null Hypothesis (H0) is: *There are no statistically significant differences attributed to the personal information of the respondents at the level of $\alpha \leq 0.05$ about the cost escalation factors in construction projects in Gaza strip*.

H_0: $\mu 1 = \mu 2 = \mu 3$

The Alternative Hypothesis (H1) is: *There are statistically significant differences attributed to the*

personal information of the respondents at the level of α ≤ 0.05 about the cost escalation factors in construction projects in Gaza strip.

H_1: μ1 ≠ μ2 ≠ μ3

The F ratio:

$$F = \frac{MS_B}{MS_W} \qquad Eq3$$

Where

- MS_B : within-group mean square = S_W/f_W
- F_{ew} : within-group degrees of freedom = $a \times (n-1)$
- S_w : within-group sum of square

Relationship between Respondent's Position and Main Groups

Table VIIII show that the Sig.-value equal 0.543 which is greater than 0.05, and the value of F_{total}= 1.258which is less than $F_{critical}$ = 3.14, we don't reject the null hypothesis. There is no statistically significant differences attributed to the relationship between the respondent's designation at the level of α ≤ 0.05 and the cost escalation factors in construction projects in Gaza strip.

It is clear from the above that whatever the career ladder you are working in the field of construction you will find that you are affected by the same factors that affect the escalation of costs, whether you are a project manager or a site engineer or others with a different size of responsibility for project managers.

TABLE VIIII
RELATIONSHIP BETWEEN RESPONDANT'S POSITION IN CONSTRUCTION AND MAIN GROUPS

No.	Field	F	Sig. value
1.	Project level	0.292	0.423
2.	Supervisory level	2.426	0.528
3.	Activity level	0.637	0.836
4.	Owner level	2.037	0.608
5.	Labor level	0.394	0.790
6.	Equipment and Material level	0.897	0.078
All fields		1.113	0.543

Relationship between Experience of Respondents and main groups

Table VV show that the Sig.-value equal 0.488 which is greater than 0.05, and the value of F_{total}= 0.977 which is less than $F_{critical}$ =3.14, we don't reject the null hypothesis. That's means there is no statistically significant differences attributed to the relationship between the experiences of respondents of the respondents at the level of α ≤ 0.05 about the cost escalation factors in construction projects in Gaza strip.

From the above, it is concluded that the more experienced construction engineers, the greater their knowledge and ability to understand the nature and impact of the factors influencing the cost escalation in the projects in which they work, and the use of the best methods of mitigation and access to the completion of projects with the best results.

TABLE VV
RELATIONSHIP BETWEEN EXPERIENCE OF RESPONDANTS AND MAIN GROUP

No.	Field	F	Sig. value
1.	Project level	0.389	0.680
2.	Supervisory level	1.857	0.165
3.	Activity level	0.351	0.705
4.	Owner level	1.978	0.148
5.	Labor level	0.746	0.645
6.	Equipment and Material level	0.541	0.585
All fields		0.977	0.488

VI. CONCLUSION

The factors that affect cost escalation in construction projects were identified from literature review. 36 factors were selected. These factors are grouped into 6 groups based on literature review. These groups give comprehensive summary of the main key escalation indicators. In this paper, 120 questionnaires were distributed, (82) questionnaires were returned showing (69 %) response rate divided as (30) contractors, (31) owners and (21) consultants.

At project level, the permits and regularity approvals of materials was the most important factor of cost escalation. This imply difficult political situation in the Gaza Strip. Israel imposes restrictions on the entry of construction materials into the Gaza Strip, identifying them as dual use items that can be used for military purposes. These problems can be seen as an obstacle to projects.

At the supervisory level, "Availability of supervision "is the most important factor . The importance of the availability of supervision for the three parties in the project is necessary to appoint the supervisory body at the beginning of the project in order to take the necessary measures and monitor the work in the project. This factor affects significantly and directly on the cost and quality of the project and the time of completion activities.

At activity level, the "inaccurate estimate" was the highest important factor. This result indicates the inaccurate estimate make projects at risk price. This will stop the project at a certain stage due to a budget deficit. This result reflects that both owner and the consultant agree that the correct assessment is the most important things for the success of the project. Amount of rework has been ranked by the contractors in the first position because the rework affects both cost and schedule throughout the construction industry that's need from contractor to pay more attention.

At owner level, "number of change and extra work orders" was highly ranked by the owners. It was ranked by the consultants in the second position, because change and extra work need additional costs and additional time. Competence and knowledge of owner has been ranked by the contractor respondents in the first position. The important things for the contractor are knowledge of the owner in the nature of the project and the methods of construction to avoid the changes and stop the work activities of the project.

At labour level, the "quality of work by subcontractors" was ranked in the highest important factor by consultant and owner. This result indicates owner and consultant always cares about the quality of the product so the quality of the subcontractor was given the highest rating. The results indicate that contractors were ranked "subcontractors and suppliers" as the highest important factor. The result indicates that underperformance in projects caused by subcontractors and suppliers as poor quality, low productivity and more cost and time that make bad relationships between contractor and clients.

At equipment and material level, the "Availability of equipment "was the most important factor to contractors. This result shows the importance of having the equipment in place in order to complete the work on time, as the shortage of equipment leads to several problems, including dependence on labour, lack of productivity and difficulty of implementation. Also, important factors in this group agreed upon by all parties of the project from the contractor and owner and consultant is the lack of materials in the market as a result of frequent closures.

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