



Review Article: Investigating the Delay Factors of Construction Projects Using Narrative Analysis Approach

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ARTICLE INFO

Article history:

Received 09 /03/ 2020.

Received in revised form 30 /05/ 2020

Accepted 09/06 / 2020.

Keywords:

Construction delay
causes of delays

RII

Arab countries

ABSTRACT

Construction delays are common problems in civil engineering projects in Arab countries. Because of the importance of this problem, the study reviewed many studies that dealt with the topic of delay in the construction projects of their countries.

The study included the delay in projects in Iraq, Jordan, Palestine, Saudi Arabia, United Arab Emirates, Qatar, Yemen, Egypt, Sudan, Algeria and Morocco. The projects included infrastructure facilities, public buildings, housing complexes, water treatment plants, sports facilities, water supply, roads. Quantitative method via a structured questionnaire was implemented in all these studies, the questionnaires were distributed to experienced project parties such as the owner, contractor, consultant and other parties. The relative importance method was used to analyze the results of the questionnaire to obtain the highest ten or five factors with the highest rank which cause delay. The results showed that the groups of contractor and owner has the highest percentage and were repeated several times compared to the rest of the groups.

The top five factors causing delay of construction projects in Arab countries are, problems of cash flow and financial by owner, difficulties in financing the project by the contractor, Poor site management and supervision of the contractor, selecting the contractor who has the lowest bid and ineffective planning and scheduling by contractors.

1. Introduction

The delay in construction projects is defined as the difference or time difference between the project finish date specified in the contract and the actual date of project completion and completion. (Junaid 1). Bassioni and El-Razek identified that delay in construction project is considered one of the most common problems causing a great number of a negative effect on the project and its participating parties, therefore must identify the actual causes of delay in order to minimize and avoid the delays and their corresponding expenses. Time lag in the completion of activities from its specified time as in contract considered as construction delay. The effect of delays in construction projects can be summarized as a figure (1).



Fig (1): Effect of delay in construction projects (3)

2. Research objective & research design

Narrative analysis is one of the tools of scientific research sober in the field of project

management, which is a kind of quantitative analysis, as this will be based on the analysis of a large number of previous studies on a research problem, and then explore the differences between these studies in order to reach new facts and knowledge.

The narrative analysis methodology consists of the following steps:

1) Formulation of the research question: The research question in this study is represented as follows:

(What are the main reasons for Delay Factors of Construction Projects)

2) Extraction of raw data from previous studies

3) Data organization.

4) Discuss results and facts

3. Data collection

The researcher organized the data extracted from previous studies based on the researcher name, the place of research, research year, research means, the title of the research, objective research and the main results.

3.1..Researcher conclude after distributing 146 questionnaires to the parties which involved in the projects, that the main ten factors which caucus delay in in large-scale public projects shown as in the figure 2. The contractor and the owner had the largest percentage to cause the delay as shown in fig 3.

Table (1): Summary of study content

Researcher name, place of research & research year	Title of the research	Equations	Likert's scale
Beker, Jordan,2018	Study and Assessment of Causes and Effects of Delay in Large Public Construction Projects in Jordan	Frequency Index = (F. I) % = $\sum a (n/N) * 100/5$.	Strongly Agree (5) Agree (4) Moderate (3) Disagree (2) Strongly Disagree (1)
		Severity Index = $(S.I.) (\%) = \sum a (n/N) * 100 / 5$	Very highly effective (5) Highly effective (4) Effective (3) Lowly effective (2) Very lowly effective (1)
		Importance Index (I.I.) (%) = $[F.I. (\%) * S.I. (\%)] / 100$	

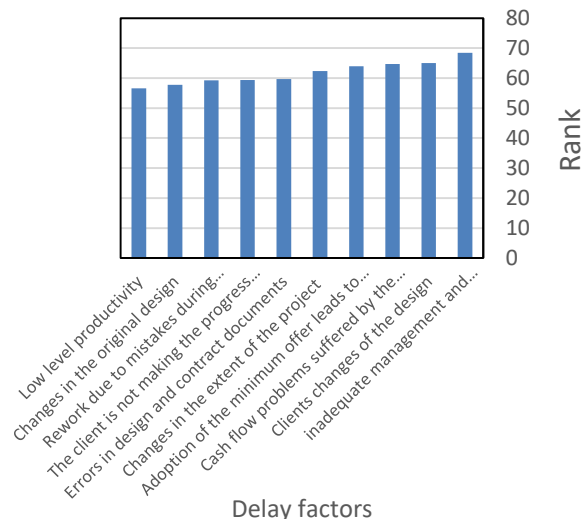


Fig (2) relationship between delay factors and their rank

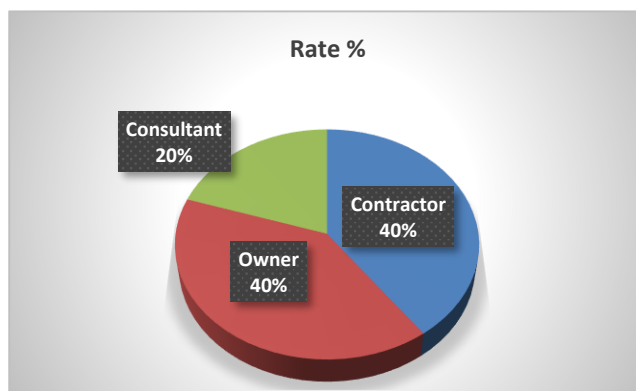


Fig (3) percentage of Factors-related group that causes the top ten delay factors

3.2. Researchers study the reasons for the delay in road construction, 186 questionnaires were distributed to the project parties except the owner who represents the government in road projects. The method of analysis was as shown in the table (2). The ten main factors which caucus delay shown as in the figure 4. The contractor factors had the largest percentage while equipment and design take a second rate in causing the delay as shown in fig 5.

Table (2) Summary of study content

Researcher name, place of research & research year	Title of the research	Equations	Likert's scale
Raymond and Asmaa, Egypt,2016	Study and Assessment of Causes and Effects of Delay in Large Public Construction Projects in Jordan	$RII = \frac{\sum_{i=1}^5 W}{A \times N}$	1 = "Not Important" 2 = "Least Important" 3 = "Important" 4 = "Very Important" 5 = "extremely Important"

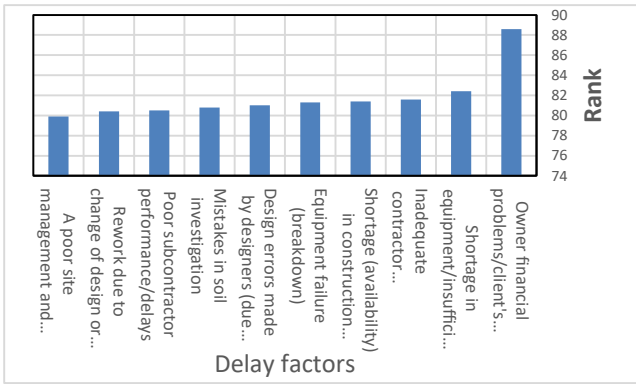


Fig (4) relationship between delay factors and their rank

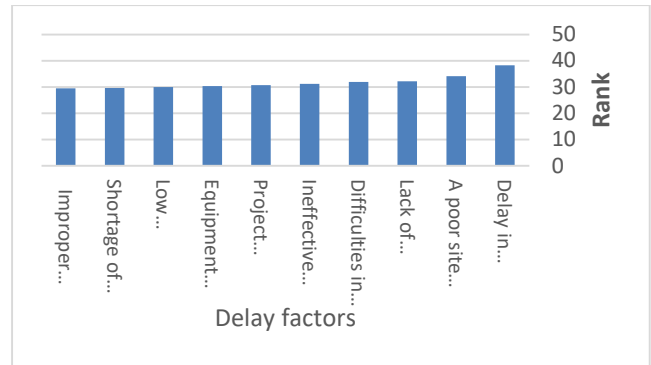


Fig (6) relationship between delay factors and their rank

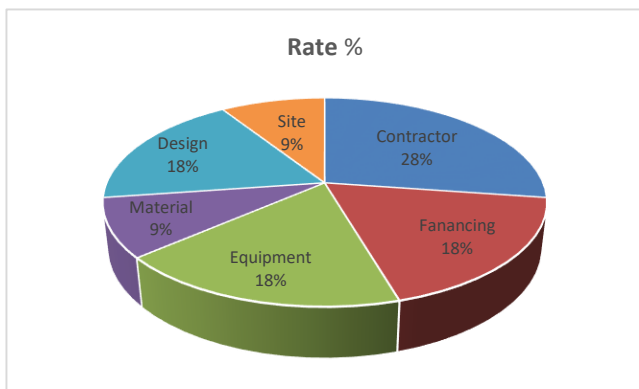


Fig (5) percentage of Factors-related group that causes the top ten delay factors

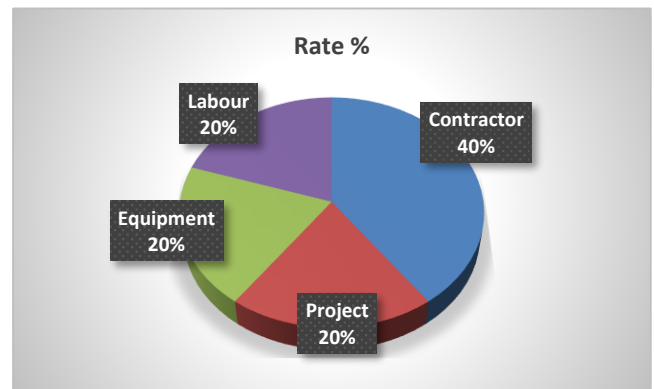


Fig (7) percentage of Factors-related group that causes the top ten delay factors

3.3. Researchers distributed 115 questionnaires. The method of analysis was as shown in the table (3). The ten main factors which caucus delay shown as in the figure 6. The contractor factors had the largest percentage while equipment, labor and project factors take same rate in causing the delay as shown in fig 7.

Table (3) Summary of study content

Researcher name, place of research & research year	Title of the research	Equations	Likert's scale
Ghada et al, Saudi Arabia, United Arab Emirates, Egypt and Qatar,2016	A Model for Evaluation of Delays in Construction Projects	Probability Index (P.I.) (%) = $\sum (a n / 6 N) \times 100$	0: not going to happen, 1: very low 2: low 3: Medium 4: High 5: very high
		Severity Index (S.I.) (%) = $\sum (a n / 6 N) \times 100$	1: very low 2: Low 3: Medium 4: High 5: very high
		Importance Index (IMP.I.) (%) = $[P.I. (%) * S.I. (%)] / 100$	

3.4. Study included government building projects in the middle and south of Iraq the owners are ministries of (Municipalities, Housing, Youth and Sports, Public works, Justice, and the Governorate of Basra... etc). Types of projects implemented by Contracting companies, are public buildings, housing complexes, water treatment plants, sports facilities, water supply, etc. The ten main factors which caucus delay shown as in the figure 8. The external factors had the largest percentage while owner factors take a second rate in causing the delay as shown in fig 9.

Table (4) Summary of study content

Researcher name, place of research & research year	Title of the research	Equations	Likert's scale
Bekr,Iraq,2015	Causes of Delay in Public Construction Projects in Iraq	Frequency Index = (F. I) % = $\sum a (n/N) * 100/5$.	Strongly Agree (5) Agree (4) Moderate (3) Disagree (2) Strongly Disagree(1)
		Severity Index = (S.I.) (%) = $\sum a (n/N) * 100 / 5$	Very highly effective (5) Highly effective (4) Effective (3) Lowly effective (2) Very lowly effective(1)
		Importance Index (I.I.) (%) = $[F.I. (%) * S.I. (%)] / 100$	

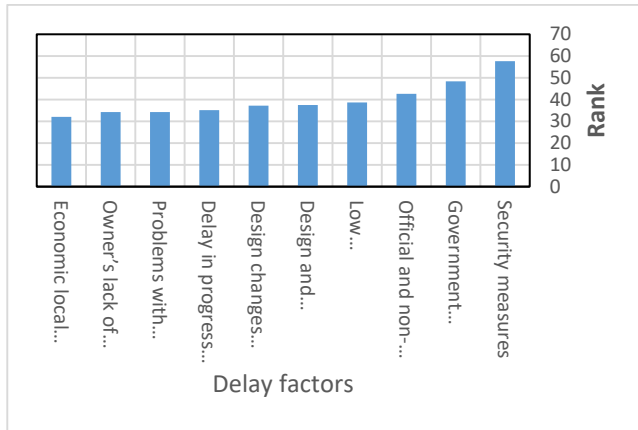


Fig (8) relationship between delay factors and their rank

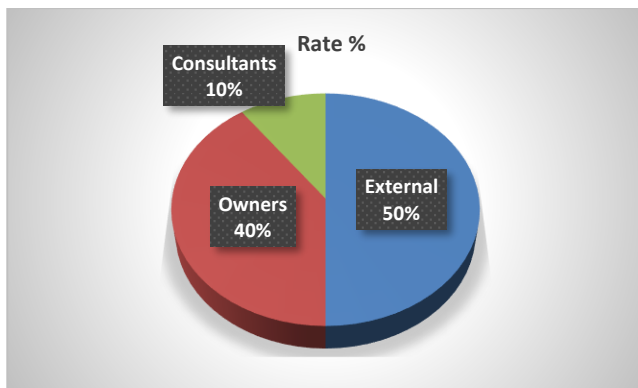


Fig (9) percentage of Factors-related group that causes the top ten delay factors

3.5. Study showed that there were delays in 38 of the 74 projects during the period between 2010 – 2014 in Hebron Municipality, and the study indicated that the average time period to exceed between 10% and 30% of the original time for projects. After the distribution of 24 questionnaires, the results were as shown in figure 10. The owner and contractor factors had the largest percentage as shown in fig 11.

Table (5) Summary of study content

Researcher name, place of research & research year	Title of the research	Equations	Likert's scale
Abu Hamdiya, Palestine, 2014	Causes of Delay in Construction Projects in Hebron Municipality	Frequency	Never 1
		Index (F. I) % =	Rarely 2
		$\Sigma a (n/N) *$	Sometimes 3
		100/5.	Frequency 4
			Always 5
	Severity Index (S.I.) (%) = $\Sigma a (n/N) * 100 / 5$	No effect	
		Almost effect	
		Strong effect	
		Very strong effect	
		Strongly effect	
	Importance Index (I.I.) (%) = $[F.I. (%) * S.I. (%)] / 100$		

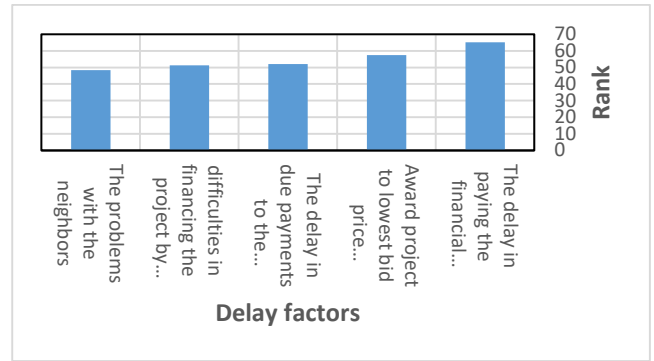


Fig (10) relationship between delay factors and their rank

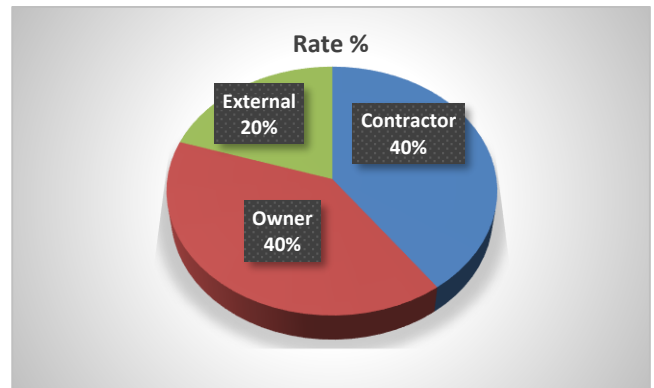


Fig (11) percentage of Factors-related group that causes the top five delay factors

3.6. Researcher find that most construction projects in the Gaza Strip are twice as likely to be delayed for this project, which causes increased costs and lost project profits, which leads to administrative and technical problems between the project parties. After the distribution of 124 questionnaires, the results are shown in figure 12. The material factors had the largest percentage while Contractor's responsibilities factors take a second rate in causing the delay as shown in fig 13.

Table (6) Summary of study content

Researcher name, place of research & research year	Title of the research	Equations	Likert's scale
Al-Najjar, Palestine, 2008	Factors Influencing Time and Cost Overruns on Construction Projects in the Gaza Strip	$RII = \frac{\Sigma wi}{A \times N}$	1 = not significant 2 = slightly significant 3 = moderately significant 4 = very significant 5 = extremely significant

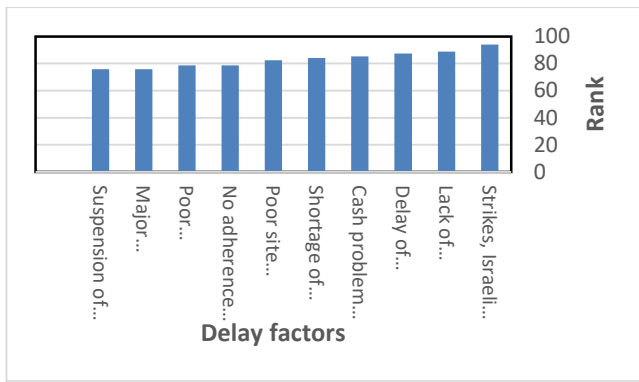


Fig (12) relationship between delay factors and their rank

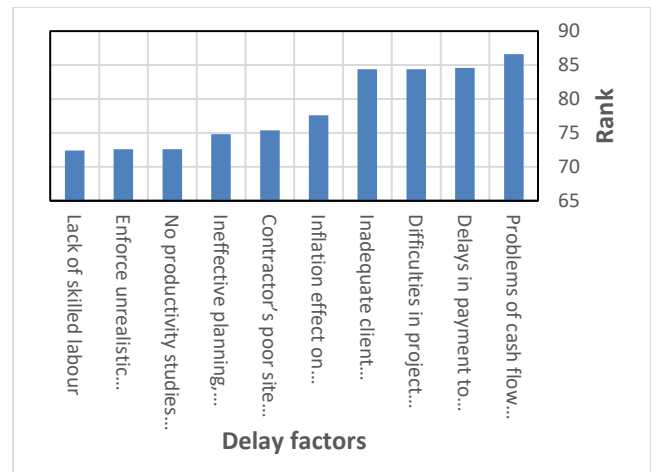


Fig (14) relationship between delay factors and their rank

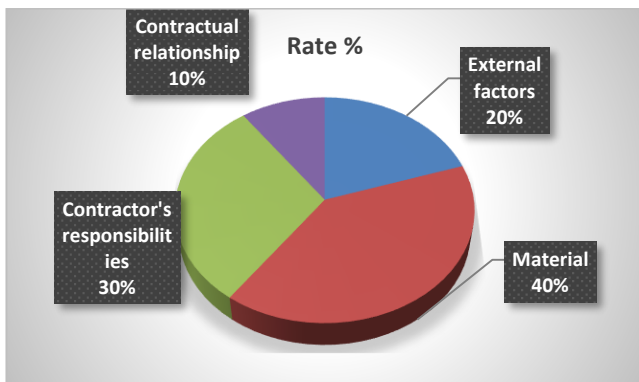


Fig (13) percentage of Factors-related group that causes the top ten delay factors

4.7. Study addressing the factors of delay faced by the road industry, because the delay in it represents a challenge for this country, as the high economic costs result from difficulties in identifying and reducing the factors that cause the delay. After the distribution of 100 questionnaires, the results are shown in figure 14. The Finance competence had the largest percentage while Project management factors take a second rate in causing the delay as shown in fig 15.

Table (7) Summary of study content

Researcher name, place of research & research year	Title of the research	Equations	Likert's scale
Khalid et al, Sudan,2017	A Management Framework to Reduce Delays in Road Construction Projects in Sudan	$RII = \frac{\sum_{i=1}^5 W * Xi}{A * N}$	(5) = Strongly Agree (4) = Agree (3) = Moderate (2) = Disagree (1) = Strongly Disagree

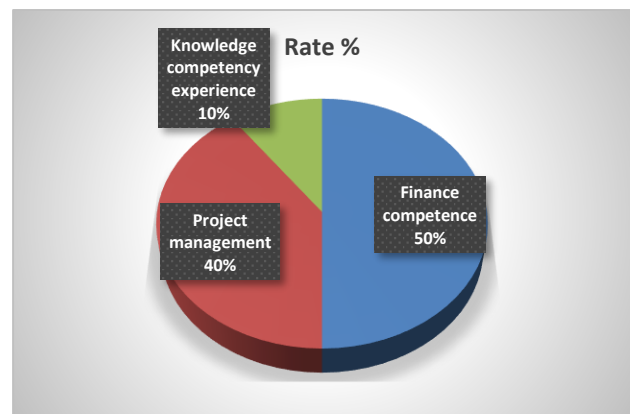


Fig (15) percentage of Factors-related group that causes the top ten delay factors

3.8. Study the reasons for the delay in construction projects, 123 questionnaires were distributed to the consultants. The ten main factors which caucus delay shown as in the figure 16. The results showed that the group of managerial and financial factors resulting from the contractor, consultant, owner and external factors formed the largest part of the factors that cause delay in construction projects as shown in fig 17.

Table (8) Summary of study content

Researcher name, place of research & research year	Title of the research	Equations	Likert's scale
Alaghbari et al, Sana'a-Yemen,	Delay Factors Impacting Construction Projects in Sana'a-Yemen	$RII = \frac{5n5+4n4+3n3+2n2+1n1}{5(n5+n4+n3+n2+n1)}$	(1) Very low effect/ non effect (2) Low effect (3) Medium effect (4) High effect (5) Very high effect

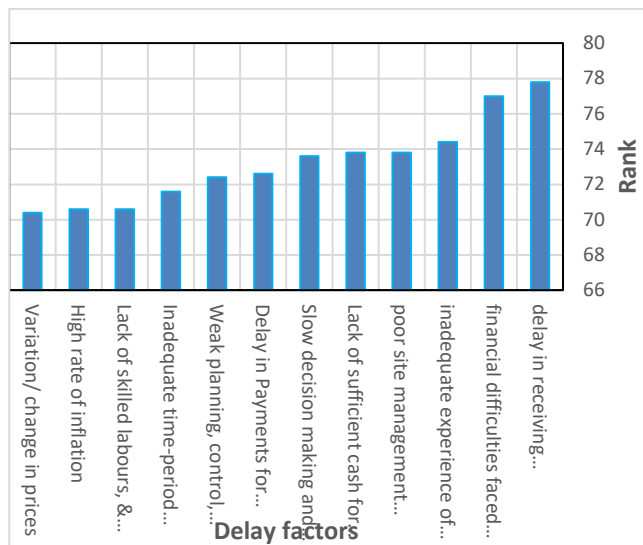


Fig (16) relationship between delay factors and their rank

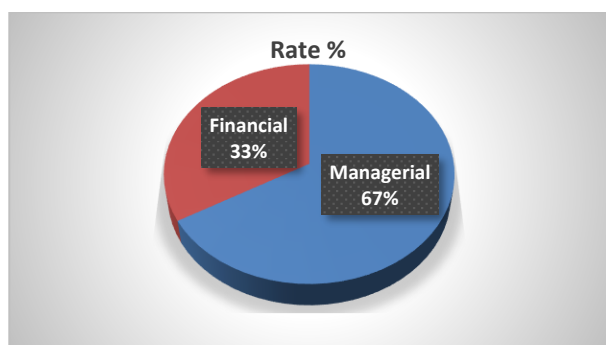


Fig (17) percentage of Factors-related group that causes the top ten delay factors

3.9. Study the causes of delays in construction projects that were launched during two decades to develop the infrastructure facilities because most of these projects suffered greatly from delays. After the distribution of 52 questionnaires, the results are shown in figure 17. Owner factors had the largest percentage while Project factors take a second rate in causing the delay as shown in fig 18.

Table (9) Summary of study content

Researcher name, place of research & research year	Title of the research	Equations	Likert's scale
Zemra et al, Algeria, 2019	Causes of schedule delays in construction projects in Algeria	$F = \frac{1}{4} \times \sum_{i=1}^n Wfi \times (\frac{ni}{N}) \times 100(\%)$ $S = \frac{1}{4} \times \sum_{i=1}^n Wsi \times (\frac{ni}{N}) \times 100(\%)$	(0 for Not relevant up to 4 for Always), (0 for Not relevant up to 4 for Extreme)
Importance Index (R) = [F (%) * S (%)] /100 (%)			

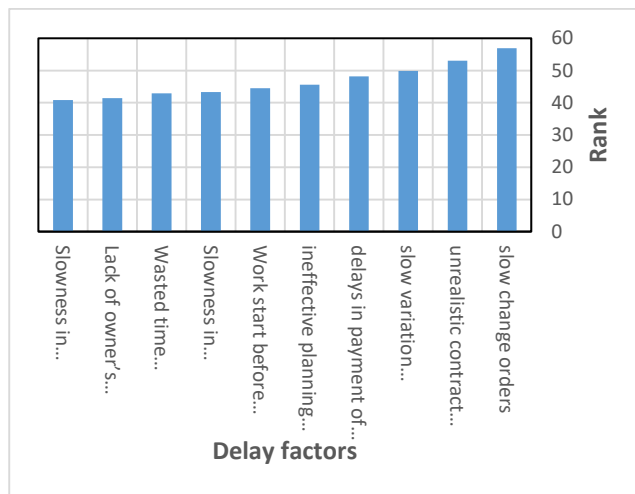


Fig (17) relationship between delay factors and their rank

3.10. Researchers aimed to identify the critical reasons affecting on construction industry because it is considered as a common problem. 330 questionnaires were distributed to the consultants and contractors. The ten main factors which caucus delay shown as in the figure 19. Contractor factors had the largest percentage while planning and scheduling, labors and equipment factors take a second rate in causing the delay as shown in Fig 20.

Table (10) Summary of study content

Researcher name, place of research & research year	Title of the research	Equations	Likert's scale
Mohamed and Anas, Morocco, 2018	Empirical study of schedule delay in Morocco	$RII\% = \frac{\sum_{i=1}^5 ai . xi}{A \times N} * 100$	1 – not important 2 – slightly important 3 – moderately important, 4- very important 5 – extremely important

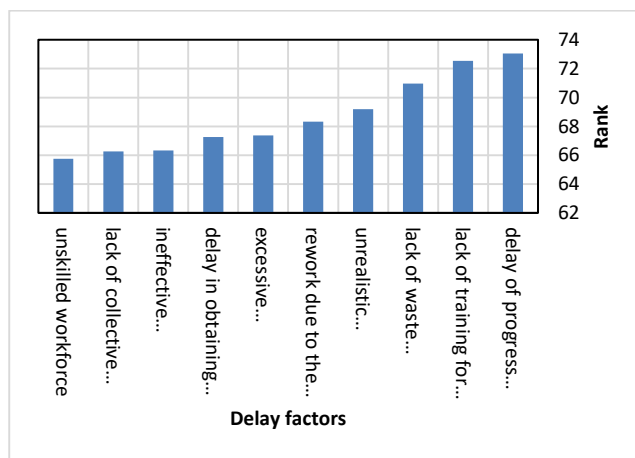


Fig (19) relationship between delay factors and their rank

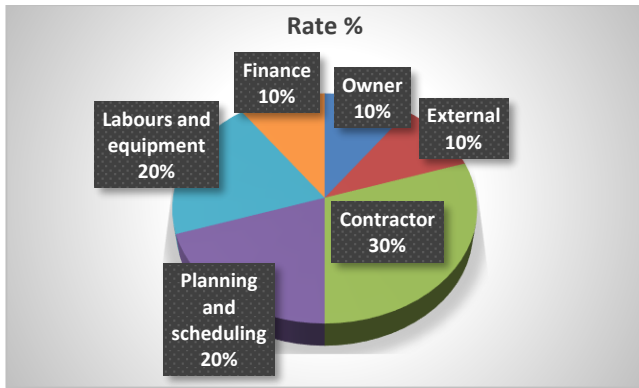


Fig (20) percentage of Factors-related group that causes the top ten delay factors

3.11. Study focused on the delay on projects because 62% of those projects suffered from this problem. 57% of the respondents indicated that there are delays in all types of projects regardless of the length of the contractual period, so the most frequent delays appear in the short and long-term project. After the distribution of 118 questionnaires, the results are shown in figure 21. The largest percentage was because of tumble in group monitoring and controlling planning according to category of operations in PMBOOK guide, as shown in Fig 22.

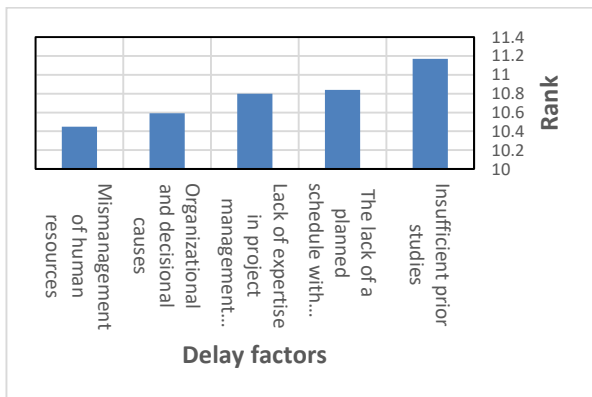


Fig (21) relationship between delay factors and their rank

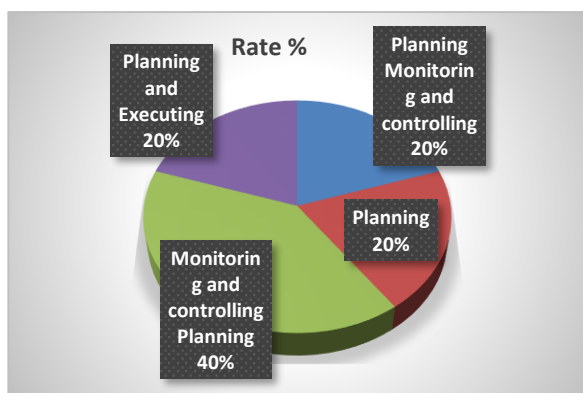


Fig (22) percentage of Factors-related group that causes the top five delay factors

3.12. Researcher addressed the issue of delay in public building projects with their relative importance. The most recent statistics show that, in the past decade, about 70% of public sector projects causing huge financial losses, a compromise in quality, and long waiting times to operate

the project for public services. After the distribution of 98 questionnaires, the results were as shown in Figure no 23. Contractor factors had the largest percentage in causing the delay as shown in fig 24.

Table (11) Summary of study content

Researcher name, place of research & research year	Title of the research	Equations	Likert's scale
Albogamy, Saudi Arabia, 2012	Addressing Construction Delays in the Kingdom of Saudi Arabia	Frequency Index (F. I) % $= \sum a (n/N) * 100/5.$	1=unknown 2=never 3=low 4=middle 5=high
		Severity Index (S.I) (%) $= \sum a (n/N) * 100 / 5$	
		Importance Index (I.I) $= [F. I * S.I] / 100$	

Table (12) Summary of study content

Researcher name, place of research & research year	Title of the research	Equations	Likert's scale
Salhi et al, Algeria, 2018	Identification of Factors Causing Delays in Construction Projects in Algeria	Frequency Index (F. I) = $\sum a n / N$	1 = Never 2 = rarely 3 = sometimes 4 = frequently 5 = always
		Severity Index (S.I.) = $\sum a n / N$	1 = low 2 = medium 3 = serious 4 = very serious 5 = extremely serious
		Importance Index (IMP.I) $= [F. I. * S.I.]$	

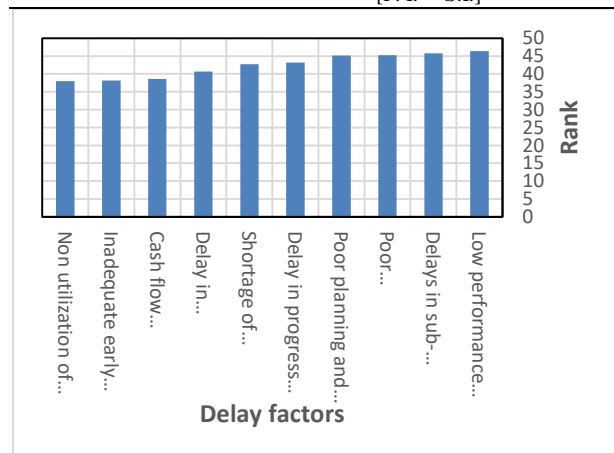


Fig (23) relationship between delay factors and their rank

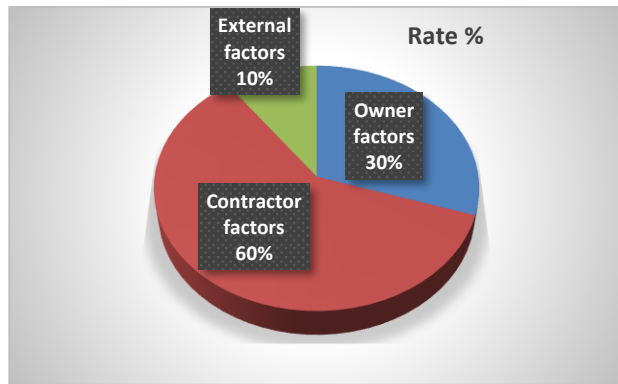


Fig (24) percentage of Factors-related group that causes the top ten delay factors

4. Results and Discussion

This paper has sought to review the published research on construction delay in Arab countries, the following conclusions of the research are drawn

4.1.When discussing the factors-related groups of the top ten or five ranks of delay factors, the following results were found:

The impact of the ‘Contractor’ related factors on the occurrence the delay had the first arrangement with proportion, 60%, 40%, 40%, 30% and 28% for other groups.

The impact of the ‘Owner’ related factors on the occurrence the delay had the first arrangement with proportion, 60% and twice with 40% for other groups.

The impact of the ‘External’ related factors on the occurrence the delay had the first arrangement with proportion 50% for other groups.

The impact of the ‘Finance Competence’ related factors on the occurrence the delay had the first arrangement with proportion 50% for other groups.

The impact of the ‘Monitoring and Controlling Planning’ related factors on the occurrence the delay had the first arrangement with proportion 40% for other groups.

The impact of the ‘Managerial’ related factors on the occurrence the delay had the first arrangement with proportion 67% for other groups.

Through this we conclude that the most important major players in the occurrence of delays in construction projects for Arab countries are the return of the first to the contractor related factors and in the second to the owner related factors.

4.2. When counting the factors that cause delays in construction projects for each Arab country under study that took the top ten or five ranks, it notes that there are factors that are repeated several times, which indicates their high relative importance and it risk of causing delay. As shown in table 13:

Table (13) the frequency of factor rank type

Delay factors	Frequency of rank							
	First	Second	Third	Fourth	Fifth	Sixth	Seventh	Eighth
Problems of cash flow and financing by owner	3	2			1	1	2	
Difficulties in financing the project by the contractor	2		2	3				1
Poor site management and supervision by contractor	1	1	1	1		2		
Ineffective planning and scheduling by contractors			1	1	2		2	1
Selecting the contractor who has the lowest bid	1	1		1				

We note from the table that the cash flow and the financial problems of the owner took the first rank for three times and the second rank twice as the highest factor that leads to the delay in construction projects in the Arab countries under study, While the financial difficulties faced by the contractor to provide cash for the project took the first rank twice.

The poor site management and supervision of the contractor, which relates to the ability of the contractor and his team to manage and supervise the project, took the first rank and was repeated as a second, third and fourth rank among the most important factors in the delay, While the factor of ineffective planning and scheduling by contractor appeared seven times among the highest delay factors, which indicates its high relative importance in causing a delay in Arab countries.

Another important factor caused by the owner is selecting the contractor who has the lowest bid, which repeated three times, and that indicates his important role in the delay because the contractor is unable to perform his duties.

5. Recommendations

1-The owner must pay the contractor's financial dues and pay them on time and provide sufficient liquidity for that because any delay in payment reflects on the contractor and weakens the ability to finance the project.

2- The contractor should make sure that he has the capital that enables him to complete the project in order to be able to pay direct and indirect costs and get rid of the problems of payment to suppliers.

3- The contractor must develop the administrative and technical capabilities of his and his team to raise the level of efficiency and gain skills in project management in terms of planning, scheduling and control methods.

4- The contractor should not be chosen at the lowest prices without looking at his experience, efficiency and previous performance because the contractor's poor performance and experience in implementing the project will lead to problems and conflicts between the project parties, especially with the owner in terms of matching the specifications and materials, which leads to the delay of the project

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