

Improving the quality of road projects for Kirkuk Governorate in the Republic of Iraq

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ABSTRACT

Aim to this search to study the reality of the state of quality control of road projects and in the republic of Iraq in general and Kirkuk governorate in particular, and what are the reasons for deviation in quality control, what are the benefits and obstacles of quality control on those projects, and what are the critical success factors in applying quality management to road projects in this governorate? and evaluation this indeed at a light foundations scientific to adjust the quality at projects construction, and that to reach to me group of conclusions and recommendations which Aims to me upgrade process improve quality construction projects to level better and to develop reality administration the quality at section roads and improve it at Iraq . Done The performance so from during plural data necessary for road questionnaire The open and personal interview was used the nominal group of fifteen engineers who have experience in the field of roads as well as from during homeliness field for some projects roads in kirkuk governorate as well a visit to the Kirkuk construction laboratory was done through it benefit from documents this is projects at this research.

And it became clear from the research that the quality management in road projects in Kirkuk governorate suffers from some shortcomings, the most important of which is the lack of efficient staff specialized in quality control work, and the lack of statistical methods for modeling processes, in addition to other factors such as the lack of an information system for quality control and the assignment of contractors to the lowest bids. Lack of qualification of laboratories examining ISO requirements, lack of clarity of design requirements, lack of clarity of technical specifications, poor engineering awareness of the importance of quality control for engineers, absence of courses and periodic awareness and training programs related to quality, and absence of coordination meetings between project parties. These reasons are considered among the important reasons that, if any, contribute to the poor quality of road projects. Finally, the research reviewed some solutions and proposals that could contribute to avoiding some quality management problems in these projects.

Keywords: Road Projects, Quality Control, Questionnaire, Nominal Group

1.1. Introduction:

That the quality of road projects in kirkuk governorate no maybe that pass about her picture accurate and that because nature work done from during group from stages and need to me evaluation clear and good before give he described for quality those projects. And saw the past three years, the Kirkuk government directed to make an effort in the road sector, but most of these projects are lacking to me concept setting the quality in which in general, as quality execution affected to me degree big factors basic and varied from highlights shortage at powers humanity self skills in construction work and manage it and not following methods Scientific and techniques modern at censorship and supervision. and surely Indeed field for a topic tuning app the quality at road works in Kirkuk province indicates to me Limited clear at orientation and response to apply requirements quality because of weakness Scientific view overall important from Side and weak understanding the meaning Real for the concept the quality from on the other hand, than pay researcher to study a comprehensive plan to improve the quality of construction projects.

1.2. Research Goal:

That the quality for road projects in Kirkuk governorate are considered from mission the basic at construction process and from without it may be exposed the road to me a lot from problems whether during execution or after completion Implement it for this the goal from this research focused on the following:

1. A case study of quality control for road projects
2. What are the reasons for the deviation in the quality control of road projects?
3. What are the benefits and obstacles of quality control in road projects?
4. What are the critical success factors in applying quality management to road projects?

1.3. Research Hypothesis:

Depends hypothesis search on what come:

1. There weakness at utilization technologies and tools stats and the means modern to adjust quality r oad projects works in kirkuk governorate cause deteriorate the quality of those projects.
2. Weakness at relationship functional between project management and departments construction laboratories and not inclusion examination reports for reasons distractions as well non statment corrective actions necessary.
3. Non existence standard quantitative to measure quality business used at Road work during phase implementation.

1.4. Research justifications:

Through a field experience of a group of implemented road projects that are under implementation in k irkuk governorate, a number of observations were made about the quality control process for these projects, the most important of which are:

1. Failure to use modern methods and techniques in the process of controlling the quality of road works, such as the technique of the seven statistical tools and quality loops the six thinking hats.
2. Relying on unqualified engineers to carry out quality control of road projects.
3. Not saving historical data for previous construction projects and using them for subsequent construction projects.
4. Not to involve consultants or designers in the process of controlling the quality of road projects works.
5. Relying on the results of laboratory tests to control the quality of the works of the implemented road projects, without resorting to a comprehensive quality control system.
6. Weakness of the effectiveness of field laboratories and the reason for this weakness is the lack of interest in them in terms of equipping them with the necessary laboratory equipment and devices, as well as not providing them with specialized manpower.
7. There is a lack of awareness of the importance of the concept of quality control and quality control in many .construction projects

1.5. Research Methodology:

Includes methodology ,search following two styles scientific on according to phase consecutive and nested Sometimes from okay Investigation ,research aims and these two the two styles they style search desktop and style application practical. **According to the first method**, local and international literature, sources, journals, studies, research and scientific publications in this field were reviewed and the general research structure was developed to collect the necessary information on quality control in road projects in Kirkuk governorate and to determine their requirements and factors affecting the improvement or deterioration of the quality of the executed works.

As for the second method, the necessary data were collected through the open questionnaire and the nominal group method, as well as through field coexistence of some road projects in Kirkuk governorate, as well as visits to the Kirkuk c onstructionlaboratory, through which the documents of these projects were used in this research

1.5.1. The method of desk research:

In this method, the concept of quality in construction projects will be discussed, the basic principles of quality management .will be clarified, and the problems of quality management in construction projects will be discussed

a. **Quality in construction projects:** Quality management is a joint responsibility between the parties to the project contract, and is not the responsibility of one party without another. It is a goal that everyone must strive for through close and continuous cooperation between all participants in the completion of the project, especially the implementation supervision department and the main contractor, to complete the work with perfection and complete it with the quality stipulated in the contract documents from plans and specifications, and the low quality of implementation reflects negatively on both quality means conforming the implementation to the technical and contractual requirements of the project, and therefore it is much more important than being left to chance. Control of the parties involved. This plan is twofold: quality control and quality assurance (JAYSON M., 2015) Quality control in construction projects includes the following

1. Setting specific standards for each construction project through plans, specifications and general and special technical conditions.
2. Diagnosing deviations by matching the executed works to plans, specifications and technical conditions.
3. Take corrective measures for negative deviations to reduce them to the minimum permissible and acceptable limits that do not affect the aspects of safety, durability and good functional performance of the executed project works.
4. Planning to improve standards and to increase conformity with them by taking advantage of the negatives and errors that appear during the course of implementation to be avoided in the subsequent implementation stages and in other construction projects.

b. **The basic principles of total quality management in construction projects:** The concept of total quality management is somewhat new in construction projects, as its application was limited to industrial projects, and then construction companies in the United States began to apply it after seeing the great success achieved by companies from applying the concept of total quality management, which depends on the pursuit of two basic principles

1. **Employer satisfaction:** The main function of any construction project is to provide the employer with ready-to-use facilities and services and fulfill their requirements, and that any construction company in order to continue working has to complete its work at a competitive cost. Total quality management is a management philosophy based on accurately defining the needs and requirements of the employer and working to secure the appropriate work environment and conditions to achieve these needs and requirements at the lowest possible cost, by ensuring quality at every stage of the construction project, starting from the fact that the construction project is an idea until it is ready for use and then the quality of this final product will be satisfactory to the employer.
2. **Continuous improvement:** To achieve total quality management, two functions must be performed:
 - a) Incrementally improving existing methods and procedures and maintaining existing improvements by adjusting the construction process, whether it is the design processes or the executive processes and others.
 - b) Directing and focusing efforts to achieve technological progress in construction and engineering processes through creativity and innovation (Oakland, *Total Quality Management and Operational Excellence*, 2014).

c. **Quality management problems in construction projects** By reviewing some research on quality management in construction projects in various countries of the world, it was found that there are a number of problems that quality management suffers from in construction projects that hinder its application and progress. The most prominent of these problems are the following (Thenoux & Ochoa, 2000):

1. Insufficient commitment by the senior management of companies and institutions to make the required efforts to implement successful quality management
2. Lack of effective communication and adequate coordination between the work team elements in the construction project (owner, designer, implementer and supervisor) and also between senior management and work sites
3. Lack of efficiency and training of frameworks, and consequently, failure to perform their tasks to effectively achieve the objectives of quality management
4. Lack of codes and general specifications that must be followed during the project creation process
5. Insufficient attention to quality on the part of project personnel
6. The instability of the volume of work in construction projects and its impact on the stability of the national economy as it is related to the availability of materials
7. Lack of planning to implement and achieve effective quality management

8. Ease of entry to the labor market in the construction sector, regardless of the availability of the necessary conditions and capabilities
necessary to achieve the required quality
9. Insufficient clarity in the limits of quality-related responsibilities between the parties to the construction process (owner, designer, implementer and supervisor)
10. Lack of legislation and regulations related to quality or shortcomings in their application
11. Weakness in the moral values of some participants (project owners, consultants, and bodies that conduct tests and examinations)
12. Ignorance of the concepts of quality and its tools, or their excessive use
13. Ignorance or misuse of modern engineering equipment and technologies
14. Insufficient preparation of plans and specifications related to projects before they are announced for contracting, and a lack of competence for a section of contractors who implement construction projects

1.5.2. The method of practical application:

This method aims to show the results of the statistical analysis of the results of the field study carried out by the researcher, noting that during the preparation of the questionnaire, the researcher consulted with experts and specialists who have a long experience in the field of quality control, in order to collect the largest possible amount of information and data with the aim of adding value to the scientific credibility of the study. The practical part included the following:

1. Sources of collecting information and data
2. Choose the search tools
3. Research sample
4. Data analysis

1. Sources of information and data collection:

In order to reach the results, conclusions and recommendations, the researcher relied in his research on two sources for data collection, namely:

- a. Primary sources: where the researcher relied on collecting primary data and information through the questionnaire, which was prepared and designed according to the research questions and hypotheses.
- b. Secondary sources: The researcher used to collect this data from books, periodicals and scientific journals available in libraries and the Internet, in addition to previous studies related to the topic of research, as well as through personal interviews with engineers.

2. Choosing the research tools:

The researcher used the main methods and techniques in order to obtain accurate information, which are:

a. Open Questionnaire:

The open questionnaire is one of the means of communicating with experts, skilled and specialized engineers; To take advantage of the information base available to them, and their dependence on making the right and accurate decisions. The open questionnaire included visits and field visits to road projects and the Kirkuk Construction Laboratory, as well as personal interviews.

1. Field visits and coexistence:

A number of road projects have been selected in Kirkuk governorate for the purposes of study and analysis. It is known that the construction of roads contributes to providing services to citizens directly. Through these frequent visits and continuous coexistence with some road projects, the researcher collected information related to various and diverse problems and everything that surrounds quality control process for these projects. The road projects for the study sample are:

First - the construction of a second corridor (Kirkuk-Manzala-Hawija): a road linking the center of Kirkuk governorate and Hawija district. It is considered a main vital road and ensures smooth flow of traffic, with a length of 42 km and a width of 8 m. The work includes all stages of construction of the road from the earth foundation and the dirt leveling to the

asphalt layers, which include (the base layer of the stabilizer and the layer of the binder covering) belonging to the directorate of roads and bridges of Kirkuk.

Secondly - Developing the road linking Hawija district with Riyadh and Al-Abbasi sub-districts from 8 m to 16 m. The work includes all stages of road construction, from the earth foundation and the earth level to the asphalt layers, which include (the base layer is stabilizers and the coating layer binder) affiliated to the directorate of roads and bridges of Kirkuk.

Third- Construction of the entrance to al-Abbasi district, a vital road with two lanes, a total length of 1 km and a width of 30 m, and the work on it includes paving, median islands, sidewalks, lighting poles and landscaping, continuation of this work to the Directorate of Municipalities of Kirkuk.

Fourthly- Internal roads in al-Abbasi district and Hawija district. The work includes paving vital internal roads linking city facilities from the inside with each other, including paving, sidewalks and lighting poles. This work is affiliated with the Kirkuk Municipalities Directorate. There were visits by the researcher to collect information and data for this research.

2. Personal interviews:

At this stage of the research, it was relied on open personal interviews with a select group of road works specialists from engineers and consultants, which are shown in the personal interviews form in the table (3:1) below, to deliberate, engage in dialogue and explore their views on the draft questionnaire form presented, which was presented to a group From academic arbitrators from university professors, as shown in the arbitrators' form in the table (3:2) below, for the purpose of determining the validity of the selected axes within the form and the accuracy of the statements, especially with regard to the various technical aspects, in order to draw a clear picture of the reality of the situation and the problems encountered in the quality control process, A lot of questions, which were initially prepared in the form of axes, were directed based on the theoretical study, and the questions contained in the open questionnaire were discussed. It is known that the method of personal interviews is considered a support and complement to the questionnaire and not a substitute for it. And if the success of the interview depends primarily on the researcher's skill in focusing on the main aspects that serve the objectives of the research, taking into account the psychological aspect and trying to create an atmosphere of trust that allows engineers to express their opinions openly and thus the possibility of reaching the best opportunity to find out all aspects of the research problem and its nature. (Al-Zwainy, 2013)

Table (3:1)Names of the personal interviews

T	The name	Certificate	Specialization	Years of Experience	Career Title	Workplace	phone number
1	Nazim Omar Hussein	Bachelor's	Civil Engineering	40	Senior Engineers	Kirkuk Municipalities Directorate	07701347803
2	Ghaith Farhan Ali	Bachelor's	Civil Engineering	22	Senior Engineers	Kirkuk Municipalities Directorate	07701354100
3	Fairouz Hassan Saber	Bachelor's	Civil Engineering	23	Senior Engineers	Kirkuk Municipalities Directorate	07702311305
4	Zainab Abdul Hussein	Bachelor's	Civil Engineering	23	Senior Engineers	Kirkuk Municipalities Directorate	07701341272
5	Hanadi Abdel Hakim	Higher Diploma	Construction Engineering	20	Senior Engineers	Kirkuk Municipalities Directorate	07701716247

6	Yilmaz Abdul Amir Jalal	Bachelor's	Building and construction engineering	19	Senior Engineers	Kirkuk Municipalities Directorate	07701257559
7	Mehtab Muhammed Hussien	Bachelor's	Civil Engineering	21	Senior Engineers	Kirkuk Municipalities Directorate	07701304376
8	Raad Hame d Majeed	Bachelor's	Civil Engineering	25	Senior Engineers	Kirkuk Municipalities Directorate	07707510566
9	Mahmoud Tawfik Ali	Bachelor's	Civil Engineering	30	Senior Engineers	Kirkuk Municipalities Directorate	07701301678
10	Ishwaq Ibrahim Seddik	Bachelor's	Civil Engineering	21	Senior Engineers	Kirkuk Municipalities Directorate	07702188863
11	Soraya Muhammed Ibrahim	Bachelor's	Civil Engineering	15	Senior Engineers	Kirkuk Municipalities Directorate	07701240486
12	Fereydoun Othman Muhammad	Bachelor's	Survey Engineering	17	Senior Engineers	Kirkuk Municipalities Directorate	07701234775
13	Sahar Fakhruddin Ahmed	Bachelor's	Survey Engineering	25	Senior Engineers	Kirkuk Municipalities Directorate	07705126495
14	Tara Bahaa El Din Ahmed	Bachelor's	Survey Engineering	24	Senior Engineers	Kirkuk Municipalities Directorate	07701304149
15	Mona Nassif Jassim	Bachelor's	Civil Engineering	23	Senior Engineers	Kirkuk Municipalities Directorate	07702370272

Table)3:2(of the names of the arbitrators

T	The name	Certificate	General specialty	Specialization	Workplace	phone number
1	Ahmed Abdullah Danuk	PhD	business management	strategy	Northern Technical University	07701003853
2	Hisham Abdullah Hamad	PhD	management and economy	business management	/ Kirkuk University Management and Economics	07801163173
3	Sahar Ismael Bakr	PhD	Civil Engineering	construction management	The Egyptian Arabic Republic	447725142476+

4	Myson Abdullah Mansour	PhD	Civil Engineering	construction management	Tikrit University/College of Engineering	07705137153
5	Adnan Jayed Zidane	PhD	Civil Engineering	Geotechnics	Tikrit University/College of Engineering	07702662994
6	Rawdan Saleh Abdullah	PhD	Civil Engineering	water resources	Northern Technical University	07817164691
7	Tahreer Ahmed Ibrahim	Msc	Civil Engineering	water resources	Northern Technical University	0781582842
8	Mohammed Mohsen Abdullah	PhD	Education	Planning	Samarra University College of Education	07815030375
9	Ammar Majeed Mutlaq	PhD	Education	Planning	,Samarra University College of Arts	07718030747

b. Nominal group technique or nominal group technique:

Definition of Nominal Group Technology: Nominal group technology is defined as a structured method of collective brainstorming that encourages participation from all, facilitates rapid agreement on the relative importance of problems, is used in problem solving, or is used to discuss solutions.

The nominal group technique is that team members start writing their ideas, then choose the idea that they feel is best, the proposals put forward are then discussed, and prioritized by the entire joint group, using only a points system that combines general ratings of the importance of individual group members, and a weighted order of priority for the proposals put forward (*Tague, 2005*).

And for project management professionals, the official localization of this technique is the “nominal collective method” as issued by the American Project Management Institute, and the nominal collective method is one of the tools and methods used in the process of assembling project requirements, among both personal skills and the skills of the work team as a whole (*PMBOK®, 2021*).

• Steps to apply the nominal group technique:

The nominal group technique consists of 7 basic steps; these steps are as follows:

1. Preparation: Before using the nominal group technique, it is necessary for the meeting person to complete a series of preparatory tasks, those tasks that pave the way for a successful meeting, such as preparing the questions that will be asked at the meeting, preparing the room that will host the meeting, as well as Provide the supplies that will be used inside the hall.
2. The stage of generating ideas: before starting, the leader, i.e. responsible for the meeting, must prepare and present the written and oral question, which will be presented to the group during its meeting. A well-thought-out question will help generate a huge wealth of ideas, and the meeting leader will encourage all participants to Writing ideas in complete silence, with the need to narrate brief phrases, so that everyone has the opportunity to express their ideas.
3. Recording ideas: In this step, the group leader will walk around the table within the meeting, and record one idea from each participant on a piece of paper. Ideas must be recorded literally or with a small paraphrase by the leader. The process continues until all ideas are recorded. If a meeting participant fails to share their idea, they pass the role.
4. Discussing ideas: In this step, each idea is taken and discussed separately, allowing to delve into one idea and focus on it while avoiding misunderstanding of that idea.
5. Vote on Ideas: During this stage the group participants will begin to narrow down the list of possible ideas, based on the discussion of the ideas that took place in the previous step, after which each member will make their own

independent judgment on those ideas, which are most likely to be a representation of the problem to be solved, or considered so Possible solution to address this problem.

6. Discuss what has been voted: This short step in the nominal group technique is designed to screen for items with inconsistent voting patterns, and to provide a full opportunity to discuss all the ideas considered as receiving too many or too few votes, it is worth noting that this step rarely changes the meeting dramatically in terms of enhancing how the idea is collectively perceived, and can lead to the activation of accuracy in the final voting process for ideas.
7. Final Voting Process: In this step individual judgments about ideas are combined to make a group decision. On the other hand, the leader may choose to follow the same voting technique used in the fifth step, but he may also choose to use a more precise voting technique such as making ratings (*Andre L Delbecq, 2015*).

3. Research sample:

The research sample in Iraq, specifically in the governorate of Kirkuk, consists of a group of road projects in the Directorate of Roads and Bridges of Kirkuk and the Directorate of Municipalities of Kirkuk, which is affiliated to the Ministry of Construction and Housing and the Iraqi Public Municipalities.

- a. **Kirkuk Roads and Bridges Directorate:** It is one of the formations of the General Authority for Roads and Bridges affiliated to the Ministry of Construction, Housing and Public Municipalities currently and undertakes the following tasks:

First: Supervising the design of public road projects of all kinds, including highways outside municipal boundaries, as well as bridges, intersections and tunnels.

Second: Supervising the implementation of the projects mentioned in paragraph "First" above and following up on the progress of work in them.

Third: Supervising the maintenance, furnishing and operation of the projects mentioned in the first paragraph above.

Fourth: Executing emergency maintenance (when needed) for roads and bridges.

Fifth: Owning land for the projects mentioned in the first paragraph above, while preserving its taboos and preventing abuse

This directorate has been called by several titles and dates back to its establishment in the 1940s. The table below shows the names and dates of its establishment (*Abdul Wahed, 2011*) .

- b. **Kirkuk Municipalities Directorate:** It is one of the formations of the Directorate of General Municipalities of the Ministry of Construction, Housing and Public Municipalities currently and undertakes the following tasks:

c.

First: Supervising the design of projects of city entrances and internal roads of all kinds located within the municipal boundaries, as well as gardens, parks, cafes, places of recreation and rest, and buildings affiliated with the municipalities such as their departments and some properties and real estate that can be used for the purpose of investment or rent according to the laws of the municipalities and which bring returns to them.

Second: Supervising the implementation of the projects mentioned in the first paragraph above and following up the progress of work in them.

Third: Supervising the maintenance, furnishing and operation of the projects mentioned in the first paragraph above.

Fourth: Executing emergency maintenance (when needed) for all projects in the first paragraph.

Fifth: Owning residential lands for citizens and services for projects while preserving their taboos and preventing abuse.

The date of the implementation of the municipal system in Iraq dates back to the days of the Ottomans, and its councils were established by the governor, Medhat Pasha (1285 - 1920), after standing on the necessity of these councils in cities, districts, and districts. Kirkuk was among these administrative formations. The council was formed in the winter of 1919 - 1920) and the implementation of the Municipalities Law of the Ottoman State until the issuance of Municipalities Law No. 84 of 1931 , which stipulated in its article (59) the abolition of the Ottoman States Municipalities Law issued in 1294 / 1877 with all laws, all regulations, instructions and data related to municipal affairs, and after the outbreak of the Fourth Revolution the tenth of July 1958 ,the Executive Authority Law No. 74 of 1959 was issued, which provided for the formation of Municipalities No. 45 of 1960 (*Abdul Wahed, 2011*).

4. Analysis data:

The researcher used Microsoft Excel 2016 program to analyze the data for the forms that were distributed to the private nominal group in the research sample. This program is considered one of the most widely used programs for analyzing statistical information in most studies, and it is widely used today by researchers in the field of civil engineering in general and in the field of project management in particular. After the researcher obtained the results of the questionnaire, the target sample was distributed according to the personal variables, and then the frequency and percentage of the variables were calculated and distributed to the groups specified in the questionnaire.

Table (3:4) The effect of the causes of deviations in quality control

Period center	Period	Answer category
10	0 -20>	Ineffective
30	20 -40>	little effect
50	40 -60>	average effect
70	60 -80>	Influential
90	80 -100>	very Influential

below, equation (1) has been applied to find the relative importance

$$\text{Relative importance} = \frac{\text{Sumation (number of class answers x class center)}}{\text{total number of answers}} \dots(1)$$

• **The first axis (information and personal data):**

It is noted from the table (3:5) below, the details and proportions of the personal information axis

1. With regard to gender, it was found that the vast majority are for females, where the percentage of females was (67%), while the percentage of males was (33%) at a rate of one third of the total number of the nominal group that was selected The educational qualifications of the sample members.

Table of personal information (3:5)

Variables	Categories	Repetition	Percentage
Gender	Male	5	%33
	Female	10	%67
Qualification	Diploma	0	%0
	Bachelor's	13	%87
	Higher Diploma	1	%6.5
	Master's	1	%6.5
	PhD	0	%0
Academic major	Civil Engineering	13	%87
	Mechanical Engineering	0	%0
	Electrical Engineering	0	%0
	Survey engineering	2	%13
Years of Experience	Less than 5 years	0	%0

	From 5-10 years	0	%0
	years 15-11	3	%20
	more than 15 years	12	%80
Rank in the Syndicate of Engineers	Assistant Engineer	1	%6.5
	Practicing Engineer	5	%33.5
	Certified Engineer	7	%46.5
	Consultant Engineer	2	%13
job position	Project Manager	4	%26.5
	Resident Engineer	8	%53.5
	Designer Engineer	0	%0
	Guest Engineer	0	%0
	Planning Engineer	3	%20
	Survey Engineer	0	%0
	Occupational safety Engineer	0	%0
	Consultant Engineer	0	%0

- As it was noted that the highest percentage was for holders of a bachelor's degree, as this percentage was (87%), which is the largest percentage of the sample, followed by those with a higher diploma degree with a percentage of (6.5%), and those with a master's degree by (6.5%). Regarding the rest of the academic qualifications, such as diploma and doctorate, they did not have a share among the sample members, as shown in Figure (3:9). This discrepancy in the academic degrees of the research sample can be explained by the desire of many to join the labor market immediately after graduation in order to gain practical experience, while those who obtained Master's degrees and higher diplomas increase the degree of their educational attainment, with the conviction that more learning gives them more job opportunities and success.
- As for the academic specialization, the largest percentage was for the civil engineering specialization, where the percentage for the nominal group sample was (87%), while the survey engineering percentage was (13%), and the rest of the disciplines did not have a share of this group because the research sample was From the specialty of civil engineering and the rest of its branches.
- As for the years of experience, there was no share for the years (less than five years, as well as from 5-10 years), because the Ministry of Construction and Housing and Public Municipalities is one of the ministries in which the appointment is very few, and also because the country has experienced a deterioration in the situation in the past ten years Financial, security and political affairs, which negatively affected the state budget, and the percentage of years of experience was between (11-15) years, that is (20%), and the largest percentage of employees who had experience of more than 15 years where their percentage was about (80%).
- As for the rank of engineers in the Syndicate of Engineers who were within the nominal group, it was for the rank of assistant engineer (6.5%), for a practicing engineer (33.5%), and for a licensed engineer, the largest percentage was (46.5%), as for the consultant rank, their percentage was (13%).

- As for the job position for them, the largest percentage was held by the resident engineer, although their percentage was (53.5%), then the project manager was (26.5%), and finally the planning and follow-up engineer where the percentage was (20%), while the rest of the job positions were not It has a share within the chosen nominal group.

The second axis: the reality of the state of quality control of road projects in Kirkuk Governorate in the Republic of Iraq

This axis aims to study the reality of the state of quality control of road projects, by asking a set of questions to the members of the nominal group selected for the purpose of knowing this questionnaire.

- Where the first question was in the table (3:6) below

Table(3:6)Percentage of having a quality control division

Is there a department or division for quality control in your organization?	Yes	No
	0%	100%

Where the results appeared from the nominal group with a percentage of (100%) No, and a percentage of (0%) Yes, both of which indicate that government institutions no to install the quality.

- As for the answers to the second question shown below in Table (3:7)

Table(3:7) is the percentage of the institution obtaining the ISO certificate

Has your organization obtained the ISO certificate?	Yes	No
	%0	%100

The answers of the nominal group appeared with a percentage of (100%) No, and nothing. This indicates that their institutions have not obtained the ISO certificate yet, and that these institutions need a comprehensive understanding of the concept of quality and the usefulness of its application, and the sobriety of this certificate indicates the sobriety of this institution.

- As for the answers to the third question shown below in Table (3:8)

Table (3:8) ofthe responses of the nominal group members about the importance of management fields

In your opinion, what is the most important field of project management in your organization?						
Administration fields	priority level					Impact degree
	It doesn't matter	Slightly important	moderately important	very important	Very very important	
Integration Management	13%	0%	40%	27%	20%	average effect
Scope management	7%	33%	33%	7%	20%	average effect
Time management	0%	0%	33%	27%	40%	very effect
Cost management	0%	0%	13%	53%	33%	very very effect
Quality management	0%	13%	20%	13%	53%	very effect
Human Resource Management	0%	0%	50%	29%	21%	average effect
Communication management	13%	27%	27%	33%	0%	very very effect

Risk management .	7%	7%	40%	33%	13%	average effect
Purchasing management .	7%	53%	13%	13%	13%	little effect
Stakeholder Management .	7%	0%	40%	47%	7%	very very effect

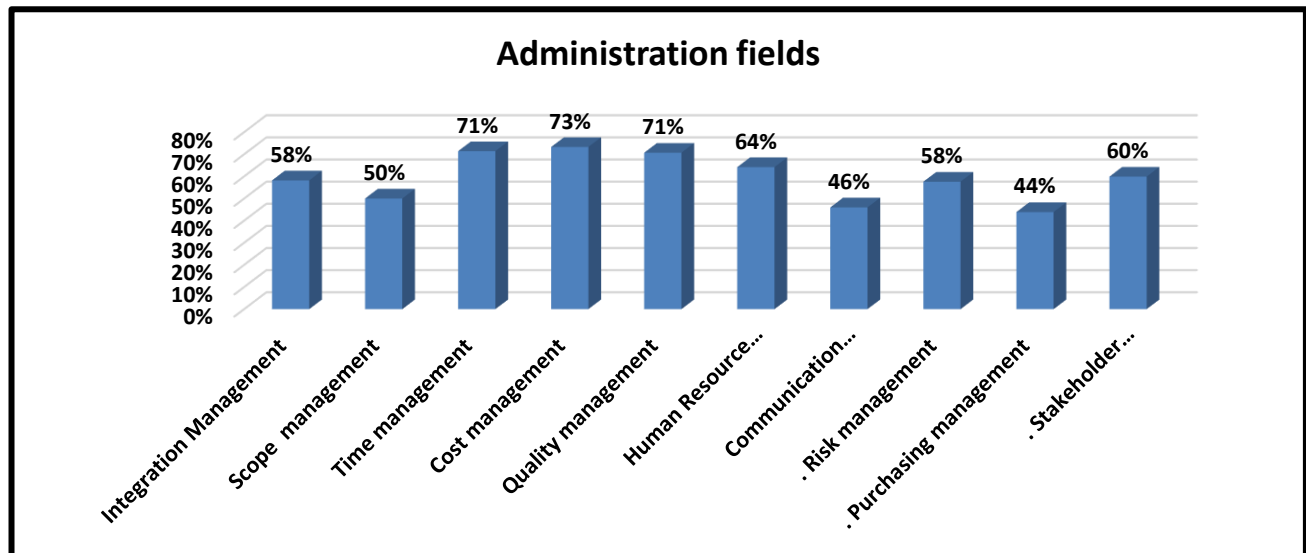


Figure (3:8) management fields

The responses of the nominal group appeared that (integration management, scope management, human resource management, risk management) have a medium impact on the importance of project management according to the understanding of this group. The chosen ones in the questionnaire for this axis, as for (time management and quality management), they are very influential in project management. As for procurement management, it appeared that it has little influence in project management, according to the answers of this group, and that this evaluation is from the point of view and understanding of this group of management fields, some of them may not have knowledge in some fields of management because most government institutions do not apply project management standards in the implementation of their projects, but rely only on three in the scale of implementation of their projects in the first place, which is (quality and time and cost).

4. As for the answer to the fourth question, which is shown in the table (3:9) below

Table(3:9)of the responses of the nominal group members to the means of measuring quality control

How important is each of the methods used below to measure the quality control of road projects in your organization ?						
the means	priority level					Impact degree
	It doesn't matter	Slightly important	moderately important	very important	Very very important	
Unannounced field visits to inspection and follow-up teams	0%	20%	13%	53%	13%	big effect

laboratory tests	0%	0%	7%	40%	53%	Very very effect
direct supervision	0%	0%	0%	7%	93%	Very very effect

The responses of the nominal group showed that direct supervision reaped the highest percentage in terms of impact, which indicates the understanding of the nominal group that the direct friction of the project is on direct supervision, which is present throughout the project implementation period so that the implementation of a paragraph does not pass in a bad or poor way and so that it does not hide from his eyes But this is no less than the importance of laboratory tests and sudden field visits to the inspection and follow-up teams, and it is considered complementary to the importance of direct supervision.

5. As for the answer to the fifth question, which is shown in the table (3:10) below

Table (3:10): Methods for measuring user satisfaction

How is user satisfaction measured for road projects in(your organization)?			
%93	Through complaints and suggestions	%7	Not measured
0	...Others remember	0	make a survey

The responses of the nominal group showed that their dependence in measuring users' satisfaction through complaints and suggestions and that they do not have any fixed plan or calculation process to measure users' satisfaction. Research if the project serves people who know their rights. There may be knowledge of whether the project is of good quality. If the people who The project serves them. They do not have any knowledge about the quality of project implementation. Its implementation may pass in a poor manner. It is assumed that they have mathematical means such as statistical methods for the purpose of evaluation during and after the implementation of the project.

6. As for the answer to the sixth question, which is shown in the table (3:11) below

Table (3:11) Extent of the existence of the official guide to international standards

Does your organization(s) have an official guide to international standards for quality control?			
100%	No	0%	Yes
0%	Work is in progress to implement these standards		

The responses of the nominal group showed that the institutions in which these employees work do not have an official guide to international standards, but rather the presence of local instructions regarding the quality of projects.

7. As for the answer to the seventh question, which is shown in the table (3:12) below

Table (3:12) matching the design plans of the executed works

?How are the design plans matched with the executed works			
%100	during implementation	%0	It is not matched by
%0	Checking designs after implementation		

The responses of the nominal group appeared that matching the design schemes of the project is during implementation in order to avoid any omission or defect in non-application, but if it is after implementation, it may negatively affect the project because the paragraph has been implemented and therefore it is correct to match during implementation.

8. As for the answer to the eighth question, which is shown in the table (3:13) below

Table (3:13) matching the design plans of the executed works

How do you train employees and workers regarding quality in your organization (institution)?			
47%	Organizing professional workshops and seminars	33%	No training
7%	On the job training	13%	Training in specialized international institutions
0%	Others remember....		

The responses of the nominal group showed that the highest percentage in the training of employees and workers through the establishment of workshops and professional seminars (47%), as well as the percentage of non-training appeared in the second place, where the rate was (33%), as for training in specialized international institutions, as well as training in the workplace The response rate to it was low, so it was supposed to get higher rates because the training is in specialized international institutions, as well as in the workplace, for ease of understanding. This is due to the fact that the government does not allocate funds for training for these international institutions, but rather they rely on local workshops and seminars and most departments do not It has training.

9. As for the answer to the ninth question, which is shown in the table (3:14) below

Table (3:14) matching the design plans of the executed works

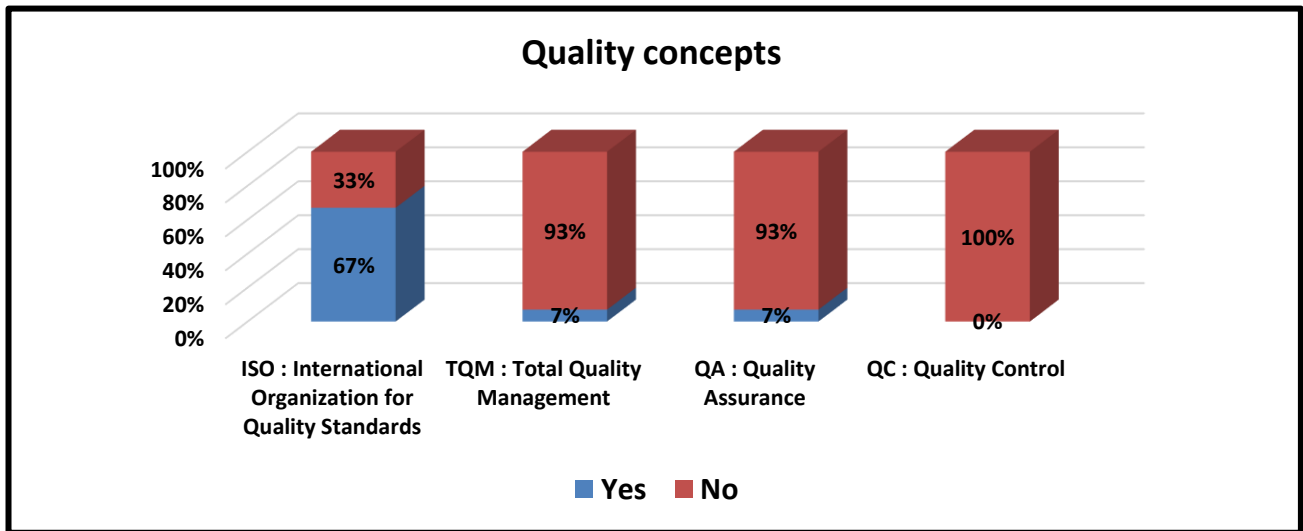
From your point of view, who is the most committed party to achieving quality control in road projects in Kirkuk Governorate?			
%33	Engineering offices	%33	Governmental institutions
%13	contracting companies	%13	donor institutions
%13	Others remember..... there is no quality control app		

The responses of the nominal group appeared that government institutions and engineering offices are the most committed to the application of quality control, as the percentage of answers for each one was 33%, while the least commitment was the contracting companies.

10. As for the answer to the tenth question, which is shown in the table (3:15) below.

Table (3:15) Quality Concepts

Have you seen the concepts of quality below?					
Quality concept	Yes	No	Quality concept	Yes	No
ISO International Organization for : Quality Standards	%67	%33	QA Quality Assurance :	%7	%93
TQM Total Quality Management :	%7	%93	QC Quality Control :	%0	%100



Figure(3:9)Quality Concepts

The responses of the nominal group appeared that the majority of them were not familiar with these concepts, only some of them had an idea about the ISO. The percentage of their answers about it was (67%) yes, and (33%) no, and this indicates that they did not look into these concepts and the main reason is the lack of Official guide to international quality standards in these institutions.

As for the answer to the eleventh question, which is shown in the table (3:16) below

Table (3:16) Quality Concepts

Does your organization (your organization) use statistical methods in analyzing examination and test results to discover deviations?			
Yes	%27	No	%73

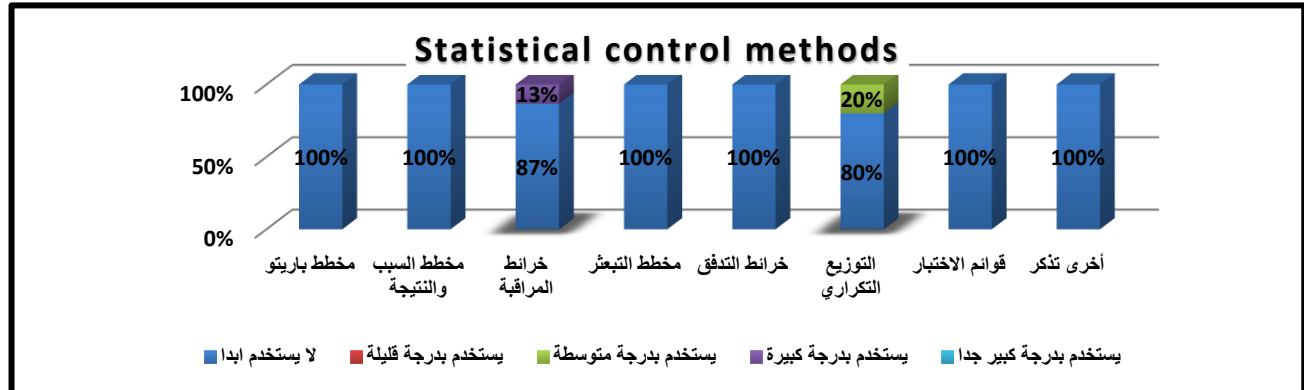
The answers of the nominal group appeared that the majority of the percentage was (73%) no, and this indicates that most projects are not used in analyzing the deviations of the projects, but they are analyzed in traditional or random ways, and this is one of the main reasons for the short life of the projects because the analysis of deviations may be in an inaccurate way.

As for the answer to the twelfth question, which is shown in the table (3:17) below

Table (3:17) is the percentage of using statistical control methods in investigating the causes of deviations

Does your organization (your organization) use the statistical quality control methods mentioned below in investigating the causes of deviations?						
Statistical quality control methods	degree of use					Impact degree
	never used	Slightly used	It is used moderately	Very much used	It is very much used	
Pareto chart	100%	0%	0%	0%	0%	Ineffective
Cause and Effect	100%	0%	0%	0%	0%	Ineffective
Control chart	87%	0%	0%	13%	0%	little effect
Scatter diagram	100%	0%	0%	0%	0%	Ineffective
Flow chart	100%	0%	0%	0%	0%	Ineffective
Histogram	80%	0%	20%	0%	0%	little effect

Test cheek	100%	0%	0%	0%	0%	Ineffective
Others remember	100%	0%	0%	0%	0%	Ineffective



Figure(3:10)The percentage of using statistical methods to investigate the causes of project deviations

The answers of the nominal group appeared that most of them do not have knowledge of these statistical methods, as the results appeared mostly that they do not use them to investigate the causes of deviations. Because most of the analytical programs that can know the level of quality of these projects are illogical or tend not to represent the real quality of the project, and therefore the economic life of the project is very short.

Third axis: The reasons for the deviation in controlling the quality of road works in Kirkuk Governorate in the Republic of Iraq

1. As for the answer to the question shown in the table (3:18) below, equation (1) has been applied to find the relative importance

Table(3:18)of the causes of deviations in quality control Effect

What is the impact of the reasons for the deviations listed below on the quality control of road projects?							
Reasons for deviations in quality control	Impact degree						Importance
	Not effect	Slightly effect	Moderately effect	Highly effect	Very highly effect	Relative importance	
Reasons related to construction materials							
Diversity of equipment sources	4	1	4	4	2	48.6%	Average
Gradient mixed gravel for the layers under the paving	0	1	0	7	7	76.6%	Important
Humidity rate	1	0	2	6	6	71.3%	Important
Deviation in the density of liquefied bitumen from the technical specification	0	0	0	4	11	84.6%	very important
Reasons related to construction equipment							

Old and worn out equipment and machinery	0	0	6	3	6	70%	Important
Absence of modern technology, equipment and machinery	0	3	3	6	3	62%	Important
Absence of specialized equipment and machinery	0	0	4	7	4	70%	Important
Reasons related to the management of the enterprise							
Double the financial allocations	0	0	2	5	8	78%	Important
lack of incentives	0	0	3	6	6	74%	Important
Lack of follow-up and oversight	0	0		6	9	82%	very important
Lack of specialized cadres	0	0	3	9	3	70%	important
Financial and administrative corruption	0	0	0	2	13	87.3%	very important
Labor related causes							
Storage and handling conditions for construction materials	0	1	6	5	3	63.3%	important
Site conditions	0	0	5	7	3	67.3%	important
Inefficiency of the examiner in taking samples	0	0	2	9	4	72.6%	important
Negligence in the application of technical specifications by the evaluator	0	0	0	5	10	83.3%	very important
lack of training	2	0	1	10	2	63.3%	important
Reasons related to the way it works							
Deviation of the mixing ratio from the technical specification equation	0	0	1	3	11	83.3%	very important
Inconsistency in the thickness of the asphalt layer	0	0	0	8	7	79.3%	important
Non-compliance with the limit ratio from the technical specification	0	0	0	4	11	84.6%	very important

Construction material conveying distance	0	0	1	9	5	75.3%	important
Asphalt mixing temperature	0	0	1	4	10	82%	very important
Type of binder between the asphalt layer and the mixed gravel	0	0	2	5	8	78%	important

The relative importance of the diversity of supply sources= $\frac{4*10 + 1*30 + 4*50 + 4*70 + 2*90}{15} = 48.6\%$

The responses of the nominal group showed that most of the causes of deviations are important in controlling the quality of projects, where the percentage of their importance ranges from very important to important, except for the reason (diversity of supply sources), which was of average importance. As for the most important reason that got the highest percentage, it was (financial and administrative corruption). Where he got a rate of 87.3%, and the researcher believes that the answer of most of this group is due to the failure to deter violators, as well as to the spread of financial and administrative corruption in most joints of the state.

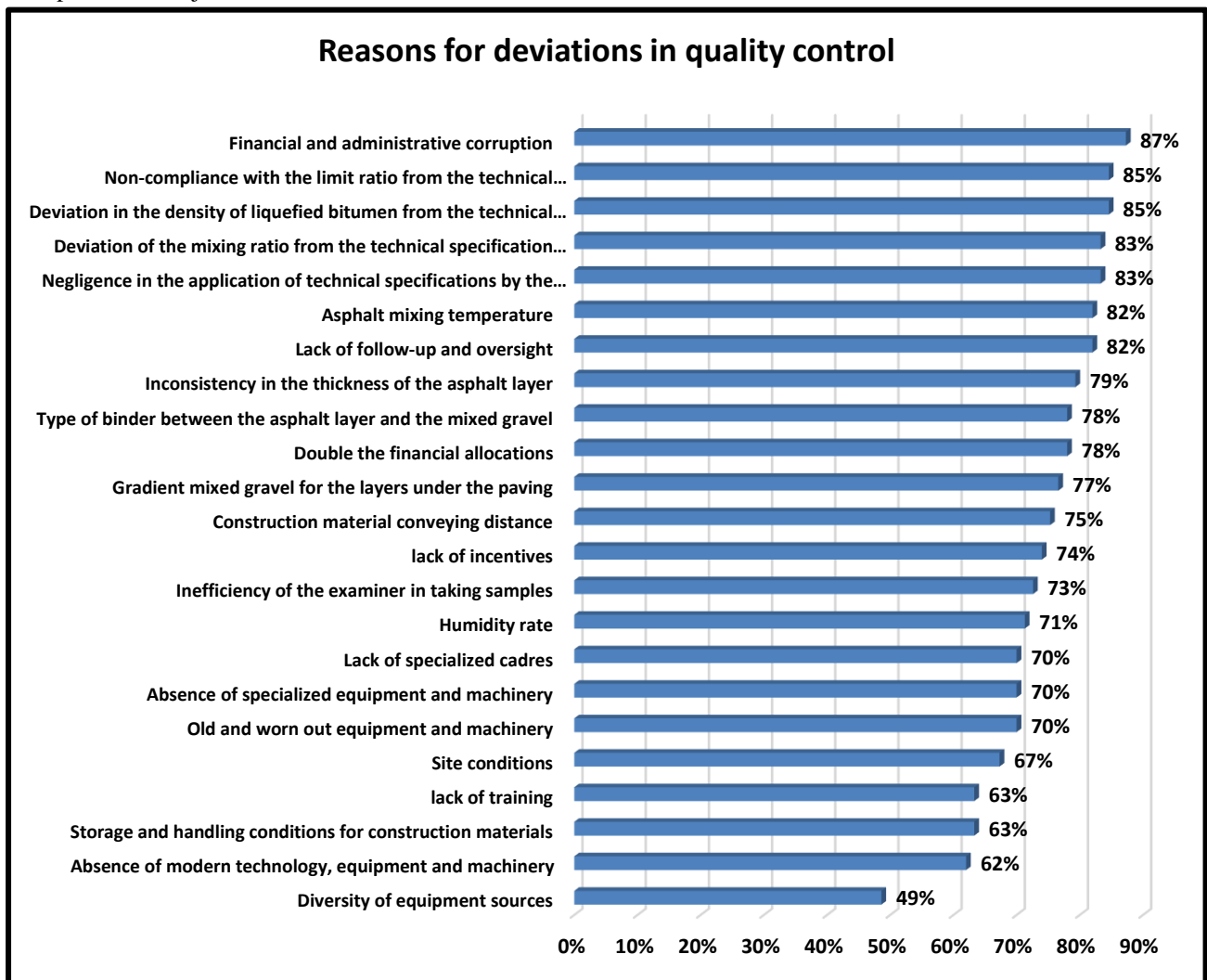


Figure (3:11) Percentages of the Reasons for deviations in quality control

Fishbone technique:

In order to diagnose the causes of deviations affecting the quality of road projects in Kirkuk governorate, the fish bone tool was used, as an appropriate tool for analyzing this problem in road projects, and the first goal of using this technique is to list all the causes of deviations that affect the quality of those projects Within one scheme that represents the relationship between (manpower in road projects - construction materials - construction machinery and equipment - method of work - management of the institution) and with the participation of all members of the research sample through the use of the nominal group method and through field coexistence that lasted more than (3) months in These projects as well as through questions, inquiries and discussions of the researcher with the project managers, engineers, technicians, workers and administrators in the projects. The main reasons for the deviations in the quality of road projects were represented by five main causes, and they branch out from each of them into sub-causes, as shown in Figure (3:12) below

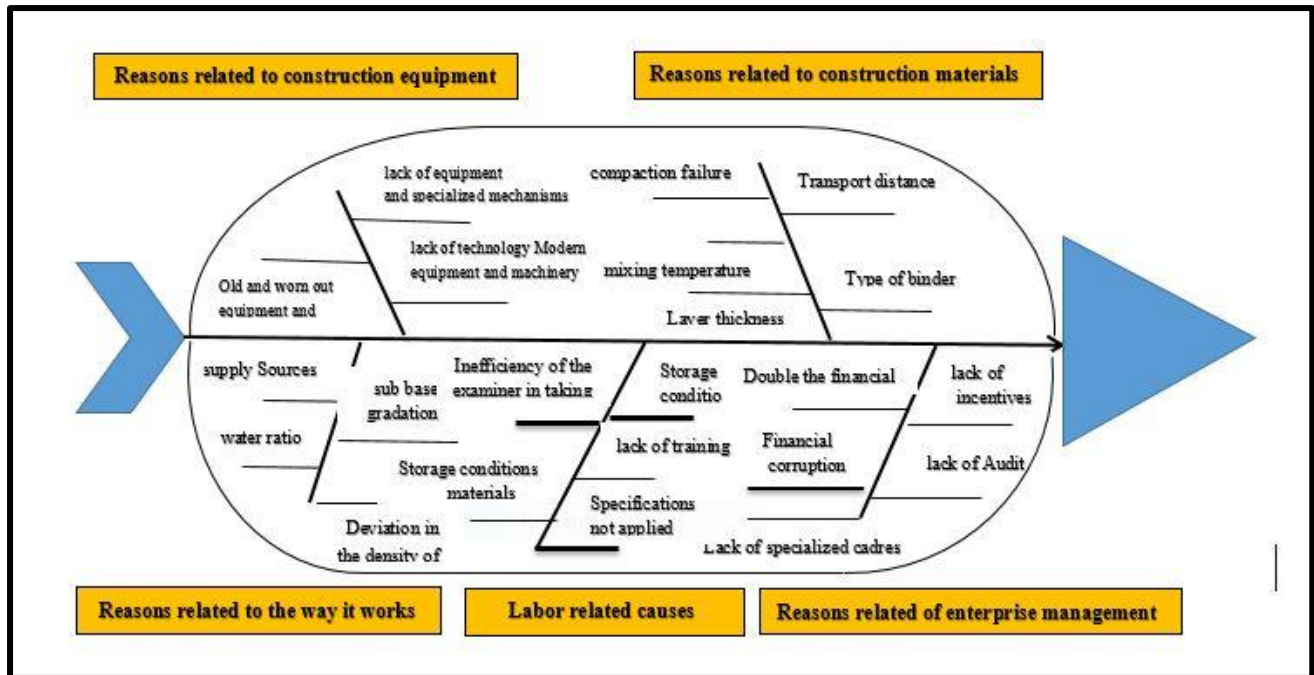


Figure (3:12) Fishbone diagram to investigate the causes of deviations affecting the quality of projects

Fourth Axis: Benefits and Obstacles Quality Control of Road Works in Kirkuk Governorate in the Republic of Iraq

As for the answer to the question shown in the table (3:18) below, equation (1) was applied to find the relative importance

Table (3:18) of the benefits of applying quality management in road projects

The most important benefits of applying quality management in road projects in Kirkuk Governorate in the Republic of Iraq, in your opinion, what is the extent of the impact of each of the benefits below?								
the benefits	priority level						Relative importance	Important
	No importance	So little important	Moderately important	Greatly important	Very much important			
locating Accurately fail	1	0	0	10	4	%71.3	Important	
reduction project costs	0	0	5	3	7	%72.7	Important	
Obtaining user satisfaction	0	1	2	4	8	%75.3	Important	

Ensure that technical specifications are applied	0	0	0	8	7	%79.3	Important
Securing traffic safety requirements for road users	0	0	3	9	3	%70.0	Important
Improving the reputation of the company or organization	0	0	7	3	5	%67.3	Important
Diagnosing efficient and loyal employees at work	0	0	0	8	7	%79.3	Important
Optimum use of available ,resources including time	0	0	0	5	10	%83.3	Very Important
Ease of adding new activities to the organization and planning for the future correctly	0	0	3	7	5	%72.7	Important
Ease of making appropriate decisions for the purpose of improving performance	0	0	5	4	6	%71.3	Important

The nominal group’s answers showed that all the benefits in the above table were the degree of importance to them (important) except for (the optimal use of available resources, including time), the degree of its importance (very important) and the percentage of the group’s answers was 83.3%.

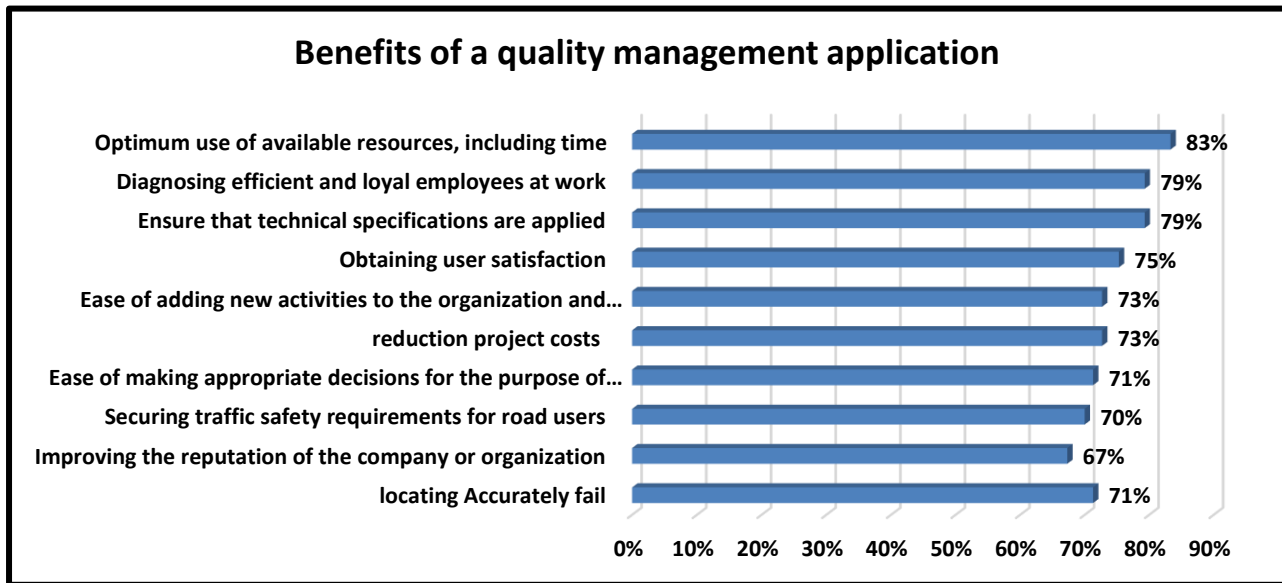


Figure (3:13) Benefits of applying quality management in road projects

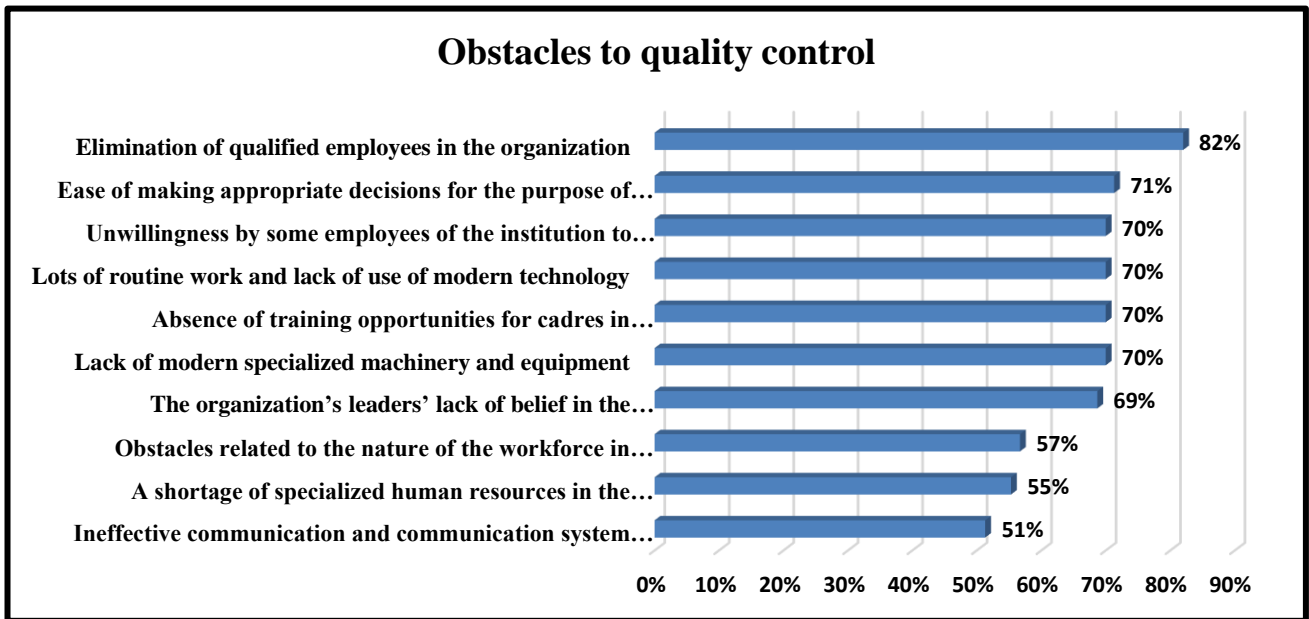
As for the answer to the question shown in the table (3:19) below, equation (1) was applied to find the relative importance

Table (3:19) Obstacles to quality control in road projects

The most important obstacles to quality control in the headquarters of the institution, in your opinion, what is the extent of the impact of each of these obstacles on the work of quality control for road works?							
Obstacles	priority level					Relative importance	Importance
	It doesn't matter	Slightly important	moderately important	very important	Very important		
A shortage of specialized human resources in the organization	1	4	2	6	2	55.3%	medium importance
Lack of modern specialized machinery and equipment	0	1	4	4	6	70.0%	Important
Elimination of qualified employees in the organization	0	0	2	2	11	82.0%	very important
Absence of training opportunities for cadres in specialized quality institutions	0	0	4	7	4	70.0%	Important

Obstacles related to the nature of the workforce in dealing with developments	2	0	7	3	3	56.7%	medium importance
Ineffective communication and communication system between the various departments of the institution	2	3	4	4	2	51.3%	medium importance
Lots of routine work and lack of use of modern technology	0	1	4	4	6	70.0%	Important
The organization's leaders' lack of belief in the principles of total quality management	0	2	2	6	5	68.7%	Important
Unwillingness by some employees of the institution to carry out quality control work	0	0	4	7	4	70.0%	Important
Ease of making appropriate decisions for the purpose of improving performance	1	4	2	6	2	71.3%	Important

The responses of the nominal group showed that all the obstacles in the above table were the degree of importance ranging from very important, important and medium importance, where the obstacle (exclusion of competent employees in the organization) got the highest response rate by (82%), while the obstacle was (ineffective communication and communication system). Among the various departments of the institution) the lowest answer rate is (51.3%), and the researcher believes that the exclusion of qualified employees is the biggest dilemma facing public sector employees, due to the presence of quotas and nepotism and the lack of desire for the employee who masters his work because it causes an obstacle to the rest of the incompetent employees.



Figure(3:13)Obstacles to quality control in road projects

The fifth axis: Critical success factors in the application of quality management for road projects in Kirkuk Governorate

As for the answer to the question shown in the table (3:20) below, equation (1) has been applied to find the relative importance

Table (3:20) of the critical success factors in the application of quality management in road projects

success factors	priority level					Relative importance	Importance
	It doesn't matter	Slightly important	moderately important	very important	Very important		
First: Factors related to senior management and its commitment							
Establish a clear definition of quality in the company's mission	3	0	3	3	6	62%	Importance
Senior management linking quality to cost and schedule	0	0	5	6	4	69%	Importance
Reviewing quality matters in senior management meetings	0	4	3	5	3	59%	medium importance
owner in making the necessary decisions	0	0	0	8	7	79%	Importance
The bid awarding . policies shall be	0	0	1	3	11	83%	Very Importance

based on efficiency and the most accurate prices							
Develop and implement plans based on the company's capabilities and readiness	0	0	1	8	6	77%	Importance
Second: Factors related to human resource management (staff and workers)							
The level of income and wages of the staff, including employees and workers	0	0	4	4	7	74%	Importance
Use the incentive system for employees	0	0	0	7	8	81%	Very Importance
Training courses for staff in skills needed by the project	0	0	4	5	6	73%	Importance
The skill and experience of the ,supervisory staff and its authority over the contractor	0	0	0	3	12	86%	Very Importance
The skill and experience of the contractor's crew and the use of experienced workers	0	0	0	7	8	81%	Very Importance
The skill and . experience of the design staff	0	0	2	7	6	75%	Importance
Effective . cooperation and coordination among all participants	0	0	1	10	4	74%	Importance
There are no previous disputes between the supervisory authority and the implementing authority	2	0	4	3	6	65%	Importance
Third: Owner-related factors							

Considering the owner's needs as the basis of the quality process	0	2	9	2	2	55%	medium importance
Nature of the owner: public or private institution	2	1	1	10	1	59%	medium importance
not It will effectively respond to the owner's inquiries and complaints	0	0	11	4		55%	medium importance
Take preventive and corrective measures that suit and satisfy the owner	0	0	7	6	2	63%	Importance
Proper use and operation of the facilities by the owner	0	0	4	6	5	71%	Importance
Budget and price set by the owner	0	4	2	7	2	59%	medium importance
Fourth: Factors related to workflow management and implementation method							
Testing and checking the conformity of project materials and works to specifications	0	0	0	2	13	87%	Very Importance
Preparation and use of working drawings	0	0	0	3	12	86%	Very Importance
continuous supervision system	0	0	0	5	10	83%	Very Importance
Clarity of work and method of work for workers and project staff	0	0	2	9	4	73%	Importance
Inspection of activities and events that directly affect quality	0	0	6	6	3	66%	Importance
receiving workers	0	0	4	5	6	73%	Importance
Fifth: Factors related to supplier management							

Suppliers are selected on the basis of their competence and commitment to quality	0	0	1	11	3	73%	Importance
Provide clear specifications to suppliers	0	0	1	10	4	74%	Importance
Provide technical assistance from suppliers	0	0	7	5	3	65%	Importance
ensure the quality of materials	0	0	0	11	4	75%	Importance
Timely securing project materials	0	0	4	4	7	74%	Importance
Sixth: Factors related to the analysis and evaluation of information							
Reviewing and checking plans and specifications before bidding	0	0	0	5	10	83%	Very Importance
Documenting for procedures disposing of non conforming materials	0	0	0	6	9	82%	Very Importance
Documentation of corrective and preventive actions	0	0	3	9	3	70%	Importance
Documentation of all documents related to the project	0	0	4	6	5	71%	Importance
Continuity of auditing to ensure the provision of high quality work	0	0	3	4	8	77%	Importance
Seventh: Factors related to the bidding documents (contracts and design plans)							
There is no conflict between the bidding documents	1	0	4	6	4	66%	Importance
Clarity and fairness of contract terms with a distribution of responsibilities	0	0	0	11	4	75%	Importance
The accuracy of the bill of quantities and	0	0	0	2	13	87%	Very Importance

containing all the details							
,Comprehensiveness coherence and clarity of design schemes	0	0	1	3	11	83%	
The use of modern technologies in the design and its compatibility with the code	0	0	5	6	4	69%	Importance
The presence of a . competent authority to audit the design schemes	0	0	1	7	7	78%	Importance
Eighth: Factors related to materials and equipment							
Using an on-site material storage and shipping system	0	0	4	9	2	67%	Importance
The role of the Iraqi Standards and Metrology Institution	0	0	2	9	4	73%	Importance
Efficiency of sample testing and accreditation laboratories	0	0	1	4	9	76%	Importance
Optimum use of materials to reduce waste	0	0	5	5	5	70%	Importance
Good use of equipment and regular maintenance	0	0	5	5	5	70%	Importance
Ninth: Factors related to financial matters							
The amount of financial flow to the contractor	0	0	0	5	10	83%	Very Importance
Regular and prompt disbursement of interim payments due to the contractor	0	1	1	9	4	71%	Importance
Contractor obtaining bank facilities	0	0	7	6	2	63%	Importance

Monitor the appropriate budget for project implementation before bidding	0	0	2	7	5	69%	Importance
The contractor obtains the advance payment to facilitate his affairs	1	1	5	5	3	61%	Importance
Tenth: Factors related to the general location of the project							
The general site is spacious and is characterized by easy movement of workers and equipment	0	0	3	8	4	71%	Importance
The general site is well organized by the contractor after receipt	0	0	7	3	5	67%	Importance
The general location is characterized by the presence of places to store materials	0	0	5	6	4	69%	Importance
Clean the general site and remove project waste in an organized way	0	0	4	4	7	74%	Importance
Fulfillment of general safety requirements in the public site	0	0	3	9	3	70%	Importance
Eleventh: Factors related to the systems used							
Use of computer programs and applications	2	0	3	7	3	62%	Importance
Apply and use . schedules	0	0	6	6	3	66%	Importance
Use of cost control system	0	0	5	7	2	61%	Importance
Implementation of the prevention and safety program	0	0	4	9	2	67%	Importance

Use comprehensive resource management system	0	2	6	6	1	58%	medium importance
Twelfth: Factors related to the surrounding environment							
Socio-economic environment	2	3	2	5	3	55%	medium importance
The stability of the political situation	2	0	1	7	5	67%	Importance
Barriers and road closures and their impact on the cost of transporting materials	0	0	2	9	4	73%	Importance
International import restrictions	2	0	4	6	3	61%	Importance
The cooperation of the residents adjacent to the project in the implementation of the workers	1	0	1	10	3	69%	Importance
Thirteenth: Factors related to continuous improvement							
Finding the root causes in diagnosing problems and defects	0	0	0	6	9	82%	Very Importance
Define, implement and monitor quality improvement standards	0	0	2	4	9	79%	Importance
,Teamwork, waste rejected materials and workers	0	0	3	7	5	73%	Importance
First: Factors related to senior management and its commitment	0	0	1	13	1	70%	Importance
Establish a clear definition of quality in the company's mission	0	2	5	5	3	62%	Importance
Senior management linking quality to cost and schedule	2		1	8	4	66%	Importance

The answers of the nominal group to all the critical success factors points appeared, as all the thirteen points in the above table were divided into secondary points, and each of them has been clarified in a form and will be explained successively.

1. With regard to the factors related to senior management and its obligations shown in the figure (3:14) below, the degree of importance ranges from medium to very important, where the highest degree of importance (the policies of awarding the bid to be efficient and the most accurate prices) was obtained by 83%, while (Reviewing issues related to quality in senior management meetings) at a rate of (59%).

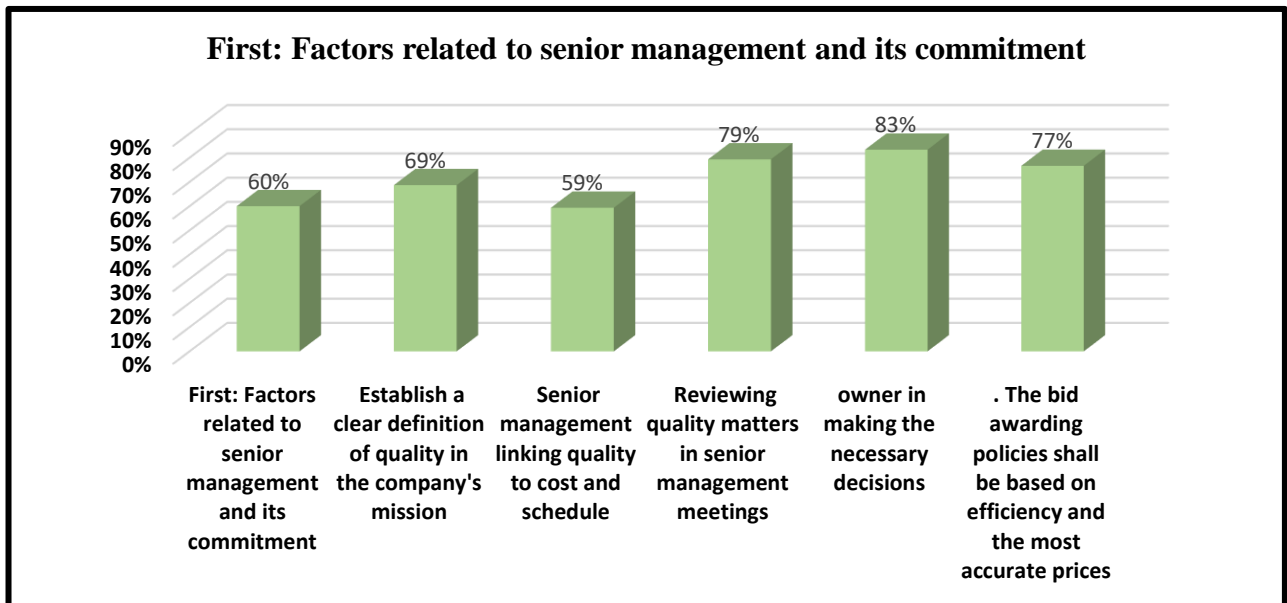
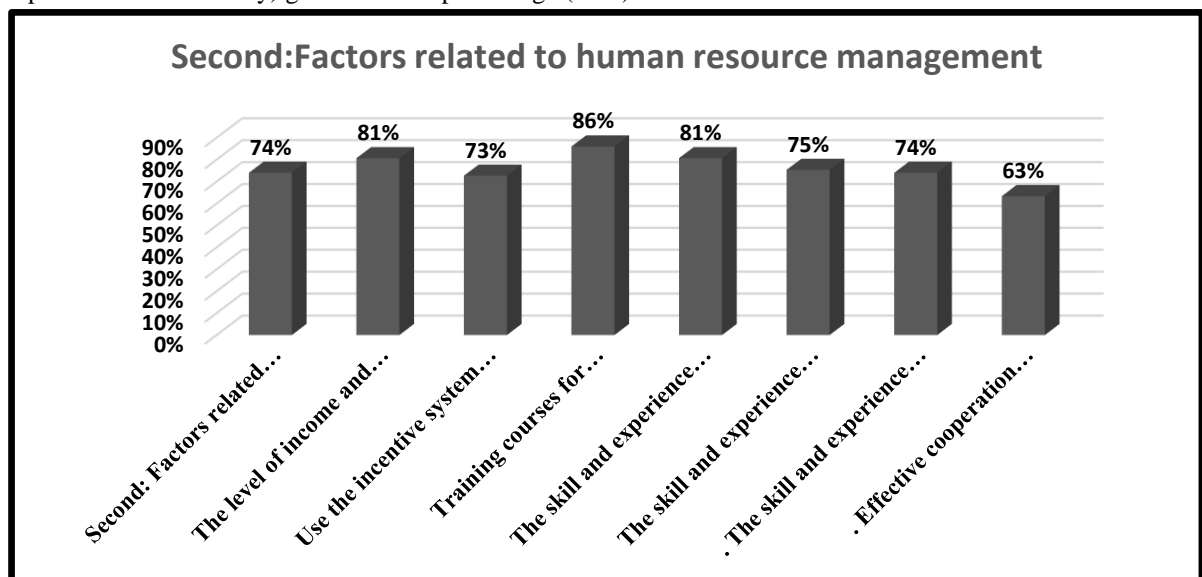


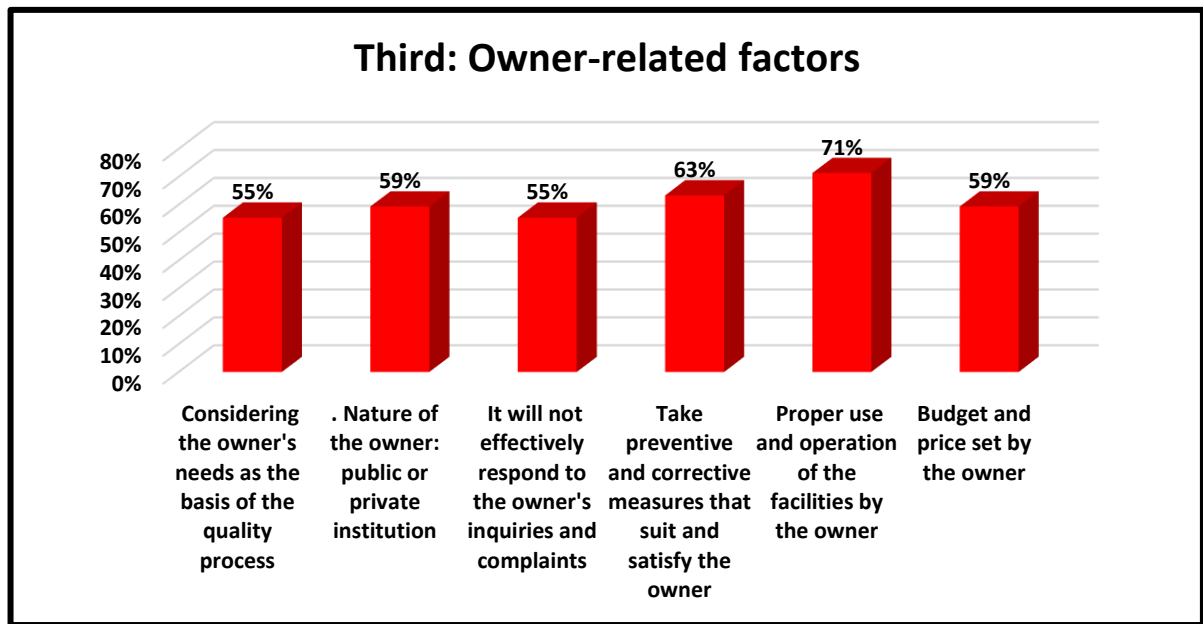
Figure (3:14) Factors related to senior management and its obligations

2. With regard to the factors related to the management of human resources (staff and workers) shown in Figure (3:15) below, where the degree of importance of the results of the answers appeared from important to very important, as (the skill and experience of the supervisory staff, and its authority over the contractor) got the highest A percentage of (86%), while (there were no previous disputes between the supervisory authority and the implementation authority) got the lowest percentage (65%).



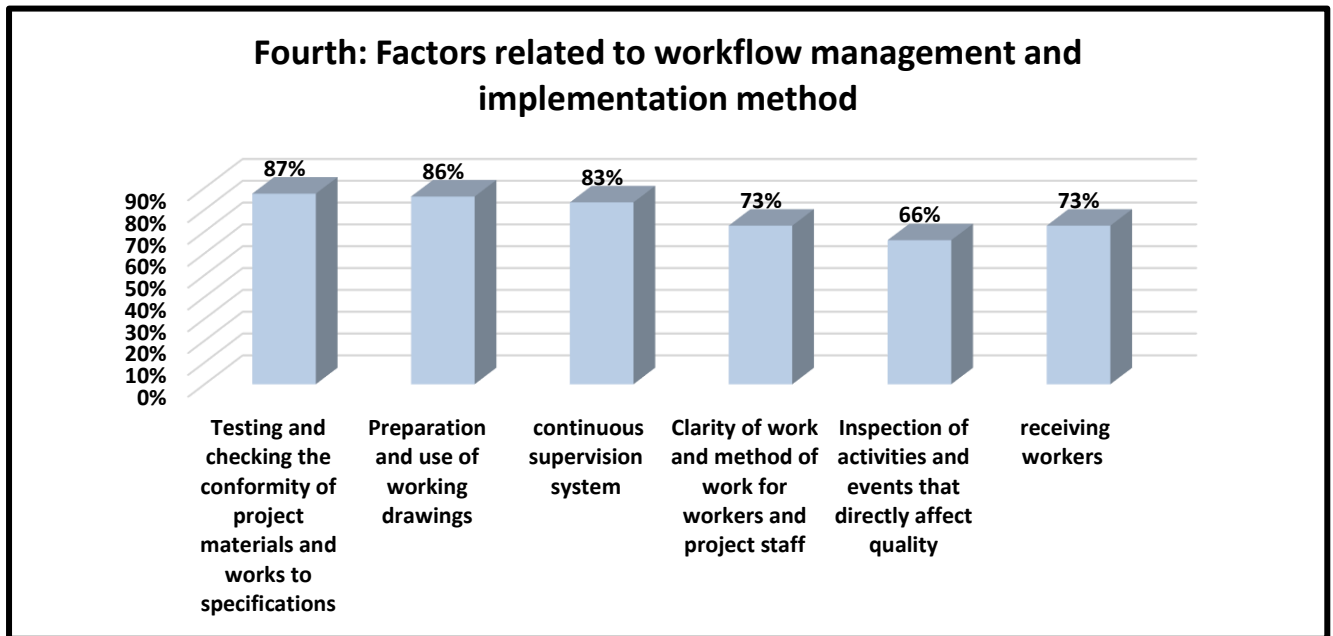
Figure(3:15)Factors related to human resource management (staff and workers) (

3. With regard to the factors related to the owner shown in Figure (3:16) below, where the degree of importance of these factors appeared between average and important, as the highest percentage of these factors (the owner’s use and operation of the facilities correctly) occurred at a rate of (71%), While the least important percentage of the two factors (considering the owner's needs as the basis of the quality process) (responding effectively to the owner's inquiries and complaints) was for each of them at a rate of (55%).



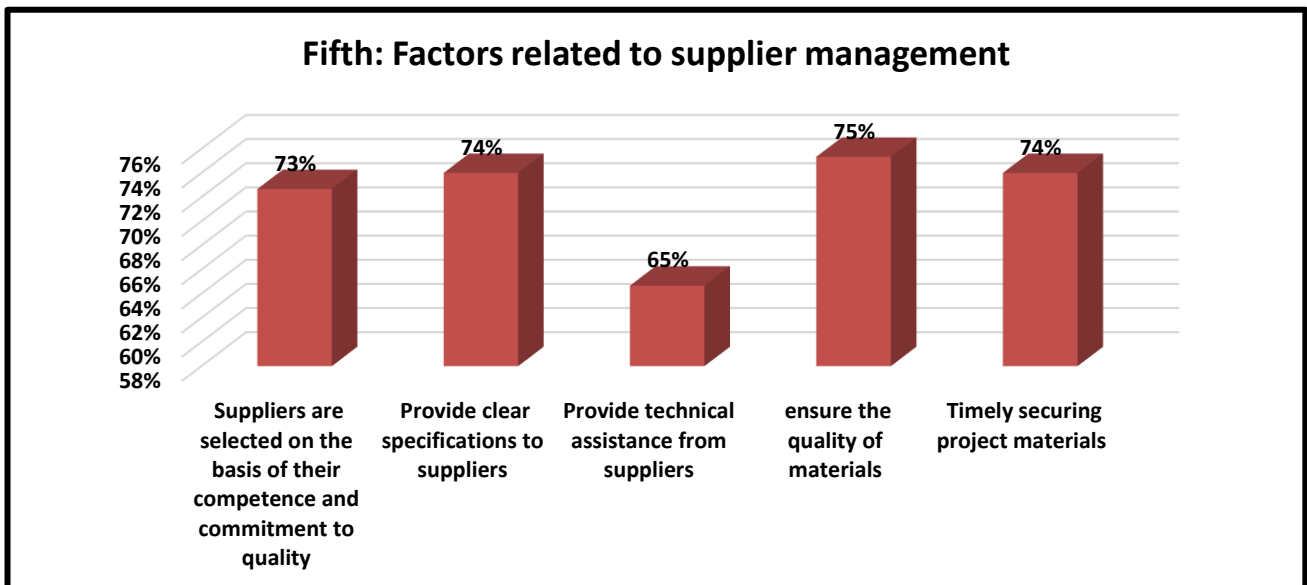
Figure(3:16)Factors related to the owner

4. With regard to the factors related to the management of workflow and the method of implementation shown in Figure (3:17) below, where the degree of importance of these factors appeared between important and very important, as the highest percentage of these factors (testing and checking the conformity of project materials and works to specifications) occurred with a percentage (87%), while the lowest percentage (inspection of activities and events that directly affect quality) was (66%).



Figure(3:18)Factors related to workflow management and implementation method

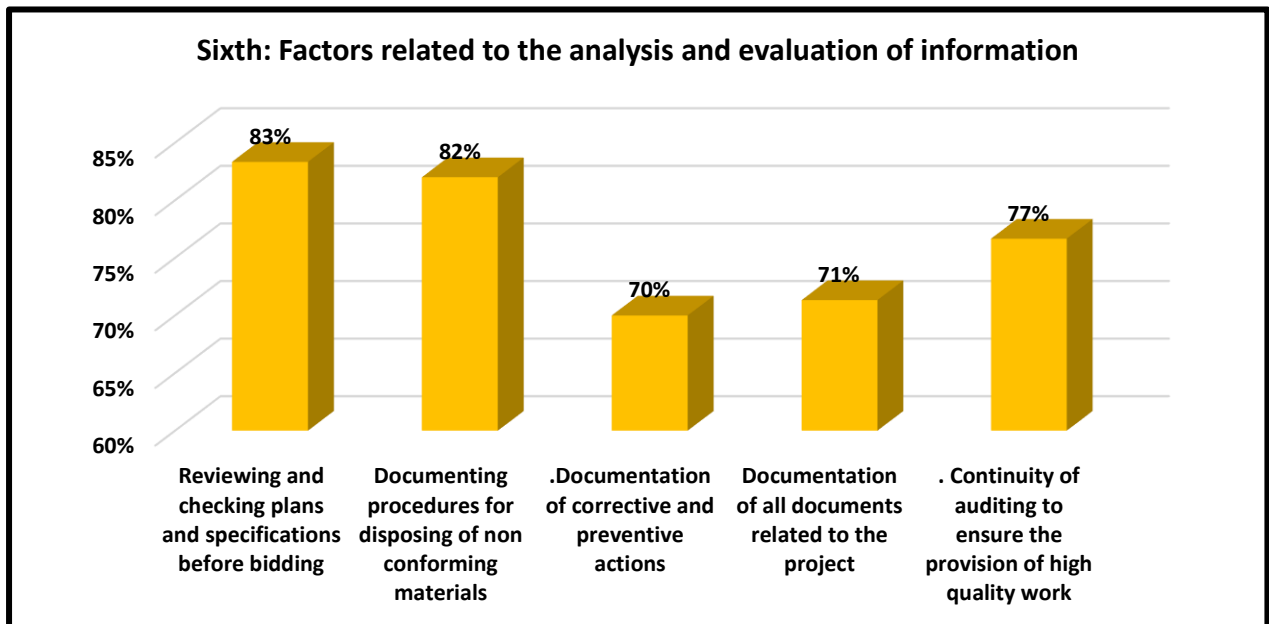
- With regard to the factors related to supplier management shown in Figure (3:19) below, where the degree of importance of all of these factors appeared important, as the highest percentage of these factors (that the suppliers have a program to ensure the quality of materials) occurred at a rate of (75%), While the lowest percentage (providing technical assistance from suppliers) was (65%).



Figure(3:19)Factors related to supplier management

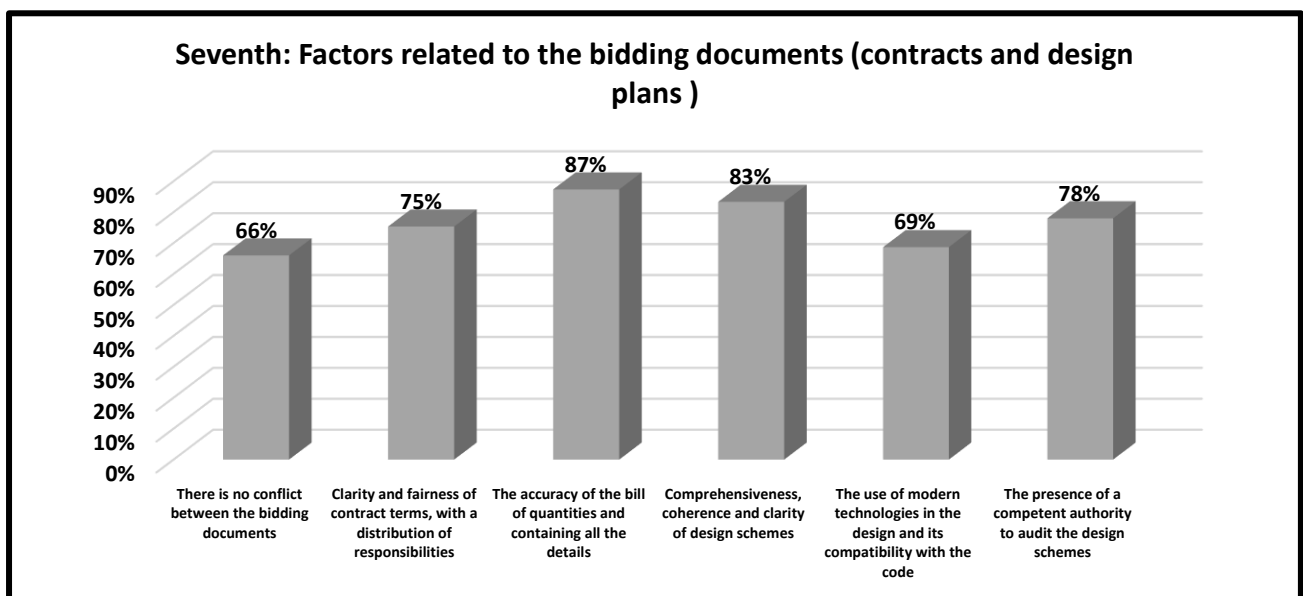
- With regard to the factors related to the analysis and evaluation of the information shown in Figure (3:20) below, where the degree of importance of these factors appeared between important and very important, as the highest

percentage of these factors (reviewing and checking plans and specifications before bidding) occurred at (83 %), while the lowest percentage (documentation of corrective and preventive measures) was (70%).



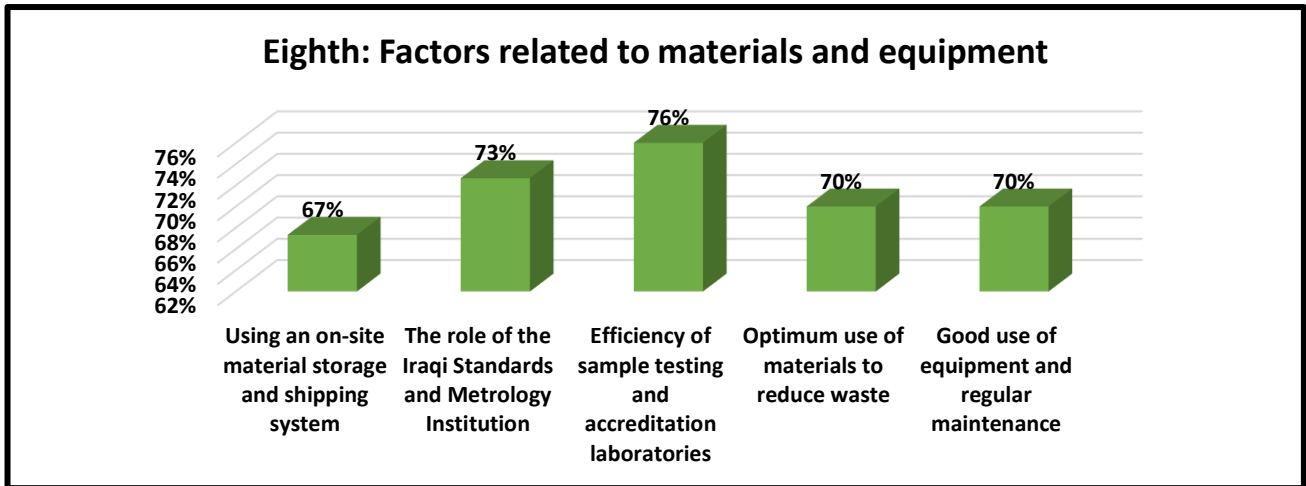
Figure(3:20)Factors related to the analysis and evaluation of information

7. With regard to the factors related to the bid documents (contracts and design schemes) shown in Figure (3:21) below, where the degree of importance of these factors appeared between important and very important, as the highest percentage of these factors occurred (the accuracy of the bill of quantities and containing all the details) by (87%), while the lowest percentage (there is no conflict between the bid documents) was (66%).



Figure(3:21) Factors related to Bidding Documents (Contracts and Design Schemes)

8. With regard to the factors related to materials and equipment shown in Figure (3:22) below, where the degree of importance of all of these factors appeared important, as the highest percentage of these factors (the efficiency of laboratories for examining and approving samples) occurred at a rate of (76%), while it was The lowest percentage (using a storage and shipping system for materials on site) (67%).



Figure(3:22)Factors related to materials and equipment

9. With regard to the factors related to the financial matters shown in Figure (3:23) below, where the degree of importance of these factors appeared between important and very important, as the highest percentage of these factors (the amount of financial flow with the contractor) occurred at a rate of (83%), While the lowest percentage (contractor obtaining the advance payment to facilitate his affairs) was (61%).

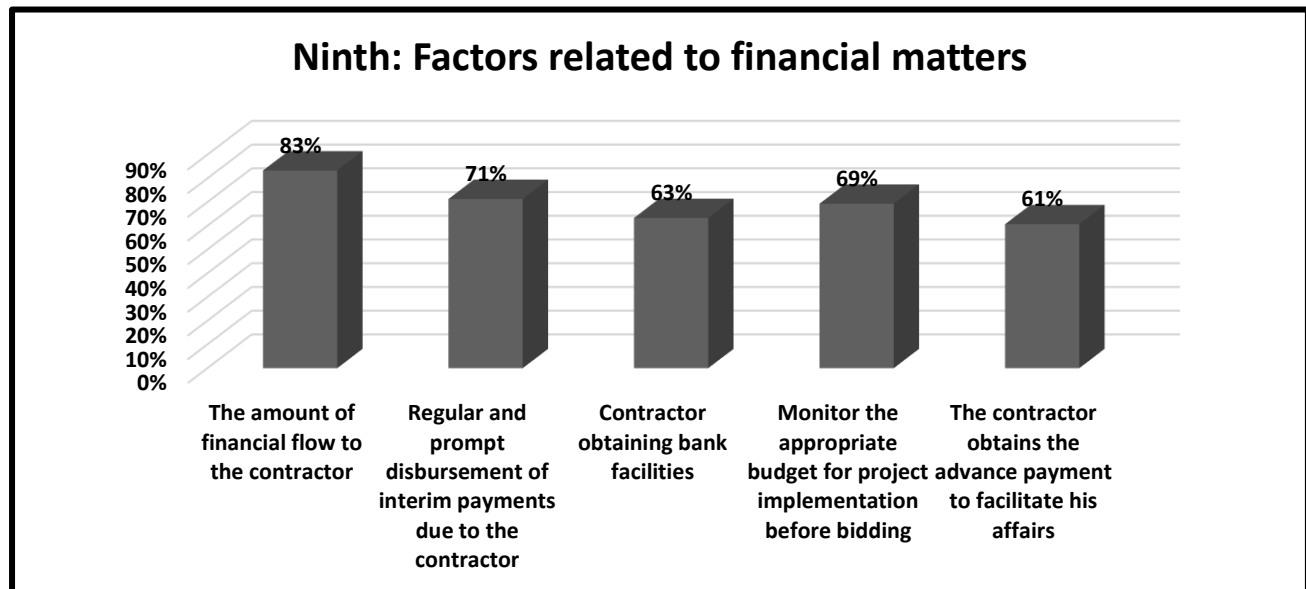
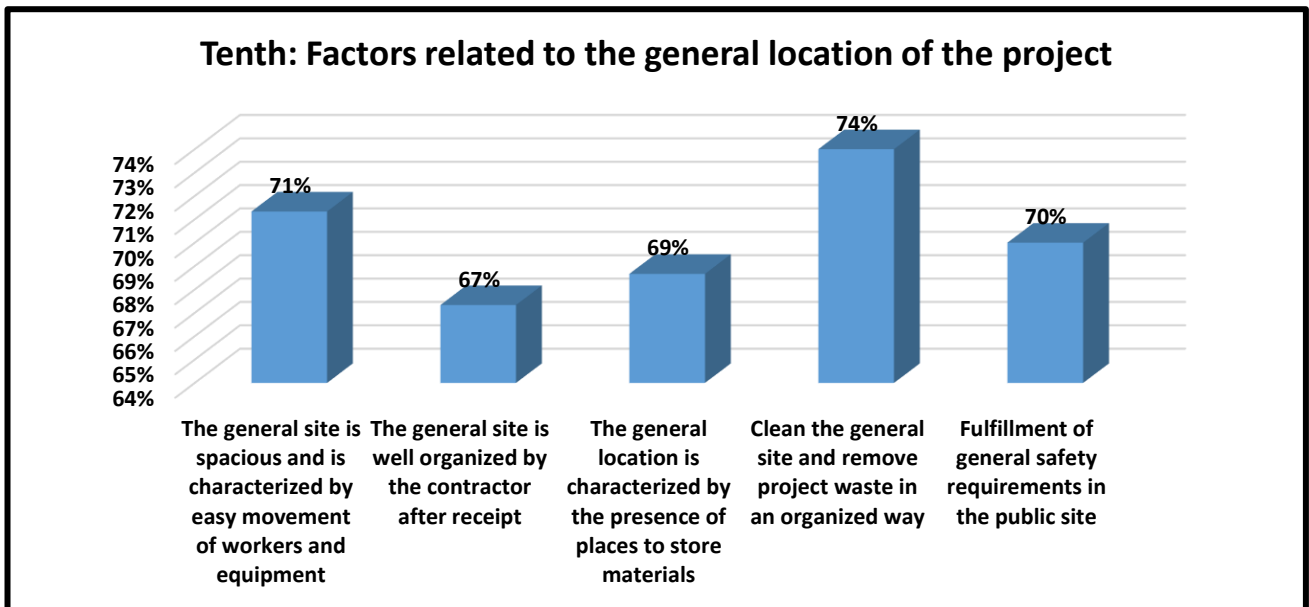


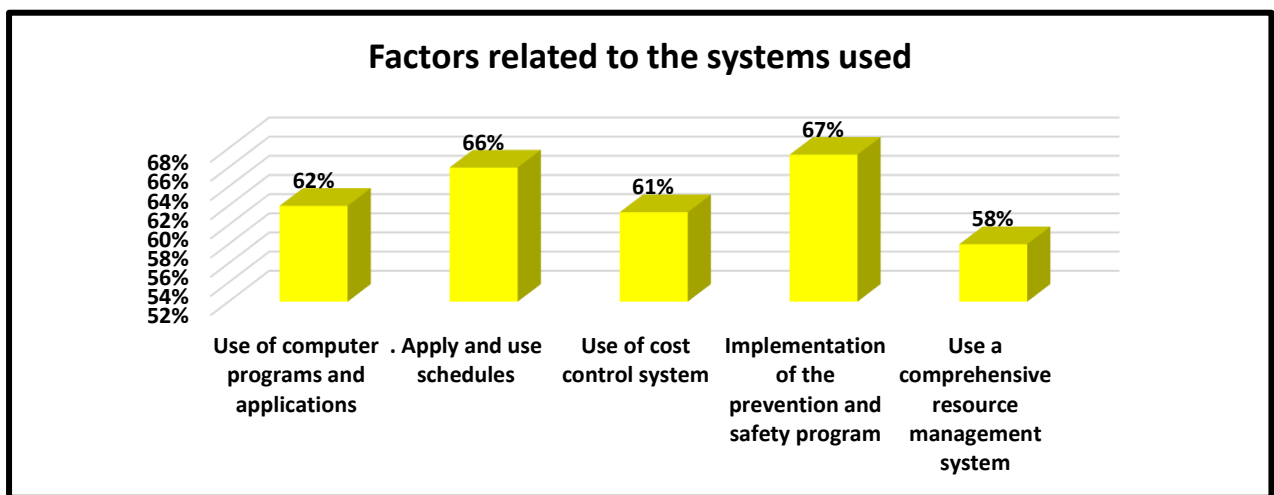
Figure (3:23)Factors related to financial matters

10. With regard to the factors related to the general location of the project shown in Figure (3:24) below, where the degree of importance of all of these factors appeared important, as the highest percentage of these factors (the general site cleanliness and the removal of project waste by organized methods) occurred at a rate of (74%) , while the lowest percentage (the general site is well organized by the contractor after receipt) was (67%).



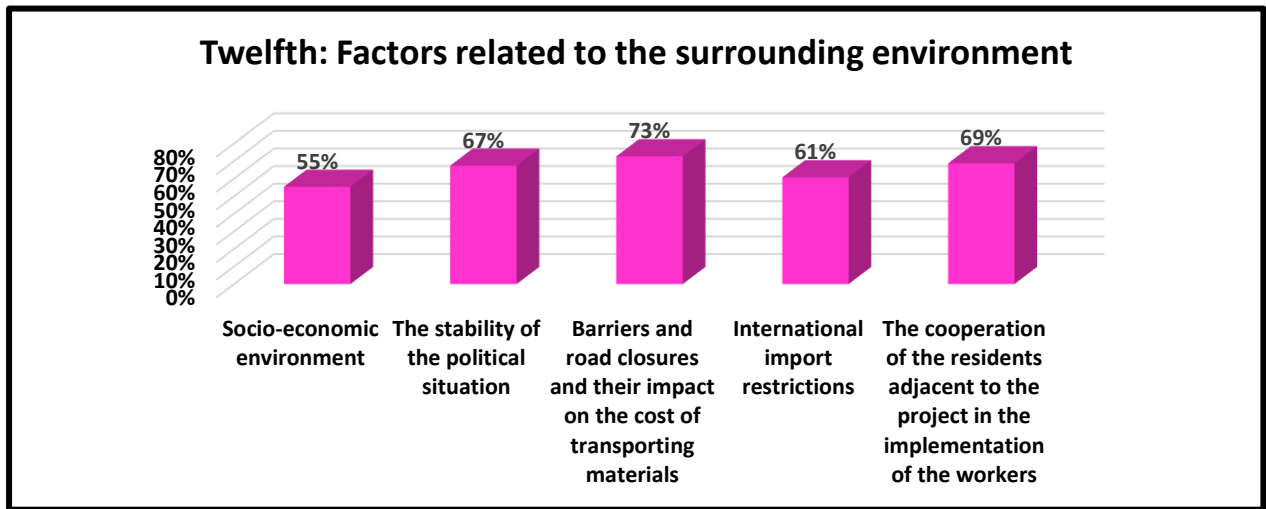
Figure(3:24)Factors related to the general location of the project

11. With regard to the factors related to the systems used shown in Figure (3:25) below, where the degree of importance of these factors appeared between average and important, as the highest percentage of these factors (the factors of the prevention and safety program) occurred at a rate of (67%), while The lowest percentage (using the cost control system) was (58%).



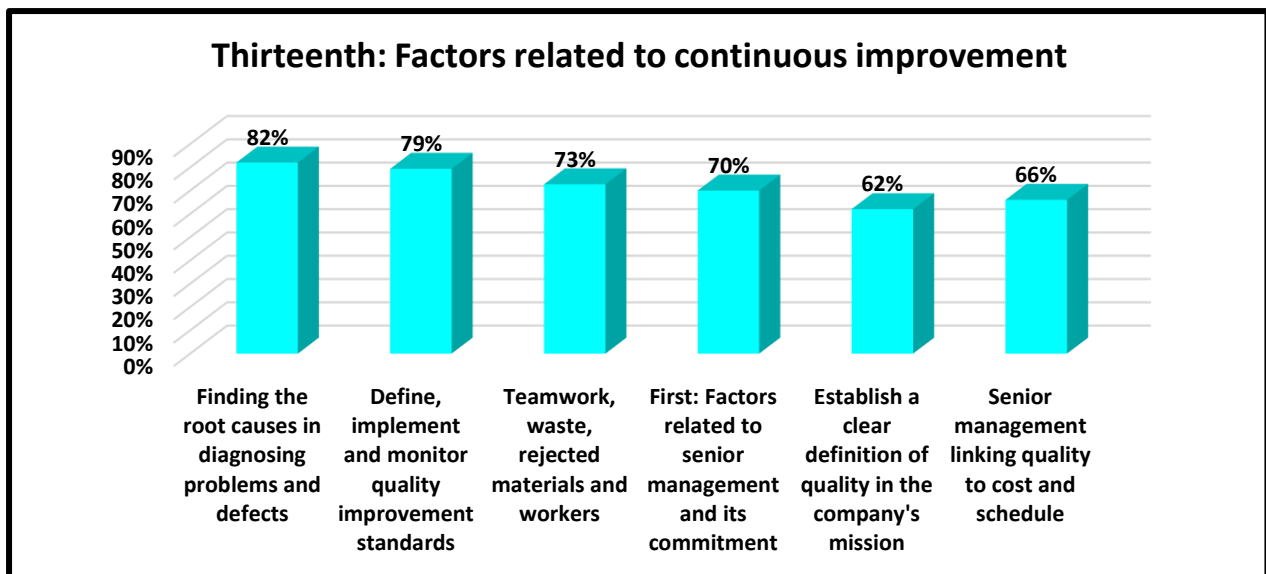
Figure(3:25)Factors related to the systems used

12. With regard to the factors related to the surrounding environment shown in Figure (3:26) below, where the degree of importance of these factors appeared between average and important, as the highest percentage of these factors (barriers and road closures and their impact on the cost of transporting materials) occurred by (73%), while the lowest percentage was (social and economic environment) (55%).



Figure(3:26)Factors related to the surrounding environment

13. With regard to the factors related to continuous improvement shown in Figure (3:27) below, where the degree of importance of these factors appeared between important and very important, as the highest percentage of these factors (the search for radical methods in diagnosing problems and defects) occurred at a rate of (82%) , while the lowest percentage (determining the quality tools used) was (62%).



Figure(3:27)Factors related to continuous improvement

1.6. Conclusions :

From During review results questionnaire and interviews Personal and coexistence field, maybe extraction Conclusions the following :

1. Existence Errors Related with bills of quantities, and during Execution Complete Return look with and modify them and swear Of which can not take Procedure about it to be late time Claim
2. Non availability plan training for workers On a light needs training and skills required for every job self quality relationship examination .

3. Existence loss at efficiency contractors calendar random Access to me this the field From projects And because of weakness concentration in choosing contractors of whom for them expertise precedent at Business similar, and accreditation On lower Bidding at assignment, Choosing a contractor credit On Evaluation financial more From Evaluation Technical .
4. non commitment contractor on terms and specifications contractor on her, with a goal Pursuit to achieve earnings greater .
5. there weakness at coordination between a team The project (owner the work And the designer and the port and supervisor) and not Existence contractual terms included Existence coordination Effective while between them .
6. scarcity laboratories construction Happening On certificate ISO so that most departments projects construction Depends on laboratories check up external whether she was government or eligibility which lack to me Experience at Techniques modeling Modern and imperfection the obvious at devices required to examine and not Accuracy Hardware and swear Of which not updated And most Hardware I'm over old operational and some the other no maybe fix it Because non Availability experience . addition to me lack laboratories construction to Procedures included Secrecy and honesty Performed checks .
7. considered as Technique greatness the fish a tool useful to analyze Problem deteriorate Quality road projects, Via confine all the reasons Which effect On Quality These projects within Planned One Represent Relationship between (forces working and materials construction and machines and equipment construction and methods Implementation of work and management of the enterprise itself)

1.7. Recommendations:

be seen researcher that there Group From Recommendations the duty take it look consideration Including :

1. supply Projects Methods with field laboratories and Angels Artistic eligible Depends On Specifications artistic and administrative in her work .
2. necessity construction Labs check up Accredited On Specifications International ISO and its attribution to me cadres Eligible for this the operation with procedure calibration patrol for all Sections laboratory . and surely get up parties concerned Such as Ministry planning And in coordination With Ministries and Authorities the other self Relationship by selecting discreet laboratories approved at do checks and circulate On all state departments .
3. Review and check designs construction From before destinations certain no linked in the side designed and statement Bezel Compliance with specifications artistic and portability executable and needs the side beneficiary From where the accounts design examinations, and more .
4. Bind all colleges and institutes engineering teaching material Scientific independent Means managed by the quality to create generation geometric aware of the importance the quality and means manage it at Different aspects the work Geometric .
5. rise managers projects by distribution the appropriate for engineers admins From with Experience and my talk graduation On Road projects to guarantee Quality implementation .
6. expansion at Utilization methods stats And that to guarantee the quality and using maps monitoring setting the quality Statistical.
7. Utilization Technologies modern as technology the information and organized the information at all operations documentation and storage And return and different Events and activities own To implement Projects roads With monitor budget necessary.

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