

Statistical Evaluation of the Planning and Scheduling Management Process for Irrigation and Drainage Projects

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ABSTRACT

The research aims to investigate the reality of the planning and scheduling management process for the implementation and maintenance of irrigation and drainage projects in the Republic of Iraq, with an indication of the most important obstacles that impede the planning and scheduling management process for these projects and ways of addressing them and minimizing their effects, for the purpose of achieving the goal of the research, a scientific methodology was followed, represented in the collection of literary information related to the subject of planning and scheduling management. Scheduling in multiple aspects, the most important of which are factors related to planning, design, implementation, contracting documents, management of the implementing agency, the nature of the project, planning, control and follow-up work, the study concluded that there are sixty-three factors influencing the planning and scheduling management process, including (not calculating the quantities of work paragraphs in an accurate and detailed manner) came in the first place with relative importance (74%), then followed by the second factor (the lack of qualified cadres to prepare time programs) And with a relative importance of (73%), and sixteen factors were excluded because they got a relative importance of less than (50%), and with regard to the factors affecting in estimating the implementation and maintenance periods in General Authority for Operation and Maintenance of Euphrates River Basin Projects, the study reached forty-five reasons, the most important of which are (Availability of financial liquidity) with relative importance (83%) in the first place, then followed by (the efficiency of the machines, machines and equipment used) with relative importance (79%), and in light of the conclusions reached, a set of recommendations were developed to develop the planning process and scheduling management for the implementation and maintenance of projects Irrigation and drainage.

Keywords: Irrigation and Drainage Projects, Planning and Scheduling Management, Relative Importance, Statistical Evaluation, Implementation and Maintenance

INTRODUCTION

The management of the implementation and maintenance of irrigation and drainage projects is an important issue that requires some skills and expertise. In essence, it consists of a set of techniques and tools that help predict and control the results of endeavors undertaken by contracting companies. and effective project management does not guarantee the success of the project, although poor project management often guarantees failure [1]

Most of the irrigation and drainage projects, whether they are implementation projects or maintenance projects that are implemented in the Republic of Iraq, are characterized by being complex and large in size, and traditional scheduling tools have been used to implement these projects, and among the planning and scheduling management tools is the GANTT CHART, but it has been noticed that many irrigation and drainage projects are late for the specified dates for their delivery, due to the lack of connection between the various project activities on the one hand and the lack of knowledge of the reasons for the logical sequence in the effective way, as well as a defect in the employment of logical sequential relationships in the scheduling management process of these projects and others the reason .

Consequently, the stakeholders in these projects began to make unremitting efforts in order to create an efficient and conscious administration that can supervise the planning and management operations of scheduling for the

implementation and maintenance of all irrigation and drainage projects and by harnessing advanced scientific tools and methods in order to ensure the implementation and maintenance of them in the least possible time and to avoid waste Time by exploiting these techniques in scheduling projects in order to achieve their goals .

It is clear from this that the importance of the planning process and scheduling management is the need to obtain specialists and engineers with experience in an attempt to control and control activities in a manner that secures the achievement of the objectives of irrigation and drainage projects. The planning and scheduling management process aims at analyzing the project and defining the activities involved in it, with defining the logical and temporal relationships between them, as well as estimating the time period needed to complete each activity, as well as the required resources from individuals, equipment, machinery and materials and their cost, while providing a basis for measuring performance and diagnosing defects and deviations, which helps in minimize the occurrence of crises. Based on the foregoing, efficient planning and scheduling management will help the administration responsible for the project in achieving its goals. In addition, the project plan provides a basis for monitoring and measuring the progress of work according to a specific schedule to identify deviations and their causes for the purpose of addressing them sufficiently to avoid delays in completing the project or increasing its cost [2]

RESEARCH PROBLEM

The research problem is as follows:-

- 1) The absence of effective planning and scheduling management for the implementation and maintenance of irrigation and drainage projects plays a major role in the failure of the implemented project departments to complete the work entrusted to them within the required time, cost and quality.
- 2) The lack of good understanding of planning and scheduling management, its importance and stages, led to a loss of control over the controlling factors in the implementation and maintenance of irrigation and drainage projects in terms of implementation time, cost and quality.

AIM OF THE RESEARCH

The research objectives include the following:-

- 1) Evaluating the planning and scheduling management process in the implementation and maintenance of irrigation and drainage projects in the Republic of Iraq.
- 2) A study of the status of the planning and scheduling management process in the implementation and maintenance of irrigation and drainage projects in the Republic of Iraq.
- 3) Identify and diagnose the reasons that contribute to poor planning and scheduling management in the implementation and maintenance of irrigation and drainage projects in the Republic of Iraq

RESEARCH HYPOTHESIS

The research hypotheses are as follows:-

- 1) There is weakness in the process of preparing planning and scheduling management, and its lack of coverage of all technical aspects of implementation and maintenance work for irrigation and drainage projects, thus delaying the completion of these projects, increasing costs and possibly deteriorating quality.
- 2) The absence of a quantitative standard to measure the quality of planning and scheduling management in the implementation and maintenance of irrigation and drainage projects during the planning, design and implementation phase.

RESEARCH JUSTIFICATIONS

Through field visits to some irrigation and drainage projects in the Republic of Iraq, a set of facts and observations about the planning process and scheduling management were diagnosed, the most important of which are.

- 1) Not exploiting modern methods and techniques in preparing the planning process and managing scheduling for the implementation and maintenance of irrigation and drainage projects, such as (Primavera Project Planner) and (Microsoft project).
- 2) The completed irrigation and drainage projects take longer than planned.
- 3) Relying on the style of bar charts without the other methods.
- 4) Reliance on personal experience and in some cases reliance on historical data in estimating timings.
- 5) Lack of sufficient information about the environment of irrigation and drainage projects.
- 6) Lack of experience required by engineers in using modern software applications for planning and scheduling management.
- 7) The absence of clear boundaries for the overlapping of responsibility between the different departments in the General Authority for the Maintenance of Irrigation and Drainage Projects.
- 8) Weak engineering awareness of the importance of time programs for the implementing engineers in the General Authority for the Maintenance of Irrigation and Sewerage Projects

RESEARCH METHODOLOGY

The study methodology necessitated the adoption of two scientific methods according to successive and overlapping stages in order to achieve the objectives of the research as follows:

1) Theoretical Method:

According to the first method, a review of local and international literature, sources, journals, studies, research and scientific publications in this field, and what was published on the Internet, were reviewed and a general research structure was established to collect the following information:

- 1- A literature study of the implementation and maintenance of irrigation and drainage projects in the Republic of Iraq.
- 2- Studying planning methods and managing scheduling for irrigation and drainage projects and determining their requirements and factors affecting their quality.

2) Field Works

The necessary data is collected through personal interviews and brainstorming, as well as through field coexistence of some irrigation and drainage projects in the Republic of Iraq

First . Theoretical Method

Planning in Irrigation Projects : It is process for the implementation and maintenance of irrigation and drainage projects determines the construction plan, the work to be completed, and the order in which the work will be accomplished through the development of a clear plan for managing events, which includes five steps.[3] .

- 1) Defining the general approach to irrigation and drainage projects (maintenance or implementation) .
- 2) Division of irrigation and drainage projects (maintenance or implementation) into major and minor activities.
- 3) Determining the logical relations of irrigation and drainage projects (maintenance or implementation).
- 4) Presenting the plan and scheduling management using one of the modern planning methods and methods.
- 5) Stakeholder approval of the scheduling plan.

Characteristics of Irrigation and Drainage Projects

It showed that the irrigation and drainage projects differ from the rest of the other projects in that they are[4].

:

- 1) Unique: as it does not include repeated operations, every irrigation and drainage project is different from the other, while other activities include carrying out repeated (typical) operations.
- 2) The irrigation and drainage project has a specific time: it has a starting point and an end point during which the stakeholders' requirements must be met.
- 3) The irrigation and drainage project has a pre-agreed budget.
- 4) The irrigation and drainage project has specific resources: at its inception, an agreed upon amount of labor, equipment, and materials allocated to it is determined.
- 5) The irrigation and drainage project involves a risk: as the lack of certainty means that there are some risks.
- 6) Achieving a beneficial change: The purpose of any irrigation and drainage project is to achieve benefit by increasing the cultivated area and delivering water quotas to stakeholders (farmers)
- 7) The irrigation and drainage project goes through several successive stages, starting with the feasibility and technical study stage, passing through the later stages known as engineering designs, purchasing materials, and then the implementation stage.

The Main Types of Irrigation and Drainage Canals

The irrigation canal is an artificially formed watercourse that is constructed on the ground to transport water from the source of its supply to the fields. The shape of the canal section is in the form of a trapezoid and in some cases it takes other forms. Canals can be classified into different types, as shown in figure No.

- 1) Irrigation channels based on the nature of the source of supply.
- 2) Irrigation channels based on size.
- 3) Irrigation channels based on their function (purpose).
- 4) Irrigation channels based on channel surface.
- 5) Irrigation channels based on alignment.
- 6) Irrigation channels based on the financial return.

Scheduling in Irrigation projects

The function of scheduling management is the detailed section of the planning function, and the importance of scheduling in irrigation and drainage projects lies in collecting the necessary information about the various components of the project. Estimates of basic resources such as manpower, construction materials and equipment and achieving a balance in their distribution between activities the scheduling is the tool used by the administration in order to predict the time of completion of the irrigation and drainage project, and then ensure the timely completion by adjusting the required materials applied to the work[5]. Among the initial steps for preparing the scheduling departments for the irrigation and drainage projects are the following [6]:

- 1) Estimate the time required for each of the irrigation and drainage project activities.
- 2) Calculating the time required to complete the irrigation and drainage project in full.
- 3) Determining the start and end date of each irrigation and drainage project activities.
- 4) Determining the critical activities for the completion of the irrigation and drainage project in a timely manner.
- 5) The critical path of the irrigation and drainage project through which the project time can be determined.

Scheduling is one of the methods that provides information to each of the stakeholders (owners, engineers, contractors, subcontractors, suppliers and the public in general) and is restricted to answering the basic question of who and when and determining the sequence and timing of construction operations. In addition to the schedule, scheduling in irrigation projects has the following benefits[6]:

- 1) Predicting the completion date of the irrigation and drainage project.
- 2) To be an effective tool for monitoring the irrigation and drainage project.
- 3) Cost management by forecasting cash flows.
- 4) Determine the start and end date for each activity.

- 5) Coordination between the contractor and the sub-contractors.
- 6) Coordinating the information needed by the General Authority for the Maintenance of Irrigation and Sewerage Projects in Iraq and between the implementing contractors and engineers.
- 7) Show the differences in the bids.
- 8) Forecasting the demand for resources (construction materials) and improving their reduction.
- 9) Documenting project data on an ongoing basis.
- 10) Calculation of work flows.
- 11) It is an effective communication tool for stakeholders.

In addition, scheduling can be considered as a basic and effective method for evaluating irrigation and drainage project scheduling and as an effective tool in responding to time-based claims.

The researcher believes that it is important to prepare a scheduling management plan based on the best expectations of the times that each event will take, as well as the necessary sequence of events, and this means that all parties involved in the project are consulted. Sometimes managers try to impose a schedule that is shorter than expected to motivate employees to reach better results. This may be useful, if this reduction in the implementation period is conscious of the working conditions. He believes that too short a time schedule makes workers lose hope in achieving it and therefore they work very slowly because they are anyway to blame or they try to achieve the schedule at the expense of the quality of work. There are a large number of planning methods and tools that have been developed and improved for the purpose of contributing to the development of planning for narrative projects. The most commonly used methods are [7][8]: -

1. Bar Charts (Gantt Charts)
2. Line of Balance

In this research, only the strip bars scheme will be addressed, because this scheme is one of the most used planning methods in irrigation and drainage projects. To prepare the scheduling management plan in the irrigation projects, the following information about the project implementation plan must be available [4]

- 1) Basic maps and plans:- A sufficient number of basic maps and plans must be available for the project to enable the planner to calculate the approximate quantities of the paragraphs to be implemented, measured in the usual units of measurement (m³, m², m.m, number) according to the nature and quality of the work being carried out. included in the paragraph.
- 2) Components of the project (Labour Division Structure): In this structure, the project or work is divided into its main component activities, and therefore each activity can be divided from the main activities to its secondary component activities.
- 3) Description of Implementation Methods: - Before starting the schedule, the planner must prepare a list that includes a brief description of the expected methods of implementing each of the main activities included in the project.
- 4) Standard production rates: It is defined as the amount of work done by one worker during one working hour under standard conditions. It is also possible to obtain standard production rates for implementation by one of the two methods:-
 - a. Relying on the practical experience gained from implementing a number of projects and benefiting from the collection and tabulation of complete statistics on production rates for each type of work that was previously completed.
 - b. Using ready-made tables showing standard production rates for the various narrative activities, which are prepared and published by specialized sources in the field of consulting engineering.

Second . Field Works.

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 experts and specialists who

have a long experience in the field of planning and follow-up in general and in the field of scheduling management in particular in irrigation and drainage projects, and that In order to collect as much information and data as possible, which enabled the researcher to understand the mechanism of planning and scheduling management in the irrigation and drainage sector in the Republic of Iraq, with the aim of adding value and scientific credibility to this study. The practical part included the following:

- 1) Gathering information and data.
- 2) Choosing the study tools.
- 3) Choosing the research sample community.
- 4) Determine the statistical methods used in analyzing and extracting the results

1) Gathering Information and Data

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

- 1- Primary sources: In collecting the primary data, the researcher relied on the questionnaire and brainstorming measurement tools, which were prepared and designed according to the study questions and hypotheses.
- 2- Secondary sources: the researcher used to collect this data from books and periodicals available in libraries, in addition to previous studies related to the subject of the study.

2) Choosing the Research Tools

The researcher used the main tools of the questionnaire and brainstorming in order to obtain accurate information, which are:

1- Questionnaire

The questionnaire is one of the means of communication with experts, skilled and specialized engineers. To benefit from the information base available to them, and to build on it in making the right decisions. The questionnaire included field visits as well as personal interviews[9]:

a - Field Visits and Co-existence:

Several sites for the implementation and maintenance of irrigation and drainage projects in Baghdad and other governorates in the Republic of Iraq have been selected for the purposes of study and analysis, as some of these projects were under implementation and the other section was completed. Through these repeated visits to some of these projects, the researcher collected information related to the various and varied problems and everything surrounding the process of preparing and following up the scheduling management plan in these projects.

b - Personal Interviews:

At this stage of the research, it was relied on personal interviews with a selected group of specialists in the preparation and follow-up of the scheduling management plan for the implementation and maintenance of irrigation and drainage projects from engineers, contractors and consultants at various administrative levels related to the subject of the research for discussion, dialogue and their opinions on the draft questionnaire form presented for the purpose of determining the extent The validity of the axes selected within the form and the accuracy of the phrases, 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 process of preparing the scheduling management plan, as many questions that were initially prepared in the form of axes were directed based on the theoretical study, and discussed the questions contained in the form questionnaire.

It is known that the personal interviews method is considered a support and complement to the questionnaire and brainstorming 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 the engineers to express their opinions frankly and thus the possibility of reaching the best opportunity to find out all aspects of the research problem and its nature and in the below The personal interviews and arbitrators forms and the performance measurement evaluation. Table (1) and Table (2) show the academic qualifications of the personal interviews and arbitrators.

Table (1): Shows the form for personal interviews

No	The name	Certificate	Specialization	Years of Experience	job position	Workplace
1	Sahar Muhammad Mohsen	B.Sc.	water resources	23	Head of the Department	The General Authority for the Maintenance of Irrigation and Sewerage Projects (Head of the Supervision and Follow-up Section)
2	Majed Hassan Mahmoud	B.Sc.	civil	22	Head of the Department	The General Authority for Operation and Maintenance of Euphrates River Basin Projects(Head of the Technical Section)
3	Arwa Khader Abdel Rahman	B.Sc.	control and systems engineering	20	Head of the Department	The General Authority for Operation and Maintenance of Euphrates River Basin Projects(Head of Planning Department)
4	Wissam Abdul-Jabbar	B.Sc.	water resources	27	Deputy Head of Department	The General Authority for Operation and Maintenance of Euphrates River Basin Projects(the Authority's headquarters)
5	Haider Hassan Daoud	H.D	civil	22	Deputy Head of Department	The General Authority for Operation and Maintenance of Euphrates River Basin Projects(the Authority's headquarters)
6	Hoda Jawad Abdel Hamza	B.Sc.	water resources	22	Deputy Head of Department	The General Authority for Operation and Maintenance of Euphrates River Basin Projects(the Authority's headquarters)
7	Ali ambush Mutashar	B.Sc.	water resources	22	Maintenance manager	Governorate of Mesan
8	Kazem Salman Jawad	B.Sc.	water resources	21	Maintenance manager	Wasit Governorate
9	Sami	B.Sc.	Mechanical	17	Division	Kirkuk Province

	Ahmed Hassan				official	
10	Ahmed Naim Kazar	M.Sc.	water resources	12	categorical official	Diwaniyah Governorate
11	Naseer Abdul Amir	B.Sc.	water resources	21	Maintenance manager	Al-Muthanna Governorate
12	Jamal Odeh Samir	M.Sc.	Mechanical	22	Maintenance manager	Anbar Province
13	Jalal HamidJalal Hamid	B.Sc.	civil	28	Enhancement Project Manager	Al-Muthanna Governorate
14	Rafid Tariq Juweed	B.Sc.	Mechanical	20	Site engineer	Karbala Province
15	Firas Hussein Ali	B.Sc.	Survey	17	Site engineer	Kirkuk Province

Table No. (2): Shows the arbitrators' form and performance measurement evaluation

No	Arbitrator's name	Certificate	Specialization	Years of Experience	job position	Workplace	Phone number or email
1	Hatem Khalifa Brism	PhD in civil engineering	project management	42	Director of the Department of Construction and Engineering Projects / University of Baghdad	University of Baghdad / Jadiriya	Dr0hatem2099@yahoo.com
2	Abbas Ali Athab	PhD in physical education	physical education	38	teaching	Baghdad University	7901518540964
3	Karim Hassan Alwan	PhD in civil engineering	urban planning	31	Dean of the Institute of Urban and Regional Planning for Postgraduate Studies	Baghdad University	kareem.h@iurp.uobaghdad.edu.iq
4	Mohsen Ali Nassif Al Mousawi	PhD in physical education	sports management	30	teaching	University of Baghdad / College of Physical Education	7723572374964
5	Nada Khalifa Al-Rikabi	PhD Planning	Environmental and sustainable planning	25	teaching	University of Baghdad/Urban Planning Center	dr.n.khalifa@iurp.uobaghdad.edu.iq
6	Ahmed	Ph.D.	Applied	25	teaching	University of	ahmedstatistic

	Diab Ahmed	Statistics	Statistics			Baghdad / College of Administration and Economics / Statistics Department	@coadec.uob aghdad.edu.iq
7	Falah Mahdi Hadi	PhD Environm ental Planning	urban and environm ental planning	24	teaching	University of Baghdad / Urban Planning Center	96477135799 17
8	Mustafa Abdel Jalil Ibrahim	PhD in urban and regional planning	spatial information technology	21	teaching	University of Baghdad / Urban Planning Center	96479018409 21
9	Aws Hatim Mahmo ud	PhD in civil engineeri ng	Project Management	20	teaching	University of Baghdad/College of Administration and Economics/Industri al Administration	Awss.hatim@ coadec.uobag hdad.edu.iq
10	Hala Hamad Majoud	PhD in Business Administ ration	production and operations	20	teaching	University of Baghdad / College of Administration and Economics / Department of Business Administration	96479018560 30
11	Sufian Munthe r Saleh	PhD in statistics and informati on	Planning (Operations Research)	20	teaching	Al-Nahrain University / Biomedical Engineering	97901509658 964
12	Harith Yaroub Maan	PhD engineeri ng	Computer design and manufacture	15	teaching	University of Baghdad/College of Administration and Economics/Industri al Administration	96477088587 38
13	Ali Amer Moham med Hassan	PhD in civil engineeri ng	Project Management	12	Engineer in construction and projects department	University of Baghdad / Jadiriya	96478034231 48

2- Brainstorming Method

Definition of brainstorming: Brainstorming can be defined as the process of creating a huge amount of ideas that are produced through an organized process with clear rules. Brainstorming is a method that can be followed to elicit ideas or even arrange them when a person feels unable to find new creative ideas or when he lacks the inspiration that makes him able to come up with such ideas. Through which a person can find specialized points that refer to the general topic he is thinking about, this scientific method can be followed when the human mind contains many ideas that he wants to narrow their scope and allocate them more and more, or even rearrange them to appear in a short form, or even find the common

relationship between these ideas in a way that allows a person to start planning properly for the task they are considering [10], there are many techniques that can be used in brainstorming, including the following [11] such as : (Free Writing, Lists, Viewpoints, Cubism, Ideas Map, Parts, Press Questions, Thinking outside the Box, Figures and Graphs, Focus on the Target and the Audience, Focus on the Target and the Audience)

The researcher used the method of focusing on the target and the audience to obtain and discuss the results, as a closed meeting was held with the engineers of the General Authority for Operation and Maintenance of Euphrates River Basin Projects in the Republic of Iraq for the technical departments. The first is with 47 distributed forms and 32 forms received from the departments (planning, supervision, technical, studies and designs) in General Authority for Operation and Maintenance of Euphrates River Basin Projects as shown in Table (3), while the number of forms distributed and received for the second questionnaire form is 75 and 54 forms, respectively. As shown in Table (4).

Third: Choosing the Research Sample and Population

Information was collected from one of the formations of the Ministry of Water Resources / General Authority for Operation and Maintenance of Euphrates River Basin Projects and its affiliated directorates.

Table (3) The Forms Distributed and Received for the Research Sample, Form No. (1)

No	sections	Number of forms received	The number of forms distributed
1	Planning Department	9	12
2	Supervision Department	10	15
3	Technical Section	7	10
4	Department of Studies and Designs	6	10

Table (4) The Forms Distributed and Received for the Research Sample, Form No. (2)

No	Maintenance departments of the General Authority for Operation and Maintenance of Euphrates River Basin Projects in Iraq	The number of forms distributed	Number of forms received
1	Baghdad Maintenance Directorate	15	11
2	Mesopotamia Maintenance Directorate	15	10
3	Babylon maintenance Directorate	10	10
4	Najaf Maintenance Directorate	10	6
5	Wasit maintenance Directorate	5	4
6	Diwaniyah Maintenance Directorate	5	4
7	Managing the lining project in Diwaniyah	5	4
8	Kirkuk maintenance Directorate	10	5
SUM		75	54

Fourth: Determining the Statistical Methods Used in Analyzing and Extracting the Results

The researcher used the electronic spreadsheet program (Microsoft Excel 2019) in the process of statistical analysis of the questionnaire results to extract the results directly, reinforced with illustrations, which enriches the research with accuracy in displaying the results.

The results were analyzed and discussed based on the relative importance of these results, which is one of the measures of central tendency. The researcher followed the following steps in the process of statistical analysis of the results:

- 1- Determining the weighted values of the degree of impact of each of the answer categories according to the five-point Likert scale as shown in Table (5), and the purpose of determining the weighted values of the degrees of

influence is to convert the answers of the sample members from qualitative values to numerical values in a way that is easy to deal with by methods of analysis Statistical and thus simplify the process of statistical analysis.

Table (5) shows the weighted values of the degree of influence of each of the answer categories

The Answer	Category Center	Period Category
Ineffective	20>-0	10
low impact	40>-20	30
Average effect	60>-40	50
Influential	80>-60	70
very Influential	100>-80	90

2- Equation No. (1) has been applied to find the relative importance

$$Relative\ importance = \frac{\sum (No\ Category\ Answers * Category\ Center)}{No\ total\ answers} \dots \dots \dots (1)$$

The researcher used the spreadsheet program (Microsoft Excel 2019) in the process of statistical analysis of the questionnaire results to extract the results directly, reinforced with illustrations, which enriches the research with accuracy in displaying the results.

Fifth : Discuss Result

a) The results will be displayed according to the sequence provided in Form No. (1).

First Axis: Personal Information:

This axis revolves around the personal information of the study sample, and their answers can be summarized as follows:

1- Gender

Figure (2) shows the gender of the study sample members, as it is noted that (63%) of the sample members are female and (37%) are male, and the researcher believes that the percentage of females is more than the percentage of males in the headquarters of the General Authority for Operation and Maintenance of Euphrates River Basin Projects in The Republic of Iraq, because male engineers are mostly present in the work sites due to the difficulty and complexity of the work, and this is a logical ratio for the irrigation and drainage sector in the Republic of Iraq.

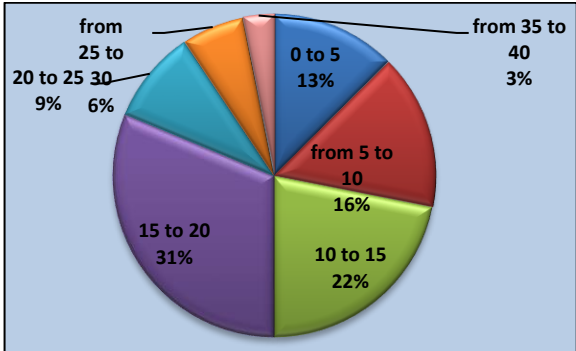


Figure (2): It shows the character trait

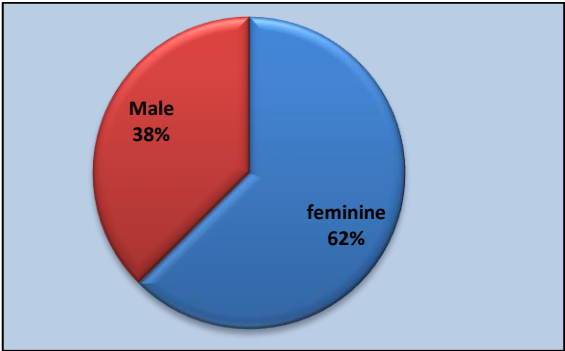


Figure (3) shows the number of years of experience

2- Years of Experience

Figure (3) represents the number of years of experience for members of the study sample, and it becomes clear that (13%) of the sample members have years of experience between (1 to 5 years), and (16%) of the sample members range from (5 to 10 years) And (22%) of the sample members, years of experience range from (10 to 15 years), and (31%) of the sample members, years of experience range from (15 to 20 years), and (9%) of the sample members range from years of experience (20 to 25 years), and (6%) of the sample members, years of experience range from (25 to 30 years), and (3%) of the sample members range from (35 to 40 years), and the researcher believes that these results The importance of the research gives the reliability in light of their answers, knowing that (31%) of the sample members range in years of experience from (15 to 20 years), and they are the majority.

3 - Academic Certificate

From the observation of Figure (4), we find that (81%) of the study sample are holders of a bachelor’s degree, (3%) are holders of a higher diploma, and (16%) are holders of a master’s degree, as for a doctorate degree, their percentage was (0%) in the study sample, and the researcher believes that the percentage of engineers who hold a bachelor’s degree are the most present in practicing the profession in General Authority for Operation and Maintenance of Euphrates River Basin Projects, while the rest prefer the academic aspect for personal, social and scientific considerations.

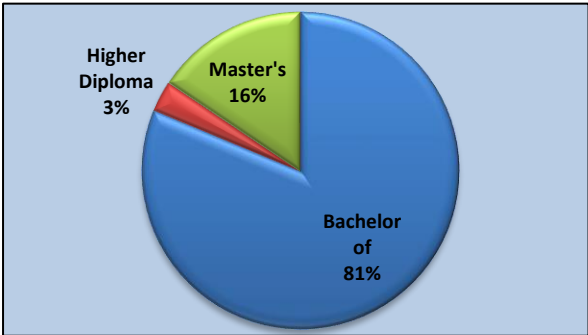


Figure (4): Shows the scientific certificate

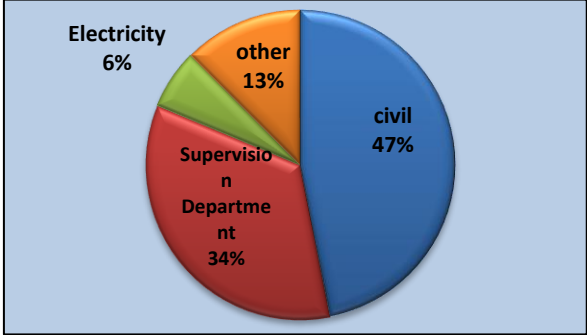


Figure (5): Engineering disciplines

4 - Engineering Specialties

Figure (5) shows that (47%) of the sample members are civil engineering, (34%) are water resources engineering, (6%) are electrical engineering, and (13%) It is for other engineering specialties, and it is noted that most of the engineers of the General Authority for Operation and Maintenance of Euphrates River Basin Projects are engineers specializing in civil engineering and water resources engineering, due to the specialized nature of work for irrigation and drainage projects.

5 - Job Position

Figure (6) shows that (12%) of the sample members work as planning engineers, (19%) work as supervision engineers, (28%) work as technical engineers, (13%) work as appraisal engineers, and (3%) work as site engineers, and (25%) in other engineering specialties, and it is clear that the largest percentage is for technical engineers, as it represents the highest percentage in the work of General Authority for Operation and Maintenance of Euphrates River Basin Projects

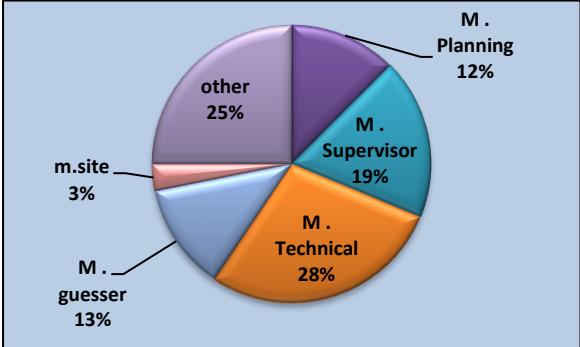


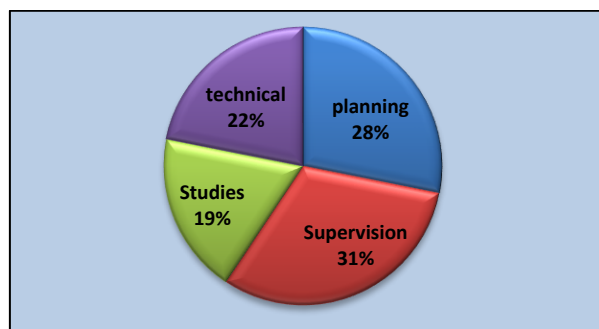
Figure (6): Shows the job position**Figure (7): Shows the professional certificate**

6- Professional Certificate

Through figure (7), it is noted that all members of the study sample do not have professional professional certificates in the field of project management, such as the certificate of PMP, PRINCE2K, and the reason for this is due to the lack of a culture of professional project management for the Iraqi engineer, and the absence of government instructions that encourage obtaining these professional certificates.

7 - Workplace

By observing Figure (8), it turns out that (28%) of the sample members in the General Authority for Operation and Maintenance of Euphrates River Basin Projectwork in the Planning Department, (31%) work in the Supervision Department, (19%) work in the Studies Department, and (22 %) working in the technical department, we note that the planning and supervision departments are the most proportional because they are specialized in planning and scheduling work, so they were focused on in the research sample.

**Figure (8): Shows the workplace for the sample**

The second Axis: assessing the status of the planning and scheduling management work in General Authority for Operation and Maintenance of Euphrates River Basin Projects.

This axis includes twelve questions for the purpose of evaluating the status of planning works and scheduling management in General Authority for Operation and Maintenance of Euphrates River Basin Projects

The First question: Table (6) shows the results of the degree of importance of the element of planning and scheduling management in irrigation and drainage projects in General Authority for Operation and Maintenance of Euphrates River Basin Projects, as the relative importance value was (83%), since the majority of sample members (72%) emphasized the importance of planning projects Irrigation and drainage, and this is a scientific fact that the researcher agrees with, meaning that the evaluation of this element is within the evaluation (very important), because the process of planning and scheduling management is considered one of the important elements in the management of irrigation and drainage projects in the Republic of Iraq.

Table (6): shows the relative importance of planning and scheduling management in General Authority for Operation and Maintenance of Euphrates River Basin Projects

In your opinion, based on your personal experience, what is the degree of importance of planning and scheduling in your organization?					
very important	Important	medium importance	insignificant	not important	Relative importance
23	7	2	0	0	83%
%72	%22	%6	%0	%0	

The Second: Table (7) shows the extent to which the American methodology (PMI-SP) (project scheduling management) is adopted in scheduling and planning irrigation and drainage projects scheduling in the Public Authority for the Maintenance of Irrigation and drainage projects, that the American methodology for project scheduling management (unaccredited) and the amount of relative importance was (24%), that is, it is (rare in accreditation), and the reason for this is due to the lack of specialized courses in (PMI-SP), in addition to the lack of mandatory instructions for applying this methodology in General Authority for Operation and Maintenance of Euphrates River Basin Projects

Table (7): shows the relative importance of adopting the American methodology (PMI-SP) to manage project scheduling

Is the American methodology PMI-SP used for scheduling professional projects in planning the work of your organization?					
always depend	often depend	sometimes depend	rare accreditation	Not supported	Relative importance
1	1	6	3	21	24%

The Third: Table (8) shows the methods of planning and management of scheduling, that the adoption of tape schemes has a relative importance of (72%). It is prevalent in the construction sector, and the researcher suggests that the line of balance (LOB) method should be used in irrigation and drainage projects because they are projects of a repetitive nature.

Table (8): shows the relative importance of the planning and scheduling management methods used in General Authority for Operation and Maintenance of Euphrates River Basin Projects

Which of the planning and scheduling methods used in your organization?						
methods	Always	frequently	Sometimes	Scarcely	not used	Relative importance
Ganttchart(Bar chart)	17	7	5	0	3	72%
Review Technique (PERT)	0	2	6	3	21	23%
Balance(Lob)	0	1	4	4	23	19%
Activity on Node (AoN)	0	1	6	6	19	23%
Activity on Arrow (AoA)	0	2	7	5	18	26%
Others	0	4	7	3	18	28%
There is no specific technique	2	2	1	3	24	22%

Fourth: Table (7) shows the extent to which software is used in planning and managing project scheduling General Authority for Operation and Maintenance of Euphrates River Basin Projects. The most common and widely used program is (Microsoft Excel) and it achieved a relative importance of 62%, which indicates that advanced programs are not used in the planning and scheduling of projects for General Authority for Operation and Maintenance of Euphrates River Basin Projects Therefore, the researcher recommends relying on advanced software such as (Microsoft Project, Primavera Navisworks) in developing planning work and managing the scheduling of irrigation and drainage projects.

Table (9): shows the relative importance of using software in business planning and scheduling

What is the extent of using software in planning and scheduling your organization's projects?						
erawtfos	Always	frequently	Sometimes	Scarcely	not used	Relative importance
project Microsoft	6	5	5	2	14	42%
Primavera	2	2	9	5	14	33%
WEKA	1	1	4	1	25	20%
FRAME NEW	2	2	4	2	22	25%

Excel Microsoft	15	6	1	3	7	62%
Navisworks	1	2	3	6	20	24%
Others	5	2	5	3	17	34%
Do not use software	1	1	2	4	24	19%

The Fifth: Table (10) shows the extent to which contracting methods are applied in General Authority for Operation and Maintenance of Euphrates River Basin Projects, the priced unit contracting contract depends (always) with a relative importance of (70%), because the above contracting method is the most Circulating in the work of General Authority for Operation and Maintenance of Euphrates River Basin Projects.

Table (10): shows the extent to which any contracting method is used in the work of General Authority for Operation and Maintenance of Euphrates River Basin Projects

To what extent is each of the contracting methods used in your organization?						
Contracting methods	Always	frequently	Sometimes	Scarcely	not used	Relative importance
Contracting total amount Contract	4	5	8	6	9	43%
Priced unit contracting Contract	15	8	5	2	2	70%
Contracting cost plus Contract	0	1	7	7	17	25%

The Sixth: Table (11) shows the ways and methods of implementing projects in General Authority for Operation and Maintenance of Euphrates River Basin Projects, the method of implementing Amana is the most used (mostly) with a relative importance of (71%), while the method of project implementation is ready (turnkey) is the least used with relative importance (28%), that is, it is (rarely used).

Table (11): shows the ways and methods of executing works in General Authority for Operation and Maintenance of Euphrates River Basin Projects

To what extent are the following implementation methods used in your organization?						
Implementation methods	Always	frequently	Sometimes	Scarcely	not used	Relative importance
General Contractor Method (Bidding Method)	2	5	18	2	5	48%
Direct Execution Method	10	12	7	2	1	68%
Turnkey Project Implementation Method	3	0	5	7	17	28%
Design and execution style	4	4	9	4	11	41%
Implementation method is honesty	17	7	4	1	3	71%

The Seventh: Table (12) shows the techniques used by the scheduling management team to estimate the timings needed to complete irrigation and drainage projects in General Authority for Operation and Maintenance of Euphrates River Basin Projects the most adopted technique is personal experience, as it reached the relative importance It has (66%), while the relative importance of artificial neural networks and vector machine techniques was (16%), so the researcher recommends the need to rely on these techniques as they are more effective and more accurate in estimating the timings of irrigation and drainage projects .

Table (12): shows the technique or tool used by the team of evaluators to estimate the project time

What is the technique or tool used by the team of evaluators to estimate the time of the current project?						
Technologies	Always	frequently	Sometimes	Scarcely	not used	Relative importance
Artificial Neural Networks	0	1	3	1	27	16%
Support vector Machine	0	2	1	2	27	16%
Historical Data	1	6	7	6	12	36%
Analog Model	0	4	2	2	24	21%
Parameter Model	0	4	5	1	22	24%
personal experience	12	8	8	1	3	66%

The Eighth: Table (13) shows the degree of interest and focus on the use of Building Information Modeling (BIM) technology in planning and scheduling management work in General Authority for Operation and Maintenance of Euphrates River Basin Projects. (BIM) (not used) and the degree of relative importance was (34%) due to the failure to keep pace with the development of building information modeling techniques for employees of General Authority for Operation and Maintenance of Euphrates River Basin Projects.

Table (13): shows the interest and focus on the use of Building Information Modeling (BIM) technology

Is there interest and focus on using the latest Building Information Modeling (BIM) technologies regarding project planning and scheduling and keeping pace with modern project management technology?					
Always	frequently	Sometimes	Scarcely	not used	tanceRelative impor
1	3	11	3	14	34%

The Ninth: Table (14) shows the method of preparing follow-up reports for planning and scheduling management work in General Authority for Operation and Maintenance of Euphrates River Basin Projects, the relative importance of preparing monthly reports was the most important and amounted to (81%), followed by the annual reports With the importance of a percentage of (73%), and these results indicate that the General Authority for Operation and Maintenance of Euphrates River Basin Projects depends on the use of monthly reports in following up on its work.

Table (14): shows how to use the preparation of follow-up reports for business

How to use follow-up reporting in your organization for technical work be?						
Reports	Always	frequently	Sometimes	Scarcely	not used	Relative importance
Daily	4	8	5	4	11	44%
Weekly	5	9	12	0	6	54%
Monthly	22	8	1	0	1	81%
Quarterly	8	5	6	3	10	49%
Annual	19	7	1	1	4	73%

Ten: Table (15) shows the responsibility for preparing the planning and scheduling management work in General Authority for Operation and Maintenance of Euphrates River Basin Projects. the Planning and Supervision Departments are responsible for planning and scheduling management work, as the relative importance of them reached (76%) and (68%) respectively. This is logical because it is one of the priorities of these departments.

Table (15): shows who is responsible for using planning work and scheduling management

Who is responsible for the use of planning and scheduling work?						
Administrator	Always	frequently	Sometimes	Scarcely	not used	Relative importance
General Director	4	5	15	3	5	50%
Planning Department	16	12	3	0	1	76%
project manager	5	11	10	1	5	56%
Resident Engineer	6	4	8	3	11	44%
Supervision Department	9	16	4	1	2	68%

Eleven: Table (16) shows the responsibility for preparing the supervision and follow-up work in the General Authority for the Maintenance of Irrigation and Drainage Projects, the technical department took the highest percentage in the supervision and follow-up work of technical works with a relative importance of (77%), followed by the supervision department Relative importance (70%), and this indicates that the technical department is responsible for the technical monitoring work to follow up on advances and spurs, and that the supervision department is responsible for following up on completion rates and work progress programs for monitoring and follow-up work in General Authority for Operation and Maintenance of Euphrates River Basin Projects

Table (16): shows who is responsible for the use of supervision and follow-up works for technical works in General Authority for Operation and Maintenance of Euphrates River Basin Projects

Who is responsible for the use of monitoring and follow-up work?						
Administrator	Always	frequently	Sometimes	Scarcely	not used	Relative importance
Planning Department	1	11	3	7	10	41%
project manager	4	9	8	3	8	49%
Resident Engineer	9	6	7	4	6	55%
Supervision Department	13	13	2	1	3	70%
Technical Department	16	13	2	0	1	77%

Twelfth: Table (17) shows the use of planning and scheduling management standards in the General Authority for Operation and Maintenance of Euphrates River Basin Projects approved by the American Institute PMI-PMBOK. 55%), then the criterion for defining project implementation activities is the least used with relative importance (39%).

Table (17): shows the standards of planning management and scheduling management for business and approved by the American Institute PMI-PMBOK

Have the planning and scheduling management standards been used in your organization and approved by the American Institute PMI-PMBOK?						
Standards for planning and scheduling management	Always	frequently	Sometimes	Scarcely	not used	Relative importance
Define project implementation activities	1	9	6	3	13	39%
Logical sequence of activities	1	7	12	3	9	43%
Estimating the resources required to implement the activities	1	11	7	2	11	43%
Estimating event times	1	11	9	3	8	46%
Establishing a schedule for the project's activities	4	11	8	3	6	53%
schedule control	7	8	9	2	6	55%

The Third Axis: Obstacles and Difficulties Facing the General Authority for Operation and Maintenance of Euphrates River Basin Projects in Planning and Scheduling Management.

This topic includes three questions about the obstacles and difficulties facing the planning and scheduling management work in the Public Authority for the Maintenance of Irrigation and Drainage Projects.

The First: Table (18) shows the extent to which irrigation and drainage projects have been completed within the estimated period in the planning and scheduling management stage in General Authority for Operation and Maintenance of Euphrates River Basin Projects. from the estimated period), meaning that the actual period for the completion of irrigation and drainage projects is greater than the estimated period and with a relative importance of 65%.

Table (18): shows the extent to which the projects have been completed in the actual used period assigned to them

Based on your previous experience, how long have the projects been completed in the actual used period of time assigned to them?						
the available choices	Always	frequently	Sometimes	Scarcely	not used	Relative importance
Less than the estimated duration	0	6	15	7	4	44%
Corresponds to the estimated duration	6	9	10	3	4	56%
greater than the estimated duration	4	17	10	1	0	65%

The Second: Figure (9) shows that there are three main totals for the reasons behind the deviation of the planning and scheduling management programs on the planned time. Related to the planning work is (lack of sufficient information about the project environment (53%)), while the reasons related to the design work are (the experience of the designer (51%)), and the reasons related to the implementation work are (security conditions (52%)).

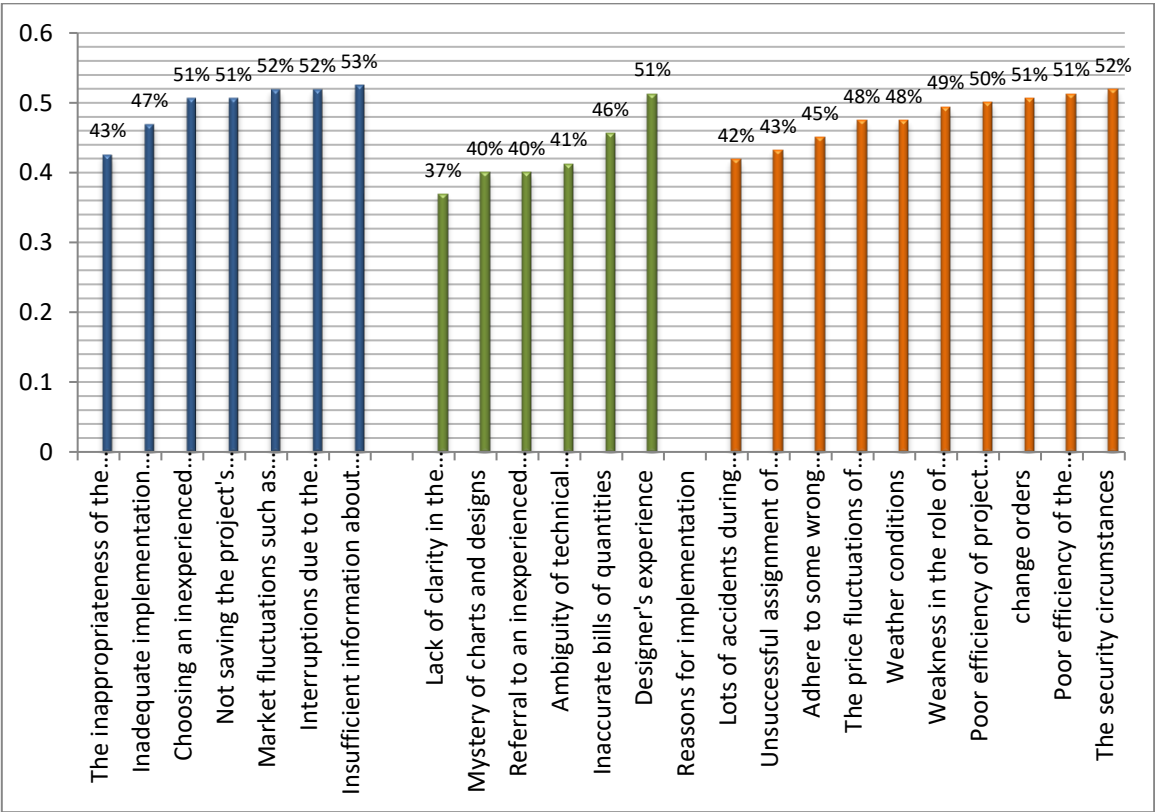


Figure (9): shows the reasons behind the deviation of the planning and scheduling management programs on the planned time

The Third: Figure (10) shows that there are ten logical reasons that lead to the poor efficiency of planning work in General Authority for Operation and Maintenance of Euphrates River Basin Projects, the main reasons for the poor efficiency of planning and scheduling management in irrigation and drainage projects, as the reason was (Failure to provide the required expertise in modern software applications for planning and scheduling management) is the most important relative amounting to (65%), and the least influential is (weak efficiency of technical departments such as the planning and supervision department, the technical department and the studies and designs department) and the relative importance to it (49%), and that The researcher agrees with the opinions of the study sample in determining the relative importance of these causes.

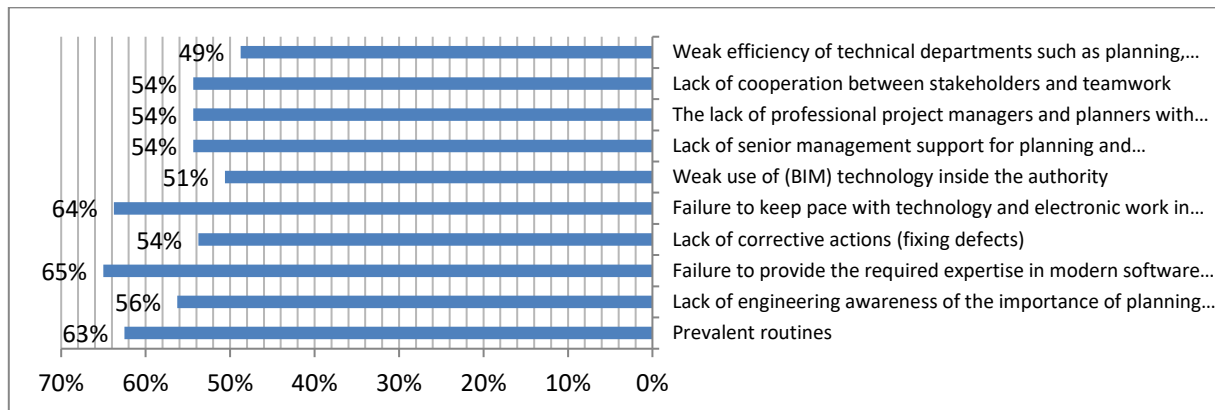


Figure (10): shows the degree of importance of the impact of causes on poor planning efficiency

Fourth Axis: This Axis Shows the Degree of Influence of Causes on the Weak Efficiency of Scheduling Management.

This axis includes five questions that show the degree of influence of the causes on the weak efficiency of scheduling management, which are as follows:

The First: Figure (11) shows the reasons related to the contracting documents, that the lack of accurate and detailed calculation of the quantities of the work paragraphs and the inconsistency of the schedule of quantities with the executive project paragraphs are all important reasons that contribute to the poor preparation of time programs, as the relative importance of them respectively reached (74 %) and (71%), meaning that the evaluation of these for reasons falls within the evaluation of (important), so the researcher believes that this evaluation is relatively high and that there is an important necessity for the responsible party to be interested in preparing contracting documents, especially preparing bills of quantities with accuracy and clarity in its work.

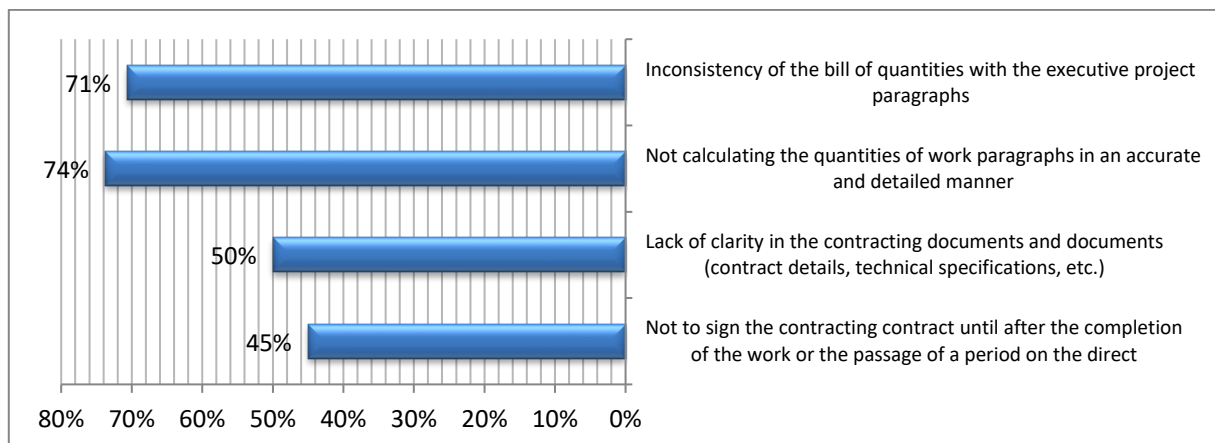


Figure (11): shows the percentages of reasons related to the contracting documents

The Second: Figure (12) shows the weakness of the management of the time programs related to the management of the implementing agency, that all these reasons have a relative importance that exceeds (50%) and therefore the project parties must take these reasons into consideration when Preparing time programs for irrigation and drainage projects. We also note from the above table and figure that more than half of the sample members considered the weakness of some departments in performing their duties towards the time programs. It is considered a very important reason for the weakness of the process of preparing time programs, which makes the relative importance of this reason (62%) within Evaluation is (important), which requires attention to this reason when preparing time programs, and the reason for the absence of periodic coordination meetings between the main departments ranked second in terms of relative importance (61%), and this reinforces the relative importance for two other reasons (lack of qualified cadres to prepare time programs, methods The time programs used in preparing the time programs are inefficient), which is the relative importance of both reasons (59%).

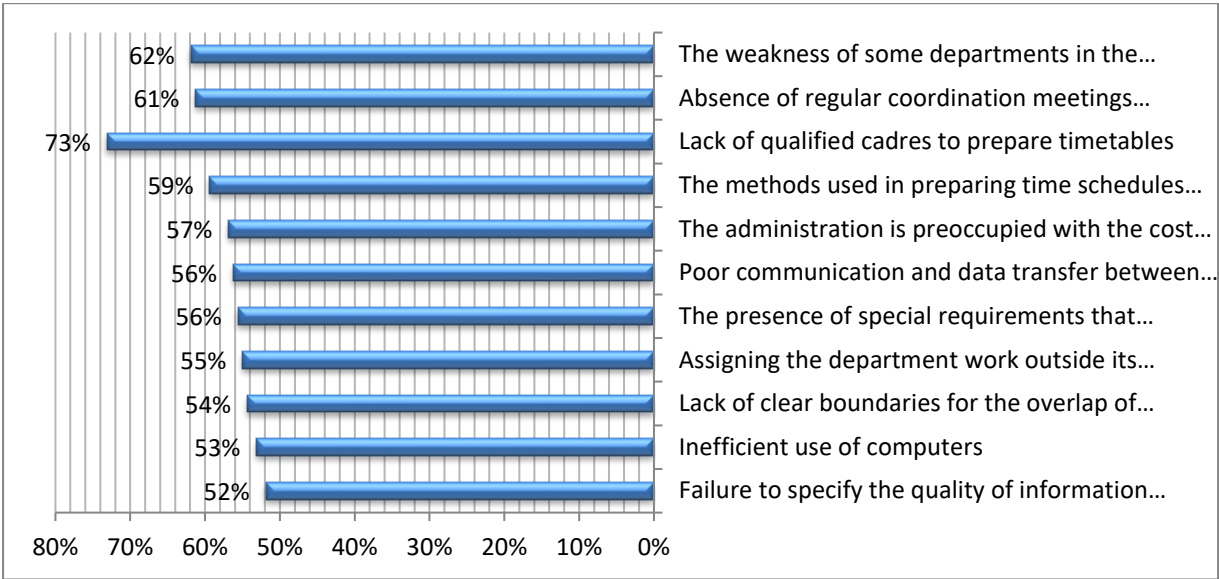


Figure (12): Shows the Weakness of the Management of Time Programs Related to the Management of the Implementing agency

The Third: Table (19) shows the reasons for the poor preparation of time programs related to the nature of irrigation and drainage projects, as some irrigation projects that are implemented for security or political reasons require speed in implementation, so the researcher tried to explain the most important reasons that lead to the weakness of the process of preparing time programs for these irrigation projects Which are mostly implemented in a direct implementation method. The researcher found, through field coexistence with these projects, that there are two main reasons:

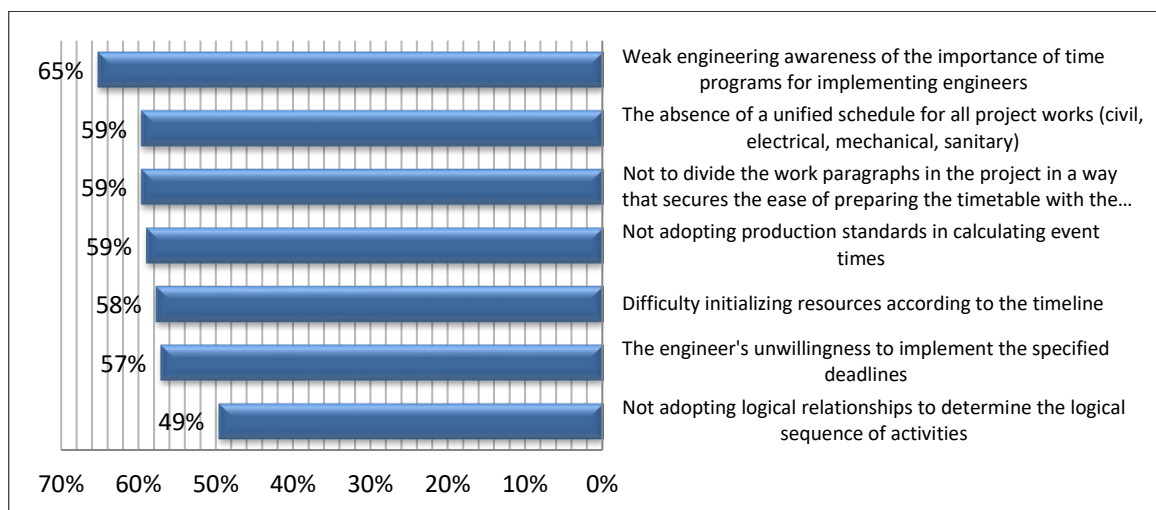
- 1- Non-participation of the project manager in the process of preparing the timetable for the irrigation project responsible for its implementation.
- 2- Commencement of the implementation of the work before informing the higher management of the task of implementation entrusted to them and in accordance with the orders issued by the employer.

That (53%) of the sample members gave an answer (important) for the reason why the project manager did not participate in the preparation process for the time schedule of the irrigation project responsible for its implementation. Which makes the relative importance of this reason (70%), as well as that (41%) of the sample members gave an answer (very important) to the reason for starting to implement the work before informing the higher management of the implementation task entrusted to them is of relative importance (63%).

Table (19): Shows The Reasons for the Poor Preparation of Time Programs Related to the Nature of the Project

Reasons	very important	Important	medium importance	insignificant	not important	Relative importance
Commence the implementation of the work before informing the higher management of the implementation task entrusted to them	13	5	6	5	3	% 63
Non-participation of the project manager in the process of preparing the timetable with the competent authority	8	17	6	1	0	% 70

Fourth: Figure (13) shows the reasons for poor preparation of time programs related to planning work and scheduling management. Because most of the answers of the sample members (19 out of a total of 32) focused on the fact that this reason is (important), and this is what the researcher agrees with. Therefore, this reason leads to a disruption or weakness in the process of preparing time programs for the narrative project, and came in second place in terms of relative importance because there was no A unified time schedule for all project works (civil, electricity, mechanics, drainage). This factor has a relative importance of (59%), and the researcher believes that this reason plays an important role in the process of preparing time programs.

**Figure (13): Shows the Reasons for the Poor Preparation of Time Programs Related to Planning Work**

The Fifth: Figure (14) shows the reasons for the weakness of preparing time programs related to control and follow-up, that all these reasons have a relative importance that exceeds (50%) and therefore the project parties must take these reasons into consideration when preparing Time programs related to control and follow-up of irrigation and drainage projects, as well as we note from the table and figure that the effectiveness of the weak efficiency of using ready-made electronic follow-up and monitoring programs is a very important reason for the weakness of the process of preparing time programs related to control and follow-up, which makes the relative importance of this reason (63%) within the evaluation (Important), which requires attention to this reason when preparing the time programs, and the reason for the lack or weakness of the capabilities of the technical staff charged with following up and monitoring the plan ranked second in terms of relative importance, as it reached (62%).

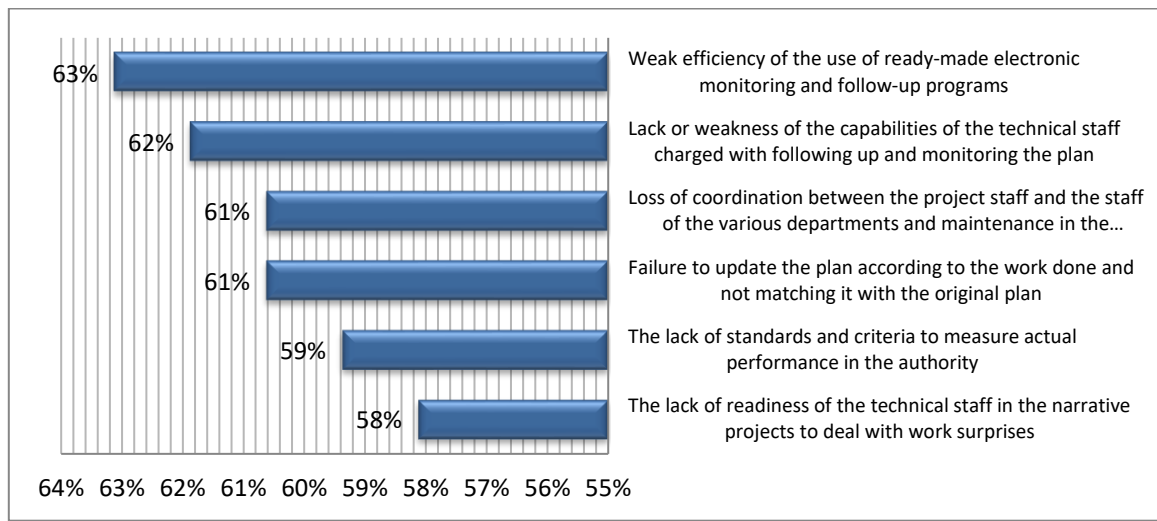


Figure (14): Explains the Reasons for the Poor Preparation of Time Programs Related to Control and Follow-Up

b) The results will be displayed according to the sequence provided in Form No. (2).

Assessing the status of planning and scheduling management works in terms of implementation and maintenance in the work of General Authority for Operation and Maintenance of Euphrates River Basin Projects.

This axis includes two main questions about the status of planning work and scheduling management in the General Authority for Operation and Maintenance of Euphrates River Basin Projects in terms of estimating the duration of new projects or maintenance projects, as follows: -

The First: The factors affecting the estimation or estimation of the implementation periods of irrigation and drainage projects are (26) influential factors, as it appears from Figure (15) that the most important factor in estimating or estimating the implementation periods of irrigation and drainage projects is (the availability of cash) , as this factor obtained a relative importance of (82%), followed by the factor (equipment and machinery efficiency) with relative importance of (76%), then the factor (the number and type of mechanisms used) with an importance of (75%), and so on down to the official holidays. and occasions (55%).

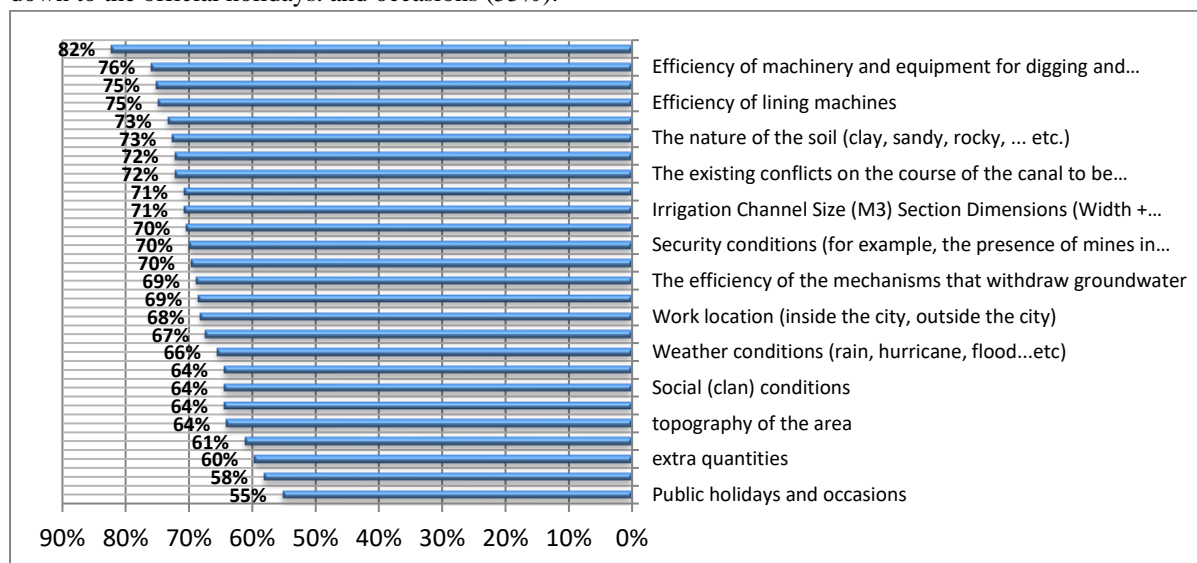


Figure (15): Shows the Factors Affecting the Estimation or Change of the Implementation Periods of the Irrigation Channel Projects

The Second: The factors affecting the estimation or estimation of the maintenance periods of irrigation and drainage projects, which are (19) are influencing factors, as Figure (16) shows that the factor (the availability of cash) represents the greatest relative importance (83%), followed by the factor (machine efficiency). and equipment) with a relative importance of (79%), and the least relative factor is (holidays and occasions) with a percentage of (54%).

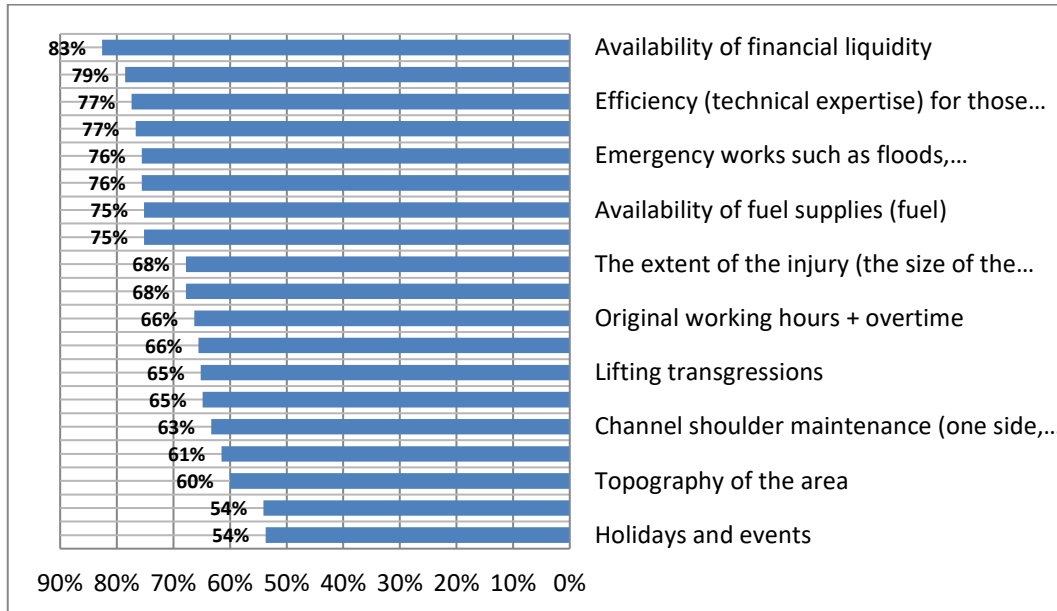


Figure (16): Shows the Factors Affecting the Estimation or Estimation of Maintenance Periods for Irrigation and Drainage Projects

CONCLUSIONS

By reviewing the results of the brainstorming and the questionnaire, the following conclusions can be drawn:

- 1) The research sample was comprehensive for most of the engineering specializations and that the engineers were in various functional, administrative and technical positions, with scientific levels and high experience in various types of irrigation and drainage projects in the Republic of Iraq.
- 2) Most of the sample members emphasized that planning and scheduling management work in irrigation and drainage projects are very important and of relative importance (72%).
- 3) The straight line diagram is one of the most widely used planning methods in irrigation and drainage projects in the Republic of Iraq.
- 4) The most important reasons for deviation in work progress programs from what was planned in irrigation and drainage projects are poor planning and implementation together, with a relative importance of (53%) and (52%), respectively.
- 5) The answers of the research sample members showed that there is a lag in the use of engineering software in planning and scheduling management work in General Authority for Operation and Maintenance of Euphrates River Basin Projects
- 6) There are sixty-three effective reasons regarding the process of planning and scheduling management and make it not feasible for implementation and practical application that the researcher reached from them, (not calculating the quantities of work paragraphs in an accurate and detailed manner) came in the first place with relative importance (74%), then it comes in the second place (The lack of qualified cadres to prepare the time programs) with a relative importance (73%), and sixteen reasons were excluded because they had a relative importance less than (50%).
- 7) The influencing factors in estimating the implementation and maintenance periods in the General Authority for Operation and Maintenance of Euphrates River Basin Projects in the Republic of Iraq that the researcher reached are

forty-five reasons, including (the availability of financial liquidity) with relative importance (83%) in the first place and then followed by (the efficiency of machines and machines and equipment used) with relative importance (79%).

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