

Evaluation of the Current Status of the Cost Control Processes in Iraqi Construction Projects

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ABSTRACT

One of the most important problems of Iraqi construction projects is the cost variances, so it is important to identify the problems and shortcomings that cause poor cost control. Through the utilization of questionnaires, the study evaluated how project costs were managed and reported. The questionnaire was distributed to 180 professionals working in the Iraqi construction sector, with a response rate of 91%. The results showed that a high percentage of projects are implemented with a difference between real and estimated costs, and the process of documenting cost data needs to be more secure. On the other hand, there is a weakness in providing the necessary work structure information to monitor costs and a lack of processing of the required data regarding mechanisms and equipment and problems. It is related to the accuracy of the estimation and the management and documentation of labor wages. Most of the problems are the lack of appropriate systems to implement cost control appropriately.

Keywords: Cost Control, Construction Project, Evaluation.

تقييم الوضع الحالي لعمليات مراقبة التكاليف في المشاريع الانشائية العراقية

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الخلاصة

واحدة من اهم مشاكل المشاريع الانشائية العراقية هو تفاوت الكلف، لذلك من المهم تحديد المشاكل وواجه القصور التي تتسبب بضعف السيطرة على الكلف. من خلال استخدام الاستبيانات، قيمت الدراسة كيفية إدارة تكلفة المشروع والإبلاغ عنها. تم توزيع الاستبيان على ١٨٠ من الخبراء العاملين في قطاع الانشاء العراقي وبنسبة استجابة وصلت ٩١%. اوضحت النتائج ان نسبة عالية من المشاريع تنفذ باختلاف ما بين الكلف الحقيقية والمخمنة كما ان عملية توثيق بيانات الكلف بحاجة على ان تكون أكثر امان. من جهة اخرى هناك ضعف في توفير معلومات هيكل العمل الضرورية لمراقبة الكلف وأيضاً قصور في تجهيز البيانات

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Peer review under the responsibility of University of Baghdad.

<https://doi.org/10.31026/j.eng.2023.01.08>

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Article received: 1/7/2022

Article accepted: 18/8/2022

Article published: 1/1/2023



المطلوبة فيما يتعلق بالآليات والمعدات ومشاكل تتعلق بدقة التخمين وإدارة اجور العمالة وتوثيقها. وان مرجعية اغلب المشاكل هو الافتقار الى انظمة مناسبة لتنفيذ سيطرة الكلف بشكل مناسب
الكلمات الرئيسية: سيطرة الكلف، المشاريع الانشائية، تقييم.

1. INTRODUCTION

The process of collecting, storing, analyzing, evaluating, reporting, and managing costs is known as cost control (**Al-Jibouri, 2003**). Controlling the costs of the construction project can be considered starting from the initial stages, considering that cost savings can be achieved in the pre-construction stages, but the construction stage is more important as any action that would increase the cost must be taken into account, as the main objective of cost control is to identify deviations that occur in the cost compare the cost set in the project plan, and then take appropriate decisions (**Bahaudin et al., 2012**). The cost control procedure should never be inactive; rather, it should be active, alive, and always working throughout the construction phase. The main and important challenge in controlling costs comes from the fact that the owner has limited money for the project (**Cunningham, 2015**). During the early stages of the project, the design of the project is sought within the budget specified by the owner, and usually, the owner is not willing to spend more money than the specified budget (**Cunningham, 2015**). The IBM SPSS software is used as a statistical analysis software in the social sciences. At the same time, many researchers from different branches of knowledge use this software to conduct statistical analysis of their data within the interfaces and features provided by this software (**Gunarto, 2019**). The IBM SPSS software has been used in this research to complete the required analysis and build conclusions. The current research deals with identifying the current practices related to cost control in Iraqi construction projects to identify the shortcomings and the possibilities for improvement.

2. Questionnaire Design

In the beginning, previous research was examined to gather, arrange, and analyze relevant information in a method that was suitable for the intended goal. The information was then put through a series of conversations, analyses, and revisions to create the questionnaire. Appendix A contains a form of the questionnaire that was distributed
The questionnaire included two components. There will be an explanation for each question on the survey.

2.1 Part One / General Information

This part includes general information about the concerned entity (such as its type and name) and information about the people who fill out the questionnaire from the target community in the study (specialization, educational qualification, Current field, and experience years).

2.2 Part Two / Evaluation of the Current Status of the Cost Control Process in Construction Projects

This part contains a set of questions to investigate and know the nature of current practices related to cost control in Iraqi construction projects. The questions in this section included the question about the extent to which projects are implemented within their cost and duration and the amount of transparency and cooperation in managing cost data. Also, the question about the extent of interest in applying organizational matters in projects that will facilitate the process of managing cost data and the extent of the quality of data



archiving. In addition to asking about reports related to cost management and control and the mechanisms and techniques used. The questions in this part are designed as a closed-ended questions and this part includes twelve questions. Closed-ended questions are more difficult to create than open-ended ones, but they produce more efficient data collection, processing, and analysis (Bourque and Fielder, 2003).

3 Questionnaire Data Analysis

3.1 Validity and Reliability

One of the most crucial elements in obtaining an acceptable and beneficial result is the use of strong research tools. One of the researcher's main objectives, according to (Behjati, 2015), is to create his research tool and give it three crucial characteristics (be meaningful, accurate, and efficient). To determine the amount of validity and reliability, the data gathered were put through the necessary tests using the statistical analysis software (IBM SPSS) (Statistical Package for the Social Sciences) Version 26.

The validity test determines the correlation coefficients between each item in a certain part and the portion as a whole (Loewenthal and Lewis, 2018). Table 1 displays the results of the internal validity test for the second portion of the questionnaire related to the evaluation of the correlation coefficients obtained for each item independently within the two parts of the questionnaire using Spearman's Rho correlation coefficient.

Table 1. Correlation Coefficients for the Items of the Second Part (Spearman's Rho)

S	Item	Correlation Coefficient	Sig. (2-tailed)
1	Is the actual cost of the completed project different from its estimated cost?	0.674**	0.000
2	Is what is being accomplished in the project compatible with what is planned regarding items and at the same planned cost?	0.674**	0.000
3	Is there privacy and transparency in the cost data documentation process (i.e., is there defining clear and explicit roles and responsibilities for each party towards entering the required data and necessary for the process of cost management and control)?	0.702**	0.000
4	Is an appropriate and detailed structure prepared for the work and tasks of the project items?	0.751**	0.000
5	Is an inventory of the possible machines to be used in the project based on the data of the project and provides all the necessary information about it before starting implementation?	0.672**	0.000
6	Do the quantities estimated to be used for each item differ from the quantities actually used?	0.674**	0.000
7	Are there regular records to record workers' wages periodically?	0.667**	0.000



8	The work reports system, which represents the completed quantities of work, and the amount of costs for completion of these quantities (materials, manpower, machinery, and other expenses) is	0.384**	0.000
9	Are comparisons made between the progress of the actual work with what is planned?	0.640**	0.000
10	If the comparison process is conducted, the comparison period takes place in periods	0.349**	0.000
11	Is there difficulty in coordinating communications and information available between the parties involved in cost management and control?	0.751**	0.000
12	Is there an appropriate cost system to control implementation costs in construction projects?	0.335**	0.000

The correlation coefficients ranged from (0.335) to (0.751), and P-values were less than 0.05. This shows that all the elements are consistent and can be used to measure what has been set up for the test.

The value of the Alpha Cronbach constant, which ranges from 0 to 1, is one of the most important techniques for calculating reliability; closer to 1 means a higher reliability (Garson, 2013).

According to the value of the Alpha-Cronbach coefficient, Table 2 shows classification for the degree of reliability.

Table 2. Reliability Cutoff Values (Yockey, 2017)

Cronbach's alpha	Degree of Reliability
$\alpha \geq 0.9$	Excellent
$0.9 > \alpha \geq 0.8$	Good
$0.8 > \alpha \geq 0.7$	Acceptable
$0.7 > \alpha \geq 0.6$	Questionable
$0.6 > \alpha \geq 0.5$	Poor
$0.5 > \alpha$	Unacceptable

The results of the Alpha Cronbach test were compared to the standard values listed in the preceding table, and they fell within a good range with a value of 0.835.

3.2 Sample Characteristics Analysis

The following figures depict the features of the survey's target sample:

1. **Fig. 1** shows the percentage of respondents from different work entities, with the contracting companies accounting for 51 percent, the owner (Ministry, municipality, local or international institution) for 42 percent, and the Consulting offices combined accounting for 7 percent.

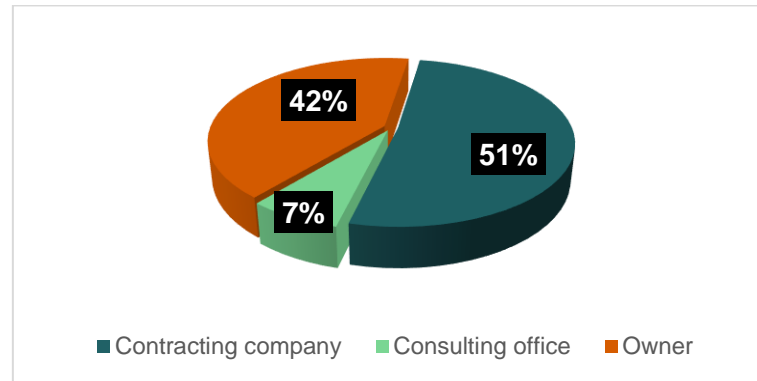


Figure 1. The Concerned Party Percentage of Respondents

The questionnaire was distributed to different agencies, as it was indicated previously that 42 percent were within government agencies, including engineering departments and project departments in different ministries such as the Ministry of Construction and Housing and Municipalities and Public Works, Ministry of Higher Education and Scientific Research, Ministry of Education, Ministry of Planning, Ministry of Health, Oil Ministry and other ministries. The sample also included several consulting and engineering offices of those currently working in the field of projects, whose percentage was set at 7 %, in addition to approximately 51 percent of contracting companies currently working in the field of projects and distributed in several governorates, including Baghdad, Diyala, Dhi Qar, Al Anbar, Basra, Erbil and others.

2. **Fig. 2** shows the percentage of respondents with a diploma 1 percent, a Bachelor's degree 56 percent, Master's degree 38% percent, Ph.D. 3 percent, and other academic qualifications (Like a higher diploma) 2 percent.

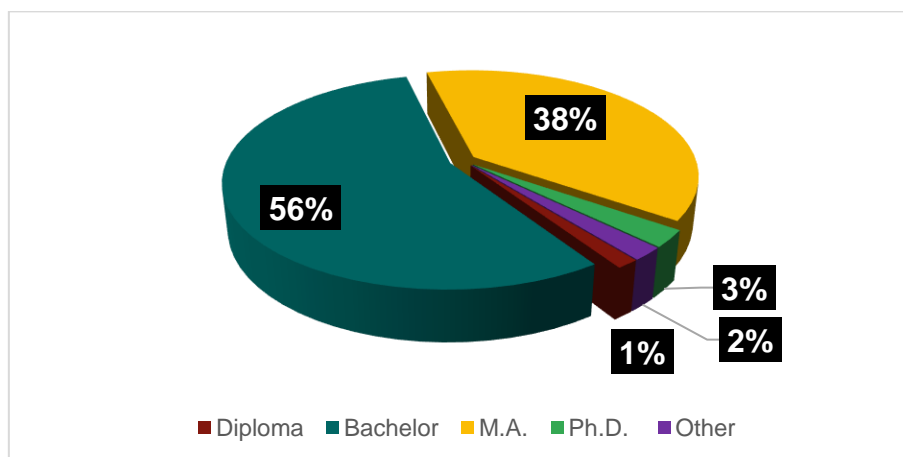


Figure 2. Respondents' Educational Levels

3. **Fig. 3** shows the specialization of responders, including Architects 1 percent, Civil Engineers 85 percent, Electrical Engineers 5 percent, Mechanical Engineers 3 percent, and others 6 percent.

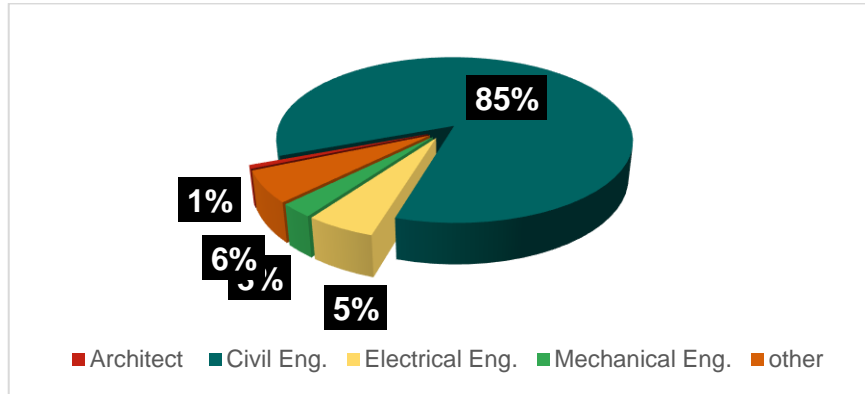


Figure 3. The Specialization of Respondents

4. **Fig. 4** depicts the demographics of the responders, showing the percentages of designers 5 percent, consultants 8 percent, project managers 19 percent, contractors 4 percent, site engineers 53 percent, and others 11 percent.

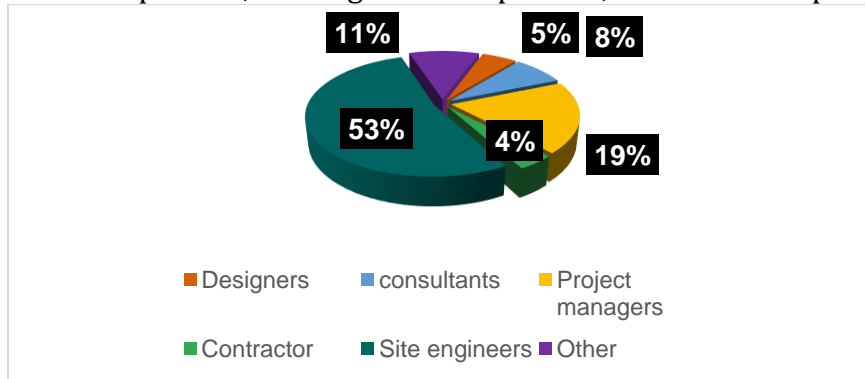


Figure 4. The Current Field of Respondents

5. **Fig. 5** illustrates the respondents' practical experience. The percentages are as follows: less than 5 years 27 percent, 5-10 years 33 percent, 11-15 years 23 percent, 16-20 years 8 percent, and more than 20 years 9 percent.

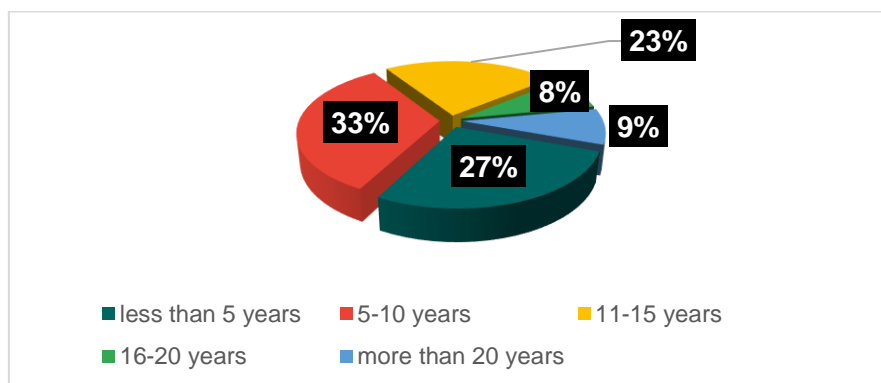


Figure 5. Respondents' Real-World Experience



3.3 Questionnaire Data Analysis / Part Two

The purpose of this part is to gain a clearer understanding of the systems and methods of work that are used to collect and document cost data, in addition to an understanding of the method of making the required comparisons between the actual data on costs and the basic data on costs, which are very necessary to make appropriate decisions. Therefore, this part included information related to project implementation and the extent to which they were exceeded within the terms of cost and systems reporting quantities of completed works also, the existence of the cost accounting system, and other information that will be clarified. Percentages of answers were calculated for each question within the second part of the questionnaire. To know the extent of the cost deviation and the importance of this aspect in achieving the expected economic feasibility of implementing the project, this part included a question about the extent of the difference in the cost of implementing the project after its completion from its estimated cost. From observing the shape of the distribution of percentages for the sample (**Fig. 6**), it is clear that the highest percentage of the sample size came in favor of the predominant difference between the actual and planned project cost by 37.1% and then 33.1% in favor of the permanent difference. Also, a ratio of 23.8% indicates that difference occurs most of the time, and 4.6% indicates that difference rarely occurs, while the lowest percentage (1.4%) was in favor of the absence of difference.

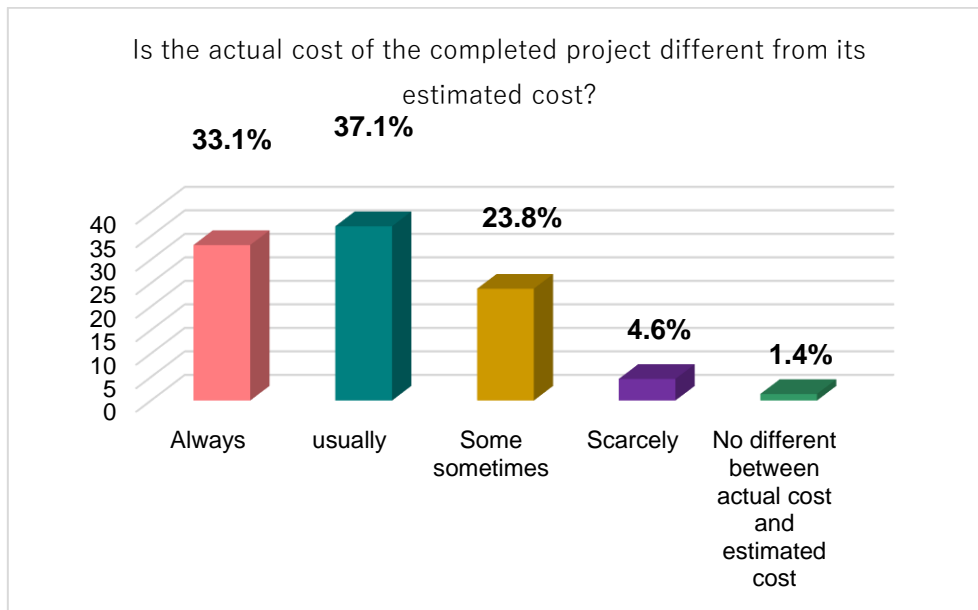


Figure 6. Percentage Distribution for First Question

In order to show the conformity of the completion of the various items of the project with their planned duration and quantities, it can be noted the distribution of the percentages (**Fig. 7**), which shows that the largest percentage, 38.4% was in favor of the lack of matching between what is planned and what is being accomplished, then 36.4% in favor of the scarcity of matching and 15.9% in favor of the occurrence matching sometimes, in addition to the percentage 5.3% for the majority of matching, and finally the least proportion 4% was the matching occurring permanently.

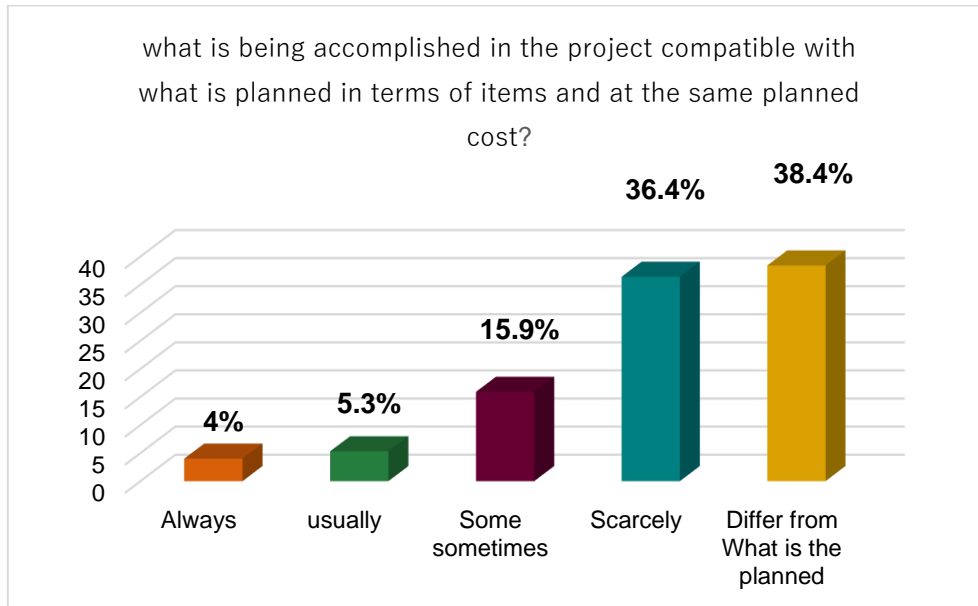


Figure 7. Percentage Distribution for Second Question

In order to know the extent of the clarity of the roles related to the entry of cost data, the form of the percentages distribution in Fig. 8, shows that the highest percentage was 27.8% in favor of privacy and clarification of roles in most cases, after 60 for the majority of privacy and 35 for its permanent presence in addition to 20 for the scarcity of privacy and finally the lowest ratio 5 for the absence of privacy.

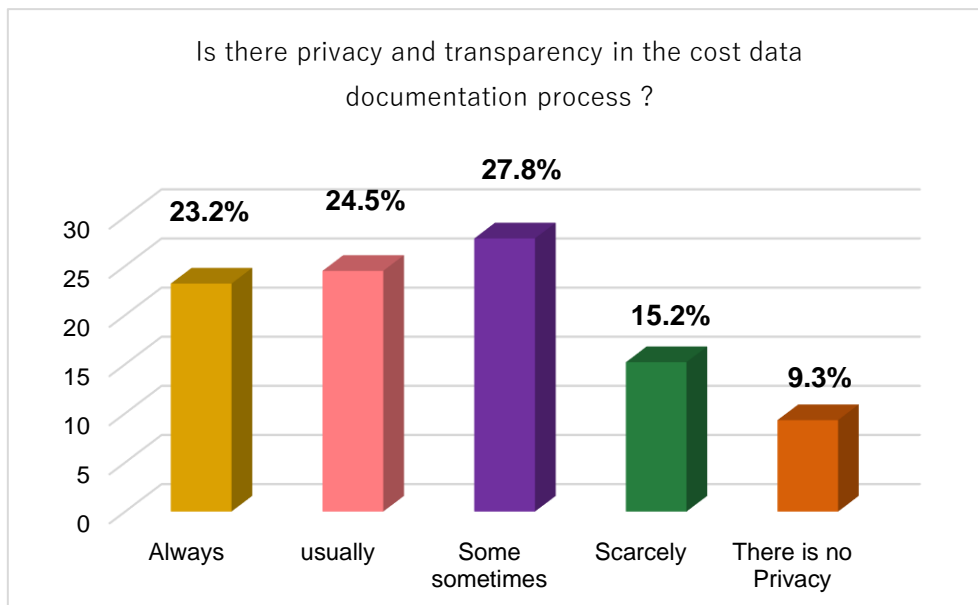


Figure 8. Percentage Distribution for Third Question

By observing the shape of the distribution of percentages in Fig. 9, the largest percentage is 40 in favor of the presence of a suitable structure most of the time, while 15 were in favor of the scarcity of a suitable structure, then 70 for the absence of an appropriate structure, and



finally the lowest percentages 15 for the majority of the presence of a suitable structure and 10 for the permanence of its existence.

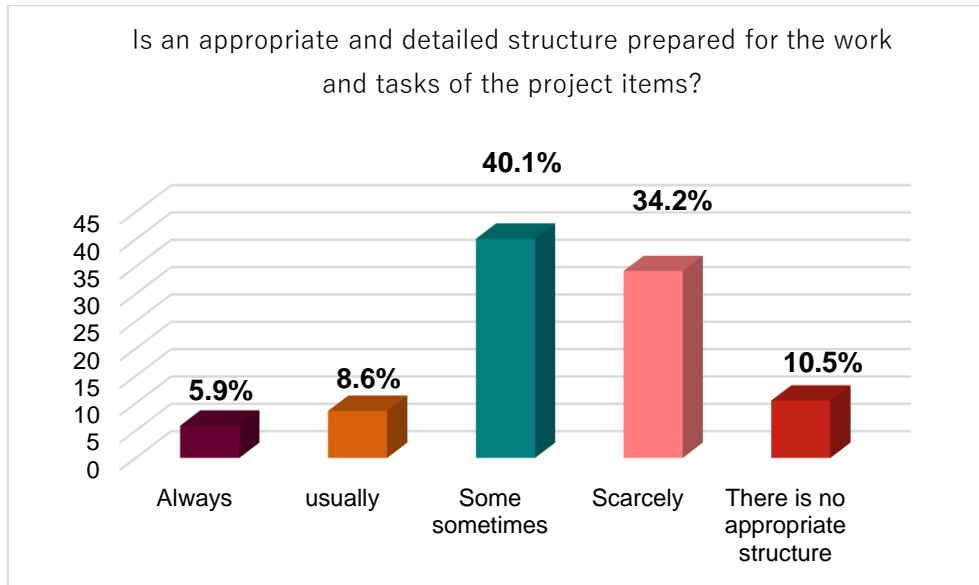


Figure 9. Percentage Distribution for Forth Question

From observing the distribution of percentages in Fig. 10, it becomes clear that the highest percentage was 30.3% in favor of no inventory, then 23.7% in favor of the scarcity of inventory, then 23.4% in favor of the presence of inventory at some times, and the last two ratios were 13.8% in favor of the majority of inventory and 8.8% for the permanence of its presence.

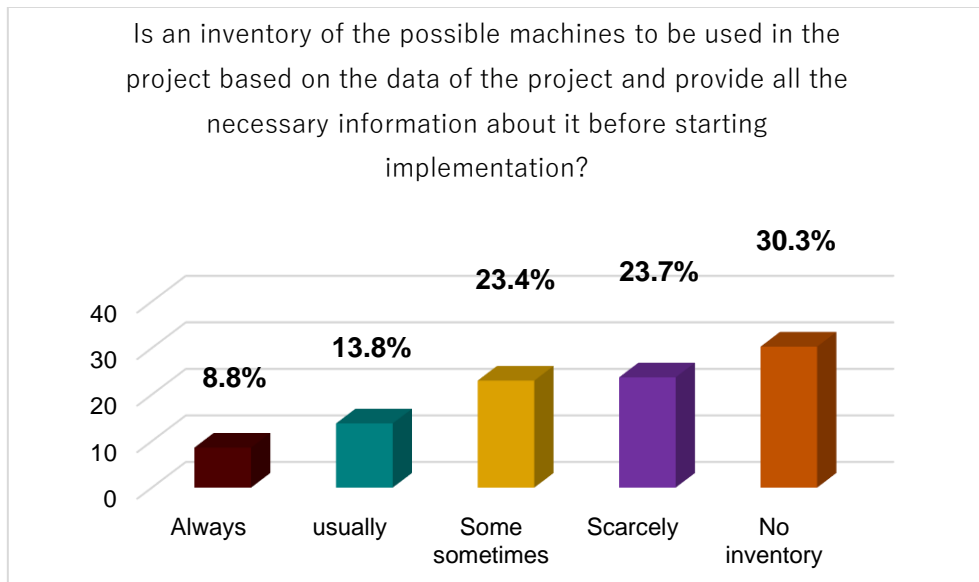


Figure 10. Percentage Distribution for Fifth Question



From observing the distribution of proportions in **Fig. 11**, it is clear that the highest percentage was 37.5% in favor of the constant difference in the quantities of actual and estimated paragraphs, then 33.6% in favor of the majority of differences, then 17.8% in favor of the presence of difference at some times, and the last two percentages were 7.9% in favor of scarcity of existence and 3.2% in favor of no difference.

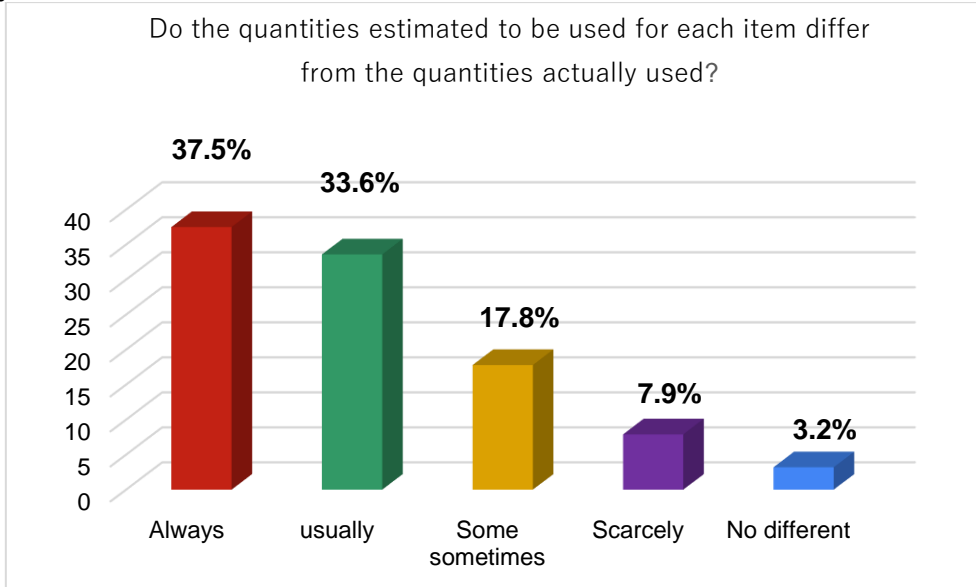


Figure 11. Percentage Distribution for Sixth Question

To find out if there are regular records for recording workers' wages periodically, it can be noted in the distribution of the ratios in **Fig. 12**, where the percentage of 38.7% was in favor of the permanent existence of records, then 23.2% for the majority of records, 15.6% for the presence of records most of the time, 12.6% for the scarcity of records, and finally 9.9% for the absence of records.

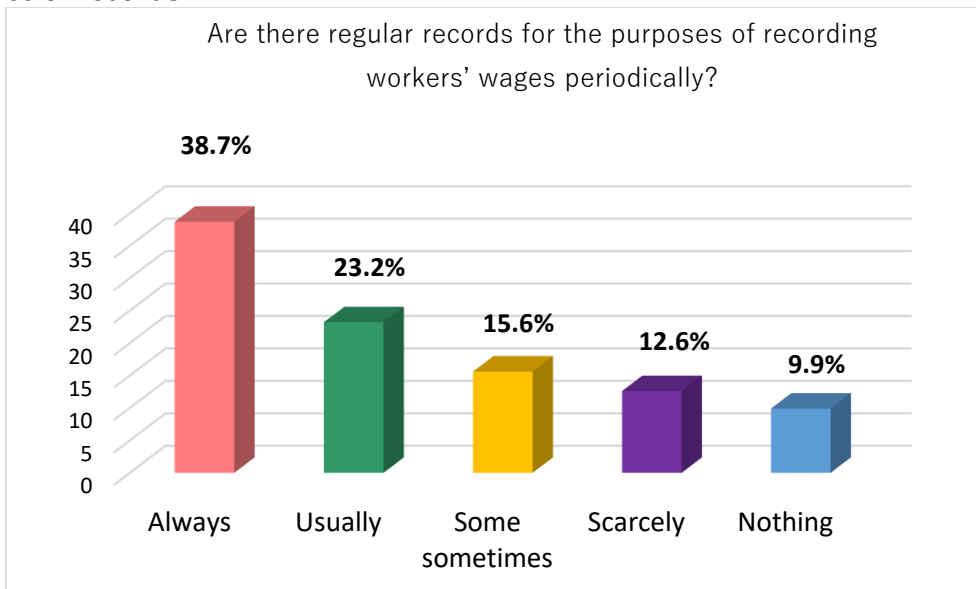


Figure 12. Percentage Distribution for Seventh Question



To find out the type of work reporting system, it can be seen that the distribution of the percentages in **Fig. 13**, where the percentage of 30.5% was according to the desire of the owner, then 27.8% for the monthly system, 20.5% for the weekly system, 12.5% for the daily system, and finally 8.6% indicated that there are no reports.

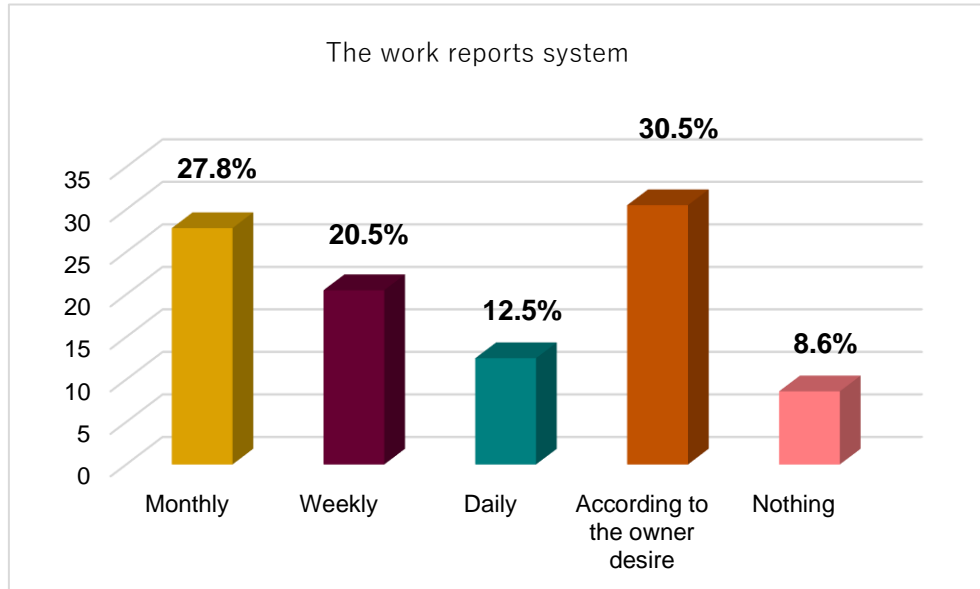


Figure 13. Percentage Distribution for Eighth Question

To find out whether a comparison is made between what is planned to be accomplished and what has actually been accomplished, the distribution of percentages can be observed (**Fig. 14**), where the ratio of 45.6% is in favor of no comparison, then 29.8% is due to the scarcity of comparison, 21.9% indicates that the comparison occurs most of the time, and 2% indicates that the comparison occurs mostly, 0.7% indicates that the comparison occurs permanently.

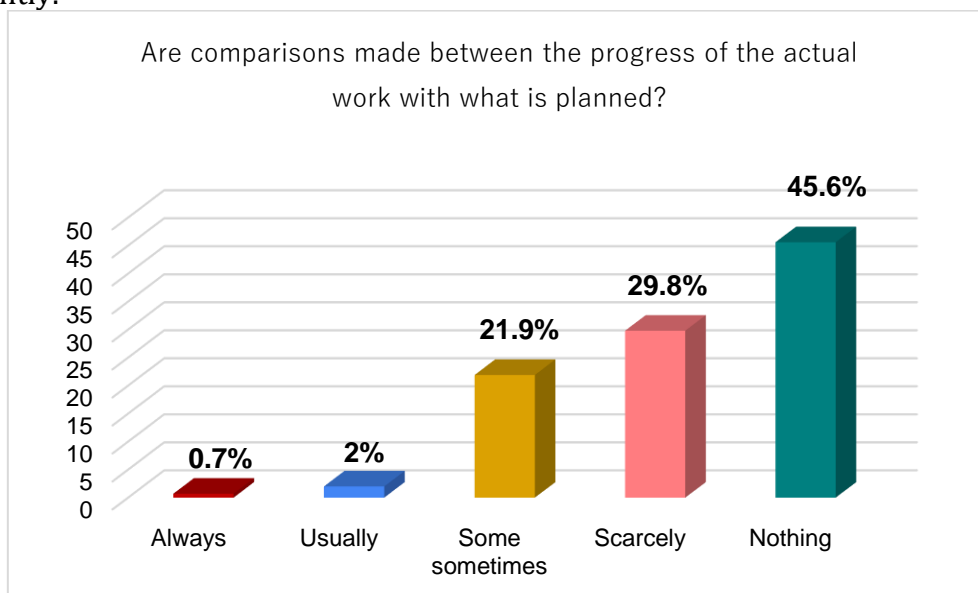


Figure 14. Percentage Distribution for Ninth Question



In order to find out the period during which the comparison between the progress of the actual works with the planned works, it can be noted the distribution of the percentages, as in **Fig. 15** as the highest percentage was 30.5% according to the progress of the work, 27.8% for the occurrence of the comparison per month, 20.5% for the comparison taking place on a weekly basis, 12.5% for the presence of the comparison on a daily basis, and finally 8.6% for the absence of occurrence of comparison.

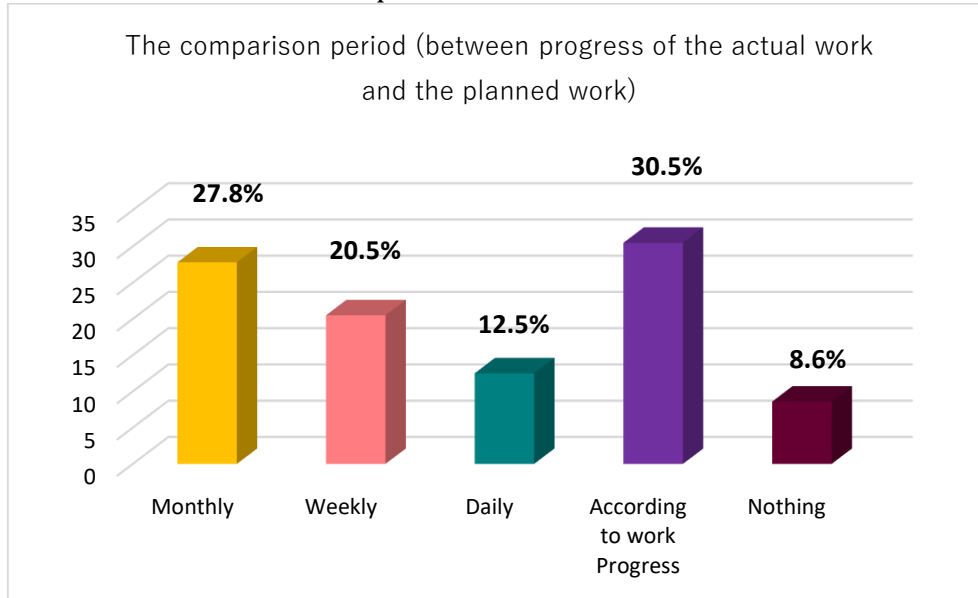


Figure 15. Percentage Distribution for Tenth Question

To find out if there are difficulties in coordinating communications, the distribution of percentages can be observed as in **Fig. 16**, where the highest percentage was 40 in favor of the presence of difficulties most of the time, 15 for the presence of difficulties in most cases, 10 for the presence of difficulties on a permanent basis, 15 for the scarcity of difficulties, and 7 for the absence of difficulties.

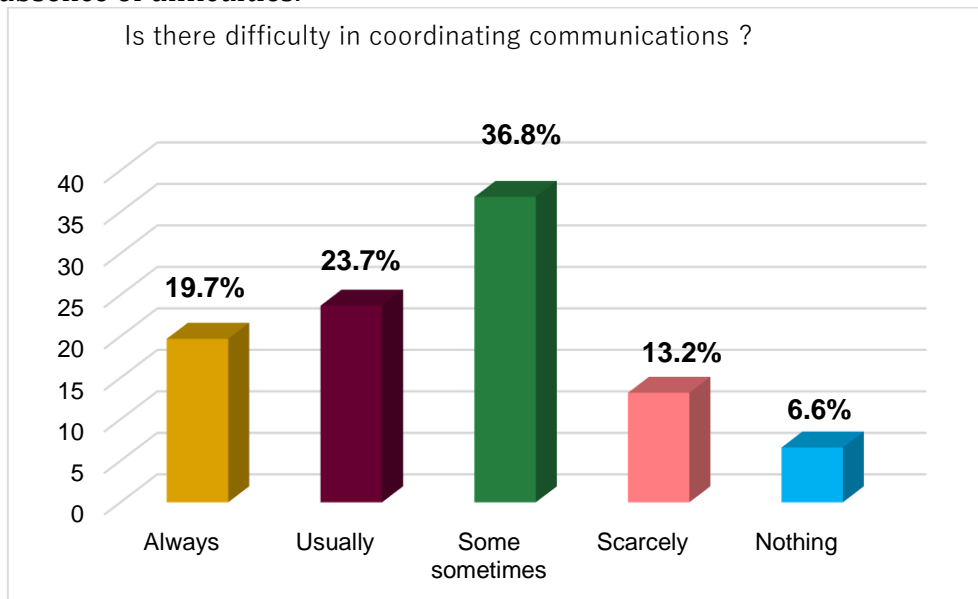


Figure 16. Percentage Distribution for Eleventh Question



For determining the existence of a project cost control system, it can be noted from Fig. 17, which shows that the highest percentage of the sample size came in favor of the absence of an appropriate cost control system at a rate of 80.8% versus 19.2% in favor of the existence of a project cost control system. The lowest percentage indicated the existence of the system. The answers varied according to the respondents. Part of them indicated the adoption of periodic monitoring and data tracking and recording through Excel. A part of the respondents indicated that they have a special electronic system. Part of them indicated that they depend on appropriate analysis of item prices and meetings dedicated to this purpose.

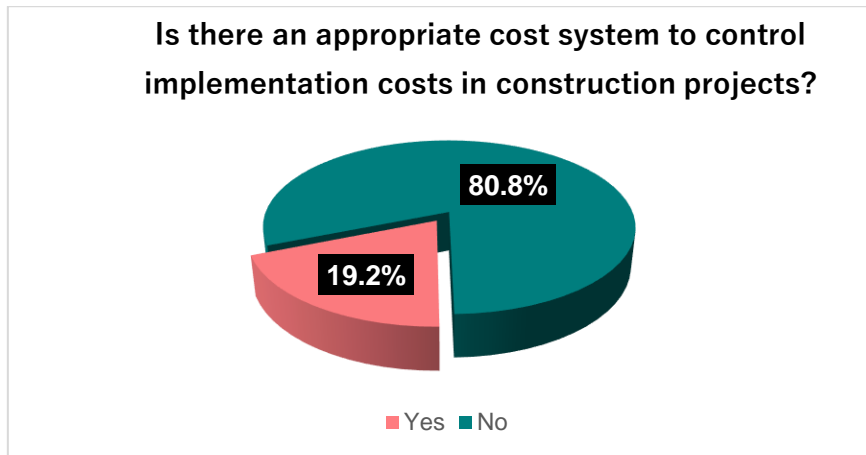


Figure 17. Percentage Distribution for Twelfth Question

The reasons indicated by the respondents that lead to the lack of an appropriate cost control system can be explained in Fig. 18.

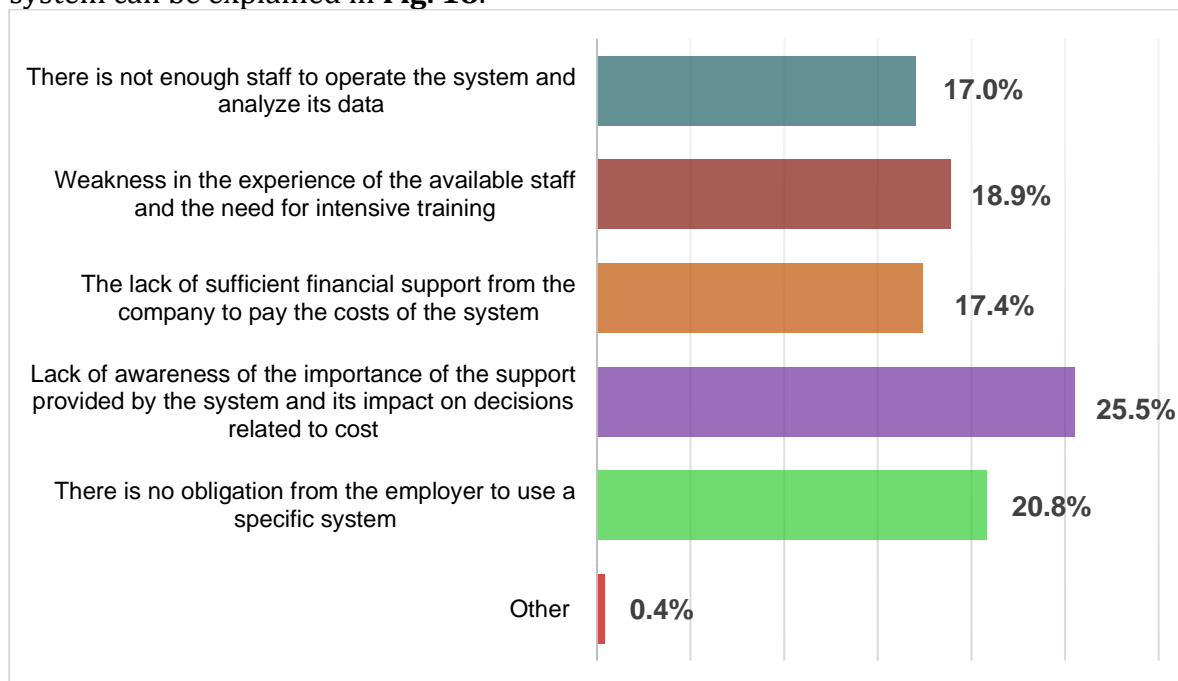


Figure 18. Reasons for the Lack of an Appropriate Cost System in Construction Projects



4 CONCLUSIONS

The research results indicate that a high percentage of Iraqi construction projects are not implemented within the estimated cost or the specified time. On the other hand, the documentation process for project cost data suffers from weakness, and there is also a lack of proper work structure planning. The research confirmed the weakness in adopting modern techniques, methods, and systems in the field of cost control, which includes weakness and a great lack of information, especially that which reaches the higher parties of the project. Also, there is a weakness in the daily documentation of the work, which affects the efficiency of cost control and does not provide accumulated experiences that can be used in future projects. A high percentage of projects, about (81 %) suffer from a lack of an appropriate cost control system due to several reasons, the most important of which is the lack of sufficient awareness of the importance and return of such systems with a percentage of 25.5%. In the second place, government agencies have no obligation to implement these regulations with a percentage (20.8%). And thirdly, the lack of experience and the need to train cadres before implementing these systems a percentage (18.9%). All these indicators give the impression that the cost control process in construction projects needs a lot of improvements.

5 Recommendations

Based on the previously mentioned conclusions, the following recommendations can be summarized:

1. To improve the control process, it is very important to integrate modern technologies into the management of construction projects, especially in the field of cost.
2. Among the important techniques that the Iraqi construction sector needs to adopt is building information modeling (BIM), which will solve many problems facing projects, including cost control.
3. There must be instructions and obligations from government agencies to implement systems and skills that can improve the cost control process in construction projects.

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Appendix A

Questionnaire Form

Part One: Personal Information of the Concerned party

The concerned party	<input type="checkbox"/> Contracting Company <input type="checkbox"/> Consulting office <input type="checkbox"/> Public and Private together
Name of the concerned part	
Information about the person completing the survey	
Educational level: <input type="checkbox"/> Diploma <input type="checkbox"/> Bachelor <input type="checkbox"/> Master <input type="checkbox"/> Ph.D. <input type="checkbox"/> Other (specify please)	Specialization: <input type="checkbox"/> Architect <input type="checkbox"/> Civil Engineer <input type="checkbox"/> Electrical Engineer <input type="checkbox"/> Mechanical engineer <input type="checkbox"/> Other (please specify)
Current field: <input type="checkbox"/> Designer <input type="checkbox"/> Consultant <input type="checkbox"/> Project Manager <input type="checkbox"/> Contractor <input type="checkbox"/> Site engineer <input type="checkbox"/> Other (specify Please)	Practical experience: <input type="checkbox"/> Less than two years <input type="checkbox"/> From 2 to 5 years <input type="checkbox"/> From 5 to 10 years <input type="checkbox"/> More than 10 years



Part Two: Evaluation of the Current Status of the Cost Control Process in Construction Projects

1- Is the actual cost of the completed project different from its estimated cost?

- Always
- Usually
- Some
Sometime
s
- Scarcely
- no different
between actual
cost and estimated
cost

2- Is what is being accomplished in the project compatible with what is planned in terms of items and at the same planned cost?

- Always
- Usually
- Some
Sometimes
- Scarcely
- Differ from
What is the
planned

3- Is there privacy and transparency in the cost data documentation process (i.e., is there defining clear and explicit roles and responsibilities for each party towards entering the required data and necessary for the process of cost management and control)?

- Always
- Usually
- Some
Sometime
s
- Scarcely
- There is no
Privacy

4- Is an appropriate and detailed structure prepared for the work and tasks of the project items?

- Always
- Usually
- Some
Sometime
s
- Scarcely
- There is no
appropriate
structure

5- Is an inventory of the possible machines to be used in the project based on the data of the project and provide all the necessary information about it before starting implementation?

- Always
- Usually
- Some
Sometimes
- Scarcely
- No inventory

6- Do the quantities estimated to be used for each item differ from the quantities actually used?

- Always
- Usually
- Some
Sometimes
- Scarcely
- No different

7- Are there regular records for the purposes of recording workers' wages periodically?

- Always
- Usually
- Some
Sometimes
- Scarcely
- Nothing



8- The work reports system, which represents the completed quantities of work, and the amount of costs completion of these quantities as (materials, manpower, machinery, and other expenses) is a (.....) reporting system

- Monthly weekly daily According to the owner desire Nothing

9- Are comparisons made between the progress of the actual work with what is planned?

- Always Usually Sometimes Scarcely Nothing

10- If the comparison process is conducted, the comparison period takes place in periods

- Monthly weekly daily according to work Progress other

11- Is there difficulty in coordinating communications and information availability between the parties involved in cost management and control?

- Always Usually Sometimes Scarcely There are no difficulties

12- Is there an appropriate cost system to control implementation costs in construction projects?

- Yes (please indicate the type of system)
 No

If the answer is “no”, please check the appropriate box about the reason for the absence of the system

(More than one reason can be indicated)

- There is not enough staff to operate the system and analyze its data
- Weakness in the experience of the available staff and the need for intensive training
- The lack of sufficient financial support from the company to pay the costs of the system
- Lack of awareness of the importance of the support provided by the system and its impact on decisions related to cost
- There is no obligation from the employer to use a specific system
- Other (Please mention them)