

## Evaluation of Management Indicators in Projects

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**Abstract.** This research study provides a methodology for calculating management indicators in construction of projects; and compares the results obtained. The purpose of this study is to evaluate and compare the management indicators for construction projects based on the opinions of practitioners of the projects. As a case study, 22 expert authorities of the construction projects of Shiraz University have been asked about the indicators, using a questionnaire that was arranged. The responses were classified in two categories; 1) Consultants and Contractors (C&C); and 2) Managers and Experts (M&E). The completed questionnaires were assessed, analyzed and the indicators were calculated separately; based on the ideas of both groups. It is found that there is a similarity between the ideas of the two groups in 25 indicators out of 38. Furthermore, the difference between twelve other indicators based on both group's ideas is small. It means that in the evaluation of 37 indicators out of 38, the ideas of both groups are similar or close to each other; which may show the accuracy in completing the questionnaire and the methodology used. In this paper, this methodology is presented; and the results are discussed.

**Keywords:** project management, managers, experts, consultants, contractors.

### 1. Introduction

Rezvanjoo (2008) indicates project's success depends highly on management practices and the potency of the project manager. Between the several indicators enhancing the success of a project, Rezvanjoo (2008) specifies that suitable management method, capabilities and the emotional intelligence of the project manager are of the most important [1]. It is important to first understand the concept of project and project management. Project is "a temporary endeavour undertaken to create a unique product, service or result" [2]. Furthermore, project management is "the application of knowledge, skills, tools and techniques related to the operations of the project in order to serve the objectives of the same project" [2].

Different researches have reviewed many management indicators, for instance: "Project Control" is managing the execution of the project based on the anticipated budget and schedule, and applying modifications and adjustments if necessary [3]. Other essential indicators that need to be considered throughout the projects are as follow: time scheduling, analyzing the sequence of practices, estimating the required resources of practices and the duration of practices' execution based on the schedule [3]. In addition, planning practices flexibly in the project will facilitate the utilization of the workforce as well as the sub-contractors [4]. Likewise, organizational performance depends highly on human resource management, human resource planning, employing talented personnel, personnel training and appropriate payment system [5]. Moreover, documenting plans and official papers carefully will yield to a proper and perfect use of the executive knowledge and experience in the future [4]. Similarly, documentation is considered as one of the most valuable pieces of information in modern project management science [4]. In addition, integration of aims, policies, activities and human resource management with the organization strategy results in an

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optimal performance [6]. This indicator becomes more significant when the negative impacts of changing the management team and consequently the incompatibility and incoherence of their decisions is observed [4].

The purpose of this study is to compare the management indicators for construction projects based on the management indicators mentioned above. This study was conducted on the construction projects in Shiraz University one of the biggest university campuses in Iran. The evaluation of these indicators was based on opinions of the practitioners in the projects.

## 2. Methodology

Using a questionnaire, 22 experienced project practitioners in Shiraz University were surveyed on the management indicators of the projects. The questionnaire included 38 questions on the execution of the construction projects. The practitioners answer to each question ranges from very high, meaning complete agreement with the question idea, to very low, meaning complete disagreement with the question idea.

Table 1- The percentage of responses to the 38 questions by the C&C group in present

Row	Concept of Question (Indicator Title)	Very high (%)	High (%)	Normal (%)	Low (%)	Very low (%)
1	Delay in execution time	30	50	10	10	0
2	Feasibility study for selection and construction of projects	0	40	40	20	0
3	Spending appropriate time in feasibility study	0	20	30	30	20
4	Prediction of the execution time in feasibility studies	0	20	50	20	10
5	Accuracy in cost estimation in feasibility studies	0	20	60	20	0
6	Effect of inappropriate design over progress	0	20	70	10	20
7	Effect of weak execution over progress	10	20	20	30	20
8	Transparency of project objectives	10	40	30	20	0
9	Documentation	0	30	30	30	10
10	Accuracy in time prediction and cost accounting	0	20	50	30	0
11	Flexibility of activities in planning	0	20	30	50	0
12	Execution of projects based on a comprehensive plan	0	70	10	10	10
13	Select of projects based on needs and requirements	0	30	70	0	0
14	Adequate training of personnel	20	0	70	10	0
15	Application of scientific methods in project control	20	0	40	40	0
16	Application of financial control software	0	20	20	50	10
17	Use of project control software for scheduled progress	0	0	40	60	0
18	Control of technical quality of projects	20	10	20	50	0
19	Scheduling	0	20	50	20	10
20	Accuracy in cost estimation of projects	0	60	30	0	10
21	Comparison of time progress with the schedule	0	20	30	50	0
22	Assessment for managing real time and cost	0	30	30	40	0
23	Continuous supervision and control over the progress	0	20	50	30	0
24	Legal problems and issues	0	20	30	40	10
25	Insufficiency of regulations and law	0	10	40	30	20
26	Allocation of credits and budgets	50	40	10	0	0
27	Effect of inflation over costs	40	60	0	0	0
28	Application of scientific methods in accounting system	0	20	60	20	0
29	Repeating changeover of managers	30	70	0	0	0
30	Adequate equipment and machinery	0	70	30	0	0
31	Instability of building materials costs	40	30	30	0	0
32	Cooperation among legal authorization and responsibility	0	40	40	20	0
33	Sufficient skill in personnel	20	50	20	10	0
34	Accuracy in estimated need for professional manpower	0	20	60	10	10
35	Accuracy in selecting capable and specialized workforce	0	30	60	0	10
36	Regulation in selecting contractors and consultants	0	60	20	20	0
37	Accuracy on contractors' work experiences in selection	40	20	10	20	10
38	Supervision over the performance of execution teams	0	60	40	10	0

The practitioners were grouped into the contractors and consultants group (C&C) and the managers and experts group (M&E). The number of practitioners in C&C group was 10; and the number of practitioners in M&E group was 12. Afterwards, the percentages of responses for each question were calculated. The

percentages of responses of the practitioners in C&C and M&E groups to the questions are presented in Tables 1 and 2; respectively.

Table 2- The percentage of responses to the 38 questions by the M&E group in present

Row	Concept of Question (Indicator Title)	Very high (%)	High (%)	Normal (%)	Low (%)	Very low (%)
1	Delay in execution time	16.67	50	33.33	0	0
2	Feasibility study for selection and construction of projects	0	16.67	50	33.33	0
3	Spending appropriate time in feasibility study	0	33.33	33.33	33.33	0
4	Prediction of the execution time in feasibility studies	0	33.33	41.67	16.67	8.33
5	Accuracy in cost estimation in feasibility studies	0	33.33	33.33	33.33	0
6	Effect of inappropriate design over progress	8.33	25	25	33.33	8.33
7	Effect of weak execution over progress	25	8.33	16.67	25	25
8	Transparency of project objectives	0	50	41.67	8.33	0
9	Documentation	9.09	54.55	0	27.27	9.09
10	Accuracy in time prediction and cost accounting	0	33.33	50	16.67	8.33
11	Flexibility of activities in planning	0	9.09	45.45	36.36	0
12	Execution of projects based on a comprehensive plan	8.33	8.33	25	50	0
13	Select of projects based on needs and requirements	16.67	50	16.67	41.67	33.33
14	Adequate training of personnel	8.33	16.67	41.67	0	16.67
15	Application of scientific methods in project control	0	0	58.33	41.67	25
16	Application of financial control software	0	16.67	16.67	8.33	8.33
17	Use of project control software for scheduled progress	0	8.33	25	16.67	8.33
18	Control of technical quality of projects	0	66.67	25	8.33	0
19	Scheduling	0	25	25	8.33	16.67
20	Accuracy in cost estimation of projects	0	33.33	58.33	50	25
21	Comparison of time progress with the schedule	0	33.33	33.33	25	0
22	Assessment for managing real time and cost	0	33.33	33.33	0	16.67
23	Continuous supervision and control over the progress	16.67	58.33	16.67	0	16.67
24	Legal problems and issues	8.33	8.33	16.67	16.67	8.33
25	Insufficiency of regulations and law	0	16.67	41.67	8.33	8.33
26	Allocation of credits and budgets	83.33	8.33	0	0	16.67
27	Effect of inflation over costs	41.67	33.33	16.67	0	0
28	Application of scientific methods in accounting system	0	16.67	50	16.67	0
29	Repeating changeover of managers	16.67	41.67	33.33	8.33	0
30	Adequate equipment and machinery	8.33	58.33	33.33	0	0
31	Instability of building materials costs	33.33	50	16.67	0	8.33
32	Cooperation among legal authorization and responsibility	8.33	50	25	16.67	0
33	Sufficient skill in personnel	25	25	25	16.67	8.33
34	Accuracy in estimated need for professional manpower	0	33.33	41.67	25	0
35	Accuracy in selecting capable and specialized workforce	0	16.67	41.67	33.33	8.33
36	Regulation in selecting contractors and consultants	8.33	25	25	41.67	0
37	Accuracy on contractors' work experiences in selection	16.67	50	8.33	16.67	8.33
38	Supervision over the performance of execution teams	25	33.33	25	16.67	0

## 2.1. Calculation of Indicator Value

Subsequently, to compare the opinions of each group, an indicator value was calculated. The following steps show the procedure of the calculation of the indicator value. As an example, the indicator value for the responses of M&E group to question 1 in Table 2 is calculated:

1. For each question the percentage of "normal" responses was ignored.
2. The percentage of "very high" responses was multiplied by two and added to the percentage of the "high" responses multiplied by one. For example:  $8.33 \times 2 + 8.33 \times 1 = 24.99$ .
3. The percentage of "very low" responses was multiplied by two and added to the percentage of the "low" responses multiplied by one. For example:  $0 \times 2 + 50 \times 1 = 50$ .
4. Considering the nature of the question, the difference of the grade of positive responses to the grade of negative responses was calculated for each question. For example:  $24.99 - 50 = - 25.01$ .
5. In this way, an indicator value was obtained for each question.

## 2.2. Interpretations

The indicator value may have these interpretations:

1. Considering the method applied for the calculation of the indicator value, the positive indicator value may be considered as agreement of the practitioners with the question idea; however, the negative indicator value may be considered as the disagreement with the question idea.
2. The indicator's evaluation may be identified by this number. For example, a high positive indicator value may show that the amount and/or the weight of the agreement to the question's idea are high.
3. If the grade for the indicator value is near to zero, it shows that the number and/or the weight of agreement and disagreement to the question idea are equal.

### 2.3. Evaluation of Indicators

The grade of indicator value may change between -200 and +200. The evaluation of indicators was classified based on the following 5 intervals:

1. Indicator numbers between -200 to -120 were evaluated as "very poor".
2. Indicator numbers between -120 to -40 were evaluated as "poor".
3. Indicator numbers between -40 to +40 were evaluated as "normal".
4. Indicator numbers between +40 to +120 were evaluated as "good".
5. Indicator numbers between +120 to +200 were evaluated as "excellent".

### 3. Results and Discussion

Table 3 presents the evaluation of the management indicators based on the answers of the practitioners. Columns 3 and 4 of this table display the indicator evaluation from C&C and M&E groups; respectively.

There may be several implications here. First of all, evaluation of "allocation of credits and budgets" in the opinions of the both groups is very poor. It seems that this indicator has played the most problematic role in desirable progress of projects.

Secondly, in the idea of C&C, evaluations of "effects of inflation over costs" and "changeover of managers" are very poor, and poor according to the idea of M&E. It may be inferred that these indicators significantly play a problematic role in progress of projects especially in the idea of C&C. On the other hand, evaluation of "use of project control software for scheduled progress" is poor based on the idea of C&C and very poor based on the idea of M&E. It may be concluded that this indicator significantly plays a problematic role in the projects particularly based on idea of M&E.

Thirdly, although the evaluation of "Execution of projects based on a comprehensive plan" is good according to C&C, it is poor according to M&E. It appears that M&E has considered this indicator much more significant in comparison to C&C.

Fourthly, "select of projects based on needs and requirements", "control of technical quality of projects by trained personnel", "continuous control over progress of projects", and "cooperation among legal authorization and staff responsibility" are in normal evaluation in the idea of C&C; however they are in good evaluation in the opinion of M&E. In contrast, the evaluations of "regulation in selecting contractors and consultants" and "accuracy in cost estimation of projects in feasibility study" are good in the opinion of C&C and normal in the idea of M&E. Moreover, the evaluation of "application of scientific methods in projects control" and "flexibility of activities in planning" are normal according to the opinion of C&C and conversely they are poor according to idea of M&E. It seems that M&E has considered these indicators more significant. On the other hand "spending appropriate time and money in feasibility study" is poor according to C&C and contrariwise it is normal according to M&E. It appears that C&C has considered this indicator more significant.

Table 3- Evaluation of indicators based on the opinions of C&C and M&E groups

Row	Indicator Title	Indicator Evaluation	
		C&C	M&E
1	Delay in execution time	Poor	Poor
2	Feasibility studies for selection and construction of projects	Normal	Normal
3	Spending appropriate time in feasibility study	Poor	Normal

4	Prediction of the execution time in feasibility studies	Normal	Normal
5	Accuracy in cost estimation in feasibility studies	Normal	Normal
6	Effect of inappropriate design over progress	Normal	Normal
7	Effect of weak execution over projects progress	Normal	Normal
8	Transparency of project objectives	Good	Good
9	Documentation	Normal	Normal
10	Accuracy in time prediction and cost accounting	Normal	Normal
11	Flexibility of activities in planning	Normal	Poor
12	Execution of projects based on a comprehensive plan	Good	Poor
13	Select of projects based on needs and requirements	Normal	Good
14	Adequate training of personnel	Normal	Normal
15	Application of scientific methods in project control	Normal	Poor
16	Application of financial control software	Poor	Poor
17	Use of project control software for scheduled progress	Poor	Very poor
18	Control of technical quality of projects	Normal	Good
19	Scheduling	Normal	Normal
20	Accuracy in cost estimation of projects	Good	Normal
21	Comparison of time progress with the schedule	Normal	Normal
22	Assessment for managing real time and cost	Normal	Normal
23	Continuous supervision and control over the progress	Normal	Good
24	Legal problems and issues	Poor	Poor
25	Insufficiency of regulations and law	Poor	Poor
26	Allocation of credits and budgets	Very poor	Very poor
27	Effect of inflation over costs	Very poor	Poor
28	Application of scientific methods in accounting system	Normal	Normal
29	Repeating changeover of managers	Very poor	Poor
30	Adequate equipment and machinery	Good	Good
31	Instability of building materials costs	Poor	Poor
32	Cooperation among legal authorization and responsibility	Normal	Good
33	Sufficient skill in personnel	Poor	Poor
34	Accuracy in estimated need for professional manpower	Normal	Normal
35	Accuracy in selecting capable and specialized workforce	Normal	Normal
36	Regulation in selecting contractors and consultants	Good	Normal
37	Accuracy on contractors' work experiences in selection	Good	Good
38	Supervision over the performance of execution teams	Good	Good

Finally, evaluations for the six indicators “instability of building materials costs over progress”, “delay of projects”, “application of financial control software”, “inadequacy of regulations”, “effect of legal problems” and “skill of personnel” are poor in both groups. This may reveal that in the idea of both groups these indicators play important role over progress of projects and they are significant according to ideas of both groups.

Based on opinions of both groups, four indicators are in good condition (indicators 8, 30, 37 and 38), fourteen indicators are in normal condition (indicators 2, 4, 5, 6, 7, 9, 10, 14, 19, 21, 22, 28, 34 and 35), six indicators are in poor condition (indicators 1, 16, 24, 25, 31 and 33) and one indicator is in a very poor condition (indicator 26) in the evaluation of both groups.

In conclusion there is a similarity between the ideas of the two groups in 25 indicators out of 38. Furthermore, the difference between twelve other indicators based on both group's ideas is small. It means that in the evaluation of 37 indicators out of 38, the ideas of both groups are similar or close to each other; which may show the accuracy in completing the questionnaire and the methodology used.

#### 4. Conclusion

This research was conducted in order to introduce a methodology to identify the situation of management indicators in the projects based on the evaluation of projects' practitioners. The purpose of this study was to identify a way of dealing with the components of project's management; and as a result, to improve the indicators managements in the campus projects of Shiraz University as a case study. The ideas of 22 practitioners (10 contractors and consultants, and 12 managers and experts) of the projects were asked on 38 management indicators using a questionnaire.

Based on the ideas of practitioners, the most problematic and/or significant indicators, that are in poor or very poor conditions, include; “allocation of credits and budgets”, “effects of inflation over costs”, “repeating changeover of managers”, “instability of building materials costs”, “delay in completion of

projects”, and “insufficient skill in executive personnel”. On the other hand, indicators such as: “application of adequate equipment and machinery”, “continuous supervision over projects”, “transparency of objectives of projects” and “accuracy on contractors’ work experiences” are in good situation based on the opinion of both groups.

Fourteen indicators are in normal condition according to both groups' opinions. These indicators include: “adequate feasibility study for selection and construction of projects”, “accuracy in prediction of executive time in feasibility study”, “accuracy in cost estimation in feasibility study”, “effect of design over progress”, “effect of execution over progress”, “time prediction and cost accounting”, “training and employing specialized human resources”, “proper scheduling”, “accuracy in estimated need for professional workforce”, “comparison of project's progress with schedule”, “application of scientific methods in accounting system” and “proper assessment of real time and cost control”.

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