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"Research Note"

A COMPARATIVE STUDY ON EXECUTIVE INDICATORS IN CIVIL PROJECTS OF SU AND SUMS*

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Abstract– The purpose of this study is to identify the way of dealing with the components of project implementation in civil projects of Shiraz University (SU) and Shiraz University of Medical Sciences (SUMS), to compare the executive indicators in civil projects of both universities. Indeed, results of studies on executive indicators of civil projects at SU and SUMS have been presented as articles at the Second International Conference on Construction and Project Management ICCPM 2011 in Singapore; and the International Conference on Civil Engineering and Transportation ICCET 2011 in Ji Nan, China, respectively. This study, however, focuses on the comparison between the executive indicators of the civil projects at both universities; based on the ideas of the decision-makers and authorities of the projects. In this study it has been found that the difference between some indicators is small. It means that the ideas of both groups in both universities are similar or close to each other; which may show the accuracy in completing the questionnaire and the methodology used. In this paper, the results of this comparative study are presented and discussed.

Keywords– Project management, executive indexes, managers, experts, consultants, contractors

1. INTRODUCTION

Project management includes the application of knowledge, skills, tools and techniques related to the functions of the project in order to serve the objectives of the same project [1]. The success of the project is highly dependent on management practices and the potency of the project managers. A review of the related literature reveals that more desirable results are achieved through appropriate leadership methods, capabilities and emotional intelligence of the project manager [2]. Having referred to the articles concerning civil projects, diverse indices relevant to projects management activities draw attention, so some matters as project control, schedule, sequence analysis of activities, and estimating resources are among the necessary cases which should be considered in the projects implementation [3]. Organizational performance depends highly on human resource management, human resource planning; appointment of qualified personnel, training, and appropriate payment system [4]. Registering the documents and plans will facilitate an appropriate and perfect use of the executive knowledge and experience in the future. Documentation is considered as one of the most valuable capitals in modern project management science [5]. Integration of human resource management, policies, activities and objectives with the organizational strategy results in an optimal performance [6]. The significance of this factor becomes more visible when the negative impact of substituting the project managers, and as a result incompatibility and incoherence of their policies and decisions, are observed [5].

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The articles, presented in Singapore [7] and Ji Nan [8] Conferences, evaluated the indicators in each of these universities, and suggested a method for the evaluation of these indicators. The purpose of this study is to compare the management indicators for civil projects in SU and SUMS, based on the points of view of the authorities of the projects in these two universities. In this study, 56 experienced authorities of the projects in these two universities have been asked about the management indicators for the civil projects, using a questionnaire. As all indicators were not the same in these two universities, shared indicators were extracted among 30 indicators in order to be compared and some indicators, which were not shared, were also introduced, considering the extent to which they were problematic.

2. METHODOLOGY

The main reason for comparing management indices of civil projects in these two universities is the prolongation of many of these projects in view of future users and irresponsible people, since these projects had the average construction period of 10 years which is too long with regard to their types [9]. In addition to specifying management problems, this study makes it possible to compare and determine the degree of problems similarities in these two universities and on this scale, it uses a method applicable to other projects to evaluate their management criteria. Also, the following methodology has been selected to provide the possibility of changing questionnaire answers to comparable qualities in two groups in both universities, so that the degree of quality of each index and its problem making is easily comparable based on the diagram.

A questionnaire was prepared including 30 questions by which the opinions of 22 and 34 managers, experts, consultants and contractors for execution of civil projects in SU and SUMS were asked, respectively. The responses of the respondents of both universities to several questions of this questionnaire were analyzed and the results were classified under two categories of A) managers and experts M&E; B) consultants and contractors. C&C, as follows in Table 1:

Table 1. The number of respondents of both universities

University	M&E	C&C	Total
SU	12	10	22
SUMS	22	12	34

Considering the opinions of the members of each group, two pie charts were drawn for each question, indicating the percentage for the opinions of the respondents. One of these charts belonged to the responses of the M&E and the other one was dedicated to the opinions of C&C. An example of the pie chart is illustrated in Fig. 1. This chart is drawn based on the responses of the civil M&E of SU to this question: "are the projects executed based on a comprehensive plan?" It is notable to mention that the total number of pie charts that are drawn for both universities is 120 charts, considering the fact that the questionnaire included 30 questions.

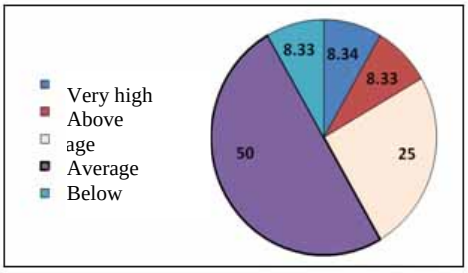


Fig. 1. An example for the percentage of responses of M&E in SU

To compare the indicators, it is necessary that the comparison chart be drawn for each question. For this purpose, the following steps were taken to draw each one of the pie charts:

1. The number of the response *average* for each pie chart was put aside.
2. The number of the response *very high* for each pie chart was multiplied by two and the number of the response *above average* was multiplied by one, and then they were summed up. For example: $8.34 \times 2 + 8.33 \times 1 = 25.01$
3. The number of the response *very low* for each pie chart was multiplied by two and the number of the response *below average* was multiplied by one, and then they were summed up. For example: $8.33 \times 2 + 50 \times 1 = 66.66$
4. The value of negative responses was subtracted from the value of positive responses; for example: 25.01-66.66=-41.65

In such a way, an indicator number was obtained for every question. Considering the method applied for the estimation of this number, that is the difference between the grade of the negative response and the grade of the positive response, the indicator numbers larger than zero are considered as positive indicators based on the opinions of the respondents of this survey; the indicator numbers smaller than zero, however, are considered as negative indicators. Therefore the larger the negative value, the greater the problem; and the larger the positive value, the less problematic the indicator.

The order of the negative and positive indicators for every chart is arranged so that the indicators with larger negative values are placed at the top of the chart and the indicators with larger positive values are placed at the bottom of the charts.

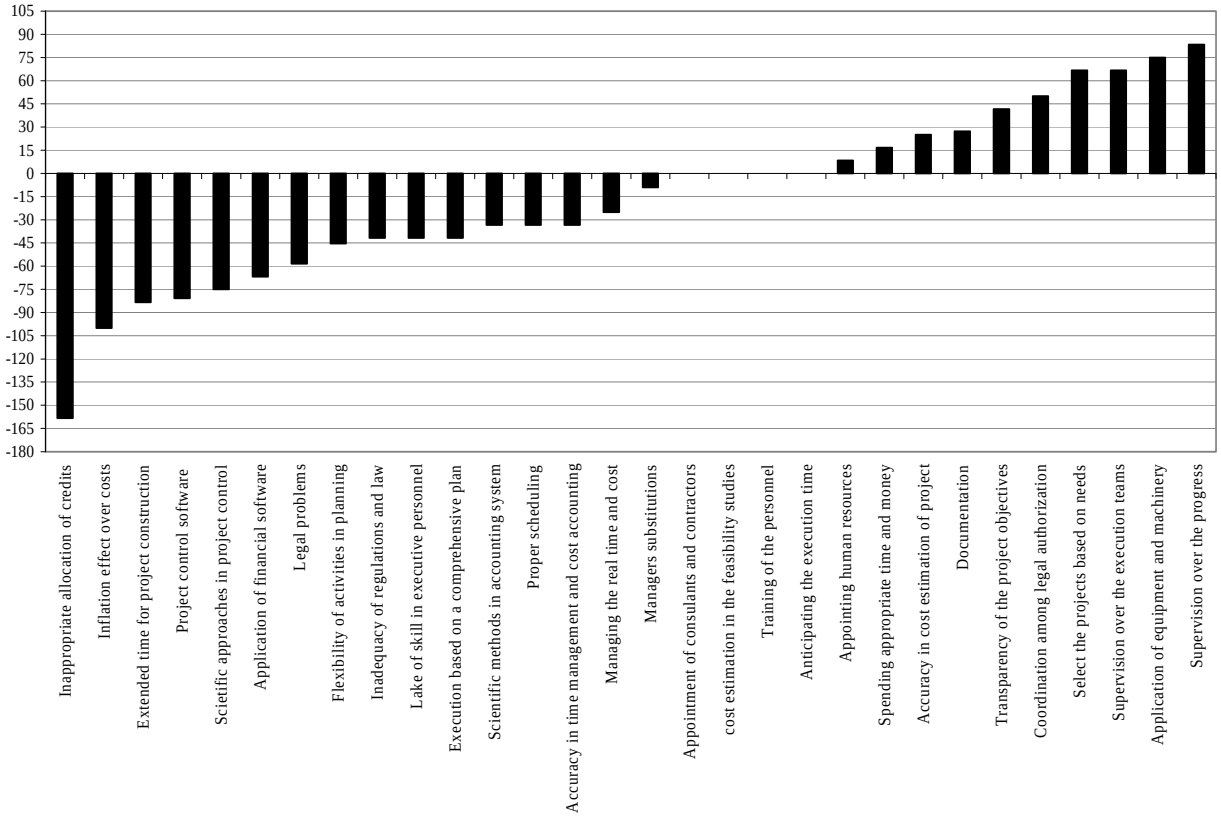
3. RESULTS

The following four charts are drawn for both universities based on the numbers and scores obtained by the above-mentioned method. These charts include:

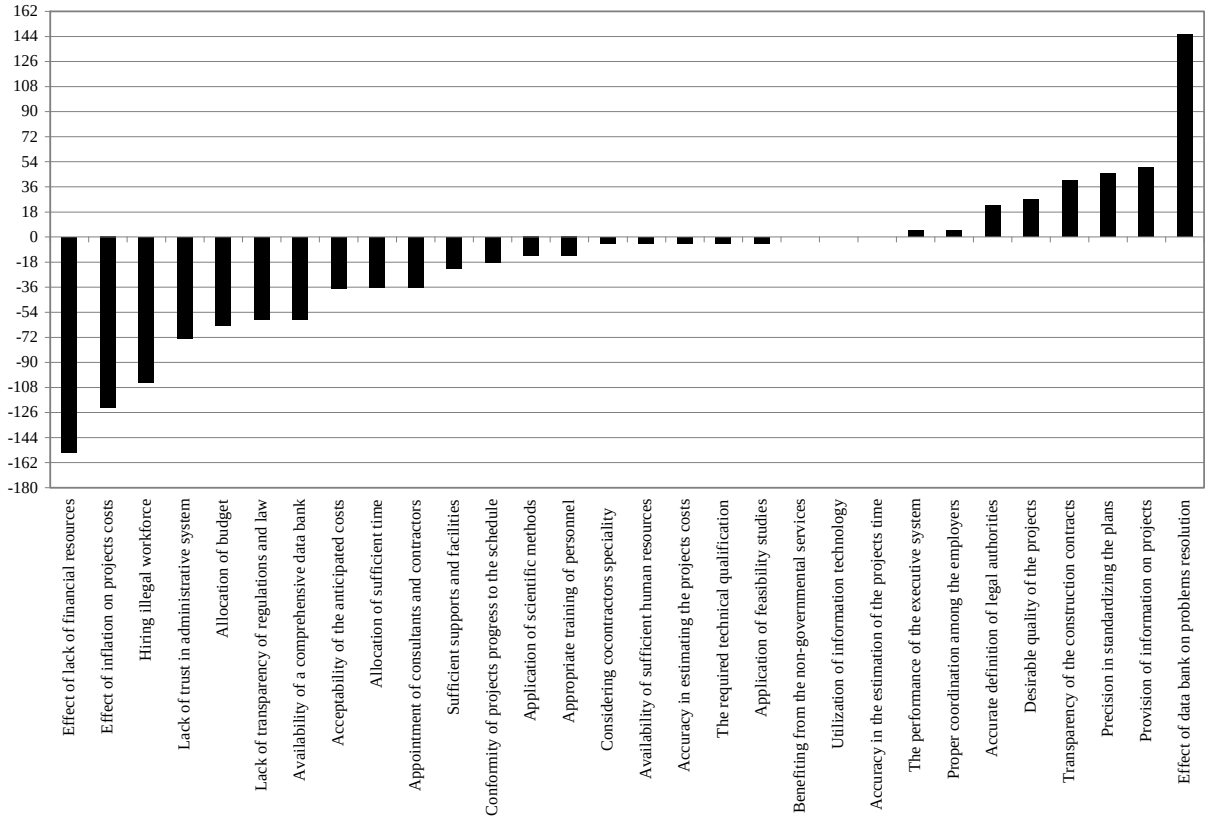
1. The diagram for indicators prioritization based on the opinions of M&E of SU is presented in diagram 1.
2. The diagram for indicators prioritization based on the opinions of M&E of SUMS is presented in diagram 2.
3. The diagram for indicators prioritization based on the opinions of C&C of SU is presented in diagram 3.
4. The diagram for indicators prioritization based on the opinions of C&C of SUMS is presented in diagram 4.

Considering the fact that the indicators are arranged based on the grades achieved, a low grade for the rank of the indicator in the above-mentioned diagram shows the significant degree of the problem and a high grade for the rank of the indicator shows that the indicator is positive.

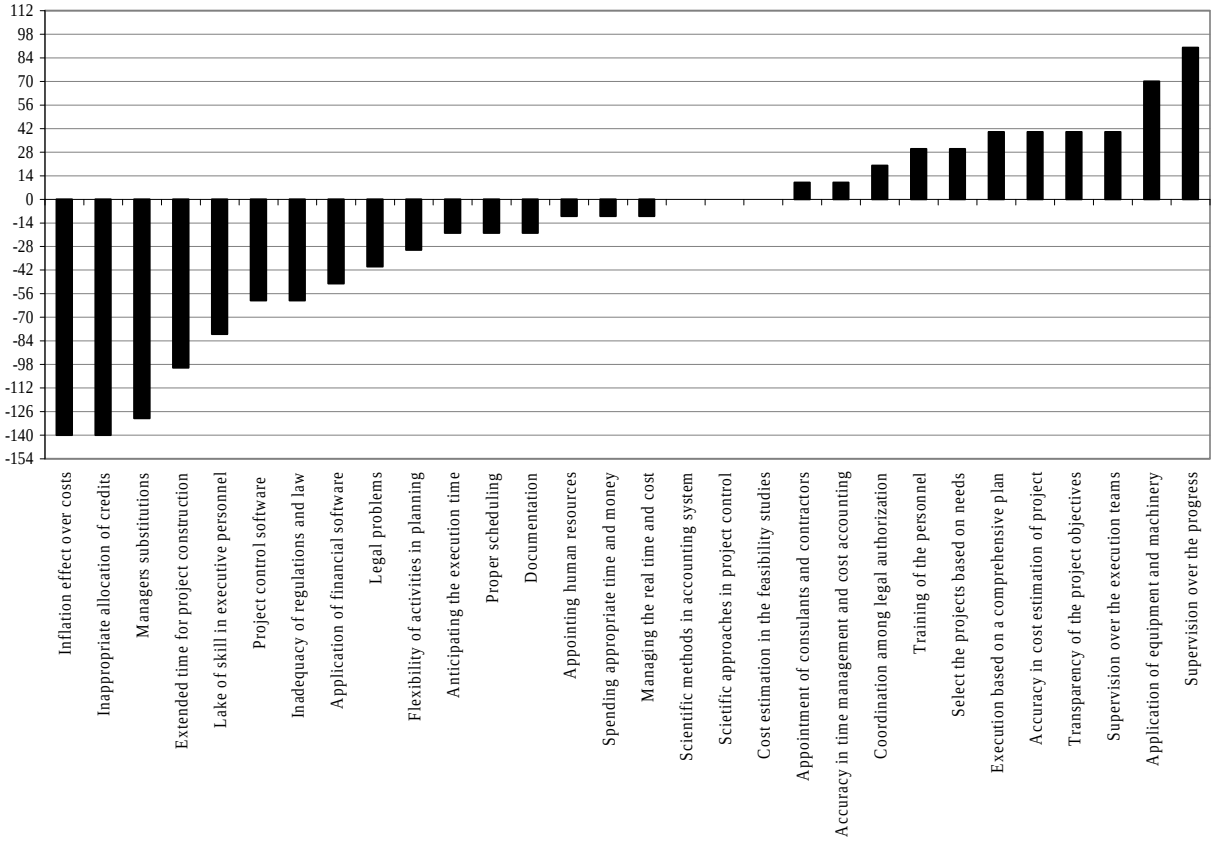
A reference to each one of these diagrams can easily identify negative and positive indicators based on the opinions of the members of each group. For example, one can refer to Diag. 1 to identify that, based on the opinions of M&E of civil projects of SU; the problematic indicators include inflation effect over costs, and etc. On the other hand, indicators such as application of equipment and machinery, etc are considered as positive indicators.



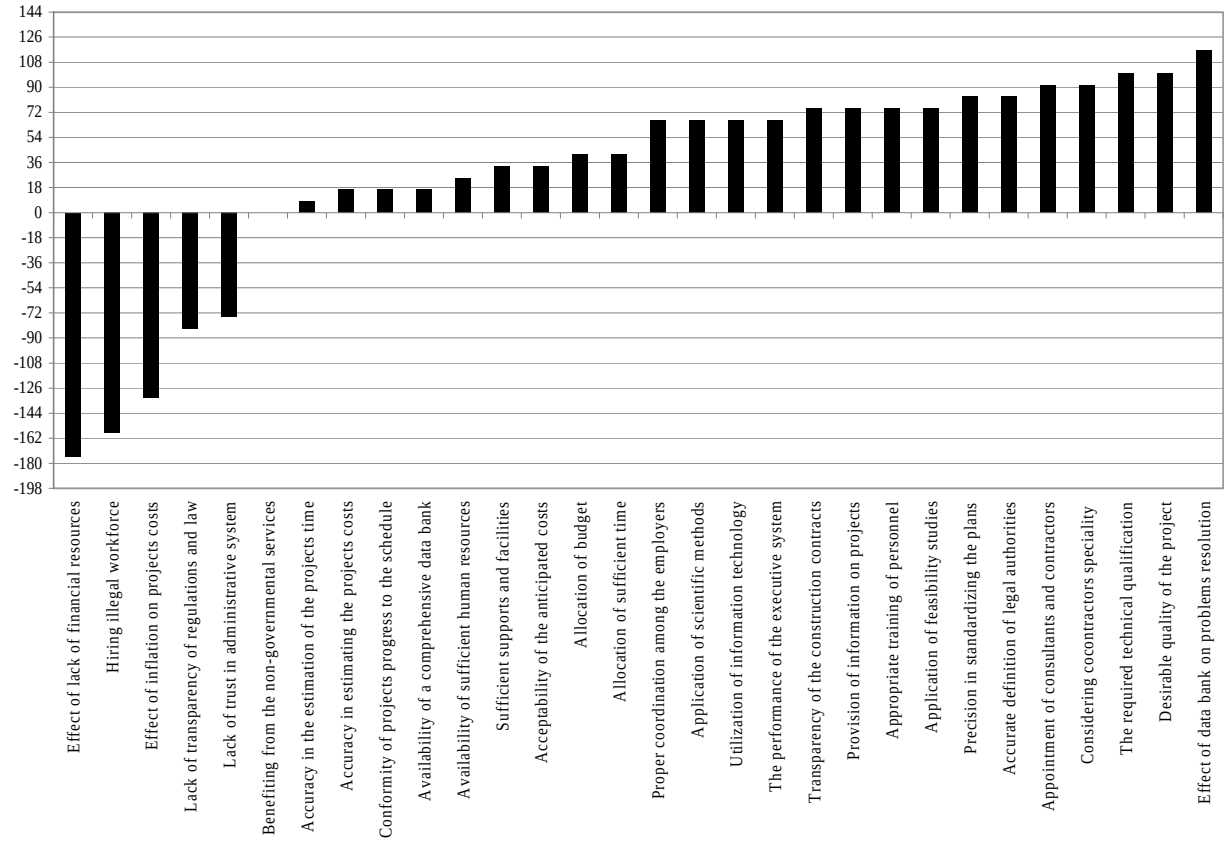
Diag. 1. Indicators prioritization based on the M&E's idea at SU



Diag. 2. Indicators prioritization based on the M&E's idea at SUMS



Diag. 3. Indicators prioritization based on the C&C's idea at SU



Diag. 4. Indicators prioritization based on C&C's idea at SUMS

4. DISCUSSION ON THE RESULTS

The sections of the article deal with the comparison between the results obtained from these four diagrams and the resulted assessments are presented under different titles.

Extended time for civil projects- A comparison of diagrams 1 and 3 reveals that lengthening the time for completion of projects has been given the third rank among 30 indicators by the M&E of civil projects in SU, but it is given the fourth rank by the C&C of the same projects. Diagrams 2 and 4 show that lack of real progress of projects based on the schedule stands in the 12th place according to the managers and directors of SUMS, but it is given the 9th rank by the contractors. This indicates that the extended time for completion of the projects is considered to be at a poor level according to both groups in SU as it is at a normal condition in SUMS.

Anticipation of Execution Time- The analysis of the diagrams reveals that the M&E of civil projects in SU consider the accuracy in anticipation of construction time to be at the 20th rank, while it stands in the 11th place according to C&C. This indicator is given the 22nd place by the M&E of the Technical Office of SUMS and the 7th place by the C&C of the Technical Office of this university. Considering the difference between the negative and positive opinions in the diagrams indicates that this indicator is at a normal situation according to both groups in both universities.

Cost estimation in the feasibility studies- A comparison of diagrams 1 and 3 reveals that the accuracy in cost estimation in feasibility studies is given the 23rd place by the M&E of civil projects in SU, and it is given the 26th place by the C&C of the same university. Diagrams 2 and 4 show that the M&E of civil projects in SUMS give it the 17th place, and the contractors give it the 8th place. This indicates that this indicator is at a normal status in both universities. However, the rank given by the C&C should be taken into consideration.

Inappropriate allocation of credits and budgets- The analysis and comparison of diagrams 1 and 2 reveals that according to the M&E, the indicator of "inappropriate allocation of credits" stands in the first place in SU as well as SUMS. Moreover, diagrams 3 and 4 show that according to the C&C, inappropriate allocation of credits possesses the second rank in SU and the first rank in SUMS. Then, this indicator is very poor in both universities and highly influential in the poor progress of the projects in both universities.

Influence of inflation- The analysis of diagrams 1 and 2 reveals that according to M&E, the effect of inflation on costs has the 2nd place in SU and also the 2nd place in SUMS. Moreover, the analysis of diagrams 3 and 4 shows that according to C&C, the indicator of the effect of inflation on costs has the first place in SU and the third place in SUMS. As a result, it can be said that the indicator of inflation is at a very poor situation at both universities. So, it plays a significant role in poor progress of projects in both universities.

Role of regulations and law- The success in management affairs is highly reliant on the approved legal regulations and powers. The study of diagrams brings us to the conclusion that, according to the M&E of SU, inadequacy of regulations plays the ninth important role in the progress of projects, and according to C&C, it plays the 7th important role. On the other hand, the lack of transparency in regulations is given the 6th rank by the M&E of SUMS and the 4th rank by C&C. This indicates that this indicator is at a poor condition according to both groups in both universities and this reveals that the inadequacy of regulations is problematic in both universities.

Coordination among the legal power; and the responsibility of the staff- The coordination among the legal power and the responsibility of the managers, experts and the executive staff is considered as a

management indicator. An analysis of diagrams shows that the failure in coordination among the legal power and the responsibility of the staff of the projects receives the 26th place according to the M&E of SU and the 22nd place according to the C&C of this university. However, the M&E and the C&C in SUMS place the indicator of accurate definition of legal powers of project managers in the 25th place. Therefore, this indicator is placed at a desirable place by the M&E at SU and at a normal status by the C&C of this university; while it is at a normal status according to the M&E of SUMS and at a desirable situation according to the C&C.

Employment of specialized human forces- The analysis of the indicator prioritization diagram of SU shows that the indicator of employment of specialized human forces is considered as the 21st significant factor by the M&E, and the 14th one by contractors. On the other hand, in SUMS the indicator of the availability of sufficient and qualified human resources is the 16th significant factor according to the M&E and the 11th one according to the C&C. Then, this indicator is at a normal condition according to both groups in both universities.

Adequate training of the managers, experts and the executive personnel- One domain of human resources investment is training. Hence, a comparison is made between two universities considering the indicator of training and employing specialized human resources. After the analysis of indicator prioritization diagram and based on the ranks provided, it was revealed that this indicator is at a normal position according to the M&E of both universities and the C&C of SU and it is at a desirable condition according to the C&C of SUMS.

Application of modern scientific methods in the project- In this regard, the scientific methods of project management in accounting system, project execution, time management, financial, technical and quality control of the project are analyzed.

The analysis of diagrams 1 and 2 shows that according to M&E, the application of scientific management methods in project control is considered as the 4th significant factor in SU, but it is considered as the 13th significant factor in SUMS. Moreover, the analysis of diagrams 3 and 4 reveals that according to C&C, this indicator is placed in the 18th place in SU, and in the 17th place in SUMS. This indicates that the M&E of SU consider this indicator to be at a poor condition while the C&C of this university and the M&E of SUMS consider it to be at a normal place.

Quality Control and Execution- Another management index is the issue of continuous monitoring of the projects process. Assessment of diagram 1 and 3 of civil project of SU shows that the difference between negative and positive opinions of M&E on a proper assessment of time and real cost control takes the position as 14th factor, supervision on the performance of the projects executive teams as 28th factor, and continuous supervision and monitoring on the process of project progress as 30th factor. Also, according to contractors, these three indices are placed 21st, 28th, 30th factors respectively, which indicates that the situation of the index of proper assessment on time and real cost control in Shiraz University is normal in the view of both groups, the index of supervision on the performance of the projects executive teams is in a good situation from the view of both groups, and the index of continuous supervision and monitoring on the process of project progress is good from the view of managers and normal in view of the contractors.

Moreover, a question was raised to assess the quality control of the projects of SUMS regarding "to what extent have the scientific methods of project management been used in the manner of construction and quality control of the projects?". The results make it clear that based on diagrams 2, 4, this index is placed as the 13th factor from the view of managers and 17th factor from the view of contractors, which is the indicative of normal situation of this index from the view of managers and it is a good situation from the view of the contractors.

Regulation in Appointing C&C- Another issue of management is the discussion over appropriate regulations for the appointment and employment of authorities and construction personnel of the projects.

The analysis of problems prioritization diagram of SU, i.e. diagrams 1 and 3, brings us to the conclusion that the factor of observing regulations in appointment of C&C is considered to be the 17th factor by the managers and the 20th factor according to contractors. This fact indicates that this is considered to be at a normal condition by the managers and at a desirable condition according to the contractors in SU.

Keeping Documentation- Keeping documentation and records which leads to a desirable use of the knowledge and experiments resulted from previous projects has been considered as one of the most valuable assets in project management. In this regard, computers can play an important role, as they can review a huge amount of historical data in order to identify similar cases and provide useful information [10]. Considering diagrams 1 and 3 reveals that the index of keeping documentation in Shiraz University has allocated rank 24 to itself from the managers' viewpoint while its rank is 13 from the view of the contractors.

Skills of Personnel- Skills influence the function and performance of the project manager through the existence of sufficient experience, management view, sense of challenging, unity and compatibility of management decisions. A high percentage of dissatisfaction from skills in SU is the indicator of another management factor in the related organization. Based on diagrams 1 and 3, the lack of skillfulness of the personnel as a problematic indicator is considered as the 5th factor according to C&C, and it is considered as the 10th factor according to M&E. This indicates that the lack of sufficient skills and qualification is considered to be at a poor situation by both groups.

Application of Appropriate Facilities- Considering the accurate estimation of technical requirements such as equipment and the machinery removes the possibility of imposing expenses and long delays for the projects. The assessment of diagrams 1 and 3 in SU brings us to the conclusion that the factor of utilization of equipment is considered to be the 29th factor by the managers as well as the C&C. Then, it can be concluded that this factor is at a desirable status according to both groups.

Employment of Illegal Workforce- Diagrams 2 and 4 reveal that the factor of illegal workforce is the third problematic factor by the managers in SUMS, and the second problematic factor according to the contractors. This indicates the poor condition of this factor according to the managers and its very poor status according to the contractors.

Influence of Central Data Bank- Diagrams 2 and 4 reveal that in SUMS, this indicator is the 30th factor according to both groups. This indicates that this indicator is at a quite desirable status according to the managers and at a very good status according to the contractors.

5. CONCLUSION

This field research has been carried out in order to identify the fundamentals of project management and its challenges in managing civil projects at both universities. Considering the comparison made between the indicators, the following results were obtained.

The prolonged time for completion of projects has been at a poor condition in SU; however, it is at a normal status in SUMS. On the accuracy of estimation of the time of the project, both universities are in a normal situation. On accurate anticipation of costs at the feasibility studies phase, both universities are in a normal situation. The indicator of inconvenient budgeting and lack of sufficient financial resources has been at a very poor situation in both universities. The effect of inflation is considered to be in a very poor situation at both universities. The inadequacy of regulations and its influence on the progress of projects is at a poor situation in both universities. The conformity between the legal powers and authorization and the responsibility of the executive personnel is at a desirable status in SU according to the managers and at a normal situation according to the contractors; while in SUMS, it is at a normal situation according to the

managers and at a desirable situation according to the contractors. The indicator of hiring specialized and qualified human force is considered to be at a normal condition in both universities. Adequate training of the managers, experts and the executive personnel is considered to be at a normal status. The application of scientific management methods in project control of SU is considered to be at a poor status by the M&E of SU, while according to the C&C of the same university, as well as the M&E of SUMS it is at a normal situation, and according to the C&C of the same university it is at a desirable situation.

The indicators of appropriate assessment of real time and cost estimation is considered to be at a normal situation, and the indicator of monitoring the performance of the execution teams is considered to be at a desirable situation, and continuous monitoring and control over the progress of projects has been enjoying a desirable condition according to the managers, and a normal condition according to contractors; while the indicator of the application of scientific management methods in project control is at a normal situation according to the managers in SUMS and at a desirable situation according to the contractors of the same university.

The indicator of observing regulations is at a normal status according to the managers of SU and at a desirable situation according to the contractors of the same university. The indicator of skilled executive personnel is at a poor situation according to both groups of SU. The indicator of the utilization of appropriate facilities and equipment is at a desirable situation in SU. Indicator of hiring illegal workforce is at a poor situation in SUMS, according to M&E and at a very poor situation according to the C&C. The indicator of the influence of central data bank on solving the problems in SUMS is considered to be at a very desirable level by the managers and at a desirable level by the contractors.

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