COMPLIANCE OF DIFFERENT STANDARDS IN CONSTRUCTION MANAGEMENT AND APPLYING THEM COMPARED TO CONVENTIONAL METHODS IN IRAN

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Abstract: Following widespread implementation of large projects with huge budgets and the need to finish them on time; as well as the importance of the final product quality and safety standards in Large-scale projects, the necessity of this field of management was felt more than ever. This study is conducted to investigate and evaluate compliance of various and well-known standards of project management in civil projects. To achieve this, efforts are being made using statistical analysis and multi-criteria decision analysis method and expert opinions, to analyze the compliance of these standards in the country's development projects and provide usable solutions to improve the management of these projects. According to the results, it was observed that the PMBOK standard is the best option followed by PRINCE2 and OPM standards, respectively.

Keywords: Compliance, Competence of standard, project management, TOPSIS.

1. Introduction

Project management is the application of necessary knowledge, skills, tools and techniques to manage the flow of actions in order to meet the needs of the project through the initiation, planning, execution, control and termination processes. Due to the significant development of science and technology in the industrialized world and subsequently production, formation of human needs in the form of various projects, led project managers to utilize new knowledge and skills, fitted the type and nature of the projects, to perform the required activities at good level of quality and the anticipated duration and cost (Scott et al. 2006). Project management, with its modern structure, is formed by emerging two institutions of IPMA and PMI in the middle of twentieth century in the planning and construction of aerospace equipment. Following widespread implementation of large projects with huge budgets and the need to finish them on time as well as the importance of the final product quality and safety standards in large-scale projects, the necessity of this field of management was felt more than ever. As a result, did not last long that the large project-based companies active in the different areas of engineering and most importantly, construction projects, recognized the need to adhere to the principles of project management and have developed different standards in this area. Accordingly, the large project-oriented companies operating in different areas of software engineering, IT, telecommunications, construction and infrastructure development, aerospace equipment manufacturers, creation and modernization of city services and most importantly, civil projects, have found the importance of adherence to recognized principles of project management and different standards were developed in this area (Dabbagh et al. 2005). Nowadays, different standards in managing different projects including civil projects are reviewing and developing by various countries so that in this way, the new standards are designed. This leads to a lot of efforts to design a global standard in the field of civil project management. However, it should be noted that only producing new standards of project management is not sufficient in detailed and comprehensive management of projects and the important issue in this field, is checking compliance of different standards and how to apply these standards (ZeinAl-Abedin, 2006). Many researchers have studied in this field that some of them have been referred in this section. In an article by Dabbagh et al, (2005), entitled "Evaluation and comparison of project management standards of PMBOK and ISO10006", two known standards have been examined and compared given the importance of the use of standards and systematic methods in projects, and in order to utilize the 10006 Standard in projects, diversity and adaptability as well as ISO standard 10006 applied to the face with it have been discussed while considering PMBOK standard as the basis of comparison. Naqvi et al, examined the efficiency PMBOK standard for Project Management with Fuzzy modeling, so that can investigate and assess the appropriateness of the exploitation and efficiency of these knowledge and skills, based on the nature or type and complexity of the projects in one of the country's research centers. They concluded that a proper sequence to prioritize activities PMBOK standard are applicable based on the project life cycle and the interaction between project management process groups (Naghavi et al. 2006). Zwerman and Thomas (2000), emphasizing the cultural structuralism PMBOK standard, have stated that specifically, original ideas are naturally transmitted by the communication; Since culture is drawn from a common system of beliefs and values based on a common understanding, a body of knowledge based on culture like PMBOK, can have a significant impact on creating this culture and common language towards integration of project common language. Because by taking it into account, project managers can use this culture as a common language in a multinational team and it has also been the aim of creating PMBOK standard. Fotwe and Caffer (2000), conducted a study on competence development of project management in the construction industry. They have identified the knowledge and skills required to project management in the construction industry. Brill et al. (2006), conducted a study on the competencies and attributes required for effective project management based on Delphi method. They used two analytical methods that one of them included 147 respondents, all with 20 or more than 20 years of project management experience; the result of which was to identify 78 competencies; in the second analysis, they showed that 42 of the 78 competencies are crucial in the successful management of projects. Ahlemann et al, (2009) comparing the results of a case and empirical study of on the use of project management standards in Germany and Switzerland assessed the spread and application of them. Their results showed that, in general, standards have been only rarely used in project management in Germany and Switzerland and the use of standards in these countries is subjected to the adoption of programs implemented in previous projects. Finally, the recommendations are provided to organize standards in order to move forward in the efforts in the mentioned countries. Rifon (2010), used standards and their features to define competency. They used standardized work like ISO and CEN which are the result of formal standardization to identify the competencies, skills and their definitions. ILIEŞ et al., (2010) studied best practices in project management. In their paper, the concept of best practices, the advantages of guidelines for compliance with project management as well as comparing two of the best methods used in project management practices (PMBOK and PCM) and their advantages and disadvantages have been discussed. Antonio and Sanjuan (2013), have examined the use of project management standards and success factors in the development of project management. They base their studies to produce useful and efficient tool to use the standard more optimally and using detailed studies on their selected projects, have examined the conformity of work done with the different guidelines in each project; they used the comparative comparison of well-known standards of PMBOK, IPMA, ICB and PRINCE2 and evaluated application of these standards in their case studies.

Given the importance of systematic use of standards and methods, this study is conducted to assess the compliance of known standards of project management in major civil projects. To reach this goal, we have attempted to evaluate the compliance of different standards such as PMBOK and PRIENCE2 in a comprehensive framework and the level of their application and success by introduction of various standards of civil projects management in Iran.

2. Theoretical principles of project management standards

Different standards have been developed in the field of project management; the four most commonly used standards in Iran are introduced in the following.

2.1 PMBOK 2008 standard

The Project Management body of knowledge manual is a recognized standard for project management profession that provides guidelines for managing individual projects. This standard was compiled in 1976 and its fourth edition was published by PMI in 2008. The best practices of project management practitioners have been also used in developing it. This standard renews the subset of project management body of knowledge as a generally recognized best practice. "Generally recognized" means that the mentioned knowledge and strategies are applicable in most of the projects and most of the time and there is consensus about their value and usefulness. It also provides and promotes a common vocabulary within the profession of project management in order for discussing, writing and implementing the project management concepts (Lynda, 2005).

2.2 PRINCE2 Standard

The "Sympket system" company in 1975 developed the original methodology that was known as PROMOT2. Since the beginning of the introduction of PRINCE2, it is widely used in the private and public sectors and today, it is considered as a known standard in project management in United Kingdom.

2.3 OPM3 Standard

The third standard which will be described here is the Organizational Project Management Maturity Model (OPM3). This standard has been developed by the Project Management Institute (PMI). The institute has developed this standard in order for implementing project management principles at the organizational level and it is looking for creating a framework that organizations can assess the level of compliance with their strategic objectives through Project Management Best Practices Lynda, .

2.4 ISO-10006 Standard

ISO 10006 manual provides quality management principles and techniques of project management. This document gives guidance on quality issues that affect the project. This guide is applicable in the projects with the different levels of complexity, size and timespan. ISO 10006 manual can be used in projects that conducted by a person or a management team and also to manage several projects simultaneously. The overall objective of ISO 10006 is to create and maintain the quality in the projects using a systematic process.

According to surveys and studies on standards for project management competency, following 8 cases can be considered among the differences between competency standards:

- Applicable in large-scale and complex projects
- using in a variety of projects
- Providing competencies according to the globally accepted definitions
- Matching knowledge competencies
- Matching functional competencies
- reviewed competencies levels
- The number and type of organizations or institutions involved in the implementation of projects
- type of admission
- Evolution in the behavioral competencies

3. Research Methodology

In this paper, to understand how to use the checklists in order for achieving project success in implementing the requirements of project management body of knowledge standard, audit checklists were completed by people involved in the project at different organizational levels using a field study that the results are presented in the following. The Percentage of conformity is calculated based on the ratio of responses to total number of questions and the results are included in the charts. Finally, using the audit results, analysis of the gap between company's processes and the processes of project management body of knowledge standard is calculated that can be an appropriate basis for designing comprehensive system of project management. After collecting the data, they have been analyzed using analytical methods. In this study, to determine the test internal reliability, Cronbach's alpha and SPSS software have been used and their reliability has been proven. This method is used for calculating the internal consistency of the measurement tool which measures the different features and each test question will be compared with the other single question. The higher the Cronbach's alpha in a research project, the higher the reliability of the questions. Cronbach's alpha coefficient can be calculated using the following equation:

$$r_{\alpha} = \left(\frac{k}{k-1}\right)\left(1-\frac{\sum \sigma_j^2}{\sigma^2}\right) \quad (1)$$

where r_{α} is the total reliability of the test, k is the total number of questions of test (sections), σ_j^2 is the variance of the Questions scores (section) j and σ^2 is the variance of the scores of all questions. Also, if the alpha coefficient is greater than 7.0, it has acceptable level of reliability (McHugh and Hogan, 2010).

The questionnaire prepared in the previous steps has been presented to a number of experts and professors in order to confirm its content validity. Then, 20 questionnaires have been experimentally presented to subjects and Alpha coefficient was obtained for all questions. The results obtained using Cronbach's alpha for evaluating the questions related to various studied factors are presented in the table below. The overall Cronbach's alpha coefficient for the research variables is 0.78 that indicated the acceptability of the questionnaire reliability. The results of describing the demographic characteristics of respondents including age, work experience have been provided in the following.

Based on data required, from 82 respondents, 14 respondents were between 20 and 30 years, 28 of them were between 30 and 40 years, 21 of them between 40 and 50 years and 19 patients were above 50 years. Percentage of respondents has been referenced in the table above. So the highest frequent is related to the group of 30 to 40 years. As can be seen, the distribution is normal. Also, among 82 respondents, nine patients have less than 5 years of work experience, 36 people have work experience between 5 and 15 years, 22 people have work experience between 15 to 25 years, and 15 of them have over 25 years of work experience. Percentage of respondents in each of groups has been mentioned in the above table. The highest frequency is related to the group with 5 and 15 years of work experience.

4. Findings and conclusions

4.1 Part I: Statistical analysis of the current status of projects in terms of project management standards

In order to statistical survey of the current status of the projects in terms of project management standards, checklists for main areas of project management knowledge including time, cost, quality and area of tender have been designed that included in forms of tables below:

Table 1: Checklist of standard audit for the knowledge body of the project area management

Code: Date:	Field of Knowledge: Project area management	Auditor name Audited name and position:				
Question Code	Questions	very low	low	Intermediate	High	Very high
1-1	How much of the project chart has been used for the planning of the project area?	11	14	22	18	16
1-2	How much of the preliminary explanation for the project area has been considered for planning?	15	18	21	12	16
1-3	Has the project management planning ever been considered for the area planning?	9	24	20	14	9
1-4	Has the deliverable material been considered to audit the area?	18	17	19	12	16
1-5	Has the information of the work performance been used to control the area?	7	12	28	21	14
1-6	Are the approved change requests used to define the area?	19	22	24	10	7
1-7	Are the environmental factors of the organization used for project area planning?	14	24	23	12	9
1-8	What amount of organization process assets was used to plan the project area?	8	21	31	12	0
1-9	Has a systematic approach been considered to apply the variations of the project?	24	15	14	11	6
1-10	Has a system been defined in order to change the work breakdown structure (WBS), area explanation, etc. based on the possible variations?	26	24	9	3	0

Table 2: Checklist of standard audit for the knowledge body of the project time management

Code: Date:	Field of Knowledge: Project area management	Auditor name Audited name and position:				
Question Code	Questions	very low	low	Intermediate	High	Very high
2-1	Is the explanation of the project area involved in defining the project activities?	17	26	14	13	12
2-2	Is the work breakdown structure system (WBS) used to define the project activities?	14	27	23	14	4
2-3	Is the project management planning considered to define the project activities?	9	14	29	18	12
2-4	How much does it consider resource access to provide the project schedule?	8	18	24	16	16
2-5	How much is the availability of resources for evaluating the resources of the project activity?	10	15	37	12	8
2-6	Is the estimation of activity cost used to estimate the duration of the project activity?	10	13	34	13	12
2-7	Is the risk record considered to estimate the duration of the project activity?	16	22	22	12	10
2-8	How much the performance reports has been applied to control the timing of the project?	6	15	34	13	15
2-9	How much the past records of the previous projects has been considered to define the project activity?	9	14	27	18	14
2-10	Is the project-scheduling plan prepared?	7	13	35	17	10
2-11	Given the results of timing control, are the proposed modification measures determined?	4	16	30	17	15

Table 3: Checklist of standard audit for the knowledge body of the of the project cost management

Code: Date:	Field of Knowledge: Project area management	Auditor name Audited name and position:				
Question code	Questions	very low	low	Intermediate	High	Very high
3-1	Is the explanation of the project area considered to estimate costs?	10	22	28	14	8
3-2	Is the Cost Management Plan considered for cost estimation?	11	16	31	13	11
3-3	Are the contracts of purchasing the engineering services applied for budgeting?	4	14	25	21	25
3-4	Is the project scheduling plan used for budgeting?	8	13	25	21	25
3-5	Are the performance reports used to control costs?	12	19	26	13	12
3-6	Are the archived data and past records used to estimate costs?	15	19	26	12	10
3-7	Are the organizational policies served to estimate costs?	13	18	25	16	10
3-8	Are the market conditions considered to estimate costs?	16	19	22	13	12
3-9	Are the commercial databases used to estimate costs?	21	26	22	11	2
3-10	Are the cost estimations considered for the requests of variations?	17	24	22	12	7
3-11	Are the cost estimations updated based on the results of cost control?	14	17	23	16	12
3-12	Is the cost of project implementation anticipated based on the results of cost control?	12	16	27	16	11

Table 4: Checklist of standard audit for the knowledge body of the of the project quality management

Code: Date:	Field of Knowledge: Project area management	Auditor name Audited name and position:				
Question Code	Questions	very low	low	Intermediate	High	Very high
4-1	Is the explanation of the project area considered for the Quality Planning?	8	13	20	23	28
4-2	Is the project management Plan considered for the quality planning?	5	12	36	19	10
4-3	Are the executed requested variations considered for quality assurance/ control?	13	16	19	22	12
4-4	Are the executed modification measures considered for quality assurance/ control?	13	21	25	14	9
4-5	Is the implemented troubleshooting considered for quality assurance / quality control?	7	14	24	23	14
4-6	Are the preservation measures performed before, considered for the quality assurance / control?	10	15	27	18	12
4-7	Has the deliverable material been considered for performing the quality control?	6	9	37	15	15
4-8	Are the standards and governmental rules considered for the quality planning?	12	16	24	14	16
4-9	Are the commercial databases considered for performing the quality planning?	15	24	28	12	3
4-10	Are the quality policy, approaches and guidelines of the quality planning considered?	7	15	29	17	14
4-11	Are the previously learned points considered for quality planning?	6	14	27	20	15
4-12	Is the Quality Management Plan prepared?	5	10	28	24	15
4-13	Are the quality standards determined?	13	18	26	13	12
4-14	Given the results of quality control, are the modification measured and requests of variations performed?	13	17	15	19	18

4.2 Discussion of evaluations in the current situation

After investigation and assessing the responses of experts, these answers are to be collected. The obtained results will be discussed as follows:

- In part of project management, in response to the question "is the project management plan considered for the area planning?" most experts have positively responded.
- The question, "Are the approved change requests used to define the area?" has faced less positive answers.
- In the case of tenth item of the project management, the least positive response has been assigned to "defining an area explanation based on the possible variations in systematic project in order to change the work breakdown structure (WBS)"
- In time management, presenting the performance reports and preparing scheduling plans have received the least negative response.
- In cost management, the choice of "applying the commercial databases to estimate costs" has received the least positive answer.
- In quality management, the choices of quality planning and applying the commercial databases for quality planning have received the least negative score and the least positive response, respectively.

The results of summarizing the audit results and completing the corresponding checklist forms are provided in the following graph. The horizontal axis represents the qualitative verbal expressions.

As you can see, the highest rate of compliance is related to:

1. the factors of project management body of knowledge about time management and quality management.

2. project management knowledge of scope and quality management.

As the completed checklists imply, in both cases, the presence of specific processes and high levels of compliance is due to the fact that they are entered into the organization through project contract documents and as input data:

- A time schedule attached to the project contract contains key project milestones and is an appropriate basis for time management.
- The technical specifications and the contract conditions of the project are considered a good basis for quality management and scope management.

But what is clearly evident is that there are many weaknesses in the factors outside the standard scope of the project management body of knowledge.

Figure 1: summarizing qualitative assessment of the standard in IRAN projects

(1) very low, (2) low, (3) average, (4) high, (5) very high

4.3 Part II: The evaluation of distinguishing standards criteria by using TOPSIS method

Multi-Attribute Decision Making (MADM) approaches are formal methods used to organize the information and evaluate decisions in areas with multiple conflicting objectives. These methods can help decision-makers understand the results of comprehensive assessments and use the results in a systematic way. MADM methods are widely used in many fields of research from which different approaches have been proposed by various researchers (Wang et al. 2010, Momenzadeh et al., 2017).

TOPSIS method was originally developed by Hwang and Yoon in 1981. According to this technique, the best alternative has the shortest distance from the positive ideal solution (PIS) and the longest distance from the negative ideal solution (NIS). The positive ideal solution is one that has the maximum benefit and minimum cost and the negative ideal solution is that with the minimum benefit and maximum cost. In TOPSIS method, in addition to taking the distance of alternative A_i from the ideal point, its distance from the negative ideal point is also considered. This means that the chosen alternative must have the shortest distance from the ideal solution while having the longest distance from the negative ideal solution. As its name implies, the ideal solution is the best one in every respect which is virtually not possible and one will try to approach it (Moraveji, 2009, Shey 2017).

In this part of the article, TOPSIS analysis approach used in most engineering problems is utilized to evaluate, analyze and compare the result. The standard prioritization and the distinction criteria in project management have been achieved using the expert judgments in this area and by analysis parameter assessment TOPSIS software. The standards and criteria have been categorized into four groups and eight criteria presented in the table below.

Table 5: Prioritization of standards and standard criteria for project management

Standard	Attribute	Criterion	Attribute
PMBOK2008	A1	1. The distinction between project management and competency standards	C1
PRINCE2	A2	2. Application in various projects	C2
0PM	A3	3. Provide competency with respect to the definitions accepted in the world	C3
ISO-10006	A4	4. Compliance of knowledge competency with the standards	C4
		5. Compliance of performance competency with the standards	C5
		6. Levels of examined competency	C6
		7. Type of admission	C7
		8. Evolution of behavioral competence	C8

4.4 Create a decision matrix

A matrix will be drawn at this step having alternatives in its rows, attributes in its columns and the weight of each attributes in the last row, and the intersection of rows and columns gives the importance of each respondent for any of the alternatives with respect to the corresponding attributes (table 6).

Table 6: Decision matrix (N)

Index / criteria	C_1	C_2	…	C_n
A_1	r_{11}	r_{12}	…	r_{1n}
A_2	r_{21}	r_{22}	…	r_{2n}
⋮	⋮	⋮		⋮
A_m	r_{m1}	r_{m2}	…	r_{mn}
W_j	W_1	W_2	…	W_n

r_{ij} is the score of i th alternative in j th attribute and w_j is the weight of j th attribute.

The following algorithm provides the relations of standards and criteria in TOPSIS pattern of the project.

Note that the decision matrix (Table 7) is the arithmetic mean of all expert judgments.

A1-A4: standards, C1-C8: criteria

Table 7: Decision Matrix (N)

	C1	C2	C3	C4	C5	C6	C7	C8
Index type	Positive	Positive	Positive	Positive	Positive	Positive	Positive	Positive
A1	6.5	5.7	7.7	6.5	7.5	8.935	6.5	6.5
A2	5.5	5.5	5.9	6.5	7.5	7.25	5.3	5
A3	6.5	5.4	6.8	6.54	7.5	7	5.35	4.88
A4	6.5	6.25	6.27	5.5	7.5	6.5	5.5	6

4.5 Normalize the decision matrix

In order to be comparable, the decision matrix is converted to the normalized (incommensurable) matrix using Eq. (2).

$$n_{ij} = \frac{r_{ij}}{\sqrt{\sum_{i=1}^{m} r_{ij}^2}} \quad (2)$$

Table 8 shows the incommensurable matrix:

Table 8: Incommensurable matrix (N1)

	C1	C2	C3	C4	C5	C6	C7	C8
A1	0.334	0.298	0.361	0.34	0.353	0.452	0.32	0.345
A2	0.283	0.287	0.278	0.34	0.353	0.366	0.261	0.266
A3	0.334	0.282	0.323	0.34	0.353	0.354	0.264	0.259
A4	0.334	0.326	0.32	0.288	0.353	0.329	0.271	0.319

4.6 Obtain the incommensurable weighted matrix

To obtain the incommensurable weighted matrix (*V*), the incommensurable matrix (obtained from the second step) is multiplied by the square matrix ($w_{n\times n}$) whose main diagonal elements are weights of attributes and other elements are zero.

$$V = N_1 \times w_{n\times n} \quad (3)$$

Table 9 shows the in commensurable weighted matrix.

Table 9: Incommensurable weighted matrix (*V*)

	C1	C2	C3	C4	C5	C6	C7	C8
A1	0.024	0.021	0.026	0.024	0.025	0.032	0.024	0.025
A2	0.02	0.02	0.02	0.024	0.025	0.026	0.019	0.019
A3	0.024	0.02	0.023	0.024	0.025	0.025	0.02	0.019
A4	0.024	0.023	0.023	0.02	0.025	0.023	0.02	0.023

4.7 Determine the positive and negative ideal factors

At this step, such options should be identified that are considered by the respondents as most important and least important factors. In other words, for positive indices, the positive and negative ideals are the largest and smallest *v* value, respectively; also, for negative indices, the positive and negative ideals are the smallest and largest *v* value, respectively. This is expressed by Eqs (3) and (4).

Positive ideal

$$A^{+} = \left\{ \left(\max_i V_{ij} \middle| j \in J \right), \left(\min_i V_{ij} \middle| j \in J' \right) \middle| i = 1,2,...,m \right\} = \left\{ V_1^{+}, V_2^{+}, ..., V_n^{+} \right\} \quad (4)$$

Negative ideal

$$A^{-} = \left\{ \left(\min_i V_{ij} \middle| j \in J \right), \left(\max_i V_{ij} \middle| j \in J' \right) \middle| i = 1,2,...,m \right\} = \left\{ V_1^{-}, V_2^{-}, ..., V_n^{-} \right\} \quad (5)$$

In this relations, *J* is positive index and J' is negative index. Table 10 shows the positive and negative ideals. The performance criteria obtained the least positive ideal and the 'number and type of involved organizations' and 'type of competence' criteria obtained the least negative ideals.

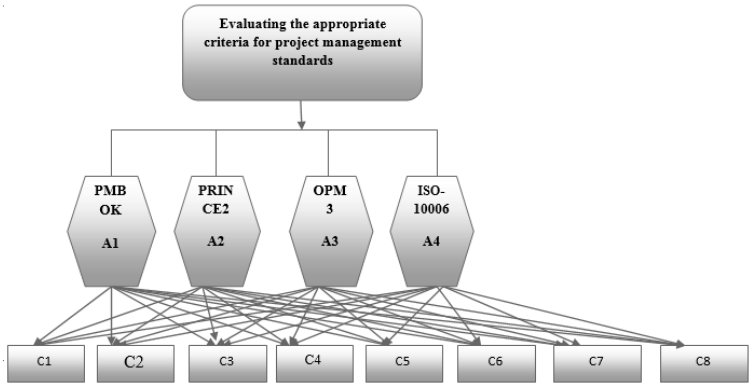

Fig. 2: TOPSIS network diagram for standard methods and criteria in project management

Table 10: Positive and negative ideals of each index

Criterion	Positive	negative
C1	0.029	0.02
C2	0.028	0.02
C3	0.026	0.02
C4	0.028	0.02
C5	0.025	0.022
C6	0.032	0.02
C7	0.031	0.019
C8	0.029	0.019

Table 11: Ranking of Options

Rank	CL	The ideal distance from negative	The ideal distance from Positive	choices
1	0.48	0.02	0.022	A1
2	0.425	0.019	0.031	A2
3	0.33	0.016	0.027	A3
4	0.295	0.014	0.022	A4

4.8 Calculate the distance from the positive and negative ideals

At this step, the distance of each option from positive and negative ideals is determined according to Eqs (6) and (7).

The distance of *i*th option from the positive ideal is

$$d_i^+ = \sqrt{\sum_{j=1}^{n}\left(V_{ij} - V_j^+\right)^2} \;;\; i = 1, 2, ..., m \tag{6}$$

The distance of *i* th option from the negative ideal is

$$d_i^- = \sqrt{\sum_{j=1}^{n}\left(V_{ij} - V_j^-\right)^2} \;;\; i = 1, 2, ..., m \tag{7}$$

Calculate the closeness level (CL) of each factor to the positive and negative ideals

At this step, the closeness level of each option to the positive and negative idealsis obtained by Eq. (8).

$$CL_i = \frac{d_i^-}{d_i^- + d_i^+} \tag{8}$$

Table 11 shows the CL values for each option.

4.9 Step Seven: Rank the options

At this step, the options are ranked based on CL values; in other words, any option having a higher CL will earn a better ranking. Table 11 shows the ranking of options.

The results obtained from the ranking of options with TOPSIS technique indicate that the PMBOK standard in this country has taken a high priority over other options.

5. Solutions

If the weakness and distance from the requirements of project management body of knowledge are based on process plans related to the cases within each of the nine areas of project management, continuing and going through a recovery process and performing periodic audit could be done to amend the procedure and reduce the distance to the standard. The organizational project management is the systematic management of projects in order to achieve the strategic goals of the organization. This concept that there is a direct relationship between the skill and ability of an organization to manage its projects and its success in implementing strategies, is the fundamental and theoretical basis of organizational maturity and organizational project management.

Although each of the projects may arise short-term, or at most, medium-term issues for the organization, the project management in an organization can create a strategic competitive advantage for the organization. The successful implementation of project management in the organization will lead to selecting the projects proportional to the organization's goals, properly allocating resources of project organizations, successfully completing the projects, and ultimately, the success of organization. An organizational maturity model represents a conceptual framework with relevant components to show the degree of maturity of the organization in the respective field. For some models, the process of transforming the organization from lower levels to higher ones may be described. The model may also be step by step (discrete) or continuous. Project management, time management, cost management and quality together can provide a complete view of the status of project management in an organization that also identify the susceptible areas of possible improvements. Accordingly, the following steps are recommended to be followed in the studied organization:

5.1. First step: Preparation for assessment

In the first step, the organization is prepared for the assessment of project management maturity. This objective is met through the perception of organizational project management and its benefits and understanding the standard components and performance.

5.2. Second step: Assessment

In the next step, the organization assesses its situation in different aspects described in the model. The first step is to define the superior strategies available in the organization and to determine the overall maturity of the organization in implementing the project management. Then, in second step, the skills proportional to any of the superior strategies that are available or not, are identified in the organization. Based on the assessment, an organization may 1) repeat assessment, 2) plan to establish and improve, and 3) get out of the standard cycle (for a given period). In the latter (which would be selected if the organization is satisfied with the current status of management),it is recommended that a time is set for repeating the assessment and reviewing the status of organization. The assessment check lists and documents are widely adopted in this step.

5.3. Third step: planning the improvement

In management standards, organizations deciding to improve the project management use the results of previous steps as a basis for planning. Identifying the capabilities an organization may have or not, allows them to be prioritized based on the organization requirements depending on the interaction between them. According to this prioritization, organization can make a plan to achieve the results representing the presence of any of the required capability for implementing a superior strategy.

5.4. Fourth step: Implementing the improvement

In this step, the necessary organizational change occurs in the organization. The successful implementation of such organizational changes will lead to the acquisition of new skills by the organization and eventually, the progress of organization in implementing the project management.

5.5. Fifth step: Repeating the process

After implementing the planned improvements, organization can return to one of the second (re-assessment of organization maturity in project management) or third step (planning further improvements based on the previous assessment). Hence, after dynamic and continuous implementation and application of the standard within the organization and achievement of relevant results, one can carry out the tender management model in the studied organization. It is evident in implementing the recovery process that the weaknesses of organization should reach aright level of compliance in the areas of greatest importance, ahead of the rest and with the passage of time and introduction of the aforementioned steps in other areas.

6. Conclusion

Although in recent years, the project management has been received much attention from many organizations and a considerable growth in this area has been made, improving the performance of project staff and particularly, project managers who are the foundation of project management, has received little attention. For a successful project to achieve its time, cost, and quality goals, a fundamental and important factor is having competent project managers. Therefore, it is essential to study the various competency standards of project management and their features as well as to identify similarities and differences between them. Hence, comparing competency standards and choosing the best option enables organizations to achieve their goals by using it given to the characteristics of the project. In this study, four applicable standards in the construction projects of the country were studied and compared. By comparing the

competency standards of project management using TOPSIS technique and the obtained results, it was observed that the PMBOK standard is the best option followed by the PRINCE2 and OPM standards in the next priorities.

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Primary Paper Section: A

Secondary Paper Section: AE