

Assessment of PMBOK Indexes in Executive Projects

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Abstract—The development of technology has recognized the importance of time, cost, resources and budget in executive projects. Thus, assessing the management process of these projects is essential in order to determine their weakness and strengths to improve them. On the other hand PMBOK is considered as one of the most essential standards in the project management profession. Therefore assessment of executive projects based on PMBOK indexes is assessed in this paper. In this research according to PMBOK guide indexes a questionnaire was provided and used to assess the Fars Petrochemical Complex as a sample. The scope of this research is to define the project management indexes priorities that are critical in the success of projects. The results show that Project Time Management has the highest influence in the success of the Petrochemical Complex.

Index Terms—project management, time management, risk management, PMBOK, petrochemical complex.

I. INTRODUCTION

Project management is the application of knowledge, skills, tools and techniques to manage activities in order to meet or exceed stakeholder needs and expectations of a project [1]. Project management is now well developed and well accepted as a domain for assessing professional expertise as an area for academic research and discourse [2]. The most important roles in project's success are played by *management indexes*, *management methods*, *management potentials* and *knowledge* [3]. Various management indicators have been defined by different researches, for instance: project control, time scheduling, analyzing the sequence of practices, estimating the required resources of practices and the duration of practices' execution based on the schedule as mentioned by Maghareh *et al.*(2011) [4].

The Project Management Body of Knowledge (PMBOK) as defined by the Project Management Institute is sum of knowledge within emerging professional project management. There are subsets of this body of knowledge which have been gathered into written documents for the purposes of standard setting, education, and creating a common language for talking about project management [5].

Numerous methods and techniques have been developed covering all aspects of managing project. For

example Maghareh *et al.*(2011) have presented a method for calculating management indexes in construction of projects based on the opinions of practitioners of different projects [6]. However, the purpose of this paper is to study the indexes in the executive projects based on the PMBOK guide methodology.

II. RESEARCH METHODOLOGY

In order to assess projects a questionnaire was prepared based on PMBOK fourth edition indexes including 60 questions in the nine categories of knowledge including Project Integration Management (PIM), Project Scope Management (PSM), Project Time Management (PTM), Project Cost Management, (PCM), Project Quality Management (PQM), Project Human Resources Management (PHRM), Project Communication Management (PCNM), Project Risk Management (PRM) and Project Procurement Management (PPM). The questionnaire sent through email to nine managers of the Fars Petrochemical Complex. For each question answers were: "Yes", "Substantially Yes", "No", "Substantially No" and "No Comment"; meaning 4 scores to zero scores respectively.

Based on the opinion of managers, the answers were analyzed through the following method. To calculate the score of each category of knowledge the following steps should be carried out for the Time Management as an example.

- Define the number of answers in each category of knowledge.
- Calculate the final score of every question according to the number of answers and the scores obtained.
- Calculate the summation of questions scores which is the score of every category of knowledge.
- Calculate the percentage of every category of knowledge by dividing the final score of each category of knowledge to the multiplication of the number of questions of each area and the maximum score given to every question which is 4.
- Define the final score of every category of knowledge by multiplying the percentage of each area defined in step 4 in the weighted coefficient of each category. The weighted coefficient of each area is defined by the importance of each category of knowledge in every particular project. For instance PTM weight is 20% of the total project.

III. RESULTS

The score of each indicator used in the questionnaire of each category of knowledge and the final scores obtained are calculated. By adding up the final score of each area, the final score of the projects will be calculated. PTM as the area that has obtained the maximum score; and PRM as the area that has the maximum deviation are the main focus in indexes in this study. Factors considered and scores obtained in these two areas of knowledge are discussed.

A. Project Time Management

This category processes required completion of project to be ensured in defined time. For example Table I provides an overview of the indicators used in assessing the PTM.

TABLE I. THE INDICATORS USED IN ASSESSING PTM

No.	Indicator Title	Indicator value
1	Process of selecting appropriate stakeholders	2.88
2	Creating plan schedules	3.55
3	Programming according to available human and inhuman resources	2.44
4	Updated the schedules regularly to show actual and forecast	3
5	corrective procedure in the case of dropping behind the schedules	2.77
SUM		15.08

B. Project Risk Management

Includes the processes of identification, analysis, response planning, monitoring and control in a

project. The objective of PRM is to increase the probability and effect of positive events, and to decrease the probability and impact of negative events in the projects. As an example Table II provides an overview of the indicators used in assessing the PRM.

TABLE II. THE INDICATORS USED IN ASSESSING PRM

No.	Indicator Title	Indicator evaluation
1	Paying attention to risk management planning	2.11
2	Identifying and documenting risk events	2.66
3	Risk register action	2.11
4	Estimation of the probability and effect of each risk element	2.55
5	Using quantitative methods	2.88
6	Risk responses Documentation	2
7	Identifying and documenting opportunities	2
8	Monitoring the identified risk element	2.33
9	looking for new risk conditions	2.22
10	Managing and Using probable resources in budgeting and scheduling	2.77
SUM		22.63

IV. FINAL RESULTS AND DISCUSSION

Table III provides the final result of the questionnaire and the summery of the scores of the nine categories defined. According to the table the project is acquired good grade by obtaining 61 scores.

TABLE III. THE FINAL RESULT OF THE QUESTIONNAIRE AND THE SUMMERY OF THE SCORES OF THE NINE CATEGORIES

No.	Knowledge category	Score of each category (%)	Weight Coefficient	Final Score	Deviation	Relative Deviation	Priority
1	PIM	74.88	5	4	1	25.12	6 th
2	PSM	68.63	10	7	3	31.37	4 th
3	PTM	75.40	20	15	5	24.60	1 th
4	PCM	68.63	15	10	5	31.37	2 th
5	PQM	77.75	5	4	1	22.25	6 th
6	PHRM	74.88	5	4	1	25.12	6 th
7	PCNM	77.63	5	4	1	22.37	6 th
8	PRM	59.08	10	6	4	40.92	5 th
9	PPM	79.81	10	8	2	20.19	3 th
10	On time reports		5				
11	Average delay		10				
SUM			100	61	Good: Grade B		

According to Fig. 1 PTM has gained the highest score in the project. PCM and PPM are at the next place. The priority of each area is shown in Fig. 2. The result indicate that defining activities, sequence of activities, estimating activity resources, estimating activity duration, development schedule and schedule control are important indicators in Fars Petrochemical Complex.

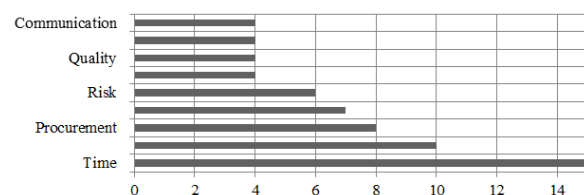


Figure 1. Final score of every category of knowledge

The general condition of each category of knowledge is shown in Fig. 2. In order to analyze the process we need to study input and output of every process. The result presented in Fig. 2 shows the level of the implementation of the process in each area and in compartment to the

ideal level of implementation. By using this report the overall performance can be analyzed. It should be considered that in addition to the variation of achieved and ideal scores, the suitability of these two should also be considered.

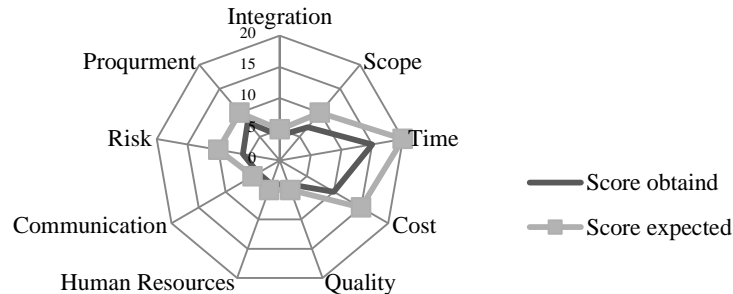


Figure 2. Level of the achievement of goals

As it is shown in Fig. 3 the maximum level deviation is in PRM index. It indicates that there are some weaknesses in identifying, analyzing and despondence to risks.

In addition to the priorities of every category of knowledge the indicators that are highlighted are the most important indicators in each category of knowledge. It

shows the indicator that has gained the maximum score in each area. For example in PTM that is the first priority, pointing to activity duration and critical activity are the most important indicators. In this research the main concern is time management because of the maximum score it has gained and risk management due to the maximum deviation reported.

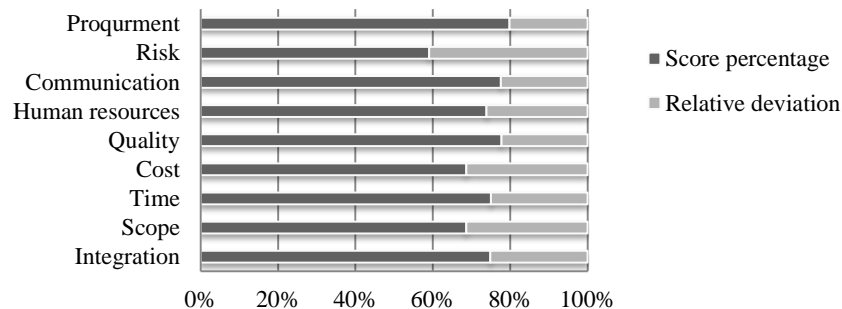


Figure 3. Relative deviation

The expected outputs in the PTM are defining activities, the process of activities, estimating activity duration, development schedule and controlling the schedule. As it is shown in Fig. 4 development of the

project schedule is the first priority in PTM and indicates that it is the main factor in the success of Fars Petrochemical Complex projects.



Figure 4. Outputs of PTM

According to Fig. 5, quantitative methods are the first priority for the PRM. Generally risk management can be divided into three categories, risk assessment, controlling risk and dealing with the risk. In this phase if the results would be shown in quantitative form they would be more

understandable, meaningful and programmable. This precedence is so close to the cost management and time management. According to Fig. 4 since time management is the first priority therefore risk management is also important although it is the fifth priority.

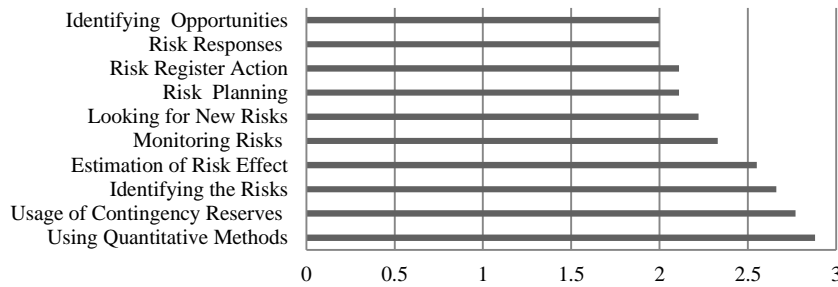


Figure 5. Outputs of PRM

V. SUMMARY

Project Management is known as the application of knowledge, skills, tools and methods in performing related activities so that the project's needs and requirements might be met. Executive projects are facing numerous problems due to the lack of knowledge in project management field. In this research petrochemical projects have been selected as a sample to assess their management procedure. A questionnaire was provided according to the PMBOK indexes and given to project managers. The results show that Fars petrochemical projects obtained 61 scores and are assessed as good level. PTM is the first priority in the project management. Results also show that there is an appropriate level of knowledge in the nine category of the PMBOK in Fars petrochemical projects.

The Strengths of Fars petrochemical projects are due to the quantitative risk analysis, providing a regular schedule and paying attention to practitioner's needs. The main weakness of the petrochemical projects is to the process of to the current risks. Although a quantitative method is used for analyzing the risks; monitoring the risks, controlling the risks, responses to risks are not done properly and due to the programs. It has been concluded that petrochemical projects are rated in a good level in compartment to other executive. Since the main problems in executive projects are prolong time of the construction, lack of budget and the high cost of materials, modeling the PTM, cost and procurement management in

petrochemical projects would be an appropriate solution in order to solve these problems. Therefore by developing the schedule plan and continues control of programs, projects would be done in estimated time.

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