

Value Engineering Methodology: An Opportunity for Optimization of the Project Management Plan

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Abstract

Recent research reveals that less than %20 of projects achieve their time, cost and quality objectives, and Project Management is one of the key factors in the success of projects. Considering that each project is unique, appropriate tools, techniques and methods must be adopted in relation to the scale, complexity and the particular characteristics of each project. The Project Management Plan is developed for this purpose. If the functions of the plan and its components are not properly evaluated for each project, besides the incurrence of extra costs, the plan may not be very effective.

Today Value Engineering Methodology is one of the most successful tools for cost reduction, as well as performance and quality improvement for a system or a product. This article is part of an ongoing research that is being carried out to investigate the potential of this methodology for the optimization of the Project Management Plan. In addition to a clear explanation of the problem, Value Engineering phases have been revised.

Keywords

Project Management, Project Management Plan, Value Engineering Methodology, Project Success.

1. Introduction

Nowadays project management is considered as one of the main elements in the project success, but in some cases, despite the used expense and attempts to manage the project, desirable results may not gain and some of the approaches are copied only because of being useful or efficient in another project. Avoiding this problem, the project management team should choose an appropriate combination of tools and techniques, named Project Management Plan, in the beginning of the project. Preparation of this plan and optimization of it is another challenging issue that we consider it.

2. The Aim and Methodology

This research aims at developing the used tools and techniques in preparing the Project Management Plan. The main question is this: "Can we use Value Engineering Methodology as a technique in developing Project Management Plan?" So in this research along with a survey of the process of developing the Project Management Plan and also the process of Value Engineering theoretically, the possibility of using the Value Engineering Methodology was assessed by the qualitative content analysis method and Value Engineering stages were revised for developing Project Management Plan.

This is a developmental and practical research, because it aims at expanding a part of project management knowledge and tries to solve a problem which exists in reality.

3. Literature Review

3.1 Project Management Plan

There are three major documents described within the *PMBOK® Guide* that should develop in the beginning of the project and each has a specific purpose (PMI, (2004)):

- Project Charter: Formally authorizes the project.
- Project Scope Statement: States what work is to be accomplished and what deliverables need to be produced.
- Project Management Plan: States how the work will be performed.

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Fig.1 depicts the place of the Project Management Plan in the planning process group. The Project Management Plan is composed of the plans and documents generated by the various processes. Those items are the subsidiary plans and components of the Project Management Plan (PMI, (2004)).

The Develop Project Management Plan process includes the actions necessary to define, integrate, and coordinate all subsidiary plans into a Project Management Plan. The Project Management Plan content will vary depending upon the application area and complexity of the project. This process results in a Project Management Plan that is updated and revised through the Integrated Change Control process. The Project Management Plan defines how the project is executed, monitored and controlled, and closed.

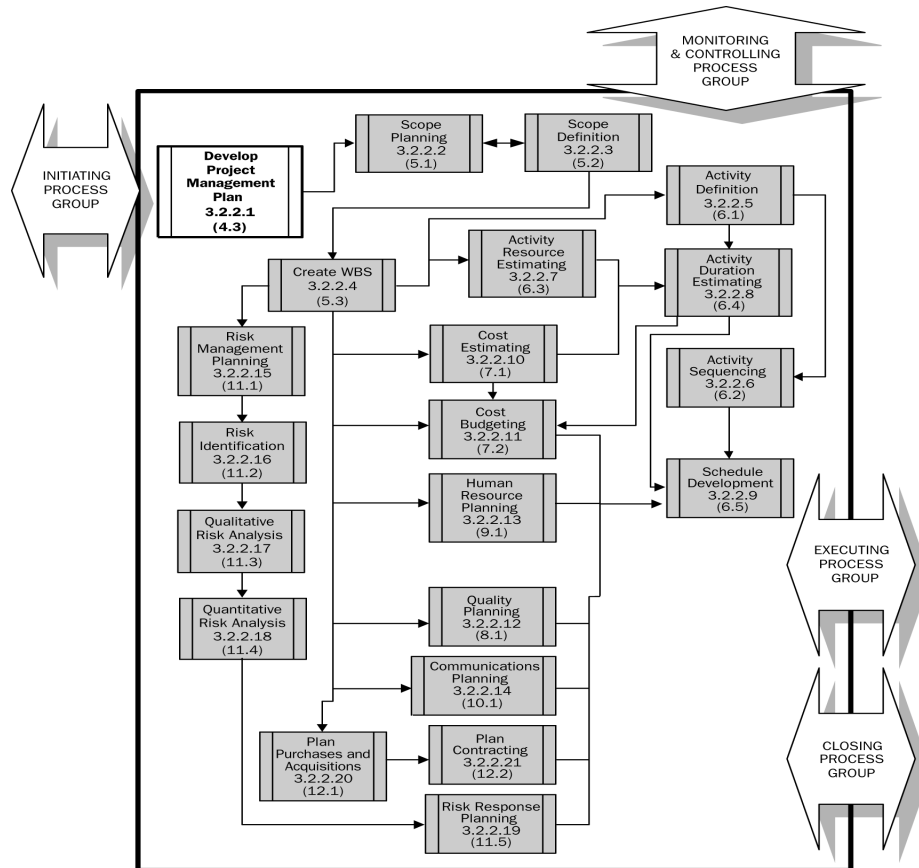


Fig.1: Planning Process Group (PMI, (2004)).

The Project Management Plan documents the collection of outputs of the planning processes of the Planning Process Group and includes (PMI, 2004):

- The project management processes selected by the project management team
- The level of implementation of each selected process
- The descriptions of the tools and techniques to be used for accomplishing those processes
- How the selected processes will be used to manage the specific project, including the dependencies and interactions among those processes, and the essential inputs and outputs
- How work will be executed to accomplish the project objectives
- How changes will be monitored and controlled
- How configuration management will be performed
- How integrity of the performance measurement baselines will be maintained and used
- The need and techniques for communication among stakeholders
- The selected project life cycle and, for multi-phase projects, the associated project phases
- Key management reviews for content, extent, and timing to facilitate addressing open issues and pending decisions.

The Project Management Plan can be either summary level or detailed, and can be composed of one or more subsidiary plans and other components. Each of the subsidiary plans and components is detailed to the extent required by the specific project. These subsidiary plans include, but are not limited to: Project scope management plan, Schedule management plan, Cost management plan, Quality management plan, Process improvement plan, Staffing management plan, Communication management plan, Risk management plan, and Procurement management plan (PMI, (2004)).

3.2 The Role of Project Management Plan in the Project Success

The literature shows that among all industries only a few projects are successful (P. Rad & G. Levin, (2002)). In a research by Standish Group more than 8000 projects were surveyed and their predicted results were compared with the gained ones. It showed that only 16% of the projects had fulfilled their time, budget and quality purposes (table1) (A.P. Hameri & R. Puittinen, (2003) and P. Rad & G. Levin, (2002)). Another research shows that between 50 to 80 % of information technology projects are unsuccessful (K.C. Desouza & J.R. Evaristo, (2006)).

Fully Successful	16%
Partially Successful	32%
Failed	52%

Table1: The rate of the success of projects (P. Rad & G. Levin, (2002))

Many researches have been done on the necessary factors for a project success which usually came up with some of them such as using Project Management Plan, leading and managing the project team, project resources management, contract management, knowing and understanding project stakeholders’ goals, etc, as the most important elements for its success (IPMA, (2000)); but the important thing in the present research is the study of the role and effect of Project Management Plan in the project success. So in this part the results of a research which has surveyed the effects of using a Project Management Plan in the success or fail of a project are considered as our groundwork. In this research a survey was done on 288 large and medium companies in which some projects had been defined and carried out. In Fig.2 distribution plentitude of surveyed projects has been presented from the project success aspect. This survey results showed that the projects with a high proportion of project management were those in which decisions were made according to a special Project Management Plan, in a way that not only were the projects goals defined but also a series of ordered managerial decisions were made during the project accomplishment period (P. Lehtonen & M. Martinsuo, (2006)).

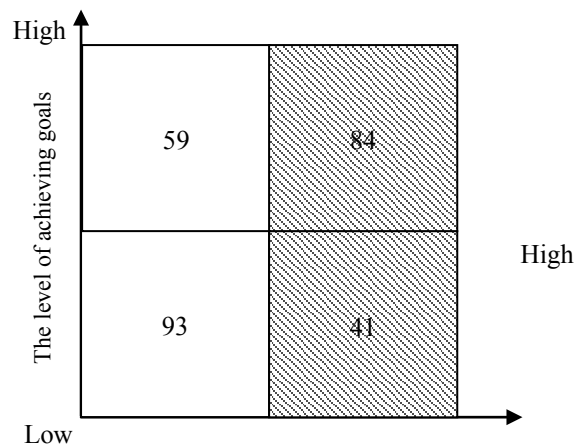


Fig.2: The Number of projects placed in each area (P. Lehtonen & M. Martinsuo, (2006)).

3.3 Develop Project Management Plan Process

Fig.3 depicts the inputs, tools and techniques, and outputs of the Develop Project Management Plan process. The tools and techniques of Develop Project Management Plan process are:

Project Management Methodology: The project management methodology defines a process, which aids a project management team in developing and controlling changes to the Project Management Plan.

Project Management Information System: The project management information system, an automated system, is used by the project management team to support generation of the Project Management Plan, facilitate feedback as the document is developed, control changes to the Project Management Plan, and release the approved document.

Expert Judgment: Expert judgment is applied to develop technical and management details to be included in the Project Management Plan.

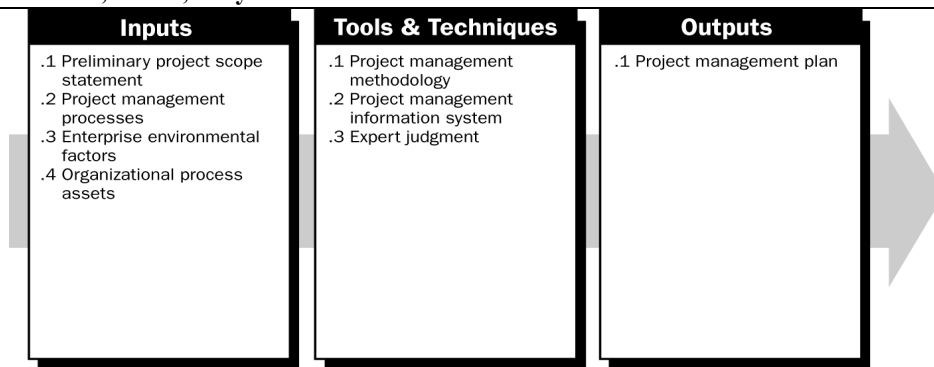


Fig.3: Develop Project Management Plan process: Inputs, Tools & Techniques, and Outputs (PMI, (2004)).

3.4 Value Engineering

It is one of the most successful techniques for problem solving, cost reduction, and quality and performance improvement. Value Engineering is a team-work, systematic and function-oriented approach, used for the assessment and improvement of a product value or a system design (M. Karimi, (2005)).

Three main elements to measure value are: function, quality and cost. The following relation exists between these elements and value:

$$\text{Value} = \frac{\text{Quality} + \text{Function}}{\text{Cost}}$$

Function = The specific work that a design/item must perform; Quality = The owner's or user's needs, desires, and expectations, and Cost = The life cycle cost of the product. Therefore, we can say that:

Value = the most cost-effective way to reliably accomplish a function that will meet the user's needs, desires, and expectations (A. Dell'Isola, (1997)).

Generally in studying Value Engineering we face two groups of questions:

The first one: the questions related to the existing situation

1. What is it?
2. What does this component do or what should it do?
3. Is it really necessary?
4. How much does it cost?

The second one: the questions related to the substitution choice:

1. What else can do the same job?
2. How much does it cost?
3. Is this new solution enforceable?
4. Is it possible to accept and to execute it?

These 8 questions include some points that by considering them, the value engineering team is after getting an explicit answer and subsequently a scenario to substitute the present choice, a scenario with a less cost and higher quality (M. Karimi, (2005)).

Three main stages of value study according to the published standard by the Society of American Value engineers (SAVE) are: Pre-study, Value study, and Post-Study (M. Karimi, (2005)).

Value study stage has been divided into 6 phases which are thus:

1. Information phase
2. Function analysis phase
3. Creativity phase
4. Evaluation phase
5. Development phase
6. Presentation phase

4. Discussion

Considering the aforesaid explanations about Project Management Plan and its role in the project success, and the organizations' needs to a method to prepare a plan with the utmost appropriateness in regard to the project and its particular characteristics, in this part we'll discuss the possibility of using Value Engineering Methodology as one of the tools and techniques in Develop Project Management Plan process.

As observed in fig.3 there are some tools and techniques for developing Project Management Plan and the main challenge is to decide about Project Management Plan components and the way of their combination according to the existing project management methodology in the organization and by using experts' judgments through holding team meetings. On the other hand each component of this plan has a different function and cost and maybe the needed function differ from one project to another. So the Value Engineering Methodology which emphasizes so

much on teamwork and on an outlook of the function of the product can be used as an efficient tool and technique in preparing this plan. In the following subsections we'll discuss the way that different stages of value engineering conform to Develop Project Management Plan process.

4.1 The First Stage: Pre-Study

It is the first stage of value engineering in which necessary information for value engineering team is gathered (M. Karimi, (2005)). On the condition of using value engineering methodology in the process of Develop Project Management Plan, project information should be handed in to the project management team in this stage, such as:

- Preliminary project scope statement,
- Project management processes,
- Enterprise environmental factors,
- Organizational process assets,
- The suggested team by the project manager for value engineering workshop,
- The constraints of project contract (time, cost, quality),
- The probable risks of the project,
- The project management methodology used in the organization,
- Project stakeholders (their list and their expectations),
- The technical standards needed by the project,
- Its needed resources,
- Some information about similar previous projects,
- The criterias for evaluating ideas, and
- Complementary explanations.

As obvious in the above list, project management methodology is one of the most important information which should be noticed in the pre-study stage. Usually in each company there is a list of guidelines, tools, techniques and procedures by the name of project management methodology, by using which and other cases in the beginning of each project, a Project Management Plan is developed. For example in each organization there is a collection of tools and methods for risk management but the risk management plan which is prepared for each project and the collection of tools and methods used for that project risk management may be different from other projects. In the next section the way of decision making about the components of Project Management Plan and their details will be explained.

4.2 The Second Stage: Value Study

This stage includes operation steps of performing value methodology. In order to develop the Project Management Plan we can revise the phases of this stage as follow:

The 1st Phase: Information

It aims at completing the information gathered in the pre-study stage. In this stage there should be a chance for team members to complete their information related to their profession of the project besides asking some questions. For example the related information to the primary plan of the available project risk management in the company and also some information about the project which would be helpful in choosing suitable methods for risk management are handed in to the related experts. Also in this phase, we should be assured that all the members of teamwork know the purpose of organizing the workshop which is applying value engineering on the Project Management Plan to review it and optimize it.

The 2nd Phase: Function Analysis

Its purpose is to determine the scope of value study on the Project Management Plan with the utmost advantage. Value study team takes the following actions:

1. The recognition and determination of the function of each component of the Project Management Plan,
2. The categorization of the functions into two basic and secondary function groups,
3. Drawing a function model like FAST Diagram model,
4. Allocating cost or other measurable criteria and calculating it for each function,
5. Estimating the value of each function with a consideration for stakeholders' expects and needs,
6. A comparison of the cost and worth of each function to determine the best improvement approach,
7. An exact assessment of the functions, based on the project's goals and plan,
8. Choosing the most suitable functions to continue analysis process, and
9. Redefinition of the value study scope.

For example in this phase the basic function of Project Risk Management Plan can be defined as "optimizing the impact of risks" and then we can draw its FAST diagram as shown in Fig.4. Then other phases of function analysis should be accomplished according to this model.

It should be noted that the collected documents of each value engineering workshop can be useful to speed up and facilitate the following ones. So it's necessary to document analyses in each phase.

The 3rd Phase: Creativity

Its purpose is to create different ideas to put into operation each one of the chosen functions at the end of the function analysis phase. For this purpose all the chosen functions are presented to the team members to create an idea for each one. It means that they should specify the other methods or tools to fulfill each one of these functions.

For example in this phase it's asked to propose new ideas for operating those functions of the risk management chosen for a more thorough survey in function analysis phase.

Leading the meeting toward more usefulness is a must. It means that not only should not the members be deprived of creativity but also the utmost number of possible ideas should be suggested and documented. For this purpose different methods such as brainstorming, TRIZ, thought-writing etc, are used.

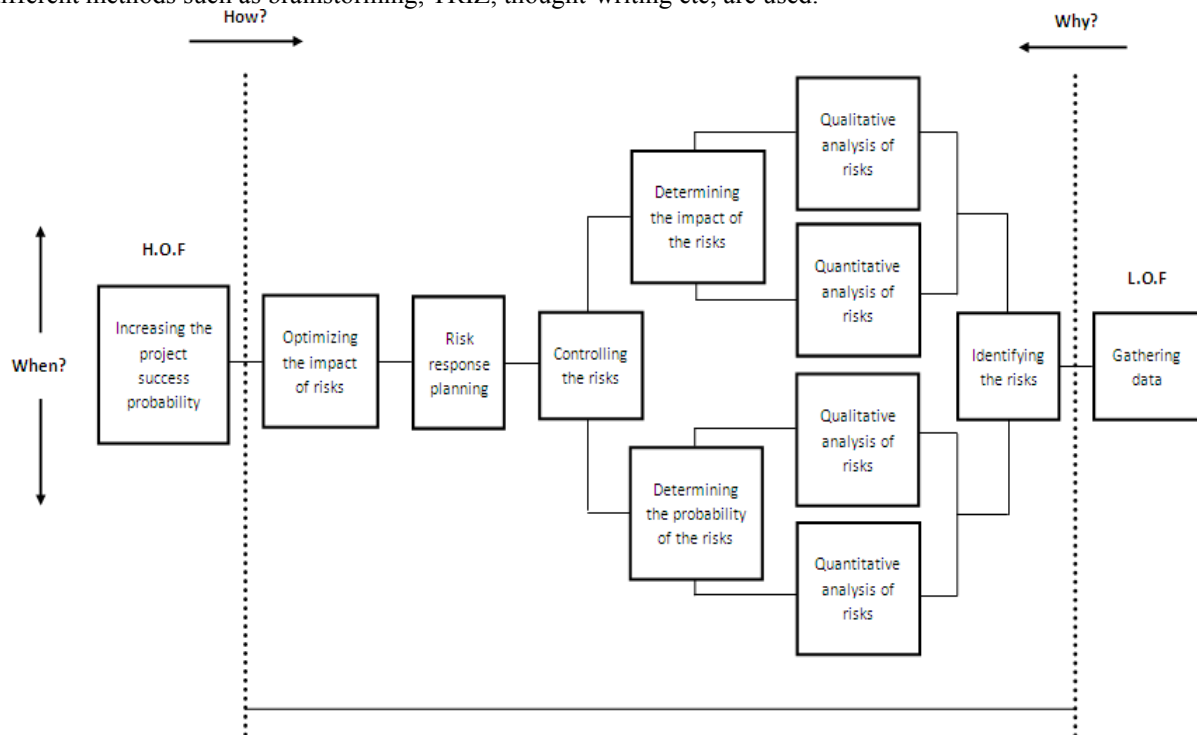


Fig.4: FAST diagram for Risk Management Plan [authors]

The 4th Phase: Evaluation

Its purpose is to liken produced ideas in the creativity phase and to choose those with a capacity of expansion in the value studying process. With a consideration of the determined criteria in the pre-study stage, the ideas are organized and the process is usually accompanied with the following steps:

1. The complicated and irrelevant ideas which are not supported are omitted,
2. Similar ideas can be merged in a group. The categorization can be labeled under different names such as risk management, time management etc,
3. The advantages and also the problems of each idea are listed. For example an idea may be very efficient and desirable but providing its equipments may be very expensive or time- taking,
4. Each group's ideas are graded considering the priority and the importance of evaluation criteria, and
5. The elected ideas are determined for development. If none of these ideas included the defined criteria, value study team should repeat the creativity phase.

The 5th Phase: Development

It aims at the combination and selection of the best solutions of the evaluation phase and the preposition of the best choices to optimize the value of Project Management Plan and includes the following steps:

1. The best and the most valuable choices are selected and their advantages and performance requirements are assessed. This analysis includes estimating primary costs, life cycle costs and those of the performance.
2. The resources of suggested choices are analyzed.
3. The proficiency information related to every choice is surveyed:
 - The explanation of the primary plan and also the suggested choices.
 - The presentation of a general plan and a comparison between the primary plan and the suggested choices.
 - The presentation of cost and performance information to show clearly the difference between the primary plan and the suggested choices.
 - The presentation of any supporting professional information such as informative and calculative sources and the background of the subject.
 - The survey of the results of the project fulfillment according to the time table of the execution of the aforesaid choices.
 - To make changes in the time table according to the suggested choices.
4. An executive plan including the suggested timing of all the performance activities, performance groups' allocation and the managerial requirements is prepared.

5. Team's recommendations for suggested choices are completed. These recommendations include every exclusive condition of the studied project.

The 6th Phase: Presentation

It aims at presenting the group's gained results from the value study and the orderers' (such as the project manager, stakeholders and other executive managers) assurance of the fulfillment of the study services explanation and the agreement on the operative nature of the value engineering team's recommendations. It will be done by a verbal presentation of the results and a written document.

4.3 The Third Stage: Post-Study

It aims at getting an assurance of applying the changes recommended at the end of value study.

5. Conclusion

Considering the vastness of different tools and techniques for project management and the difference of their functions and costs and also the difference of the carried out projects from the viewpoint of scale, complexity, goals etc, one Project Management Plan can't be used for all projects, whereas by a consideration of each project specifications and using experts' ideas a plan should be composed for the project management at the beginning.

An appropriate combination of Project Management Plan components to cover all its managerial needs and to impose an appropriate expense and effort on the project and company at the same time can't be done easily unless we use an organized and aimful process.

As obvious in the sections 3 and 4 of this article, the teamwork approach of Value Engineering Methodology causes all the participating people in developing Project Management Plan to analyze the function of the components of this plan effectually and to deploy the best tools, techniques and methods in the intended project by focusing on the main functions of each component. Also the creative approach of value engineering will cause the planners of Project Management Plan not to limit themselves only to the existing tools and techniques in the company and the organization's process assets and to suggest newer tools and techniques according to the intended case and by using their creativity. So it seems that Value Engineering Methodology can be added as an efficient tool to the list of the used tools and techniques in the Develop Project Management Plan (Fig. 5). Of course it should be noted that the accomplishment of the results of this research in projects needs more studies in this field and also its experimental fulfillment in some projects and an exact assessment of its results.

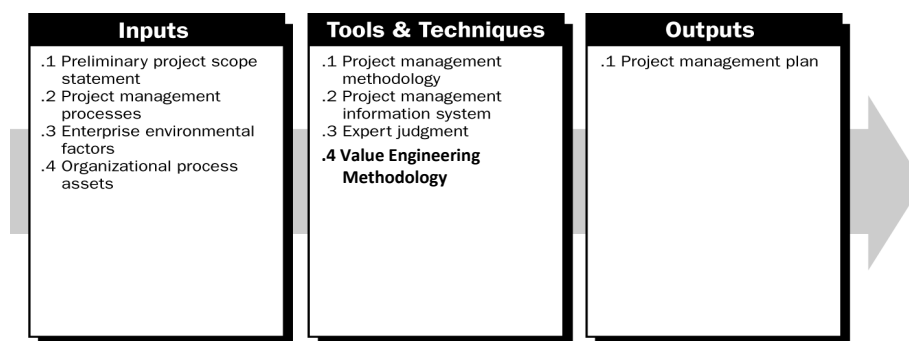


Fig.5: Proposed Develop Project Management Plan process [authors]

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