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Composing Model of Value Engineering and Work Survey Engineering in order to Achieve the Exalted Goals of Organization

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ABSTRACT

In today's conditions of universal economy, the competence between productive and service institutions is continually increasing. The most important goal of these situations is to provide requirements of customers and to achieve their satisfaction. One of managing instrument that would utilize in late decade is the value engineering but, it cannot observe real standards solely. That's why; work Study engineering is one of the precise and scientific ways for measuring work. Its advantage is the relatively low cost and high accuracy. It also presents a more real standard of temporal quality and doing work. In composing model of value engineering and work Study engineering in order to achieve the exalted goals of organization, it permit organizations to schedule better before start the project and its activities. And also in order to have more influence on project's profits and exalted goals of organization. This composing model establishes from interact and compose of study methods of value engineering and work Study engineering and work Study engineering. This technique assigns to achieve to project's goals with minimum cost, time and wasting energy and to increase profitability, to keep quality and to determine standards of doing work. It also assigns to appropriate a more suitable place toward other managing techniques and planning projects.

KEY WORDS: value engineering, work Study engineering, and exalted goals of organization

1. INTRODUCTION

1.1 concepts of study Value engineering (VE)

It's a creative, practical and organized attempt with the purpose of identifying unnecessary costs, which has no relation with quality, age, appearance beauty and the characteristics of customer's demands [16]. It has been known as one of the most useful and important economical methods in the engineering area. The VE methods are economization of the design process which starts from the most primary level of design and development based on the functions of project [5]. International society of American value engineering (SAVE) divide the process of studying VE into three parts:



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- A. primary study phase (pre-study)
- B. Value study phase (basic study). The International Society of Value Engineering divide this phase into six steps :
- 1. Information step
- 2. Analyzing the functions step
- 3. Creativity step
- 4. Evaluation step
- 5. Development step
- 6. Presentation step
- C. Supplementary phase(post study)



Work study engineering

It's a series of methods which help the efficiency and proficiency of the organization by study and analysis of current work procedures, improving those methods and determining the standard time of work achievement [6]. Work study, would study in three phase. Work-study implement the efficient method of work procedures in theory and practice [17]. These methods not only guarantee the safety and health of workers but also increase the efficiency and improve the quality of products [3].

1. Method study phase :

This phase record, study and analyze the current procedures systematically and critically and also suggests and designs more simple economized procedures to increase efficiency and proficiency in organization [6].

In this phase some techniques is used to specify the determined time of work achievement by experts who have determined tasks in order to mark inefficient times of work.

3. Implementation phase

In this phase-in Structures and regulations has codified and implementation of procedures has started then monitor the process of work to maintain the system.

2.1 background history of work study engineering and value engineering

The first serious work about time study of work study engineering refers to 1881 and Fredrick Taylor in Mydvile factory. Taylor's works and activities have more reputation and importance than other because he invented a pattern for element study, determining work time achievement and suggested the term of "time study"[6]. In 1930's movement of work study engineering started with purpose of founding more simple methods and improving them. After that period joint use of time and movement study has been utilized as complements so that by defining problems and issues, setting goals and founding appropriate solutions for procedures to improve efficiency. Value has a history more than half a century in world and more than three decade in Iran. This managerial technique invented by Lawrence D. Mailesf rom General Electric, an American company, in 1947. The results of utilizing this method caused Armed Services Procurement Regulations and transportation department use VE in head of their plan and assume that the rent of return stock in value engineering is 10\$ for every dollar[11]. A study which has been done on a 500 reports of projects' value engineering shows that the rate of thrift was 5% to 35% of primary costs and noticeable amount of age period is also decreased [13]. But VE has been started from latest 70's in some industrials and at the beginning of 80's has been used by Minister of Road Construction. The sea domain of country is one of the pioneers in VE which start the implementation of it by a two years program since 1391.



Fig 3. The process of work engineering and Value Engineering formation

3.1 The purpose of study

As for high costs, number of beneficiaries, project agents, need for new ideas in solving new problems and also several limitations in project, interaction of VE and work study engineering can be a practical and efficient method.

By this method not only the decrease in costs of age duration can be achieved but also it can help increasing efficiency and improving project quality (organization's high purpose). It should be assumed that costs, time and quality are basics index of projects' functions [9][8].

By using this interaction the basic purposes can be found in this research:

- 1. Each of these Methods is effective in costs management.
- 2. We can review for future products and plan it in current methods.

3.Both of this study processes should be in order to improve production.

4. In order to achieve useful and effective findings both of these studies should interact and move toward organization's high purposes.

5. Identifying effective elements on VE and work study engineering.

4.1 importance and necessity of subject

With a quick look at features of running a project such as high costs and involvement of different organization etc. it can be understand that solving upon problems is difficult for managers. Now these questions come to mind: does it really impossible to decrease these problems? Are these problems related respective organization or other organization?

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What do managers can do for solving these problems? Investigating the solutions of this problems shows that mangers not only paid costs but also use the current circumstances to solve their problems. Most of the industrials lost their hope for findings a solution for decreasing costs and concerns about quality decline because of decreasing costs. Customers, competitors and alterations force companies to move to a direction which seems scary and strange from involve people's point of view. The important point is that companies should consider and monitor several aspects at the same time. Managers assume that their organizations are sensitive toward changes but in fact most of companies just react toward those changes which they expect. To be successful in the current competitive market, companies should use work study engineering and VE in the appropriate way. So the customers' taste would be considered in new products and presenting services.

2. METHODOLOGY

Current study has been done in PUREBRED writing style and considered that there isn't any study in this matter. This study used theory and librarian methodology. In fact, researcher aim to by using this model implement organization's high level purposes to present new techniques in production and costs management. And answer questions like:

What would be effects of synchronous interaction of two methods on organization's high level purposes? Can the correct identification of study stages just by considering the extra costs elimination in projects cycle help the organization's purposes?

Do competitive global markets provide the power of ignoring the process of VE and work study engineering?

Does completing data and information in primary study of organization's functions help organization reaching the ultimate goals.

2. Study findings

This model shows that if VE and work study engineering use synchronously as practical technique for the purpose of achieving goals of project with minimum costs. Findings of this method are:

1. Help managers to identify necessary equipment and facilities and decrease the capacities and useless sources of organization by practical planning.

- 1. Improving efficiency
- 2. Procedure's standard with purpose of effective production planning
- 3. Gradual changes by work study and work objective investigation
- 4. Improving quality of services and activities by decreasing and elimination of useless and extra activities
- 5. Illustration of needs
- 6. Investigation of beneficiary parties ambiguities and solving it.
- 7. Decreasing costs and time of work achievement beside improving quality
- 8. Improving production ability
- 9. Using standard time calculation index (will be discussed)
- 10. Using value index as a successful long term strategy in business cause ideality of procedure.

This formula shows that procedures ideality is assumed based on sum of useful and

Functions divided to sum of system's costs. Using this formula along with identification of system value index shows the idealistic procedures and sum of functions.

$$I(s) = \frac{\sum f(MUF)}{\sum f(MUF)}$$

$$\sum(WSEC)$$

→ { F: function, U: useful, M: main, s: ideal system, C: cost, E: consummed energy, S: size, W: weight } 3. Discussion

3.1 investigating composing model of value engineering and work study engineering

Cost management techniques implement in three ways for production in past, present and future. But VE and work study engineering techniques plan in order to avoid unexpected costs for future products.

Evaluation process of work study engineering consists of three parts and in this study value engineering in three parts. In this study VE and work study engineering divided into three parts and composing stages of VE and work study engineering would be explained which would be practical in organization.

A. First advanced phase

Composing the phase of methodology study in work study engineering and primary study

Phase in VE:

Before starting main processes we need to do some primary actions. This actions which are results of composing methodology study and pre-study of VE in order to record, study and investigate current procedures systematically with critical point of view and suggest more simple, more effective and more economical methods to improve efficiency. In

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this area preparation and effective actions for VE implementation would be done and the most matter in this stage is data collection and appropriate information [7].

For this purpose following actions should be done in this phase:

- 1. Team selection
- 2. Project selection
- 3. Information preparation
- 4. Project coordination
- 5. Identifying methods improving procedures
- 6. Data collection and appropriate information
- 7. Correct identification of work procedure levels
- 8. Identifying the beneficiary parties and their demands
- 9. Simplifying the procedures
- 10. Improving procedures
- 11. Improving using materials and equipment and standardization
- B. Second advanced phase: composing steps of time study in work study engineering and value study engineering

This is the most important and main stage because it's the operational stage which help management of the standard time procedures and also executing available resources.

The important point in this stage is that new information may cause to return to previous phases but it is impossible to eliminate a stage or level. Stages should pass in order. Such as other studies and value-based plans, value engineering has an organized discipline work plan. This work plan implement VE study processes in six level. Current work plan present based on levels' overlap. This levels has been formed by comprising time study stage in work study engineering and value study stage in VE. [2][12][14][15]

1. Information phase

The purpose of this level is completing data which has been started in, the first stage of primary study. Visiting the location of project is necessary in this level in case it hadn't done still.

2. Function analysis phase

The purpose of this level is production and presentation of several choices for achieving selected functions. In this level determined work for standard time measurement would be analysis.

3. Creativity phase

The purpose of this phase is to present suggestions for achieving selected functions. It should be mentioned that this level present different ideas related to other function's methods. It seems that creativity and ideas can increase by teaching the procedures to whom their work is going to measure.

4. Evaluation phase

The purpose of this level is decreasing number of ideas and presenting a brief list of most potential ideas for improving and achieving project functions considering quality needs and resource limitations.

5. Development phase

Purpose of this level is development of selection and preparation of best choices of improving values. Logical solutions with lower costs could be implemented with help of industrial consoler and using national standards. This level is consist of four steps:

- 1. The best choice is selection then analyzing productivity and determining executive needs with regard to primary costs of investment, utilization and running period, risk and not pragmatism.
- 2. Technical data should be collected for each kind of suggestion. These data are consisted following:
- A. Explaining primary plan and suggested choices.
- B. Primary plan and suggested choices.
- C. Implementations related to costs and functions in a way that show the differences between primary plan and suggested choices.
- D. Each kind of technical information is consisting of: Resources, information, determining normal time of finishing work, calculating allowed extra costs.
- E. Implemented changes in time plan:

Adjusting resulted time and determining final standard. In this level each element calculate correctly with a stop which (which is epenthetic).

The advantages of this method are law costs and much time and give us more real standard. Function coefficients very important in this level. According to this point, the judgment of person who calculate time about efficiency and speed of worker result from knowing the natural function coefficient and its effect on observing time of normal time. In this formula punctuality step and number of necessary observation calculate based on time of each observation.

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$$\frac{(P/S\sqrt{n\sum x_i^2 - (\sum x_i)})}{\sum x_i} \xrightarrow{2} \begin{cases} \frac{p}{s} : punctuality step \\ x_i : time of each observation \\ n: number of nessecary observations \end{cases}$$
Personal needs
General tiredness
$$\xrightarrow{+}$$
Normal time
Total time of standard time
Fig.4 allowed times

After determining normal time for identifying standard time or actual time of work finishing, the unavoidable elements (allowed additions) which are occurring in work environment should also mention in standard time (according to fig.5)

Following formula is the result of composing normal time and allowed times by production:

Standard time = normal time + allowed additions

(Here, Allowed additions is calculated based on 100% of worker's potential) (Zahedi, 1379; p.303-304)

6. Presentation phase, report of study results

Considering that standard time has been calculated in previous levels, the results of previous studies could presented as a report to people in order to achieve an agreement with designer and employer.

H. Third advanced phase: composing of advanced studies in VE and implementation of work study engineering investigations:

New method should be considered according to evaluation and analysis of functions, measurements and data in this phase. Regulations and instructions should set in this phase. This phase concerns about implementation and control of new method, maintaining and protecting current system.

2.4 What time does interaction of VE and work study engineering start?

This interaction is executable in all levels of project. But most advantages of it is in primary levels of planning and project designing. According to SAVE International standard, most of thrifts happens in resources in primary levels of development and during conceptual levels. Projects primary information form here but the main plan of project hasn't still determined. Also situated solutions can determine and considered.

Value methodology can be used more than one time. Primary function of value methodology help the start of project in the correct way and its findings also help correcting project's path. When a value study implement in final levels costs would be increase.

Value engineering is one of the tools that is using widely in order to improve project efficiency [10].

According to what has been mentioned here one can conclude that if VE study and work study engineering were in primary levels then the projects benefit would be increased more [1].



Conclusion:

In this study a composed model of value engineering and work study engineering is presented with purpose of achieving organization's high level purposes. Main steps of this study process discussed with simultaneous executing pattern. And a theoretical framework and advanced practical has presented in this matter. Explaining the steps of mentioned process shows that success of this model and achieving desire results request enough attention to instruction and optimized use of this technique and its tools. Among different methods of solving problems, just this model leads us to optimized use of creative intellectual methods and standardization of work time in order to analyzing functions. This composed model can be used in executive project with regards to their complexity to control costs, methods' standard and work time. This model provides the opportunity of achieving organization's supreme goals more

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confidently by simultaneous implementation of VE and work study engineering. By this point of view in order to calculate desire work, one can use value index and standard work time measurements

Time of this model is executable in all project level but in primary level has more benefits because employer and designer's flexibility would increase and changes are simpler, costs are lower and effect of changes in work time is low. The main philosophy of this project is that there is always a better way and a better time for each activity.



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