

The Relationship of the Enterprise Resource Planning (ERP) System to Value Engineering and their Role in Reducing Costs

Raghad Hashim Jasim¹

Abstract

The research aims to clarify the relationship between the enterprise resource planning system and value engineering, and to clarify their impact on reducing costs. Providing enterprise resource planning eliminates its suffering from its dependence on outdated information systems that are not compatible with rapid changes and established standards. It also supports the presence of an effective procedural structure for performing work that removes obstacles and bottlenecks, invests in means of transferring and flowing information, and excludes jobs that do not bring additional benefit to the work in the series of procedures through which the product or service is produced until it finally reaches the customer in the fastest time and with the least amount. Cost while achieving a high level of quality.

Keywords: Enterprise, Resource Planning, Value Engineering, Reducing Costs.

INTRODUCTION

Enterprise Resource Planning (ERP) relies on collecting an organization's information and processes into one system that contains many systems and devices, to collect them in one database. The objectives of ERP basically indicate how a large organization plans to make the most of its large resources. Value engineering is also a business method that relies on the analytical side in order to solve problems and reduce costs, without affecting the quality and performance of products. It contributes to enterprise resource planning, as value engineering conducts studies and research in order to improve, develop and raise the quality of products while reducing their cost at the same time. This is done by eliminating unnecessary activities and eliminating waste and extravagance during the production process.

Value engineering works in conjunction with enterprise resource planning programs, which provide an integrated information environment for the organization to perform its multiple functions, allowing the transparent and rapid transfer of information between different departments and between the organization and the entities that deal with it. He. She. They work to reduce costs by eliminating unnecessary labor or... eliminating waste during production. Using value engineering with organization resource planning reduces costs through good planning and conducting studies and research aimed at analyzing activities and their costs. It is analyzed into activities and costs that add value and activities and costs that do not add value, by excluding the activities and costs associated with them that do not add value to the customer and the production process, which leads to reducing the final cost of the work. project. Therefore, the price of the product will decrease while maintaining the quality characteristics required by customers, which leads to retaining existing customers and the organization gaining new customers, all of which enhances the organization's position in the competitive market.

Research Problem

Not following modern methods of cost reduction, including enterprise resource planning and value engineering, which contribute to reducing costs, which aim to analyze activities and their costs into activities that add value and activities that do not add value, and try to get rid of activities that do not add value or reduce wasteful processes. Extravagance and extravagance. In the organization's resources.

¹ Accounting Department, College of Administration and Economics, Al-Mustansiriyah University. ORCID: <http://orcid.org/0000-0002-5247-3753>.
E-mail: dr_raghadhashim@uomustansiriyah.edu.iq

Research Hypothesis

The research is based on clarifying the role that enterprise resource planning and value engineering play in reducing costs, through their role in analyzing activities into activities that add value and activities that do not add value to the customer, by removing activities that do not add value to the customer. As the added value reduces the cost of the product.

Research Aim

The research aims to rely on organization resource planning and value engineering as an analytical method that contributes to reducing costs, and thus contributes to reducing the costs of final products, which leads to reducing their prices in the market compared to similar products, and through them the organization can gain a competitive advantage.

Enterprise Resource Planning

The Concept of Enterprise Resource Planning (ERP)

The term ERP is an abbreviation for: Enterprise Resource Planning. Enterprise Resource Planning: These are programs that integrate all departments and functions of a single organization on a computer system that can serve different departments with their special needs. <https://www.sap.com/products/erp/what-is-erp.html>

It has always been the dream of many profit and non-profit organizations around the world to provide an integrated information environment to perform its multiple functions, allowing the transparent and rapid transfer of information between different departments and between different departments. The institution and the entities that deal with it. Providing this environment in many of these institutions eliminates their suffering from their dependence on outdated information systems that are not compatible with rapid changes and established standards. It also supports the presence of an effective procedural structure for performing work that eliminates obstacles and bottlenecks, invests in means of transferring and flowing information, and excludes functions that do not bring additional benefit to the work in the chain of procedures through which the product or product is made. The service is produced until it finally reaches the customer in the quickest time and for the least amount. Cost while achieving a high level of quality. There is no doubt that many establishments have begun to realize the change in the scales and standards of commercial and service competition, and have come to see the effectiveness of the business infrastructure and supporting information systems as an essential force for achieving distinct competitive positions that depend on creativity. In using modern information technologies to achieve better customer services, either internally within the organization, such as departments that serve each other, or externally, such as suppliers and associated facilities that may be part of the supply chain. There is no doubt that this change has an important impact in developing the organization's core competencies and enhancing them in the continuous use and absorption of renewable technologies.

In line with this paradigm shift in the way business infrastructure is organized, represented by re-engineering procedures, using modern information technologies, and investing in increasing applications for the customer environment, business resource planning systems have emerged. These 1990s systems are an improvement (with many office functions) of both the manufacturing requirements planning systems of the 1980s and the MRP systems of the 1970s, most of which were limited to industrial sectors. At present, applications of ERP systems have spread amazingly in various parts of the world until the number of software products classified from these systems has reached more than 500 programs that vary in their coverage, sizes, and fields of application. There is a growing demand from many companies in various sectors that see it as an ideal option to modernize their technical infrastructure. Accordingly. Today, many major companies such as Microsoft, IBM, General Motors, Nestlé, Lucent Technologies, and Boeing have their own ERP system as their standard IT. (Al Saud, 2006: 1)

Enterprise Resource Planning (ERP) relies on collecting an organization's information and processes into one system that contains many systems and devices, to collect them in one database. ERP objectives basically indicate how a large organization plans to make the most of its large resources. In the past, enterprise resource

planning (ERP) systems were implemented in industrial enterprises. However, usage has spread and it is now available to all types and sizes of organizations. The programs were separate, with the ERP system performing limited functions for departments. It contained only two systems, for example (accounts and payroll), and most ERP programs contained the same group. But current ERP systems can meet a wide range of functions and integrate them into a single database, such as human resources (HR) and supply chain management (SCM). Customer Relationship Management [CRM], Financial Accounting, Inventory Management, Purchases, Sales, Production, Projects, Restaurants, Hospitals...etc. Each of the previous functions depends on a separate software application, but is collected in a single network with a single database, and this is called an ERP system. Aggregation is the primary goal of ERP, as an ERP system relies on collecting, standardizing, and simplifying data and processes from all departments of an organization. Work to create one huge database, employ multiple programs for different departments, and create outputs based on sound information. <https://www.sap.com/products/erp/what-is-erp.html>

Features of the ERP System

There are many advantages to implementing an ERP system.

One common system, all users contributed to its preparation. (data privacy level).

Scalability of processes and workflow. (data availability).

The ability to easily share data between different departments in the organization. (Data organization and decision making).

Developing customer service and after-sales services (participation and support).

Improving efficiency and productivity levels.

Improving the ability to forecast, identify trends and advanced analysis.

Reducing cost. (Ahmed, 2023:1).

Disadvantages of the ERP System

While there are advantages to ERP, there are also some disadvantages, which are as follows:

Requires restructuring of the organization's operations.

Its high cost may constitute an obstacle to its operation.

Requires high technology.

It would be inappropriate for specialized organizations that want to change direction in the near future.

Some of these defects can be reduced through training and oversight processes in all departments.

The Contribution of Value Engineering with Enterprise Resource Planning to Reduce Costs

Value Engineering Concept

There are multiple names for this method, such as value analysis, value control, value management and others. Value engineering or value engineering is collective work organized with a scientific methodology, carried out by a specialized team, aiming to analyze the functions of the item, its components and its costs, and then propose alternatives that ensure the achievement of those functions at the lowest total cost (total costs are the costs of the life period, which is the initial cost plus all Indirect industrial costs such as operation, maintenance, etc.). This method is distinguished from others in that it is an effective method that relies on creative solutions to solve problems without affecting quality or performance. (Qamar, 2005: 1,3) Engineer Saleh Al-Ashish defined it in his valuable book entitled (Value Engineering Theory and Application): "It is an analytical study with a specific approach carried out by a multidisciplinary work team on a product, project, or service, to identify and classify functions. It performs To ensure that those required functions are fulfilled in a better way. Or at a lower overall cost, or both through innovative alternatives without compromising basic requirements.

Value engineering has a broad concept and does not mean engineering... These are ruler machines... charts, measurements, drawings and shapes... Value engineering is functional engineering, that is, re-studying the performance of the institution's function and performing its role in the best way or at the lowest cost... This study does not require that the study of value engineering have one goal, which is to reduce costs... as may occur to many people who have a wrong concept about value engineering... which is that it is only to reduce costs or work within a certain budget... and that its goal is to eliminate parts of the project. Not covering the budget. .. Rather, its goal is to reduce extravagance and extravagance in a simple way.. Value engineering has very lofty meanings, which is to accustom people to not being extravagant and wasteful.. (Al-Suhaibani, 2010:1) The researcher believes that value engineering can be defined as a method of work that depends on the analytical aspect in order to solve problems and reduce costs, without affecting the quality and performance of products. Rather, value engineering conducts studies and research in order to improve, develop and raise the quality of products while reducing their cost at the same time. This is done by eliminating unnecessary activities and getting rid of waste. And extravagance during the production process.

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Second: Uses of Value Engineering Applications

Areas where value engineering can be used effectively and profitably are:

Engineering work: design, product improvement.

Industry: receipt and delivery of raw materials, tool design and production.

Purchases: New product information

Sales operations: Slow sales operations.

Routine systems and procedures: paperwork, updating document circulation systems, document copying services

Maintenance: procedures, materials, work scheduling.

Alternative energy sources: procedures, product cost analysis

Construction: planning, scheduling, labor, consumable materials. Use the surplus.

http://www.12manage.com/methods_miles_value_engineering_ar.html

There are many cases that require studying value engineering, including:(khalil, 2015: 1)

When there is a problem with increased product or project expenses.

When you want to achieve the highest possible quality with constant cost.

When wanting to improve the performance of the product, project or process.

When wanting to reduce the cost of a project, product or process without affecting the basic functionality of the final product.

When there is a need to increase production.

When there is a need to improve or develop the design or product.

When there is a need to eliminate the large number of production steps or processes.

When you want to improve employee performance and focus on production.

When there is a need to identify shortcomings in institutions and how to update them...etc

Thus, we note that value engineering can be used in various fields, whether engineering, industrial, commercial, administrative, service, construction...etc. fields.

Reduce Cost by Applying Value Engineering and Enterprise Resource Planning

Value engineering often works in conjunction with enterprise resource planning software, which provides an integrated information environment for the organization to perform its multiple functions in a way that allows transparent and rapid transfer of information between different departments and between the organization and the parties that deal with it. They work to reduce costs by eliminating unnecessary work. necessary or eliminating waste during production. This can be done through the following:

Replacing Some Materials: It is sometimes possible to replace some expensive and unnecessary inputs to the production process with lower-priced inputs that serve the same purpose.

Efficiency And Effectiveness Of Operations: Efficiency of operations can be benefited by redesigning the processes for producing the product by reducing unnecessary or exaggerated spending during the production process, as well as reducing unnecessary production operations. Thus, overall costs can be reduced and an increase in the efficiency of the production process can be achieved. Target profit.

Product Development and Market Monitoring: Value engineering attempts to align customer requirements for products on the one hand with the costs necessary to develop these products on the other hand in order to gain customer satisfaction and at the same time achieve the desired profit for the company. Facility.

Efficiency and Effectiveness of the Energy Used in Production: Value engineering has a major role in reducing the energy used by increasing the efficiency and effectiveness of its use by helping to devise some methods that help reduce energy consumption.

So when value engineering talks about cost reduction, it usually also refers to the lifetime of total costs or direct production costs. (Qamar, 2005: 6)

Al-Samarrai prepared a cost-reduction program that goes through the following stages:

The First Stage: The basic objectives must be determined... The main objectives of the cost reduction process are to reduce extravagance, loss and waste in the organization's internal resources... and increase the return on the capital invested in the facility... and reduce the cost of goods and services provided by the organization without affecting the organization's internal resources. The quality, type, or level of service of the product, or reducing its use for the purpose for which it was produced.

The Second Stage: It is necessary to conduct a broad and comprehensive study of all relevant activities, when planning a cost reduction program, so that it becomes possible to know all the problems that these activities are exposed to when they are practiced within the organization, which limits raising the efficiency of their performance, whether these activities are administrative or financial. Or artistic...etc. As a result, we work to reduce these problems and obstacles and work to overcome them if possible.

The Third Stage: After collecting all information related to the activities related to the cost reduction process, comes the information analysis stage. Analyzing every aspect of the facility's work... constitutes a source of cost reduction... At the same time, no analysis of any process may be conducted except after determining its importance and necessity.

The Fourth Stage: Determine the priorities for implementing cost reduction based on the results of the analyzes conducted for the activities in the previous stage.

The Fifth Stage: Choosing the appropriate method for the cost reduction process.

Sixth Stage: The evaluation process, which requires the precise identification of all main and subsidiary activities in the facility. Here it is based on the results of the detailed analyzes that were conducted for these activities in a solid manner.

The Seventh Stage: the stage of choosing between the alternatives produced by previous analyses.

The eighth stage: Implementing the decision taken to reduce costs in the area designated for that. (Al-Samarrai 1999: 23, 24, 25)

Based on the previous stages, the enterprise resource planning system uses value engineering analysis (that is, process value analysis), meaning a systematic analysis of the activities necessary to produce a product or perform a service, that is, identifying all activities that consume the resources necessary to produce the product or service, and classifying them into activities that add value and activities that do not. It adds value by nature (Garrison and Noreen, 2002: 226). Value engineering begins with the formation of a work team whose task is to differentiate between activities and costs that add to the value and between activities and costs that do not add to the value of the product from the customer's point of view. Then value engineering analysis seeks to reduce, if not eliminate, activities and therefore costs that do not add to value, by reducing the cost drivers (drivers) of activities that do not add to value. For example, the re-operation and repair activity, and therefore the cost of the damaged or defective unit, are considered costs that do not add value from the customer's point of view. Therefore, reducing these costs requires reducing restart hours (the activity that causes the restart cost). Value engineering also focuses on achieving greater efficiency in activities that add value to reduce the costs of these activities. For example, reducing the cost of direct labor requires reducing the number of hours required to manufacture units of the product. The work team conducting value engineering analysis must also focus its cost reduction efforts on analyzing the design of the new product with the aim of improving its quality and improving confidence in it while reducing additional special features so that it can be offered at a price that customers accept. (Hussein, 2000: 103, 104) From From all this, we note that the use of value engineering with resource planning for the organization contributes to reducing costs. This is done through good planning and conducting studies and research aimed at analyzing activities and their costs. They are analyzed into activities and costs that add value and activities and costs that do not add value, and by eliminating the associated activities and costs. Which does not add value to the customer and to the production process, resulting in a reduction in the final cost of the product. Therefore, the price of the product will decrease while maintaining the quality characteristics required by customers, which causes the retention of current customers and the organization's acquisition of new customers, all of which enhances the organization's position in the market. Competitive. We must not stop at this point, but the organization must pay attention to conducting studies and research aimed at reducing costs while maintaining the level of quality required by customers at the same time in order for the organization to remain distinguished at all times.

The Practical Side

Research Population and Sample

The research community is represented by a sample of university teachers, and their opinions can be used to achieve the research objectives.

A random sample representing (30) university teachers was selected, and a questionnaire form was distributed to them. We were able to retrieve 25 questionnaires, i.e. 75% of the questionnaires distributed. The following table shows a description of the research sample according to years of experience.

Table No. (1): Research sample according to years of experience

Years of Experience	Sample volume
Less than 5 years	3
6-10 years	7
11-15 years	9
16 years and over	6
the total	25

Presenting and Analyzing the Opinions of the Research Sample

To achieve the research objectives, the descriptive analytical method was used, and the answers to the questionnaires were recorded in a worksheet on Microsoft Excel and then transferred to the statistical program SPSS for analysis.

The results of the analysis were as follows:

Analyzing the sample's answers to the first axis of the questionnaire related to enterprise resource planning leads to performing the work correctly, which leads to reducing negative deviation and thus reducing costs.

The following table shows the values of the arithmetic mean and standard deviation of the sample members' answers to the first axis questions (1-4) included in the questionnaire.

Table No. (2) Values of the arithmetic mean and standard deviation of the sample members' answers to the questions of the first axis of the questionnaire (1-4)

Question number	Questions	Arithmetic mean	Standard deviation
1	Providing an integrated information environment to perform its multiple functions, allowing the transparent and rapid transfer of information between different departments and between the institution and the entities that deal with it.	3.9	0.514
2	The effectiveness of business infrastructure and supporting information systems is a fundamental force that leads to achieving distinguished competitive positions.	3.5	0.840
3	The use of modern information technologies achieves better services for the customer, whether internally within the organization, such as departments that serve each other, or externally, such as suppliers and associated facilities that may be part of the supply chain.	4.5	0.112
4	Using an enterprise resource planning system allows data to be easily shared between different departments in an organization.	4.92	0.140

The results of the statistical analysis shown in the previous table showed that there is agreement among the sample members that enterprise resource planning leads to proper business performance, which leads to reducing negative deviation and thus reducing costs.

Regarding the first question, it achieved a mean of (3.9), and since it exceeds 3 degrees, a five-point scale was used and the answers (very agree, agree, neutral, disagree, very disagree) were given scores of (5), 4, 3, 2, 1) respectively. This means that the sample members support providing an integrated information environment to perform its multiple functions, allowing the transparent and rapid transfer of information between different departments and between the institution and the entities that deal with it. The standard deviation for this question reflected some slight dispersion in the answers, reaching (0.514).

As for the second question, it achieved an arithmetic mean of (3.5), and since it also exceeds 3 marks, this means that the sample members agree that the effectiveness of business infrastructure and supporting information systems is a basic force that leads to achieving distinct competitive positions. . The standard deviation for this question reflected some dispersion in the answers, reaching (0.840).

As for the third question, it achieved an arithmetic mean of (4.5), and since it is more than 3 marks, this means that the sample members almost completely agree on the necessity of using modern information technologies to achieve better services to the customer, whether internally within the framework of the organization's work, such as the departments that serve each other or externally, such as suppliers and associated facilities that may be part of the supply chain. The standard deviation for this question was low and did not reflect the dispersion in the answers, as it reached (0.112).

As for the fourth question, it achieved a mean of (4.92), and since it is more than 3, this means that the sample members strongly support that using an enterprise resource planning system leads to the possibility of sharing data easily between various parties. Departments in the organization. The standard deviation for this question was low and reflects very little dispersion in the answers, reaching (0.140).

Analysis of the sample's answers to the second axis of the questionnaire related to value engineering and cost reduction.

Table No. (3): The arithmetic mean and standard deviation values of the sample members' answers to the questions of the second axis (5-7) contained in the questionnaire.

Question number	Questions	Arithmetic mean	Standard deviation
5	Value engineering is a business approach that relies on the analytical aspect in order to solve problems and reduce costs, without affecting the quality and performance of products.	4.76	0.210

6	Value engineering conducts studies and research in order to improve, develop and raise the quality of products while reducing their cost at the same time. This is done by eliminating unnecessary activities and eliminating waste and extravagance during the production process.	4.68	0.429
7	Value engineering works in conjunction with enterprise resource planning programs, which provide an integrated information environment for the organization to perform its multiple functions, allowing the transparent and rapid transfer of information between different departments and between the organization and the entities that deal with it. He. She. They work to reduce costs by eliminating unnecessary labor or... eliminating waste during production.	3.92	0.722

The analysis results shown in the previous table showed that there is agreement among sample members on the necessity of applying value engineering with enterprise resource planning in order to reduce costs.

Regarding the fifth question, it achieved an arithmetic average of (4.76), and since it is also more than 3 marks, this means that the sample members strongly agree that value engineering is a work method that relies on the analytical aspect in order to solve problems and reduce costs, without affecting the quality. and product performance. . The standard deviation for this question was low and reflects a slight dispersion in the answers, reaching (0.210).

As for the sixth question (4.68), since it also exceeds 3 marks, this means that the sample members support this value engineering to conduct studies and research in order to improve, develop and raise the quality of products while reducing their cost at the same time. This is done by eliminating unnecessary activities. Eliminate waste and extravagance during the production process. The standard deviation for this question reflected a slight dispersion in the answers, reaching (0.429).

As for the seventh question, it achieved an arithmetic mean of (3.92), and since it is also more than 3 marks, this means that value engineering works in conjunction with enterprise resource planning programs, which provides an integrated information environment for the organization to perform its multiple functions in a way that allows the transparent and rapid transfer of information between departments. . They work to reduce costs by eliminating unnecessary labor or eliminating waste during production. The standard deviation for this question reflected some dispersion in the answers, reaching (0.722).

CONCLUSIONS

Enterprise resource planning provides an integrated information environment for the organization to perform its multiple functions in a way that allows the transparent and rapid transfer of information between different departments and between the organization and the parties that deal with it.

Value engineering is an analysis-based method for solving problems and reducing costs without affecting quality and performance.

Value engineering creates a work team from various disciplines whose mission is to identify and classify the functions that a particular product may perform, and to identify activities that add value and activities that do not add value.

Value engineering and enterprise resource planning contribute to reducing costs through the role they play by eliminating unnecessary activities that do not add value, or eliminating waste, extravagance, and waste of resources during the production process.

Reducing costs using value engineering and enterprise resource planning gives the organization a competitive advantage through its role in reducing the cost of the product, improving its quality, and offering it to the market at the lowest possible price.

Recommendations

Focus on activities that add value to customers, and eliminate activities that do not add value to customers.

Work using the value engineering and enterprise resource planning method to solve problems that may face the production process. And benefit from the experiences of countries that have applied this method and succeeded in applying it.

Training and developing the work team that is formed through value engineering. The team's task is for a specific period of time to study problems related to a particular product. The mission of this team is advisory in times of need only, by presenting proposals and alternatives to implement projects at the lowest costs, and the decision maker has the option of adopting them. I will ignore that.

It is necessary to reduce costs using value engineering and enterprise resource planning. This is done by conducting extensive studies and research on activities, identifying the problems to which these activities are exposed, knowing the necessary activities and harmless activities that do not add value to the product and the customer, and trying to get rid of them. Reducing wasted operations. And wasting resources. All this leads to reducing the costs of this product and thus reducing its price.

In order to obtain a competitive advantage by providing distinguished products at a reasonable price that gain customers' trust, it is necessary to use value engineering to reduce costs based on activities, and it is necessary to continue to conduct studies and research that aim to reduce costs without compromising the level of quality required. customers, in order to maintain the advantage. Competitiveness.

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