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Improving Customer Value Through the Integral of Techniques Quality Function Deployment and Value Engineering

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Abstract

Health service institutions suffer from challenges resulting from the great changes that our world is witnessing today. This has affected the value that these institutions add to the patient.

This research aims to identify the effect of integrating each of the techniques of QFD and value engineering for the health services provided to the patient to improve the value for him and thus obtain his satisfaction, which is reflected in the reputation of the surveyed hospitals. To achieve this, the descriptive analytical method was used, and a questionnaire was designed to collect the necessary data, which represents a measure of this research. The questionnaire was distributed to a sample deliberately taken from the research community consisting of hospital directors, department managers and divisions in research hospitals, where the sample size was (97) individuals. Various statistical methods were used to test the research hypotheses, including confirmatory factor analysis and path analysis .The results were extracted using SPSS and Amos. The quality function diffusion and value engineering had an effective and substantial effect in improving value for patients in the surveyed hospitals, which is the most important finding of this research. One of the most important recommendations of the research is to work on the participation of health staff in the health sector with the academic authorities represented by universities and specialized colleges and to work on continuing consultations to implement methods that contribute to achieving the highest levels of quality of health services.

Paper type : Research paper.
Keywords: Quality Function Deployment, Value Engineering, Customer Value.

1. Introduction

Health service organizations, especially private ones, are considered one of the most important sectors because they deal with human life. However, they are suffering from challenges caused by the great changes that our world is witnessing today and the developments resulting from the industrial revolution, climate pollution and the emergence of epidemics such as the Corona virus and epidemics and the economic situation and fever such as the economic situation and fever. This affected the value that these hospitals add to the patient in terms of his need for a health service of high quality and who is willing to pay for it.

The researcher noted from the initial visits and personal interviews with officials of some hospitals, especially the private ones, that they still did not reach the ambitious level in providing health services with high quality, in addition to the weakness in the application of modern technologies that would improve the performance of the departments of these institutions, which is reflected in the realization of value to the customer. So, the research sought to study this problem faced by hospital administrations in general and hospitals in the field of study in particular, to improve the quality of their health services and to improve the value of patients, which represents its main objective, and in order to efficiently meet consumer needs and increase customer satisfaction, healthcare businesses must utilize a variety of techniques and instruments. A well known process for customer focused design and product development rev ews is called "QualityFunction Deployment" QFD. The competitiveness of a company can be impacted by a variety of factors, including quality, delivery speed, cost, innovation and service delivery restrictions (Olhager and West,2002: 52). During the service development cycle, QFD can assist a company in identifying customer demands. At each stage of the service development cycle, a company can translate client needs using QFD based on existing needs (Vavdhara et al., 2011: 1). Engineering VE is a technique used to cut production costs by assessing the value of components, equipment and procedures. Organizations can utilize VE to produce functional needs at lower overall costs without compromising product quality .

The search seeks to achieve a set of goals; the most important of which is to determine the extent of interest in research variables and the nature of dealing with them in terms of their practice in hospitals in the field of research and testing and determining the impact of the integration of the techniques of spreading the quality function and Value Engineering in improving customer value in hospitals.

And to search time limits, spatial, temporal and human boundaries, and objective limits as follows:

i. **Spatial boundaries : The spatial boundaries of the current research were limited to three hospitals within the private sector in Baghdad, specifically (International Al-Ahly Hospital, Al-Moayyed Al-Ahly Hospital, Al-Qimmah Surgical National Hospital) that are associated with the Ministry of Health.**
ii. **Time limits : They were represented by the duration of the preparation of the practical side of the research, from the numbers of the questionnaire and the application in hospitals, the field of study, to the statistical analysis, which extended from March 2022 until July 2022.**
iii. **Human boundaries : An intentional (classified) sample of decision makers with different levels of (hospital directors, departments and people) was elected in the surveyed hospitals.**

iv. Objective limits: The limits of the goal are the main variables of the research and their sub-dimensions.

Boerdonk, et al (2020) developed circular touch points as focal points between customer value (the proposal part of the business model) and supplier offers (doctors), which leads to the creation of (multiple) value for customers, since the creation of customer value and its activities must be linked to a circular business model. These relationships are built on six moments where customers and hospitals can make choices to participate in a circular economy modelled as circular points of contact.

The study concluded that in order to create value within the circular economy, customer value must be effectively linked to the circular activities of suppliers (doctors), circular touch points are developed as focal points between customer value and supplier offers. This means that the circular economy can only be successful if the supplier knows exactly how to respond to customer value for all circular activities.

1) Al-Asadi,(2020) The study aimed to shed light on the concept of customer value, its importance and types, as well as to adopt a set of dimensions of customer value to know its role in improving the reputation of the organization. And the Focusing on a set of key parts that achieve customer retention, namely the quality of service, the cost of the service provided, and the emotional and mental value of the municipality's employees dealing with them.

The study concluded that customer value provides assistance to the organization by enabling its service management to set goals and target the best customers, manage service delivery campaigns with customers, update information shared by many employees with customers, and simplify operations.

Alena, et al (2020) The study was submitted an investigation on the study of the "voice of the consumer" in the outpatient sector of a medical organization. The results of a patient survey and the formation of the patient's voice in the "technical characteristics" are presented. The basic needs of patients receiving medical care are investigated.

The study concluded that the methodology of structuring quality functions (QFD analysis) for a medical institution is a way of organizing consumer complaints and examining their basic needs that patients expect to meet by coming to the clinic through receiving high-quality medical care.

Lee et al (2015) aimed to explore and understand the customer requirements of the present healthcare services and then to decide the optimum portfolio of the healthcare services. By adopting Quality Function Deployment QFD and fuzzy logic, this study proposes a new approach to support the decision making process in healthcare industry.

The study concluded that coupled fuzzy logic with QFD in healthcare services enables medical practitioners to understand customer requirements and include them for continuous improvement during the health service delivery.

Ismail, (2018) aimed to: 1. Explain how to apply the VE method, which in turn leads to improving the quality of service delivery and reducing its cost at the same time. 2. Clarifying the stages, foundations and techniques of applying the VE method and clarifying the extent to which this method is distinguished from other management methods. 3. Indicating the level of application of the value engineering

method in the Iraqi hotel sector, especially in the excellent hotels in Baghdad, and the reasons leading to it. And the results of the study proved that there is an important and significant role among its variables (value engineering, service quality), but when testing the relationship and effect of the VE variable with each dimension of the dependent variable, it was found that there was no impact of VE on the dimensions of empathy, ease and comfort and evidence for the other.

Rashti and Zanjanchi, (2014) emphasized the importance of using value engineering / value analysis as an approach to project management and improving production quality, taking into account the factors of time and costs (job performance) and costs.

The study concluded that value engineering or value analysis has the ability to effectively identify, measure, implement and control housing projects at any stage of project development, and can significantly reduce the cost and time of projects.

Health service organizations, especially private ones, suffer from challenges resulting from the great changes that our world is witnessing today and the developments resulting from the industrial revolution, climate pollution, the emergence of epidemics such as the Corona virus, hemorrhagic fever, population density, the client's situation (economic and non-diverse), and the diverse needs of the client, as well as his needs from (kindness and gentleness in dealing with the client) and the procedural dimension of the production system and the provision of health services; all of this affected the value that these hospitals add to the patient in terms of his need for a high quality health service and he is willing to pay for it; modern technology such as (publishing the quality function and value engineering) are consistent with the above developments and contribute to the goal of improving customer (patient) value.

The research problem can be formulated in the following main question: is there an effect of quality function and VE on improving customer value in hospitals in the field of research?

This research seeks to achieve a number of goals that can be summarized as follows:

i. **Indicating the level of presence of research variables in hospitals in the field of research and the level of benefiting from them in the field of practical application.**
ii. **Explanation of the impact of the integration of the technology of spreading the quality function and VE on the value of the customer in hospitals in the field of research.**
iii. **Presenting a number of proposals necessary for future studies.**

2. Materials and Methods

2.1. Quality Function Deployment (QFD)

QFD is a technique for enhancing the quality of goods or services by comprehending customer needs and then connecting them to the technical aspects of manufacturing goods or services at each level of production. When creating design and manufacturing specifications, QFD can assist businesses in keeping their attention on the needs of their clients. By discovering consumer voices, identifying consumer aspirations, and integrating them in the product or service development stage, the QFD method is a technique for quality engineering. QFD

employs a questionnaire that asks about consumer wants or looks into how satisfied customers are with items' technical specifications (Lia et al , 2014 : 38).

Since its creation in 1996 by Yoji Akao in Japan, QFD has gained a reputation as an efficient technique for developing new products or processes. QFD is a strategy for including consumer input in product development. It is used in a variety of areas, including the automotive, electronics, building, and service industries (Ginting , 2018: 55).

When creating design and production specifications, businesses can use QFD to assist them in keeping the demands of the client in mind. The four steps of QFD are utilized to transfer part characteristics, manufacturing processes, and production characteristics from customer needs to product design features. The product design stage applies the QFD stage's findings regarding consumer wants and component attributes. Finding priority design criteria that are the major focus of product design and development is the main goal of QFD. The Quality House is the primary planning device employed in quality development. The organization or business that will create those design requirements is matched with the organization or firm that will translate the customer's voice into design requirements that achieve certain value objectives (Ginting et al , 2014: 3).

2.1.1 Measuring Quality Function Deployment technique.

On this, many authors and researchers in operations and production management agree on the existence of several dimensions of QFD technology, which is essentially the components of the quality house, and the dimensions (customer voice, employees' voice, relationship matrix, technical evaluation) will be adopted as meeting points for most writers and researchers, as well as its comprehensiveness and consistency according to what suits the current study environment, and these dimensions can be described in the following Table 1

Table 1 : Describe the dimensions of the quality function deployment.

No	Dimension	Description	Target
1	Customer's Voice	This dimension is one of the most important dimensions that he focuses on in building a quality house, as the customer's voice is the key to entering the correct construction of the house	Determining ways and mechanisms to meet the basic requirements of patients such as (speed of entry, provision of treatment, accurate diagnosis, psychological comfort, cost of recovery, ease of procedures) through accurate identification of them.
2	Employees' Voice	This dimension represents the required technical specifications such as (patient guidance, emergency admission, initial examination, staff of doctors and nurses, administrative procedures) which are determined by workers who have direct contact with the patient, to meet his requirements, and here these specifications must be specified and described clearly by workers such as doctors and administrators.	Determining the technical specifications of the service by the workers to meet the requirements of the customer (the patient) because of their direct impact on achieving patient satisfaction, and thus the voice of the workers is the cornerstone of service provision activities

3	Relationship Matrix	This dimension represents the link between each of the customer's requirements and the voice of the employees, and this relationship is based either on personal experience or on customer opinion surveys or data from statistical studies or previous experiences of organizations, and the team searches for an agreement between the impact of each service characteristic on the customer's requirements .	Obtaining a consistent combination of customer requirements and the voice of employees, which is the essence of QFD technology.
4	Technical Assessment	This dimension is a tool for comparison with the organization's competitors with regard to the product characteristics or the functional characteristics of the service, as it shows the performance of the competing organizations compared to the performance of the organization, in terms of technical capabilities, engineering and personnel skills available to the competing organizations.	Knowing the organization's competitive position in relation to the rest of the organizations in terms of technical and technical capabilities.

Source: Al-Naimi, A.H. (2006), "Assessment of the dimensions of the QFD deployment: a study of the opinions of managers in a number of industrial companies in Nineveh Governorate", unpublished master's thesis, Department of Industrial Management, College of Administration and Economics, University of Mosul, P: 86 .

2.2 Value Engineering VE

Larry Miles created it during World War II to lower production costs. Olhager and West (2002) stated that a designer can create substitute solutions that demonstrate the same job performance but at a reduced cost. This is done by considering the functionality of the product. VE seeks to increase efficiency and cut costs while preserving quality (Dimsey and Mazur, 2002 : 1). VE is a method that identifies the purposes of goods and services, assesses the worth of each purpose, and meets the demands of each purpose at a reasonable price. Value comes in many different forms, including the value of usability, cost, price, and exchange value (Ukurta and Nismah, 2020 : 772).

VE is a technical technique that has its origins in the administrative, accounting and engineering disciplines, and is concerned with the study of three basic variables: quality, performance and cost, and aims to increase the value generated by working as a product or as a service or both by reducing cost and at the same time maintaining quality (Al-Khashab, 2016: 107).The VE process is divided into numerous phases, including the orientation phase, information phase, functional phase, creative phase, assessment phase, development phase, presentation phase, and implementation phase.

2.2.1 Measurement of Value Engineering Technology

It is possible to clarify the most important dimensions of VE that will be addressed in this research, the dimensions (functional performance, quality, cost, evaluation of ideas) shown in Table (2) have been identified. Table 3 displays some QFD integration models with VE that were used in earlier product design studies

Table 2 : Describe the dimensions of value engineering technology.

No	Dimension	Description	Target
1	job performance	Function or performance in VE means the specific purpose of having, using, or possessing an object, whether that is an item, good, service, etc.	This performance describes the work that the thing performs and makes it valuable to those in its possession and expresses the function in VE studies in two words: a verb and a noun, and it must be to facilitate the comparison of alternatives and to determine the cost of the alternative.
2	Quality	It is the degree of brilliance and distinction and the fact that performance is excellent or that the characteristics of the product (service or good) are excellent compared to the standards set from the point of view of the organization or from the point of view of the customer.	Continuously achieving the goals and desires of customers and achieving competitive advantage.
3	Cost	It is the total amount paid to obtain a good or service, and it includes direct and indirect costs and the cost of time during the period of use or enjoyment of obtaining the service.	The main objective of VE is to improve value by removing unnecessary costs that do not contribute to the function and appearance of the product and these costs are added to the product for many reasons, so it is necessary to know how unnecessary costs appear so that the necessary actions can be taken to overcome or reduce them.
4	Evaluate Ideas	It is a serious evaluation process for the ideas put forward by the workers and the aim is to maximize the ideas that have the greatest impact in improving the quality of services or the optimal solution to the problems at hand.	Maximizing the ideas that have the greatest impact in improving the quality of services or the optimal solution to the problems at hand.

Source:1. Sghir, I. and Bahloul, L. (2021), "Using the Elements of Value Engineering as an Entrance to Achieving Competitive Advantage in Business Organizations: A Study of Sample Trends from Condor Electronics Company", University of Tebessa, Algeria, Journal of North African Economics, Volume 17, No. 25, pp :542.

2. Ismail, I.M. (2018), "The Role of Value Engineering in Improving Service Quality: An Analytical Study of a Sample of Hotels in Baghdad", unpublished Master Thesis, College of Business Economics, Al-Nahrain University, P: 7.

Table 3: Examples of integrating quality function deployment and value engineering in product design.

No	Year	Reference	Product design
1	2009	N. Kongprasert, D. Brissaud, C. Bouchard, Ameziane Aoussat, Suthep Butdee	Bags, Clothing
2	2011	K. Yegenegi, M.Arasti, M.Mousakhani	Health center
3	2012	J.H. Farsi, Noraddin Hakiminezhad	Oil pump, air conditioner controller, tractor control system
4	2013	C.M. Annappa, Kallurkar Shrikant Panditrao	Computer desk/desktop
5	2013	Chougule Mahadeo Annappa	Computer desk
6	2014	Zahra Karimi, Alireza Jafari	Acicular concrete sleeper
7	2016	Suryanarayana Chowdary Gunnam, Emmanuel S. Eneyo	Smartphone

Source: Ginting,R et al. (2020), "Integration of quality function deployment and value engineering: A case study of designing a Texon cutting tool", Journal Songklanakarin J. Sci. Technol, Vol. 42, No. 2, pp:773

2.3 Customer Value (CV)

Instead of relying on the traditional segmentation methods like gender or age, organizations now segment their customers based on the standards of the value offered, expressed in the service and the commodity. They concentrate on the wants and needs of the client in order to continuously improve the services offered and the relationship between the organization and those who are targeted for that client. "What remains for the longest possible period in dealing with the organization without resulting in additional costs to persuade and satisfy him, and the profits achieved through him are subject to measuring his relationship with the organization in addition to the value of the client relationship," they state. The value, whether it represents the profits made or the services rendered, is "Analysis of the extension of the customer's relationship with the organization," and as such, the organization seeks to gauge the customer's satisfaction, loyalty, and the continuity of his survival for the longest possible period through the value (Fethiye, 2009: 116).

Accordingly, the definition of customer value is "the perceived value of a set of economic, service, and psychological benefits that the consumer anticipates through a certain offer." In other words, the value is the discrepancy between the expected customer's assessment of the cost of economic advantages and a competitive offer of the available alternatives (Karim, 2010: 181).

The phrase "systematic efforts done by the business to establish the extent to which its customers are satisfied with the services it delivers" was also used to define the customer value. The idea demonstrates the possibility of systematic approaches that might be based on market share, production rates, and client counts, which are indicators of how satisfied a customer is with the service that has been rendered to him (Abu Bakr, 2013: 13).

Numerous definitions of the value of the customer have been addressed in scientific studies and research, including: "A personal evaluation of the customer for the comparison between the benefits they receive and the sacrifices they make" and "a mental perception to judge the economic, functional, and psychological potentials that customers attribute from the marketer's offer." The principles make it evident that the term "value customer" refers to the combination of awareness of something's value and rationality, cognitive perception, judgment, and equilibrium. This combination of awareness and perception enables computed predictions to be formed about the customer (the beneficiary of the service) (Rihova, 2014: 3).

2.3.1 Customer Value Importance:

The importance of customer value can be determined as follows:

1) Customer satisfaction is the cornerstone of any organization's sustainability since it is crucial to determining whether or not high-quality products or services satisfy customers' requests, wants, and needs. Future predictions predict that customer satisfaction will rise due to the fact that it boosts client retention to generate large revenues(Hawari, 2013: 128).

2) The economic benefits of the organization are: the returns and market share that expand through repurchase, enhance the share of the customer's portfolio through cross-purchases, and guarantee returns from the value of the customer's life, in addition to those outcomes (Hawari, 2013: 17).

3) Customer retention: in order to avoid these clients from becoming rival businesses, it aims to comprehend their demands, keep its promises, and maintain a distinct relationship with them. This is done through maximizing customer value, which is defined as the difference between total benefits and expenses. (Omar, 2017 : 4).

4) Customer loyalty: it means "a biased behavioral response that is expressed constantly despite the presence of one or more alternatives and is indicative of psychological processes", or "a commitment to repurchase or re-acquire the preferred product continuously in the future despite the influence of factors and marketing efforts," meaning that customer loyalty requires several conditions, including, the customer's response to the purchase of goods or service preference and the expression of the level of services on an ongoing basis (Abdul Rasoul, 2019: 12).

2.3.2 Customer Value Dimensions:

There are a set of dimensions by which the customer's value in the organization can be measured, including the following:

1) Time value: is the cost of the time spent waiting to receive the commodity or service. Some customers place a larger value on time than money, and this is particularly evident among those who do not want to wait longer than necessary to receive the service or item (Abu Fazaa, 2015: 24).

2) Perceived (mental) value: this is an impression or image formed in the customer's mind as a result of information about the good or service combined with attitudes and experiences with the company. This information was first stored in the customer's memory and given a positive or negative meaning before being recovered to create the mental image in the customer's imagination, particularly when the customer hears the company's name and uses his imagination (Shubar, 2014: 72).

3) Emotional value (satisfaction): this is the mental state in which a customer expresses his feelings toward a good or service, particularly after buying the good or using the service. It reflects a fleeting impression of the discrepancy between the customer's expectations and the organization's performance. Along with considering the customer's pleasure, the quality of the service is assessed. The ultimate assessment of the service's performance in the sphere of anticipated performance of the service is made after testing others, determining their expectations, their perceptions of the actual service's quality, and their verdict of whether they were satisfied or unsatisfied with it (Kazem, 2018: 340).

4) Monetary value: this dimension has identified two ways that tangibles can be turned into financial value, and the exchange in customer management relationships can take the form of a one-time transaction or a long-term relationship, in the first case. As a result, this dimension is one of the most significant drivers of creating customer value in the organization and generating returns in the market. When the contract is closed and there is a high level of mistrust between the business and the client, the negotiation is cancelled. The relationship in the second is based on the customer's loyalty, which is described as: "The measure of the customer's return and his desire to engage in the performance of the organization's operations." Some typically rely on a customer's loyalty. The rule is confidence because it is crucial to attaining the organization's policy and long-term profitability. Equalization with confidence in the price of the commodity is not the basis for acquiring the client (Najm, 2012: 91).

2.4 Hypotheses and Research Model

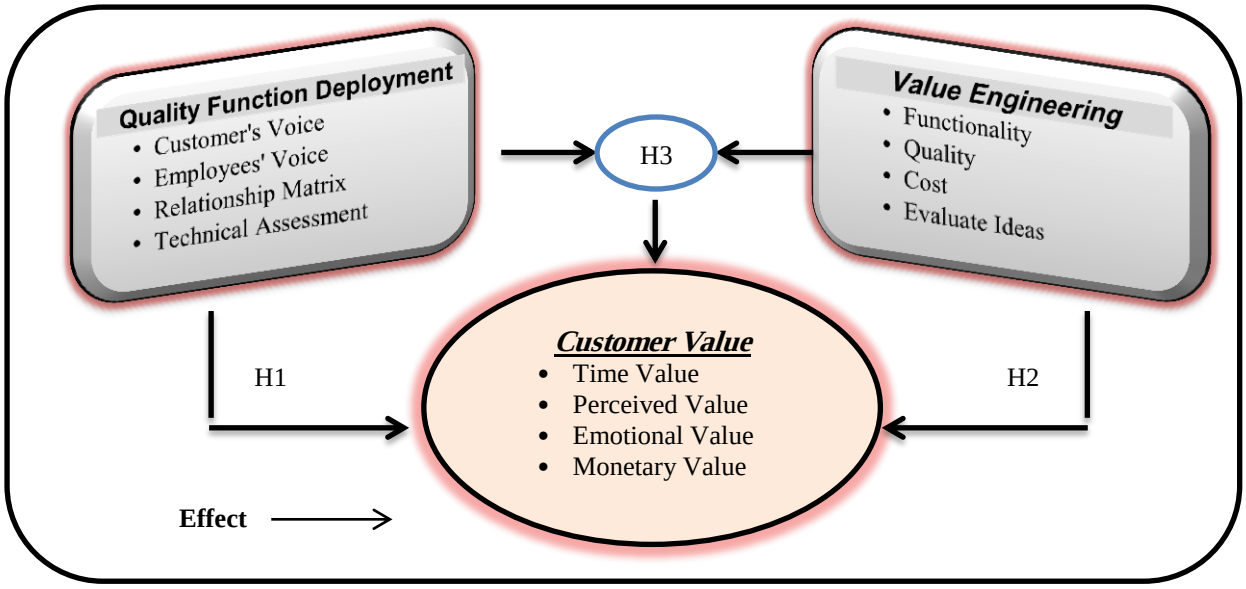


Figure (1) research model

Source: Prepared by the researcher

The first main hypothesis (H1) : "there is a statistically significant effect for the deployment of the quality function and its dimensions on the value of the customer in researched hospitals, " from which branch the following sub-hypotheses:

▪ The sub-hypothesis: "There is a significant effect for the dimensions of the quality function deployment together on the value of the customer in researched hospitals,"

The second main hypothesis (H2) : "There is a statistically significant effect for VE and its dimensions on the customer's value in private hospitals." The following sub-hypotheses derive from it:

▪ The sub-hypothesis: "There is a significant effect for the dimensions of VE together on the value of the customer in the hospitals. "

The third main hypothesis (H3) : "The impact of the integration of the techniques of QFD and VE is associated with customer value."

2.5 Population and sample research

The research community consisted of administrative leaders and their assistants and heads of departments and administrative units working in the hospitals (International Private Hospital, Al-Moayad Private Hospital, and Al-Qimma Private Surgical Hospital) operating in Baghdad City; their number reached (203) individuals, and a sample of 97 individuals was selected . The sample was selected according to the purposive stratified sample.

3. Discussion of Results

Descriptive Statistics for Items of Questionnaire

3.1 Evaluating the quality and conformity of the used metrics in the research

3.1.1 Assessment of the quality and conformity of the QFD variable questions

It is evident from Table (4) that:

- The values of the standard saturations for all items of the technical variable of the quality function dissemination ranged between (0.477-0.778), which is a good relative, as the standard saturations values indicate the extent to which each item contributes to the dimension to which it belongs. The higher the contribution of the item, the more important it is in explaining the dimension that belong to him.

- The results show that the structural validity of the scale for all items of the technical variable of the quality function deployment is significant. This indicates the validity of the item and is a good indicator for conducting subsequent statistical analyzes.

- The value of the significant level for all items of the technical variable of publishing the quality function reached (0.000), which is smaller than the significance level of (0.05), and this also indicates that all items are significant, which is a good indicator.

Table (4) Statistical Indicators of the Quality Function Deployment Technology Model

Questions	Path	Dimensions	Standard dendrites	Compound Reliability CR	P
Q1	--->	Customer's voice	.694		
Q2	--->		.737	6.551	0.000
Q3	--->		.701	6.255	0.000
Q4	--->		.703	6.276	0.000
Q5	--->		.689	6.162	0.000
W2	--->	Employees' voice	.685		
W3	--->		.706	6.208	0.000
W4	--->		.756	6.592	0.000
W5	--->		.583	5.211	0.000
R1	--->	Relationship Matrix	.718		
R2	--->		.655	6.410	0.000
R3	--->		.667	8.021	0.000
R4	--->		.582	5.681	0.000
R5	--->		.640	6.254	0.000
L1	--->	Technical Assessment	.778		
L2	--->		.679	6.777	0.000
L3	--->		.477	4.589	0.000
L5	--->		.607	5.970	0.000

Source: Amos. v 25 program

3.1.2 Assessment of the quality and conformity of the Value Engineering variable questions VE

It is clear from Table (5) that:

- The standard saturation values for all items of the VE variable ranged between (0.502-0.747), which is a good percentage, as the standard saturation values indicate the extent to which each item contributes to the dimension to which it belongs.

- The results showed that the structural validity of the scale for all items of the VE variable was significant, as it was found that the standard values (CR) for all items ranged between (4.046 - 6.56), which is greater than the critical standard value (CR) of (1.96), and this indicates the validity of expressions, which is a good indicator for subsequent statistical analyses.

- The value of the significance level was recorded for all the items of the VE variable (0.000), which is smaller than the significance level of (0.05), and this also indicates that all the items are significant and indicates the validity of the statements, which is a good indicator.

Table (5) Statistical indicators of the Value Engineering model

Questions	Path	Dimensions	Standard dendrites	Compound Reliability CR	P
V1	--->	Functionality	.657		
V2	--->		.612	4.310	0.000
V3	--->		.576	4.736	0.000
V4	--->		.634	4.434	0.000
V5	--->		.689	5.502	0.000
B1	--->	Quality	.502		
B2	--->		.614	4.139	0.000
B3	--->		.680	4.368	0.000
B4	--->		.589	4.046	0.000
B5	--->		.657	4.291	0.000
N1	--->	Cost	.747		
N2	--->		.697	6.560	0.000
N3	--->		.597	5.587	0.000
N4	--->		.626	5.871	0.000
N5	--->		.545	5.086	0.000
K1	--->	Evaluate Ideas	.705		
K2	--->		.664	4.629	0.000
K4	--->		.601	4.746	0.000
K5	--->		.660	5.175	0.000

Source: Amos. v 25 program

3.1.3 Assessment of the quality and conformity of the Customer Value variable questions (CV)

It is clear from Table (6) that:

- The standard saturation values for all items of the customer value variable ranged between (0.502-0.842), which is a good relativity, as the standard saturation values indicate the extent to which each items contributes to the dimension to which it belongs.

- The results indicated that the structural validity of the scale for all items of the customer value variable was significant, as it was found that the standard values (CR) for all items ranged between (4.246- 6.819), which is greater than the critical standard value (CR) of (1.96), and this indicates the validity of expressions which is a good indicator for subsequent statistical analyses.

- The value of the significance level for all items of the customer value variable reached (0.000), which is smaller than the significance level of (0.05), and this also indicates that all items are significant and indicates the validity of the statements, which is a good indicator.

Table (6) Statistical indicators of the Customer Value model

Questions	Path	Dimensions	Standard dendrites	Compound Reliability (CR)	P
C1	--->	Time Value	.634		
C2	--->		.502	4.472	0.000
C3	--->		.555	4.484	0.000
C4	--->		.590	4.689	0.000
C5	--->		.842	5.113	0.000
G1	--->	Perceived Value	.719		
G2	--->		.596	5.062	0.000
G4	--->		.729	6.819	0.000
G5	--->		.591	5.504	0.000
H1	--->	Emotional Value	.749		
H2	--->		.688	6.618	0.000
H3	--->		.558	5.247	0.000
H4	--->		.668	6.413	0.000
H5	--->		.565	5.389	0.000
P1	--->	Monetary Value	.623		
P2	--->		.590	4.588	0.000
P3	--->		.808	5.755	0.000
P4	--->		.753	5.388	0.000
P5	--->		.516	4.246	0.000

Source: Amos. v 25 program

3.2 Statistical Analysis of the Variables:

From the data in Table (7) :

Where the statistical results showed that the highest value was for the variable QFD with an arithmetic mean (3.713) and a good level with a standard deviation (0.524), where the coefficient of variation reached (14.11), where the availability of the variable in the surveyed hospitals in general reached (74.26%). As for the size of the gap, it reached (25.74%), where this variable came in the first level in terms of relative importance.

As for the lowest value, it came with the VE variable with an arithmetic mean (3.662), a good level and a standard deviation (0.458), where the coefficient of variation reached (12.498), and the percentage of availability of the variable in the surveyed hospitals in general was (73.24%). As for the size of the gap, it reached (26.76%), where this variable came in the third level in terms of relative importance.

It is clear that the variable (publishing the quality function) ranked first in terms of research variables, as most of the sample answers were in agreement about this variable compared to the other variable as shown in Table (7).

Table (7) Summary of the dimensions of the research variables

S/N	Research variables	Arithmetic mean	Standard deviation	coefficient of variation	Availability percentage	Size of the gap	Order of variables
1	QFD	3.713	0.524	14.11	74.26	25.74	1
2	Value Engineering	3.662	0.458	12.498	73.24	26.76	3
3	Customer Value	3.693	0.478	12.946	73.86	26.14	2

Source: **SPSS V.25 program**

3.3 Hypothesis testing between the dimensions of QFD and VE in customer value

3.3.1 First hypothesis test:

That there is a significant effect for the QFD on the Customer Value , Table (8) and Figure (2) indicate the statistical indicators for testing the hypotheses between the QFD variable in the Customer Value.

The calculated (t) value of the estimated model was 23.814, which is greater than the tabular value (t) of (1.984) at the significance level (0.05), and this indicates the significance of the marginal trend of the QFD variable, and in light of this result we accept the hypothesis that there is a significant effect for the QFD variable on the value of the customer at the level of significance (5%), i.e. with a degree of confidence (95%), which indicates that the QFD variable has an effective and basic effect on the value of the customer.

- The results indicated that the value of the marginal regression coefficient (β) for the QFD variable amounted to (0.845), and this indicates that increasing variable QFD by one unit will lead to an increase (the value of the customer) by 84%.

- The results showed that the effect size (F) for the QFD variable was large, as it recorded a value of (567.125), which is greater than (3.94), which is a good indicator.

- It is clear from the value of the adjusted coefficient of determination (R^2) of (0.855) that the QFD variable is able to explain (85%) of the changes that occur in (customer value), while the remaining percentage (15%) depends on other variables that are not included in the search form.

▪ The sub-hypothesis test (Between the dimensions of QFD variable and the customer value variable)

Table 9 shows the statistical indicators between the dimensions of the QFD in the value of the customer as it comes :

- The calculated (F) value of the model has been estimated (165.097), which is greater than the tabular (F) value of (2.46) at the level of significance (0.05), and accordingly we accept the hypothesis and this means (there is a statistically significant effect for QFD and its dimensions in the value of the customer) and this indicates that the dimensions of QFD have an effective and essential impact on the value of the customer.

- The value of the corrected determination coefficient Adj (R^2) of (0.872) shows that QFD dimensions are able to explain (87%) of the changes that occur in (customer value), while the remaining percentage (13%) is dependent on other variables.

Table 8 Statistical Indicators between QFD in Customer Value

Dependent variable	QFD variable		(R^2)	Adjusted (R^2)	(F)	(t)	Sig	Decision
Customer Value	(α)	0.557	0.857	0.855	567.125	23.814	0.000	Hypothesis Accepted
	(β)	0.845						
Tabular value (F) = 3.94 Tabular value (t) = 1.984 Sample size = 97								

Source: SPSS V.25 program

Table 9 Statistical indicators of the dimensions of QFD in customer value using multiple linear regression

Dimensions Of QFD	Multiple Linear Regression Model		
	Sig.	(t)	(β)
Customer's voice	0.000	6.327	0.326
Employees' voice	0.099	1.665	0.075
Relationship Matrix	0.008	2.699	0.155
Technical Assessment	0.000	6.247	0.306
(α)	0.490		
Multiple Correlation Value (R)	0.937		
coefficient of determination (R^2)	0.878		
Corrected coefficient of determination (R^2)	0.872		
Value (F) computed	165.097		
Sig	0.000		
Tabular (F) value	2.46		
Tabular (t) value	1.984		
sample size = 97			

Source: SPSS V.25 program

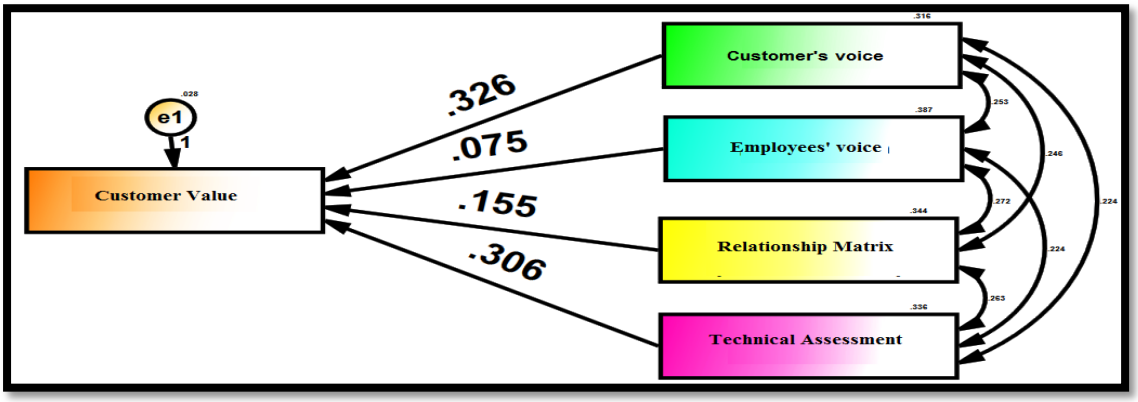


Figure (2) The effect among Dimensions QFD in the Customer Value
Source: Amos. v 25 program

3.3.2 Testing the second hypothesis:

That there is a significant effect for the VE on the customer value variable , Table 10 and Figure 3 indicate the statistical indicators for testing the hypotheses between the VE variable in the Customer Value. The calculated (t) value of the estimated model was (15.852), which is greater than the tabular value (t) of (1.984) at the significance level (0.05), and this indicates the significance of the marginal trend of the VE variable, and in light of this result we accept the hypothesis that there is an effect significance between the VE variable in the value of the customer at the level of significance (5%), i.e. with a degree of confidence (95%), which indicates that the VE variable has an effective and basic effect on the value of the customer.

- The results indicated that the value of the marginal regression coefficient (β) for the VE variable amounted to (0.890), and this indicates that increasing variable VE by one unit will lead to an increase (the value of the customer) by (89%).
- The results showed that the effect size (F) for the VE variable was large, as it recorded a value of (250.422), which is greater than (3.94), which is a good indicator.
- It is clear from the value of the adjusted coefficient of determination (R^2) of (0.722) that the VE variable is able to explain (72%) of the changes that occur in (customer value), while the remaining percentage (28%) depends on other variables that are not included in the search form.
▪ The sub-hypothesis test (between the dimensions of VE variable and the customer value variable)
Table (11) shows the statistical indicators between the dimensions of the VE in the value of the customer as it comes:
- The calculated (F) value of the model has been estimated (68.097), which is greater than the tabular (F) value of (2.46) at the level of significance (0.05), and accordingly we accept the hypothesis and this means (there is a statistically significant effect for VE and its dimensions on the value of the customer) and this indicates that the dimensions of VE have an effective and essential impact in the value of customer.

- The value of the corrected determination coefficient Adj (R^2) of (0.737) shows that VE dimensions are able to explain (73%) of the changes that occur on (customer value), while the remaining percentage (27%) is dependent on other variables.

Table (10) Statistical Indicators between (Value Engineering) in Customer Value

Dependent variable	(EV) Variable		(R^2)	Adjusted (R^2)	(F)	(t)	Sig	Decision
Customer Value	(α)	0.436	0.725	0.722	250.422	15.825	0.000	Hypothesis Accepted
	(β)	0.890						
Tabular value (F) = 3.94 Tabular value (t) = 1.984 Sample size = 97								

Source: SPSS V.25 program

Table (11) Statistical indicators of the dimensions of VE in customer value using multiple linear regression

Dimensions Of VE	Multiple Linear Regression Model		
	Sig.	(t)	(β)
Functionality	0.008	2.695	0.211
Quality	0.019	2.385	0.149
Cost	0.021	2.352	0.159
Evaluate Ideas	0000	6.704	0.376
(α)	0.411		
Multiple Correlation Value (R)	0.865		
coefficient of determination (R^2)	0.748		
Corrected coefficient (R^2)	0.737		
Value (F) computed	68.336		
Sig	0.000		
Tabular (F) value	2.46		
Tabular (t) value	1.984		
sample size = 97			

Source: SPSS V.25 program

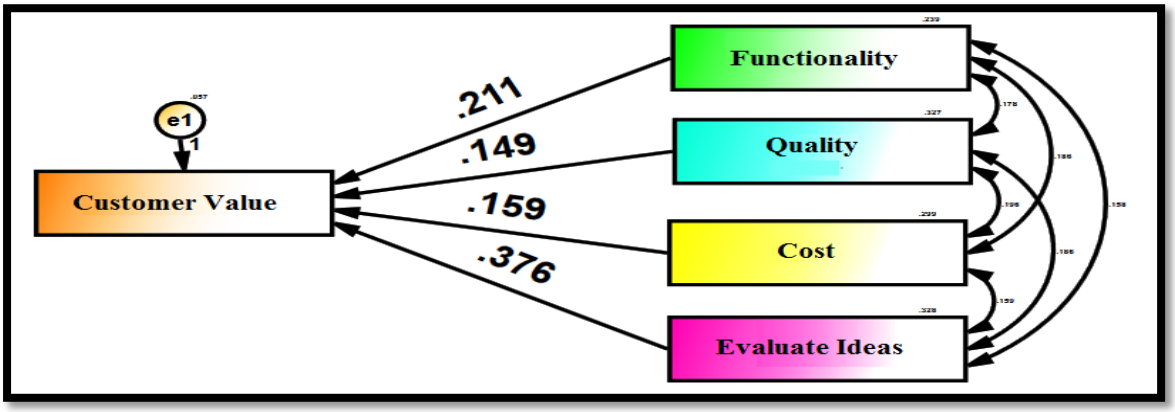


Figure (3) The effect for the dimensions of value engineering on customer value
Source: Amos. v 25 program

3.3.3 Testing the third hypothesis:

In this part of the analysis, the hypotheses of the impact of integration between QFD and VE will be tested in qualitative addition in improving customer value and determining the possibility of judging them by rejection or acceptance.

So, in light of the results achieved in the previous two hypotheses, the impact of the integration between the two techniques of the QFD and VE will be tested in the qualitative addition in customer value, as shown in Table (12). As it turns out that the critical value (CR) for the integration between (QFD and VE) reached (21.049), which is greater than the standard critical value of (1.96) at its significance level (0.000), which is less than the approved significance level of (0.05), and therefore the hypothesis is accepted.

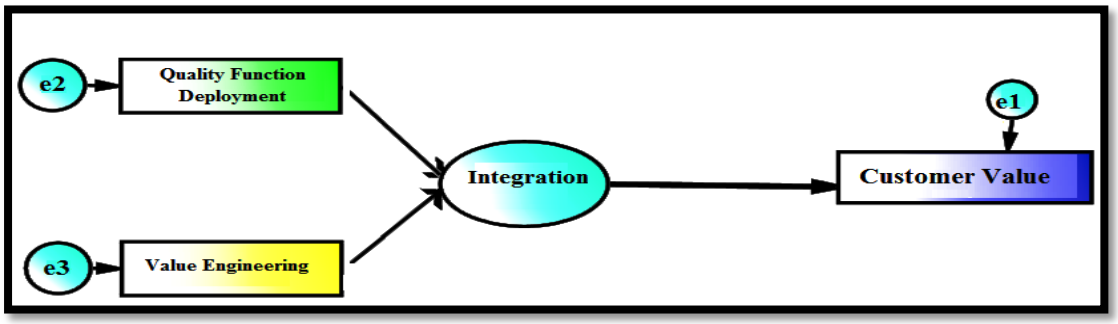
That is, (there is a statistically significant effect of the integration between QFD and VE techniques on customer value) as shown in Figure (4).

Table (12) The effect of integration between (QFD and Value Engineering) on customer value

			P	C.R.	S.E.	(β)	decision
Customer Value	--->	integration	0.000	21.049	.045	0.951	Hypothesis Acceptance

Source: Amos. v 25 program

Figure (4) The effect of the integration of QFD and VE technologies on customer value



Source: Amos. v 25 program

i. **The results of the multiple linear regression analysis of the research variables revealed that the two techniques QFD and VE have a strong and direct impact on the value of the customer in the surveyed hospitals, specifically the following results:**

A. It was found that QFD with its significant dimensions (voice of the customer, Technical Assessment , relationship matrix), respectively, after deleting the non-significant dimension, is able to explain about (87%) of the changes that occur in the value of the customer, while the remaining percentage (13%) is dependent. For other variables not included in the research model, as it was found from the value of the marginal slope coefficient (β) of (0.845) that an increase in QFD by one unit will lead to an increase in the value of the customer by (84%), and this indicates that the dimensions of QFD have effective and substantial impact on customer value. And this is what the study of Alena, et al (2020) found.

B. It was found that VE with its moral dimensions (Evaluation of ideas, Job performance, Quality, Cost), respectively, is able to explain about (73%) of the changes that occur in the value of the customer, while the remaining percentage is dependent on other variables not included in the research model, as it was found from the value of the marginal slope coefficient (β) of (0.890) that increasing the VE by one unit will lead to an increase in the value of the customer by (89%), and this indicates that the dimensions of the quality function deployment technique have an effective and substantial impact on the value of the customer.). This is what Ismail, (2018) study found.

ii. **The theoretical side of the research showed the extent of the researchers' interest in the concepts of customer value and its importance in various aspects of social and economic life, taking into account the value provided by any organization, whether service or industrial, in order to maximize the returns on its investments in light of achieving customer satisfaction and staying in its competitive environment.**

iii. **Whoever achieves the corresponding between the customer's requirements and the perceived benefit from the functional performance of the service is the integration between the two techniques of spreading the quality function and value engineering, and this is an affirmation that the customer is the main axis for the success or failure of economic units and as a result obtaining a competitive advantage in the market as a result of providing services that are consistent with his needs with high quality and low cost.**

iv. **The VE technique can only be applied by its integration with the quality function deployment technique, because the latter focuses on the art of listening and understanding the customer in preparation for determining his requirements and then converting them into technical requirements in the form of components of the service provided whose functions meet all the requirements of the customer and this represents the essence of the integration between the two technologies above .**

v. **The results showed that the order of relative importance of the research variables in the researched private hospitals from the point of view of their administrations is (QFD, CV, VE), respectively, as it is clear that the least gap size was at the QFD variable and it came in the first order, while the largest gap size was When the VE variable, it ranked third in terms of the arrangement of the study variables, which shows that the hospital administration's interest in the first place focused on meeting the basic needs of patients and taking the opinions of doctors, technicians**

and administrators working and harmonizing them and looking at the services of competing hospitals to enhance their services and provide them to the patient with high quality to gain his satisfaction and do not give high importance to job performance, evaluation of proposed ideas and reducing resource costs.

vi. **Finally, the researchers find in the light of the results achieved for the strong influence relationship between the two independent variables in the dependent variable, and from the results of the critical value CR between the integration between (the two techniques of QFD and value engineering) amounting to (21.049), there is a statistically significant effect of the integration between the two techniques of diffusion quality and VE function in improving patient value, and this was proven by some previous studies referred to in Table 3.**

4. Conclusion

It was found that the relationship between the two techniques of QFD and VE is based on the dimensions that organizations adopt to achieve their goals, such as focusing on product design and everything related to it, attention to technical specifications, customer voice and participation in the design, the voice of employees, the extent to which the principle of quality house is applied, and the evaluation of ideas and innovation in design and operations, and focus on Quality to achieve a better value for the product and a balance between cost, performance and quality. Also, the relationship between QFD and customer value will be achieved through the dimensions of QFD technology and attention to integrating the customer's voice in product development by translating his needs and desires into technical requirements that achieve a competitive advantage for the organization by focusing on the value that will be provided to the customer, especially the mental and expected value, the monetary value he wants to obtain and the quality performance, ease of use, and emotional value that ensure product loyalty.

And the researchers recommend hospitals in the field of research to strive towards investing the advantages of responding with the dimensions of QFD and VE technologies within the framework of high administrative support and commitment, which is done with personal and functional conviction and not just a reaction to the directives of higher authorities, because of their great impact in improving the value of the patient.

As for the most prominent limitations that faced the researcher, it was the difficulty of obtaining answers from the target sample, which required several months to persuade hospital administrations to facilitate the researcher's task

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تحسين قيمة الزبون من خلال تكامل تقنيتي نشر وظيفة الجودة وهندسة القيمة بحث تحليلي لعينة من المستشفيات الاهلية في بغداد

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مستخلص البحث :

تعاني مؤسسات الخدمة الصحية من تحديات ناجمة من التغيرات الكبيرة التي يشهدها عالمنا اليوم كظهور الاوبئة وزيادة النمو السكاني. وقد أثر ذلك على القيمة التي تضيفها هذهِ المؤسسات للمريض. الهدف من البحث هو التعرف على تأثير تكامل كل من تقنيتي نشر وظيفة الجودة وهندسة القيمة للخدمات الصحية المقدمة للمريض من اجل تحسين القيمة له وبالتالي نيل رضاه ما ينعكس على سمعة المستشفيات المبحوثة ، ولتحقيق ذلك تم استخدام المنهج الوصفي التحليلي ، وتم تصميم استبيان لجمع البيانات اللازمة والتي تمثل مقياساً لهذا البحث. وزع الاستبيان على عينة أخذت عمداً من مجتمع البحث المكون من مدراء المستشفيات ومدراء الأقسام والشعب في المستشفيات البحوثة ، حيث بلغ حجم العينة (97) فرداً. تم استخدام طرق إحصائية متنوعة لاختبار فرضيات البحث منها التحليل العاملي التوكيدي ، معامل الانحدار الخطي وتحليل المسار. كما تم استخلاص النتائج باستخدام البرنامج الإحصائي SPSS و Amos. كان لتقنية نشر وظيفة الجودة وهندسة القيمة تأثير فعال وجوهري في تحسين القيمة للمرضى في المستشفيات المبحوثة ، وهو الاستنتاج الأكثر أهمية لهذا البحث. ومن اهم توصيات البحث هو العمل على مشاركة الملاكات الصحية في القطاع الصحي مع الجهات الاكاديمية متمثلة بالجامعات والكليات المتخصصة والعمل على تواصل الاستشارات لتطبيق اساليب تساهم في تحقيق اعلى مستويات لجودة الخدمات الصحية .

نوع البحث: ورقة بحثية .
المصطلحات الرئيسة للبحث : قيمة الزبون ، نشر وظيفة الجودة ، هندسة القيمة .

*البحث مستل من رسالة ماجستير