THE EFFECT OF CONCURRENT ENGINEERING ON THE QUALITY OF SERVICE

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ABSTRACT

Purpose: *The current research seeks to extract the intellectual contents of concurrent engineering to determine the quality of service in luxury hotels in Baghdad as promising business organizations. This will be done at three levels; the first level includes the presentation, diagnosis and description of the intellectual content of concurrent engineering and quality of service. The second level (level of analysis) shows the impact analysis and alignment between the dimensions of concurrent engineering (service design, process design, and supply chain design) and the quality of service in their five dimensions (reliability, responsiveness, empathy, safety, tangibility), and the third level (level of prediction) involved the development of a hypothetical scheme to promote concurrent engineering in hotels and stating specific perceptions of the nature of appropriate relationships between research variables.*

Research problem*: The current research problem has reduced the range of questions. Most importantly, what is the role of concurrent engineering in increasing the quality of service? What is the positive impact of concurrent engineering in the quality of service? And do banks have prior perceptions of research variables?*

Methodology*: The researcher used the analytical survey strategy to complete his research. The research community was five top-class hotels in Baghdad, and the research sample was (12) person. The researcher used the questionnaire as a measurement tool, and after the evaluation and testing of the credibility of the measurement tool, the questionnaire was distributed to the research sample of management leadership. After data is collected and analyzed by statistical tools such as simple and multiple regression, and the Pearson correlation coefficient, the results revealed the validity of most of the research hypotheses. On this basis, some conclusions and recommendations were formulated, the most important of which was the need to pay attention to the relationship between concurrent engineering and the quality of service, and benefiting from the positive impact of concurrent engineering on the quality of service.*

Originality*: this research undertakes to provide assistance to hotel managements in addressing problems and challenges through optimal investment of concurrent engineering to enhance the quality of service.*

Keywords: Concurrent Engineering, Quality of Service, Premium Class Hotels.

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INTRODUCTION

Concurrent engineering is a very important strategy in direct manufacturing operations, where the design processes of (service / goods, production processes, and supply chain) are the cornerstone of the success of organizations that distinguish them from others, and because they provide several advantages, including improving quality, reducing costs, strengthening the market position of the organization and achieving the competitive advantage, so it is necessary to study and understand it well, know the positive and negative impact on organizations, and properly plan for its implementation.

Successful administrations of organizations that are willing to develop their own businesses in order to achieve success in the context of environmental variables must adopt new and appropriate methods for their successful functioning. With the overall orientation of business organizations towards the quality of service being an organizational strategy that ensures continuity and growth for the organization, To that end, organizations must pay attention to the quality dimensions of service represented by (reliability, responsiveness, empathy, safety, tangibility). This concern will lead to the perception and construction of competitive possibilities that depend primarily on quality. To know that these dimensions work correctly, they must be measured by measuring the gaps between the expected service and the realized service. From the foregoing, the role of this research comes to clarify the effect of concurrent engineering on the quality of service.

The First Topic: The Problem of Research and Formulation of Hypotheses

The research problem: the issue of concurrent engineering occupies an important degree for most writers and researchers, because it has a prominent role in increasing quality and reducing costs, in addition to what the researcher feels about the necessity of applying this strategy in the service field. From the above, the research problem can be clarified through the following questions:

1. What is the role of concurrent engineering in increasing the quality of service from the point of view of the administrative leaders in the surveyed hotels?
2. Is there an effect of concurrent engineering on the quality of service from the point of view of the administrative leaders in the surveyed hotels?
3. What is the extent of the knowledge of the administrative leaders in the surveyed hotels to harmonize the concept of concurrent engineering with the quality of service?
4. Do the hotels under study have preconceptions about concurrent engineering and quality of service?
5. Is there an actual interest in Concurrent Engineering, and its reflection in the quality of service?

The importance of the research: The importance of the research is to develop a general framework to test the relationship between concurrent engineering and the quality of service in the hotels under study from the point of view of the administrative leaders in them, as well as the importance of linking variables with each other to reach new results and facts in scientific research. This research presents an important intellectual discussion and has a major role in the advancement of hotel work from both the theoretical and practical aspects, and by focusing on the role that concurrent engineering plays in the quality of service, and providing assistance to the hotels under study by providing the necessary information that helps in the development of business in the hotel field, with taking advantage of the conclusions and recommendations of

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other organizations, as well as clarifying the important aspects of the development process in terms of design and reducing costs and waste or eliminating them.

Research Objectives

The research aims to know the cognitive repercussions caused by the variables in the Iraqi hotels, as well as to clarify the impact and the positive contribution of concurrent engineering to the quality of service. Accordingly, the research seeks to achieve the following goals:

1. Clarifying the theoretical and intellectual aspects of the variables and clarifying their sub-dimensions and basic concepts.
2. Analyzing and testing the impact of concurrent engineering on service quality.
3. Analyzing and testing the correlation relationship between the two independent variables, which are concurrent engineering and the dependent variable, the quality of service.

The hypothesis of the research: After conducting more than one review on the subject of the research and conducting a survey of the scientific intellectual results related to the research topics (concurrent engineering, and the quality of service), the study plan was built and developed to reflect the dimensions and variables of the research and for the purpose of clarifying the idea of the scheme. The research will present its objectives, its variables and the mechanism of its movement, since the comprehensive scheme takes into account all the main and sub-research variables by focusing on the main pillars shown in Figure 1, as well as the possibility of measuring the impact of the variables directly or indirectly.

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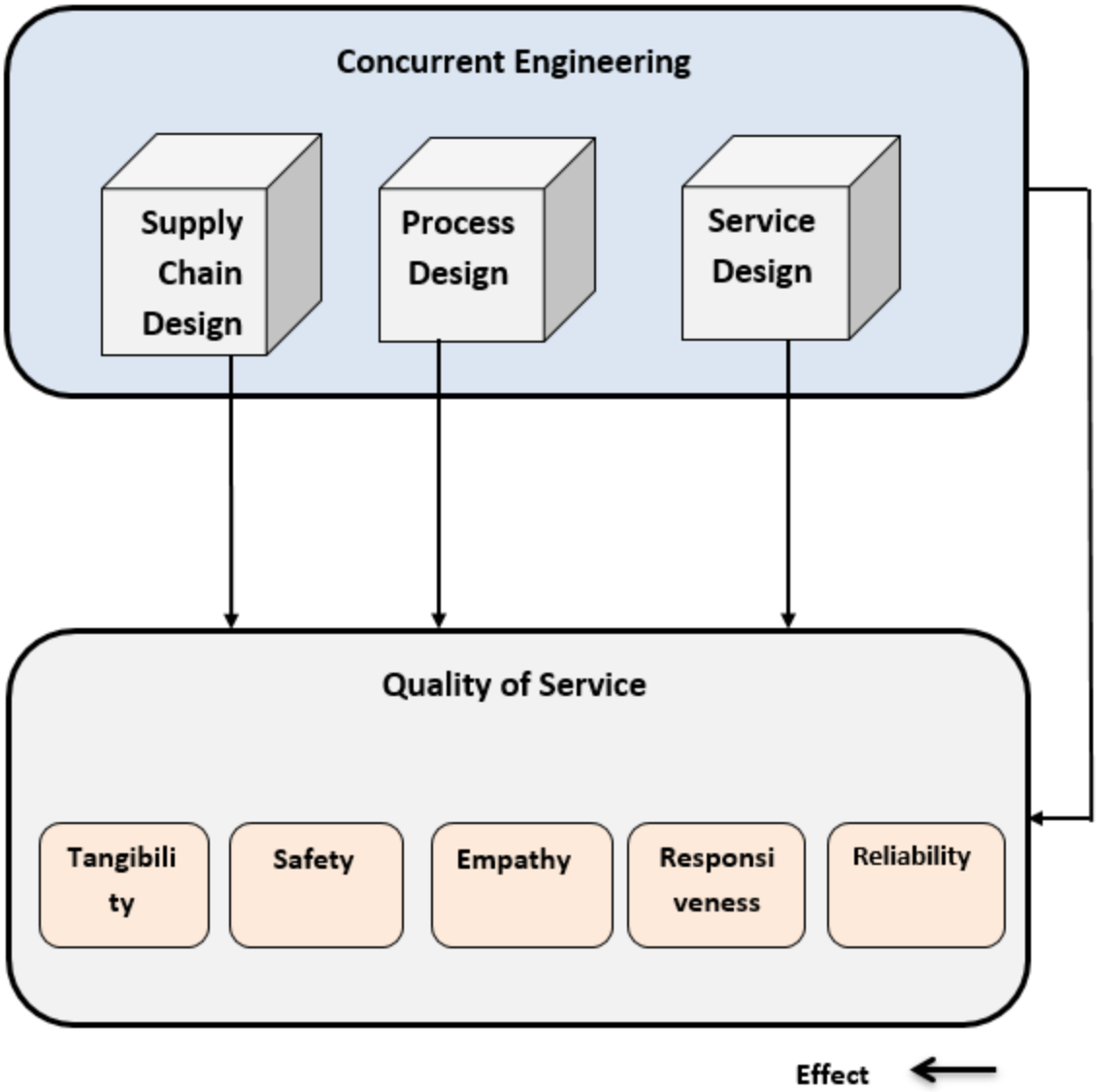

Figure 1
THE HYPOTHESIS OF THE RESEARCH

Research Hypotheses

Main hypotheses

There is a statistically significant effect of concurrent engineering on the quality of service, from which the following sub-hypotheses are branched:

1. There is a statistically significant effect of the service design dimension on the quality of service.
2. There is a statistically significant effect of the process design dimension on the quality of service.

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3. There is a statistically significant effect of the supply chain dimension on the quality of service.

The Theoretical Entrance to the Research Variables

Concurrent engineering: A systematic approach to the integrated design of products and related processes, including manufacturing and support. This approach aims to make developers interested in all elements of the product lifecycle including quality, cost, schedule, and user requirements (Winner, 2013: 1).

The importance of concurrent engineering (Belay, 2011: 8-7)

1. **Reducing the design and development time:** Organizations that are able to transfer the technology they use in the market quickly and effectively will be able to meet the needs of customers faster and with high quality and in a way that provides or exceeds their expectations. They will also have the ability to develop their current products and introduce new products to markets.
2. **Increasing performance**: Most of the organizations that have applied concurrent engineering in their work have recognized that it is a major work for product development, improving the development process, reducing production costs, and speeding up the production of products on time.
3. **Achieving competitive advantages**: The use of concurrent engineering increases the possibility of achieving the competitive advantage of organizations, and it can fit with large or small organizations.

The Dimentions of Concurrent Engineering

1. **Service design**: The process of designing and manufacturing products is one of the main tasks of the operations department, as well as determining special decisions related to products, whether these products are physical goods or service, that is, they are tangible or intangible products. The first decision taken by operations department is finding and determining the quality of products and determining the methods of their manufacture and presentation. The production and operations system depends on the presence of planning and design (Abdul Salam, 2014: 72). The product design process is a multifunctional work that depends on knowledge, so this process is important in the business environment competitiveness, and the product design process is defined as the process of finding an idea in order to develop a specific product or produce a new product.
2. **Process design**: The process of designing (the process) includes identifying all the activities and individuals through which the daily activities of each individual involved in the process will be performed and what roles he will play. The process is defined as the activity through which the frameworks and format of resources and activities that constitute a service or product are developed (Salck, 2004:102).
3. **Supply chain design**: The design of the supply chain means the ability to coordinate and cooperate between suppliers and distribution channels, and it is an essential part in the strategic planning process of any organization because it contains all the operations and functions of the organization. The provision of service and high-quality products must include strategic design decisions (Ali, 2005: 46).

Quality of Service: The organization's ability to meet customer expectations by providing high quality service (Stevenson, 2012: 432).

The importance of the quality of service: The product, whether it is a commodity or a service, which is characterized by high quality, adds great importance to organizations, as the quality of service represents an important role in the life of the organization and is considered a competitive weapon for it because of the competitive advantage it carries in which it achieves its strategic objectives (Slack, 1998: 501). It has attracted the attention of researchers and writers, as it is considered as a preventive approach that prevents errors from occurring according to scientific methods that take into account the capabilities and capabilities of the organization

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(David, 2009: 1). That is why the quality of service has become one of the most important principles in service organizations.

Dimentions the quality of service

1. **Reliability**: the organization's ability to provide service of high quality and a high degree of reliability without errors. The organization's commitment to the standards it sets means that it has reliability (Schroeder, 2007:14).
2. **Responsiveness**: the organization's ability to meet the needs and desires of customers within the specified time for performance, as the organization promised in advance, as well as the organization's desire and willingness to help customers, receive suggestions and problems, provide quick solutions to them, and address problems that accompany the service provision process (Cauny, 2013:88).
3. **Empathy**: means the degree of empathy and concern that the organization has towards the customer through the quality of the service provided, and that this dimension focuses on realizing and understanding the needs and desires of customers and working to solve the problems they face and work to solve them (Chiaming: 2002: 76).
4. **Safety**: It means that the interaction between the customer and the service organizations is free of risk and suspicion (Al-Mahawi, 2006: 112).
5. **Tangibility**: The quality of service from customers is usually evaluated in light of the material facilities, which are the auxiliary element in the service provision process (Al-Mahawi, 2006: 113).

Statistical description: Presentation, interpretation and analysis of the research results

Validity and Reliability: For the purpose of completing the research requirements, the internal consistency of the paragraphs of the research measures was checked through the (Kaiser-Meyer-Olkin, KMO) test to verify the adequ Adequacy of the sample size to perform the statistical analysis, especially the confirmatory factor analysis, so its value exceeds (0.50). The closer its value is to one, it indicates an increase in the reliability of the factors, but if it is less than (0.50), the sample size should be increased, in addition to the Bartlett test, which is an indicator of the relationship between the variables in Table 1.

Table 1
SHOWS THE KMO AND BARTLETT'S TEST

Dimentions	Number of Items	KMO Test	Bartlett Test Based on The Value of Chi-Square	Sig
Service Design	**5**	**0.928**	**1333.053**	**0.000**
Process Design	**5**			
Supply Chain	**5**			
Concurrent Engineering	**15**			
Reliability	**5**	**0.930**	**2194.626**	**0.000**
Responsiveness	**5**			
Empathy	**5**			
Safety	**5**			
Tangibility	**5**			
Quality Of Service	**25**			

Source: SPSS V.25 output

A. From the Table 1, we note that the concurrent engineering variable was measured across (15) items and three dimensions. The value of the (KMO) test was (0.928), which is greater than the minimum required percentage, and according to (Kaiser) classification, this value is good and indicates that the sample size is sufficient to conduct statistical analyzes. Thus increasing the reliability of the factors adopted in the

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questionnaire, and as shown in the table (Bartlett test), which indicates the presence of morale, as the test value reached (1333.053) at the level of significance (0.000) which is less than (0.05) and the results indicate The correlation matrix is not a unit matrix. The previous results indicate that the sample size was sufficient, which is a good indicator for conducting subsequent statistical analyzes.

B. The variable of service quality was measured across (25) items and five dimensions, the value of the (KMO) test was (0.930), which is greater than the minimum required percentage. According to (Kaiser) classification, this value is good and indicates that the sample size is sufficient to conduct Statistical analyzes, thus increasing the reliability of the factors adopted in the questionnaire. As shown in the table (Bartlett test) indicates the presence of significance, where the test value reached (2194.626) at the level of significance (0.000), which is less than (0.05). The results indicate that the correlation matrix It is not a unit matrix. The previous results indicate that the sample size was sufficient, which is a good indicator for conducting subsequent statistical analyzes.

Testing effect hypotheses

Testing the effect of the second main hypothesis using simple linear regression

To test the effect of the second main hypothesis, which states the following (there is a statistically significant effect of concurrent engineering on the quality of service). The analysis will be done according to the simple linear regression model, as follows:

(Y)= 1.381+0.680 (X)

It is evident from Table 2, that:

The calculated (F) value recorded a value of (189.294) which is greater than the tabular (F) value of (3.94) at the level of significance (0.05). Accordingly, we accept the hypothesis that states (there is a statistically significant effect of concurrent engineering on the quality of service). Through the value of the corrected coefficient of determination (²R) of (0.629), it is clear that concurrent engineering explains (62%) of the variables that occur in the quality of service, while the remaining percentage (38%) is due to other variables not included in the study model. The calculated value (t) of the marginal slope coefficient of the concurrent engineering variable (13.758) was recorded. It is greater than the tabular value (t) of (1.984) at the level of significance (0.05), and this indicates the significance of the marginal slope coefficient of the concurrent engineering variable. One unit will increase the quality of service by (68%), and the value of the constant (α) was recorded in the equation (1.381), meaning when concurrent engineering is equal to zero, the quality of service will not be less than this value.

Table 2
STATISTICAL INDICATORS OF ANALYZING THE IMPACT OF CONCURRENT ENGINEERING ON THE QUALITY OF SERVICE

Dependent Variable	Concurrent Engineering (x)		(R^2)	Adjusted (R^2)	(F)	(t)	Sig	Significance
Quality of service (Y)	(α)	1.381	.632**0**	.629**0**	**189.294**	**13.758**	**0.000**	Significant
	(**β**)	.680**0**						
Tabular value (F) = 3.94 Tabular value (t) = 1.984 Sample size = 112								

Testing effect of the first sub-hypothesis

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To test the effect of the first sub-hypothesis, which stares the following (there is a statistically significant effect of the service design dimension on the quality of service). The analysis will be done according to the simple linear regression model, as follows:

(Y) = 1.838+ 0.551 (SD)

It is evident from Table 3 that:

The calculated (F) value recorded a value of (119.422) which is greater than the tabular (F) value of (3.94) at the level of significance (0.05). Accordingly, we accept the hypothesis which states (there is a statistically significant effect of the service design dimension on the quality of service). Through the value of the corrected coefficient of determination (²R) of (0.516), it is clear that the dimention of the design of the service explains 51% of the variables that occur in the quality of service, while the remaining percentage (49%) is due to other variables that are not included in the study model. The calculated value (t) of the marginal slope coefficient for the service design dimension was recorded (10.928), which is greater than the tabular (t) value of (1.984) at the level of significance (0.05). This indicates the significance of the marginal slope coefficient for the service design dimension. It is also shown by the value of the marginal slope coefficient (β) of (0.551) that an increase in the service design dimension by one unit will lead to an increase in the quality of service by (55%), and the value of the constant (α) was recorded in equation (1.838), meaning when the service design dimension is equal to zero, the quality of service will not be less than this value.

Table 3
STATISTICAL INDICATORS FOR ANALYZING THE IMPACT OF SERVICE DESIGN ON SERVICE QUALITY

Dependent Variable	Service Design SD		(R^2)	Adjusted (R^2)	(F)	(t)	Sig	Significance
Quality of service(Y)	(α)	1.838	**0**.521	**0**.516	**119.422**	**10.928**	**0.000**	Significant
	(β)	**0**.551						
Tabular value (F) = 3.94 Tabular value (t) = 1.984 Sample size = 112								

Source: SPSS V.25 output

Impact test for the second sub-hypothesis

To test the effect of the second sub-hypothesis, which stipulates the following (there is a statistically significant effect of the process design dimension in the quality of service), the analysis will be done according to the simple linear regression model, as follows:

(Y)= 1.595+ 0.623 (PD)

It is evident from Table 4 that:

The calculated (F) value recorded (147.241), which is greater than the tabular (F) value of (3.94) at the level of significance (0.05). Accordingly, we accept the hypothesis which states (there is a statistically significant effect of the process design dimension on the quality of service) It is evident from the value of the corrected determination coefficient (R^2) of (0.568) that the dimention of process design explains (56%) of the variables that occur in the quality of service, while the remaining (44%) is due to other variables not included in the study model.

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Also, the calculated value (t) of the marginal slope coefficient for the process design dimension recorded (12.134), which is greater than the tabular (t) value of (1.984) at the level of significance (0.05), which indicates the significance of the marginal slope coefficient for the process design dimension. The marginal slope coefficient (β) of (0.623) shows that an increase in the process design dimension by one unit will lead to an increase in the quality of service by (62%). The value of the constant (α) was recorded in equation (1.595), meaning when the process design dimention is equal to zero, the quality of service will not be less than this value.

Table 4
STATISTICAL INDICATORS FOR ANALYZING THE IMPACT OF PROCESS DESIGN ON THE QUALITY OF SERVICE

Dependent Variable	Process Design (PD)		(R^2)	Adjusted (R^2)	(F)	(t)	Sig	Significance
Quality of service (Y)	(α)	1.595	**0**.572	**0**.568	**147.241**	**12.134**	**0.000**	Significant
	(β)	**0**.623						

Tabular value (F) = 3.94
Tabular value (t) = 1.984
Sample size = 112

Source: SPSS V.25 output

Impact test for the third sub-hypothesis

To test the effect of the third sub-hypothesis, which states the following (there is a statistically significant effect of the supply chain dimension in the quality of service), the analysis will be done according to the simple linear regression model, as follows:

(Y)= 1.617+ 0.600 (SC)

It is evident from Table 5 that:

The calculated (F) value recorded (136.115), which is greater than the tabular (F) value of (3.94) at the level of significance (0.05). Through the value of the corrected coefficient of determination (R^2) of (0.549), it is clear that the supply chain dimension explains (54%) of the variables that occur in the quality of service, while the remaining percentage (46%) is due to other variables that are not included in the study model. The calculated value (t) of the marginal slope coefficient of the supply chain dimension recorded (11.667), which is greater than the tabular value (t) of (1.984) at the level of significance (0.05), and this indicates the significance of the marginal slope coefficient of the supply chain dimension. The value of the marginal slope coefficient (β) of (0.600) shows that an increase in the supply chain dimension by one unit will lead to an increase in the quality of service by (60%), and the value of the constant (α) was recorded in equation (1.617), meaning when the supply chain dimension is equal to zero, the quality of service will not be less than this value.

Table 5
STATISTICAL INDICATORS OF ANALYZING THE EFFECT OF THE SUPPLY CHAIN ON THE QUALITY OF SERVICE

Dependent Variable	**Supply Chain (SC)**		**(R^2)**	**Adjusted (R^2)**	**(F)**	**(t)**	**Sig**	**Significance**
Quality of service ((Y	**(α)**	**1.617**	**0.553**	**0.549**	**136.115**	**11.667**	**0.000**	**Significant**
	(β)	**0.600**						

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Tabular value (F) = 3.94
Tabular value (t) = 1.984
Sample size = 112

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

1. Concurrent engineering contributes to increasing the quality of service through its three dimensions (service design, process design, supply chain design), and this means that the researched hotels have a clear understanding of the dimensions of research variables. In other words, the more hotels surveyed pay attention to concurrent engineering, the higher the quality service provided to customers.
2. Concurrent engineering has a clear impact on the quality of service, especially the process design dimention, which ranked first in terms of impact strength, and comes the supply chain dimention in the second place, and in the last place came service design dimention, which indicates the validity of the hypothesis that states that concurrent engineering affects the quality of service.

Recommendations

1. The necessity of paying attention to the relationship between concurrent engineering and the quality of service to increase the quality in the service provided by hotel administrations to customers. This is done through continuous improvements to achieve a competitive advantage for the surveyed hotels.
2. Proceeding from the positive impact of concurrent engineering on the quality of service, hotel management should be directed to the need to pay attention to the dimensions of concurrent engineering , especially the of service design and dimention of the supply chain to increase the quality of service provided to hotel customers.
3. In light of the results reached by the researcher, he recommends the hotel administrations under study to pay more attention to the quality of the service they provide.
4. The researched hotel administrations' interest in the concept of concurrent engineering deepened as it is an important step in the hotel business development process. This is done through preparing seminars and meetings that explain to senior leaders and employees the concept and its economic benefits that are focusing on increasing the quality of service provided by hotel administrations.

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Citation Information: Alsaqal, A.H., Ahmed, H.A., & Aldeen, O.M.S. (2021). The effect of concurrent engineering on the quality of service*. Academy of Accounting and Financial Studies Journal, 26*(1), 1-11.