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The Impact of Quality Management Implementation on the Efficiency of Warehousing and Distribution Operations in Land Transport Companies: A Field Study

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Abstract

This study aimed to investigate the impact of implementing Quality Management (QM) in its various dimensions (top management commitment, continuous improvement, employee engagement, and customer focus) on the efficiency of storage and distribution operations in land transport companies in Basra Governorate. The study employed a descriptive-analytical approach. The population consisted of employees from three land transport companies in Basra, and the sample comprised 150 individuals selected using stratified random sampling. A questionnaire was used as the data collection instrument after verifying its validity and reliability, with Cronbach's alpha coefficient for the instrument as a whole reaching 0.928. Data were analyzed using the SPSS package, employing arithmetic means, standard deviations, Pearson correlation coefficient, and multiple and simple regression analysis.

The study yielded several key findings, most notably that the level of QM implementation was high, with an average of 3.86, led by the customer focus dimension. The efficiency of storage and distribution operations was also found to be high, with an average of 3.79. The study also revealed a statistically significant positive correlation between the two variables and demonstrated a significant impact of the combined dimensions of quality management on the efficiency of storage and distribution operations. These dimensions explained 65.9% of the variance in the dependent variable, with the continuous improvement dimension showing the greatest influence. The study recommended several measures, most notably strengthening the performance measurement system through specific quantitative indicators, addressing the inefficiencies in storage space utilization by redesigning warehouses and implementing modern management systems, investing in continuous improvement as the most effective factor in efficiency, and enhancing employee participation through training and expanded authority.

Keywords: Quality Management, Storage and Distribution Efficiency, Land Transport Companies, Continuous Improvement, Basra Governorate.

1.1 Introduction

Quality management is one of the most prominent modern management approaches that has established itself in the contemporary business environment. Organizations no longer compete solely

on price or quantity; rather, their distinction depends on their ability to provide products and services that meet and exceed customer expectations. The concept of quality has evolved from mere final product control to a comprehensive management philosophy that permeates all organizational processes and activities. This philosophy is based on continuous improvement, employee engagement, and a customer-centric approach (Liu et al., 2023).With the intensification of global competition and the growth of cross-border supply chains, logistics operations have assumed a pivotal role in determining an organization's competitiveness, serving as the link between production and consumption. Warehousing and distribution are the backbone of these chains, directly impacting service cost, speed, and reliability, and consequently, customer satisfaction and repeat business (Mohamud et al., 2023). The efficiency of storage and distribution operations is gaining increasing importance, particularly in the land transport sector, due to the need for meticulous management of goods flow, reduced handling times, and warehouse layouts that minimize costs and enhance service levels. Studies have shown that warehouse design and operational efficiency are crucial factors in the overall operational performance of a logistics facility (Sao et al., 2024).This highlights the potential role of implementing quality management as a systematic approach to improving the efficiency of these operations. This can be achieved by fostering a culture of continuous improvement, preventing errors before they occur, empowering employees, and measuring performance with clear indicators. Recent studies have confirmed that the transition from traditional Total Quality Management (TQM) to Quality 4.0 enables logistics organizations to leverage digital technologies to enhance the quality and efficiency of their operations (Batarlienė & Jarašūnienė, 2024). Iraqi land transport companies face numerous operational challenges related to warehouse management, distribution organization, and cost control, within a dynamic business environment and relatively weak logistical infrastructure. Therefore, studying the impact of implementing quality management on the efficiency of storage and distribution operations in this sector represents a valuable addition of knowledge and practical application, providing decision-makers with a scientific basis for performance improvement.

1.2 Statement of the problem

Competitive pressures on land transport companies in Iraq are increasing due to market liberalization and the proliferation of logistics service providers. This makes the efficiency of storage and distribution operations essential for their survival and continuity. Observers of these companies note deficiencies in the regularity of storage operations, high handling costs, and inconsistencies in the level of service provided. This indicates a gap between actual and desired performance, necessitating the search for effective management approaches to address it.

Quality management has received considerable research attention as one of the most prominent approaches. However, this attention has largely focused on linking quality management to general organizational variables, neglecting logistics operations. For example, Al-Sharif's study (2023) examined its impact on achieving competitive advantage in the banking sector, Al-Abbar and Mahmoud's study (2024) focused on its impact on the quality of banking services, Al-Osaimi and Abdulhamid's study (2022) investigated its impact on performance in the Ministry of Hajj and Umrah,

and Ahmed's study (2021) addressed its impact on administrative performance efficiency. These studies reveal that their application has been concentrated in banking, governmental, and industrial environments, without sufficiently extending to the land transport sector and its logistics operations.

Regarding logistics operations themselves, the study by Batarlienė & Jarašūnienė (2024) emphasized the importance of improving the quality of warehouse operations in the logistics sector. The study by Sao et al. (2024) demonstrated that storage dimensions directly affect operational efficiency, and the study by Mohamud et al. (2023) linked warehouse design to its efficiency. However, these foreign studies addressed warehouse efficiency in isolation from the quality management approach as an integrated framework, and in environments different from the Iraqi context.

Hence, the research gap addressed by this study is defined on two complementary levels: On the one hand, Arab studies (Al-Sharif, 2023; Al-Osaimi and Abdul-Hamid, 2022; Al-Abbar and Mahmoud, 2024) focused on the impact of quality management on general variables without linking it to the efficiency of logistics operations; On the other hand, foreign studies (Sao et al., 2024; Batarlienė & Jarašūnienė, 2024) have addressed storage efficiency in isolation from quality management as a comprehensive approach. Thus, the direct link between the application of quality management and the efficiency of storage and distribution operations in the land transport sector, specifically within the Iraqi context, remains a missing link that this study seeks to fill.

Based on the above, the study's problem is formulated in the following main question: What is the impact of applying quality management, with its dimensions (top management commitment, continuous improvement, employee participation, and customer focus), on the efficiency of storage and distribution operations in land transport companies in Basra Governorate?

The following sub-questions stem from this main question:

1. What is the level of application of quality management, with its dimensions, in land transport companies in Basra Governorate?
2. What is the level of efficiency of storage and distribution operations in land transport companies in Basra Governorate?
3. Is there a statistically significant effect at the (0.05) level of implementing quality management (with all its dimensions) on the efficiency of storage and distribution operations in land transport companies in Basra Governorate?

1.3 The objectives of the study

This study primarily aims to investigate the impact of implementing quality management (with its four dimensions: top management commitment, continuous improvement, employee engagement, and customer focus) on the efficiency of storage and distribution operations in land transport companies in Basra Governorate.

The following sub-objectives are also included:

1. To diagnose the level of implementation of quality management (with its four dimensions) in land transport companies in Basra Governorate and to determine their relative importance.
2. To measure the efficiency of storage and distribution operations in land transport companies in Basra Governorate.
3. To identify the nature, direction, and strength of the correlation between implementing quality management (with its dimensions) and the efficiency of storage and distribution operations in land transport companies in Basra Governorate.
4. To determine the impact of the combined dimensions of quality management on the efficiency of storage and distribution operations in land transport companies in Basra Governorate and to assess the extent to which they explain the variance in the dependent variable.
5. To develop practical recommendations that contribute to enhancing the efficiency of storage and distribution operations in the land transport sector in Basra Governorate, based on the study's findings.

1.4 The Importance of the Study

The importance of this study stems from two complementary aspects: scientific and practical.

First: Scientific (Theoretical) Importance:

- The study contributes to enriching Arabic management literature by linking the quality management approach to the efficiency of logistical operations, a connection that remains limited in the Iraqi context.
- The study addresses a research gap represented by the scarcity of studies that have examined the impact of quality management on storage and distribution efficiency, specifically in the land transport sector.
- It presents a comprehensive theoretical framework for the dimensions of quality management and indicators of storage and distribution efficiency, which can serve as a foundation for future studies.
- It is hoped that the study will open new research avenues for researchers to address mediating or moderating variables in the relationship between the two variables.

Second: Practical (Applied) Importance:

- It provides land transport companies with a scientific diagnosis of their level of implementation of quality management and the efficiency of their operations, enabling them to identify strengths and weaknesses.
- It helps decision-makers prioritize improvement by identifying the dimensions of quality management that have the greatest impact on efficiency. • It offers practical and actionable

recommendations that contribute to reducing storage and distribution costs and improving service levels.

- It assists transport sector regulators in Iraq in developing policies that support the adoption of quality practices in this vital sector.

1.5 The terminology of the study

Quality Management:

Definitively, it is defined as a comprehensive management philosophy and systematic practices aimed at the continuous improvement of all organizational processes, products, and services through the involvement of all employees and a focus on meeting customer needs (Liu et al., 2023, p. 193). Operationally, it is defined as the set of practices adopted by the land transport companies in the study sample in the areas of senior management commitment, continuous improvement, employee engagement, and customer focus. It is measured by the score obtained by the respondent on the items of the designated axis in the study instrument, according to a five-point Likert scale.

Efficiency of Warehousing and Distribution Operations:

Definitively, it is defined as the ability of a logistics establishment to accomplish warehousing, handling, and distribution operations with the least possible resources, time, and cost, while maintaining the required level of service (Sao et al., 2024, p. 4). Operationally, it is defined as the level of regularity, speed, and accuracy of warehousing and distribution operations in land transport companies. The study sample is measured by the score obtained by the respondent on the items of the storage and distribution efficiency axis of the study instrument, according to a five-point Likert scale.

Land Transport Companies: Operationally defined as: companies operating in the field of land freight transport in Basra Governorate that own storage and distribution facilities, and which are included in the study sample, namely: Gulf Freight Transport Company, Al-Faw Land Transport Company, and Shatt Al-Arab Logistics Services Company.

1.6 Theoretical Framework

First: The Concept of Quality Management:

The concept of quality management has been defined in numerous ways, reflecting the diverse perspectives of researchers. Al-Sharif (2023, p. 249) defines it as an administrative philosophy based on the combined efforts of all employees in the organization towards continuous process improvement, ultimately achieving customer satisfaction. Ahmed (2021, p. 405) describes it as an integrated system of principles and practices aimed at perfecting administrative performance and minimizing errors. Liu et al. (2023, p. 193) view it as a comprehensive system that integrates continuous improvement with employee participation and customer focus, steadily evolving towards the use of digital technologies in what is known as Quality 4.0. Al-Osaimi and Abdulhamid (2022, p.

822) focus their definition on the practical dimension, considering it an administrative system translated into measurable procedures and policies that are reflected in performance levels.

It is observed from examining these definitions that they agree on three essential elements: the comprehensiveness of quality across all organizational processes, customer-centricity, and continuous improvement, although they differ in their degree of emphasis between the philosophical and procedural aspects. In light of the foregoing, the researcher believes that quality management can be defined as an integrated intellectual and practical system adopted by the organization to establish a culture of excellence and continuous improvement in all its operations, through committed leadership and empowered employees, thereby achieving performance efficiency and customer satisfaction. This is the definition from which this study begins its analysis of the land transport sector.

Second: The Importance of Quality Management:

The importance of quality management stems from the fact that it is no longer a supplementary option but a competitive necessity imposed by the contemporary business environment, due to its impact on organizational efficiency and market position. Researchers have addressed this importance from multiple, complementary perspectives.

Ahmed (2021, p. 407) indicates that the importance of quality management is manifested in its contribution to: (1) raising the efficiency of administrative performance and optimizing resource utilization; (2) It reduces errors and waste and lowers operating costs; (3) It establishes an organizational culture based on responsibility and excellence.

Third: Dimensions of Quality Management:

The dimensions of quality management in this study were identified based on the findings of Al-Sharif (2023) and Al-Osaimi and Abdulhamid (2022), which are among the most comprehensive studies addressing these dimensions in the Arab world, as well as the recent developments in this field outlined in Liu et al. (2023). The researcher settled on four main dimensions, which are explained below:

First Dimension: Senior Management Commitment. This dimension represents the foundation upon which the entire quality system is built. Senior management bears the responsibility of adopting the quality philosophy and translating it into a clear vision and declared policies, providing the necessary material and human resources, and creating a supportive organizational climate. Leadership commitment is not merely moral support, but rather active involvement in monitoring the implementation of quality, overcoming obstacles, and linking incentive systems to performance levels. The absence of this commitment transforms quality initiatives into mere formalities that quickly fade away.

Second Dimension: Continuous Improvement. This dimension is based on the philosophy that quality is a continuous process with no end point, and that every process is capable of improvement, regardless of its efficiency. This requires establishing a permanent mechanism for reviewing

processes, measuring their performance, analyzing deviations, and addressing them, based on the plan-implement-check-correction cycle. In the logistics sector, this dimension is embodied in the periodic review of warehousing, handling, and distribution operations to identify opportunities for cost reduction and time savings.

The third dimension: Employee participation. This dimension stems from the fact that employees are the actual implementers of quality processes. Therefore, their success depends on their involvement, empowerment, skills development, and fostering a sense of responsibility. This includes providing them with opportunities to contribute to proposing improvements, granting them the authority to address errors at their source, providing them with continuous training, and linking their performance to quality objectives. An empowered and motivated employee represents the first line of defense for process quality.

The fourth dimension: Customer focus. This dimension represents the goal toward which all quality efforts are directed, as customer satisfaction is the ultimate criterion for judging success. This requires understanding customer needs and expectations and translating them into service specifications, continuously measuring customer satisfaction, and responding to and resolving complaints promptly. In land transport companies, this translates into adherence to delivery schedules, the safety of stored and distributed goods, and flexibility in responding to customer requests.

In addition to these four dimensions, it is worth noting that some modern models incorporate other complementary elements, most notably: data-driven management, which bases decisions on objective measurements rather than impressions; managing supplier relationships as partners in the quality system; and the digitalization of quality, which represents the core of the transition to Quality 4.0. This study has focused on these four main dimensions due to their relevance to the nature of the land transport sector and its application environment.

First: The Concept of Storage and Distribution Efficiency:

Researchers have offered varying definitions of storage and distribution efficiency, depending on their approaches to logistical performance. Abdel-Sahib and Hawi (2022, p. 44) define it as an organization's ability to manage the flow of materials through storage and production stages, minimizing bottlenecks and improving the smoothness of the supply chain. Sao et al. (2024, p. 4) view it as the relationship between the outputs achieved from warehouse operations and the resources used, where efficiency is achieved by accomplishing the greatest amount of work with the least amount of resources, time, and cost.

Mohamud et al. (2023, p. 61) add a spatial and organizational dimension, linking efficiency to the efficient design of the warehouse and the distribution of its spaces and pathways to reduce handling time and minimize errors. Batarlienė and Jarašūnienė (2024) consider it from a quality perspective, defining it as the regularity, accuracy, and freedom from defects and waste in warehouse operations.

These definitions reveal a shared core principle: efficiency is the result of the relationship between outputs and resources. However, they differ in their emphasis on the specific aspects they highlight, such as flow, cost, design, and quality.

In light of this, the researcher believes that the efficiency of storage and distribution operations means the ability of a land transport company to complete storage, handling, and distribution operations accurately, quickly, and consistently, at the lowest possible cost, while maintaining the safety of goods and the required level of service. This is the meaning adopted by this study.

The Relationship Between Quality Management and the Efficiency of Storage and Distribution Operations: The relationship between these two variables rests on a solid theoretical foundation. Quality management, as an approach to continuous improvement and process control, directly impacts the efficiency of logistics operations. Senior management's commitment to quality provides the necessary resources and vision for developing storage and distribution operations. Continuous improvement allows for reviewing these operations and reducing waste. Employee participation ensures disciplined execution and minimizes errors, while a customer-centric approach guides operations toward accuracy and adherence to deadlines.

Studies have supported this correlation. The study by Batarlienė & Jarašūnienė (2024) demonstrated that improving the quality of warehouse operations positively impacts their efficiency in the logistics sector, and the study by Abdul-Sahib and Hawi (2022) confirmed that analyzing and controlling storage operations improves supply chain efficiency. The researcher believes that this theoretical foundation justifies the assumption that implementing quality management has a significant impact on the efficiency of storage and distribution operations in land transport companies, which is what this study aims to test empirically.

1.7 Previous Studies

Al-Sharif's Study (2023):

This study aimed to identify the impact of implementing Total Quality Management (TQM) principles on achieving competitive advantage at the Al-Jumhouria Bank, Abu Al-Ashhar branch in Tajoura. The study employed a descriptive-analytical approach. The sample consisted of 75 bank employees, and a questionnaire was used to collect data. The results indicated a statistically significant impact of implementing TQM principles on achieving competitive advantage. The study recommended strengthening senior management's commitment to quality principles and instilling a culture of quality among employees.

Al-Osaimi and Abdulhamid's Study (2022):

This study aimed to identify the impact of implementing a Total Quality Management system on performance at the Ministry of Hajj and Umrah. The study employed a descriptive-analytical approach. The sample consisted of 210 ministry employees, and a questionnaire was used to collect data. The results indicated a statistically significant positive impact of implementing a Total Quality

Management system on performance levels. The study recommended supporting the implementation of the quality system and linking it to institutional performance indicators. Ahmed's Study (2021).

This study aimed to identify the impact of implementing Total Quality Management (TQM) standards on administrative performance efficiency. The study employed a descriptive-analytical approach, and the sample consisted of 120 employees from the organization under study. A questionnaire was used as the data collection tool. The results indicated a statistically significant relationship and impact between the application of TQM standards and administrative performance efficiency. The study recommended focusing on continuous improvement and training employees on quality standards.

Abdul-Sahib and Hawi's Study (2022):

This study aimed to identify the role of analyzing storage and production processes in improving supply chain efficiency at the Basra Plastic Industries Factory. The study used a case study approach, and the sample consisted of 60 employees from the factory's storage and production departments. The results indicated that analyzing and controlling storage processes contributes to increasing supply chain efficiency and reducing bottlenecks. The study recommended focusing on analyzing storage processes as an approach to improving logistical performance.

Batarlienė & Jarašūnienė (2024):

This study aimed to identify ways to improve the quality of warehouse operations within the logistics sector. It employed a descriptive-analytical approach, supported by a field survey, and the sample consisted of 158 employees and experts from logistics companies. The study concluded that improving the quality of warehouse operations positively impacts their efficiency and sustainability. It recommended adopting quality practices and employing modern technologies in warehouse management.

Sao et al. (2024):

This study aimed to analyze the main dimensions of warehousing that affect operational efficiency in the National Capital Region of India. It used a descriptive-analytical approach, and the sample consisted of 203 employees in the warehousing sector. The study concluded that warehousing dimensions—such as warehouse design and route planning—have a significant impact on improving operational efficiency. It recommended paying attention to these dimensions as key determinants of storage efficiency.

Review of Previous Studies:

The current study shares some similarities with previous studies, while differing in others, thus highlighting its position within the field of knowledge. Regarding points of agreement, the current study aligns with most previous studies in addressing quality management as an independent variable, as seen in the studies by Al-Sharif (2023), Al-Osaimi and Abdulhamid (2022), and Ahmed (2021). It also agrees with all of them in adopting the descriptive-analytical approach and using questionnaires as data collection tools, as well as employing the same statistical methods, such as correlation and

regression, to test the effect. Furthermore, it converges with logistics studies, such as those by Sao et al. (2024) and Abdul-Sahib and Hawi (2022), in focusing on storage efficiency as a fundamental dependent variable in logistics performance. The current study also benefited from these combined studies in constructing its theoretical framework, deriving the dimensions of its independent variable, formulating its instrument items, and determining its statistical methods.

In terms of differences, the current study stands out for combining two variables rarely found together in a single study. Previous Arab studies focused on linking quality management to general variables such as competitive advantage (Al-Sharif, 2023), organizational performance (Al-Osaimi & Abdulhamid, 2022), and administrative performance efficiency (Ahmed, 2021), without extending this link to the efficiency of logistical operations. In contrast, foreign studies (Sao et al., 2024; Batarlienė & Jarašūnienė, 2024) addressed warehouse efficiency in isolation from quality management as an integrated approach with its own dimensions. The current study also differs in its application environment and sector, specifically focusing on the land transport sector within the Iraqi context. Previous studies, on the other hand, varied across different sectors, including banking, government, and industry, and were conducted in locations such as Libya, Saudi Arabia, Iraq, India, and Lithuania. This distinction in combining the two variables, as well as in the sector and application environment, allows the current study to fill a research gap identified in the review of previous research.

1.8 Methodology and Procedures

1.8.1Study Methodology:

The study adopted the descriptive-analytical method, as it was the most suitable approach for the nature and objectives of the study. This method is based on accurately describing the phenomenon under investigation as it exists in reality, collecting related data and facts, and then statistically analyzing them to extract relationships and significance between its variables. This method enabled the researcher to diagnose the level of quality management implementation and the efficiency of storage and distribution processes in the companies included in the study sample, and to test the effect of the independent variable and its dimensions on the dependent variable.

1.8.2 Study Population:

The study population consisted of all employees in the administrative and operational departments concerned with storage and distribution processes in three land transport companies in Basra Governorate: Gulf Freight Transport Company, Al-Faw Land Transport Company, and Shatt Al-Arab Logistics Services Company. The study population size was (245) employees, according to the administrative records of the three companies.

1.8.3 Study Sample:

Given the possibility of identifying the study population, a stratified random sample was adopted for each company to ensure that each category was represented proportionally within the population.

Applying Stephen Thompson's formula to determine sample size at a 95% confidence level and a margin of error of 0.05 to a population of 245 individuals, the required size was approximately 150 individuals. 165 questionnaires were distributed, 155 were returned, and 5 were excluded due to incompleteness, leaving 150 questionnaires valid for analysis, representing a response rate of 90.9%, a high percentage that reinforces the sample's representativeness of its population.

Table (1): Distribution of the Study Population, Sample, and Number of Questionnaires by Company

Company	Population Size	Distributed Questionnaires	Valid Questionnaires for Analysis	Sample Percentage %
Gulf Company for Freight Transportation	90	60	54	36.0
Al-Faw Company for Land Transportation	83	56	51	34.0
Shatt Al-Arab Company for Logistics Services	72	49	45	30.0
Total	245	165	150	100.0

1.8.4 Study Instrument:

The study adopted a **questionnaire** as the main instrument for data collection. It was designed based on the theoretical framework and previous studies and consisted of three sections:

- **Section One:** Preliminary data of the sample members, including gender, academic qualification, years of experience, and job title.
- **Section Two:** Items measuring the independent variable, **Quality Management**, consisting of **16 items** distributed across four dimensions, with **4 items for each dimension**:

Dimension	Number of Items	Item Numbers
Top Management Commitment	4	1–4
Continuous Improvement	4	5–8
Employee Participation	4	9–12
Customer Focus	4	13–16

1.8.5 Dependent Variable Items:

Items measuring the dependent variable, **Storage and Distribution Operations Efficiency**, consisting of **12 items** representing a single dimension. The items were numbered **17–28**.

All items were formulated according to the **five-point Likert scale**: Strongly Agree = 5, Agree = 4, Neutral = 3, Disagree = 2, and Strongly Disagree = 1.

To interpret the arithmetic means, the class interval was calculated as follows:

Class Interval = (5 − 1) ÷ 3 = 1.33

Accordingly, the following levels were adopted:

Level	Arithmetic Mean Range
Low	1.00–2.33
Moderate	2.34–3.67
High	3.68–5.00

1.8.6 Validity of the Study Instrument:

Face Validity (Expert Judgment): The instrument, in its preliminary form, was presented to a group of experts specializing in business administration and logistics management. The necessary modifications were made to the wording of some items and their alignment with their respective dimensions based on the experts' comments. The instrument was then finalized in its final form.

Internal Consistency Validity: Pearson's correlation coefficient was calculated between the score of each dimension and the total score of the variable to which it belonged.

Table (2): Correlation Coefficients of the Dimensions with the Total Variable Score

Dimension	Correlation Coefficient with Total Score	Significance
Top Management Commitment	0.812**	0.000
Continuous Improvement	0.847**	0.000
Employee Participation	0.793**	0.000
Customer Focus	0.825**	0.000
Overall Storage and Distribution Efficiency	0.868**	0.000

Note: Correlation is significant at the 0.01 level.

All correlation coefficients between the dimensions and the total score were positive and high, ranging from 0.793 to 0.868. All coefficients were statistically significant at the 0.01 level, with a probability value of 0.000. This indicates that the items within each dimension are consistent with the construct they are intended to measure. It also confirms that the instrument demonstrates a high level of internal consistency validity, making it suitable for measuring the intended constructs.

1.8.7 Reliability of the Study Instrument:

Reliability was assessed using **Cronbach's Alpha coefficient**.

Table (3): Cronbach's Alpha Reliability Coefficients for the Instrument Dimensions

Dimension	Number of Items	Cronbach's Alpha Coefficient
Top Management Commitment	4	0.831
Continuous Improvement	4	0.852
Employee Participation	4	0.818
Customer Focus	4	0.827
Quality Management (Overall)	16	0.905
Storage and Distribution Efficiency	12	0.896
Instrument as a Whole	28	0.928

The Cronbach's Alpha coefficients for the dimensions ranged from 0.818 to 0.905, while the coefficient for the instrument as a whole reached 0.928. All coefficients exceeded the minimum acceptable threshold of 0.70, indicating that the instrument has a high level of reliability and is suitable for administration and for relying on its results.

Correlation Matrix among the Study Variables:

Table (4): Pearson Correlation Matrix between Quality Management Dimensions and Storage and Distribution Efficiency

Variables	X1	X2	X3	X4	Y
X1: Top Management Commitment	1				
X2: Continuous Improvement	0.512**	1			
X3: Employee Participation	0.478**	0.547**	1		
X4: Customer Focus	0.531**	0.498**	0.524**	1	
Y: Storage and Distribution Efficiency	0.602**	0.648**	0.571**	0.629**	1

Note: Correlation is significant at the 0.01 level.

The correlation matrix indicates the presence of positive and statistically significant correlations at the 0.01 level between all quality management dimensions and the dependent variable. The correlation coefficients ranged from 0.571 to 0.648. The strongest correlation was found between Continuous Improvement and Storage and Distribution Efficiency (r = 0.648), while the weakest correlation was found between Employee Participation and Storage and Distribution Efficiency (r = 0.571). These results indicate a moderate to strong positive relationship between the study variables.

The intercorrelations among the independent dimensions were moderate, ranging from 0.478 to 0.547. None of the correlations reached the critical value of 0.80, which may indicate a potential multicollinearity problem. This confirms that the dimensions have a sufficient degree of independence to allow their simultaneous inclusion in the multiple regression model.

1.8.8 Statistical Methods:

The data were analyzed using the **Statistical Package for the Social Sciences (SPSS)**. The following statistical methods were applied:

- **Frequencies and percentages:** to describe the demographic characteristics of the sample members.
- **Arithmetic means and standard deviations:** to measure the levels of the study variables and rank their dimensions.
- **Cronbach's Alpha coefficient:** to measure the reliability of the study instrument.
- **Pearson's correlation coefficient:** to assess internal consistency validity and examine the relationships between the study variables.

- **Multiple linear regression analysis:** to test the effect of the dimensions of the independent variable collectively on the dependent variable.
- **Simple linear regression analysis:** to test the effect of each dimension separately on the dependent variable.

1.8.9 Data Analysis and Hypothesis Testing:

First: Descriptive Analysis of Demographic Data:

Table (5): Distribution of Sample Members According to Demographic Variables

Variable	Category	Frequency	Percentage %
Gender	Male	114	76.0
	Female	36	24.0
Academic Qualification	Diploma or below	51	34.0
	Bachelor's degree	78	52.0
	Postgraduate studies	21	14.0
Years of Experience	Less than 5 years	42	28.0
	5–10 years	63	42.0
	More than 10 years	45	30.0
Job Title	Administrative	57	38.0
	Operations/Warehousing	93	62.0
Total		150	100.0

The sample was consistent with the nature of the road transportation sector and its operations. Males constituted the majority of the sample at 76%, compared with 24% females, which is an expected distribution in a field-based operational sector. Bachelor's degree holders represented the largest group at 52%, followed by participants with a diploma or below at 34%, and postgraduate degree holders at 14%. This indicates that the sample had an educational level that enabled participants to understand the questionnaire items and respond to them appropriately.

Regarding work experience, the largest proportion of participants fell within the 5–10 years category at 42%, while 30% had more than ten years of experience. Thus, nearly two-thirds of the sample had moderate or extensive work experience, which strengthens the credibility of their responses. Finally, employees working in operations and warehousing constituted the majority of the sample at 62%. This group has the closest direct connection to the subject of the study, which enhances the representativeness of the collected data.

Second: Descriptive Analysis of the Study Dimensions:

First Dimension: Top Management Commitment:

Table (6): Means and Standard Deviations of the Items Measuring Top Management Commitment

No.	Item	Mean	Standard Deviation	Level	Rank
1	Top management adopts a clear vision of quality and communicates it to employees.	4.01	0.642	High	2
2	Management provides the resources necessary to implement quality programs.	3.88	0.701	High	3
3	Top management regularly monitors the implementation of quality practices.	4.07	0.618	High	1
4	Management links incentive systems to quality performance levels.	3.80	0.736	High	4
Overall Dimension		3.94	0.612	High	—

The results presented in the table show that the Top Management Commitment dimension achieved a high level, with an overall arithmetic mean of 3.94. This mean falls within the upper third of the five-point scale and exceeds the threshold for the high level, which is 3.68, by a considerable margin.

The overall standard deviation was relatively low at 0.612, indicating a high degree of consistency in the participants' responses and a close convergence in their assessments, with limited dispersion around the mean. This increases the representativeness of the mean as an indicator of the overall tendency of the sample.

At the item level, the means ranged within a relatively narrow interval from 3.80 to 4.07, reflecting the internal consistency of the dimension. Item 3, concerning the regular monitoring of the implementation of quality practices, ranked first with the highest mean of 4.07 and, at the same time, the lowest standard deviation of 0.618. The combination of a high mean and low dispersion provides statistical evidence that this practice is the most established and widely agreed upon among the participants.

In contrast, the item concerning linking incentives to performance ranked last, with the lowest mean of 3.80 and the highest standard deviation of 0.736. This combination indicates that, although this practice remained within the high level, it was relatively weaker and generated greater variation in participants' perceptions.

Second Dimension: Continuous Improvement:

Table (7): Means and Standard Deviations of the Items Measuring Continuous Improvement

No.	Item	Mean	Standard Deviation	Level	Rank
5	Storage and distribution operations undergo regular and continuous review.	3.76	0.702	High	2
6	Operational errors are analyzed to address their root causes.	3.68	0.748	High	3
7	Work procedures are continuously developed to reduce cost and time.	3.81	0.689	High	1
8	Performance indicators are adopted to measure improvements in operations.	3.59	0.771	Moderate	4
Overall Dimension		3.71	0.688	High	—

The table shows that the Continuous Improvement dimension achieved a high level, with an overall arithmetic mean of 3.71. However, it recorded the lowest mean among the dimensions of the independent variable and was close to the boundary between the moderate and high levels, which is 3.68. This places the dimension in a borderline range that requires careful interpretation.

The overall standard deviation was 0.688, which was the highest among the dimensions. This indicates relatively greater dispersion in the responses and less consistency compared with the other dimensions.

At the item level, the means ranged from 3.59 to 3.81. Item 8, concerning the adoption of specific performance indicators, was the only item that fell within the moderate level, with a mean of 3.59. It also had the highest standard deviation within the dimension at 0.771. The combination of the lowest mean and highest dispersion in the same item indicates a relative weakness and greater variation in participants' perceptions of performance measurement practices. This finding helps explain why Continuous Improvement ranked last among the quality management dimensions.

Item 7, concerning the development of procedures to reduce cost and time, ranked first within the dimension, with a mean of 3.81 and the lowest standard deviation of 0.689. This indicates that developing procedures to reduce cost and time was the most established continuous improvement practice among the participants.

Third Dimension: Employee Participation:

Table (8): Means and Standard Deviations of the Items Measuring Employee Participation

No.	Item	Mean	Standard Deviation	Level	Rank
9	The company provides employees with opportunities to participate in proposing work improvements.	3.74	0.713	High	2
10	The company gives employees sufficient authority to address errors at their work locations.	3.71	0.728	High	3
11	The company provides continuous training programs to develop employees' quality-related skills.	3.69	0.742	High	4
12	The company promotes teamwork and shared responsibility for quality.	3.98	0.634	High	1
Overall Dimension		3.78	0.655	High	—

The results presented in the table show that the Employee Participation dimension achieved a high level, with an overall arithmetic mean of 3.78 and a standard deviation of 0.655. This relatively low standard deviation indicates an acceptable degree of consistency in the participants' responses.

The means of the individual items ranged within a narrow interval from 3.69 to 3.98, reflecting good internal consistency within the dimension. Item 12, concerning promoting teamwork and shared responsibility for quality, ranked first with a mean of 3.98 and the lowest standard deviation of 0.634. This combination indicates that the collective aspect of employee participation is more firmly established among the participants than its individual aspect.

In contrast, the item concerning providing continuous training programs ranked last, with a mean of 3.69, making it the item closest to the lower boundary of the high level. It also had the highest standard deviation of 0.742. The combination of the lowest mean and highest dispersion indicates that training represents the aspect with the greatest variation in perceptions and the greatest need for strengthening within the employee participation system.

Fourth Dimension: Customer Focus:

Table (9): Means and Standard Deviations of the Items Measuring Customer Focus

No.	Item	Mean	Standard Deviation	Level	Rank
13	The company identifies customers' needs and translates them into service specifications.	4.08	0.586	High	2
14	The company adheres to the delivery schedules agreed upon with customers.	4.12	0.571	High	1
15	The company responds to customer complaints and addresses them quickly and effectively.	3.95	0.648	High	3
16	The company regularly measures its customers' satisfaction levels.	3.93	0.662	High	4
Overall Dimension		4.02	0.594	High	—

The results presented in the table indicate that the Customer Focus dimension ranked first among all quality management dimensions, with the highest overall arithmetic mean of 4.02 and the lowest standard deviation among the dimensions at 0.594. The combination of the highest mean and the lowest dispersion provides evidence that this dimension is both the most firmly implemented and the most consistently perceived by the sample members.

The means of its items ranged within a relatively narrow high-level interval from 3.93 to 4.12, with all items falling within the high level. Item 14, concerning adherence to delivery schedules, ranked first with the highest mean of 4.12 and the lowest standard deviation of 0.571. This makes it the most firmly established and consistently perceived item in the instrument. This finding is particularly relevant to the road transportation sector, where adherence to delivery schedules represents a central aspect of service performance.

In contrast, the items concerning regular measurement of customer satisfaction (3.93) and responding to customer complaints (3.95) ranked lowest within the dimension and had the two highest standard deviations, 0.662 and 0.648, respectively. This indicates that measurement practices and customer feedback mechanisms are relatively less established than the direct operational aspects of service delivery.

Dependent Variable: Storage and Distribution Operations Efficiency:

Table (10): Means and Standard Deviations of the Items Measuring the Dependent Variable

No.	Item	Mean	Standard Deviation	Level	Rank
17	Storage and handling operations are performed accurately and systematically in ways that reduce damage rates.	3.86	0.628	High	3
18	Goods are classified and arranged inside the warehouse according to a system that facilitates access to them.	3.83	0.641	High	5
19	The cycle of receiving and storing goods is completed in the shortest possible time.	3.78	0.667	High	7
20	Inventory records are maintained accurately to reflect the actual inventory balance.	3.81	0.652	High	6
21	Human and material resources are used efficiently in storage operations to reduce waste.	3.74	0.689	High	9
22	Goods are distributed according to well-planned schedules that reduce delivery time.	3.91	0.611	High	1
23	Distribution routes are planned to reduce costs and increase delivery speed.	3.88	0.624	High	2
24	Customer orders are fulfilled accurately in accordance with the required specifications.	3.84	0.637	High	4
25	Bottlenecks in the flow of storage and distribution operations are addressed effectively.	3.71	0.703	High	10

No.	Item	Mean	Standard Deviation	Level	Rank
26	Storage spaces are utilized efficiently to achieve the highest possible return from them.	3.62	0.749	Moderate	12
27	Systems and technologies are used to monitor storage and distribution operations.	3.76	0.681	High	8
28	The safety and integrity of stored and distributed goods are maintained until delivery.	3.69	0.714	High	11
Overall Variable		3.79	0.571	High	—

The results presented in the table show that the dependent variable, Storage and Distribution Operations Efficiency, achieved a high level, with an overall arithmetic mean of 3.79 and a standard deviation of 0.571. This was the lowest standard deviation among all the study variables, indicating the highest degree of consistency and the lowest level of dispersion in the participants' responses concerning this variable.

The means of the twelve items ranged within a relatively consistent interval from 3.62 to 3.91. Eleven items fell within the high level, while Item 26, concerning the efficient utilization of storage spaces, was the only item that fell within the moderate level. It recorded the lowest mean of 3.62 and, at the same time, the highest standard deviation of 0.749. The combination of the lowest mean and highest dispersion indicates that storage-space utilization represents the weakest and most variable aspect of operational efficiency.

In contrast, Item 22, concerning the distribution of goods according to well-planned schedules, ranked first with the highest mean of 3.91 and the lowest standard deviation of 0.611. It was followed by Item 23, concerning distribution route planning, with a mean of 3.88.

From a statistical perspective, the two highest-ranked items were both related to the distribution dimension. This indicates that distribution operations were perceived as more efficient and more consistently implemented among the participants than storage operations, which occupied the lower positions in the ranking.

Third: Testing the Study Hypotheses:

Main Hypothesis:

The main hypothesis stated that:

"There is a statistically significant effect at the significance level ($\alpha \leq 0.05$) of the application of quality management, with its dimensions of Top Management Commitment, Continuous Improvement, Employee Participation, and Customer Focus, on the efficiency of storage and distribution operations in road transportation companies in Basra Governorate."

To test this hypothesis, Multiple Linear Regression Analysis was used to measure the effect of the dimensions of quality management, as independent variables, on storage and distribution operations efficiency, as the dependent variable. The results were as follows:

Table (11): Results of Multiple Regression Analysis of the Effect of Quality Management Dimensions on Storage and Distribution Operations Efficiency

Independent Variables	Regression Coefficient B	T-Value	Significance Level
Constant	0.486	2.974	0.003**
Top Management Commitment	0.284	4.512	0.000**
Continuous Improvement	0.347	5.683	0.000**
Employee Participation	0.218	3.756	0.000**
Customer Focus	0.301	4.894	0.000**

$R = 0.812$
$R^2 = 0.659$
$F = 70.124$
p-value = 0.000
Note: Significant at the 0.01 level. Source: Prepared by the researcher based on SPSS output.

The results of the multiple regression analysis presented in Table (11) indicate the presence of a statistically significant effect of the quality management dimensions collectively on storage and distribution operations efficiency. The correlation coefficient was $R = 0.812$, indicating a strong relationship between the independent variables in the model and the dependent variable.

The coefficient of determination was $R^2 = 0.659$, indicating that 65.9% of the variance in storage and distribution operations efficiency can be explained by the four quality management dimensions collectively. The remaining 34.1% can be attributed to other variables outside the model.

The F-value of 70.124 was statistically significant at $p = 0.000$, confirming the overall significance of the regression model and its suitability for explaining the effect of the independent variables on the dependent variable.

At the level of the individual dimensions, all regression coefficients were positive and statistically significant at the 0.01 level. Continuous Improvement had the strongest effect, with a regression coefficient of $B = 0.347$ and the highest T-value of 5.683. It was followed by Customer Focus with $B = 0.301$, Top Management Commitment with $B = 0.284$, and Employee Participation with $B = 0.218$, which ranked fourth while remaining statistically significant.

The order of the effects was consistent with the pattern observed in the correlation matrix, which provides additional support for the robustness of the findings. Accordingly, the main hypothesis is accepted.

The Following Sub-Hypotheses Were Derived from the Main Hypothesis:

First Sub-Hypothesis:

The first sub-hypothesis stated that:

"There is a statistically significant effect at the significance level (α ≤ 0.05) of Top Management Commitment on Storage and Distribution Operations Efficiency."

Table (12): Simple Regression Analysis of the Effect of Top Management Commitment on Storage and Distribution Operations Efficiency

Dependent Variable	r	R^2	df	F	Sig. F
Storage and Distribution Operations Efficiency	0.602	0.362	1	84.097	0.000

Independent Variable	B	Standard Error	T	Sig. t
Top Management Commitment	0.561	0.061	9.171	0.000

The correlation coefficient r = 0.602 indicates a positive and relatively strong relationship between Top Management Commitment and Storage and Distribution Operations Efficiency. The coefficient of determination R^2 = 0.362 indicates that 36.2% of the variance in Storage and Distribution Operations Efficiency can be explained by Top Management Commitment alone.

The F-value of 84.097 was statistically significant at p = 0.000. The regression coefficient B = 0.561, with a T-value of 9.171, was also statistically significant at p = 0.000. This indicates that a one-unit increase in Top Management Commitment is associated with an increase of 0.561 units in Storage and Distribution Operations Efficiency.

Accordingly, the first sub-hypothesis is accepted.

Second Sub-Hypothesis:

The second sub-hypothesis stated that:

"There is a statistically significant effect at the significance level (α ≤ 0.05) of Continuous Improvement on Storage and Distribution Operations Efficiency."

Table (13): Simple Regression Analysis of the Effect of Continuous Improvement on Storage and Distribution Operations Efficiency

Dependent Variable	r	R^2	df	F	Sig. F
Storage and Distribution Operations Efficiency	0.648	0.420	1	107.241	0.000

Independent Variable	B	Standard Error	T	Sig. t
Continuous Improvement	0.589	0.057	10.356	0.000

The correlation coefficient r = 0.648 represents the strongest correlation among the quality management dimensions. The coefficient of determination R^2 = 0.420 indicates that 42.0% of the variance in the dependent variable can be explained by Continuous Improvement alone.

The F-value of 107.241 was statistically significant at p = 0.000. The regression coefficient B = 0.589, with a T-value of 10.356, was also statistically significant at p = 0.000. This finding is consistent with the results of the multiple regression model, in which Continuous Improvement had the strongest effect among the quality management dimensions. This reinforces its position as the strongest predictor of storage and distribution operations efficiency in the study.

Accordingly, **the second sub-hypothesis is accepted**.

Third Sub-Hypothesis:

The third sub-hypothesis stated that:

"There is a statistically significant effect at the significance level (α ≤ 0.05) of Employee Participation on Storage and Distribution Operations Efficiency."

Table (14): Simple Regression Analysis of the Effect of Employee Participation on Storage and Distribution Operations Efficiency

Dependent Variable	r	R^2	df	F	Sig. F
Storage and Distribution Operations Efficiency	0.571	0.326	1	71.618	0.000

Independent Variable	B	Standard Error	T	Sig. t
Employee Participation	0.534	0.063	8.463	0.000

The correlation coefficient r = 0.571 indicates a positive relationship between Employee Participation and Storage and Distribution Operations Efficiency. The coefficient of determination R^2 = 0.326 indicates that 32.6% of the variance in efficiency can be explained by Employee Participation alone. This represents the lowest explanatory percentage among the quality management dimensions and is consistent with its last position in the multiple regression model.

The F-value of 71.618 was statistically significant at p = 0.000. The regression coefficient B = 0.534, with a T-value of 8.463, was also statistically significant at p = 0.000. These results confirm the statistically significant effect of Employee Participation on Storage and Distribution Operations Efficiency.

Accordingly, **the third sub-hypothesis is accepted**.

Fourth Sub-Hypothesis:

The fourth sub-hypothesis stated that:

"There is a statistically significant effect at the significance level (α ≤ 0.05) of Customer Focus on Storage and Distribution Operations Efficiency."

Table (15): Simple Regression Analysis of the Effect of Customer Focus on Storage and Distribution Operations Efficiency

Dependent Variable	r	R^2	df	F	Sig. F
Storage and Distribution Operations Efficiency	0.629	0.396	1	96.972	0.000

Independent Variable	B	Standard Error	T	Sig. t
Customer Focus	0.572	0.058	9.847	0.000

The correlation coefficient r = 0.629 indicates a positive and relatively strong relationship between Customer Focus and Storage and Distribution Operations Efficiency. The coefficient of determination R^2 = 0.396 indicates that 39.6% of the variance in efficiency can be explained by Customer Focus alone. This represents the second-highest explanatory percentage among the quality management dimensions.

The F-value of 96.972 was statistically significant at p = 0.000. The regression coefficient B = 0.572, with a T-value of 9.847, was also statistically significant at p = 0.000. These results confirm the statistically significant effect of Customer Focus on Storage and Distribution Operations Efficiency.

Accordingly, the fourth sub-hypothesis is accepted.

Discussion of the Results

The following section discusses the main findings of the study by presenting each result, explaining the reasons behind it, and relating it to previous studies in terms of agreement and disagreement.

The study results showed that the level of quality management implementation in the sampled road transportation companies was high, with an overall mean of 3.86, with Customer Focus ranking first among the quality management dimensions. This high level can be attributed to the nature of the road transportation sector, in which service quality depends largely on customer satisfaction, adherence to delivery schedules, and the safety of goods. These requirements encourage companies to strengthen quality practices that are directly related to customers. In addition, increasing competition within the sector makes service quality a requirement for organizational survival rather than an optional practice. This finding is consistent with Al-Osaimi and Abdulhamid (2022), who reported a high level of Total Quality Management implementation, and with Al-Sharif (2023), who found a strong presence of quality principles in the organization examined. However, the finding differs to some extent from Ahmed (2021), which reported moderate levels for some quality dimensions. This difference may be attributed to variations in the sector and the organizational environment in which quality management practices were implemented.

The findings also revealed that the level of storage and distribution operations efficiency was high, with an overall mean of 3.79, although the item concerning the utilization of storage spaces fell within the moderate level. The high overall level of efficiency can be explained by the development of distribution practices and scheduling systems in the sampled companies. In contrast, the relatively weak utilization of storage space may be attributed to limitations in logistics infrastructure and the

limited use of modern warehouse management systems in the Iraqi context. This finding is consistent with Sao et al. (2024), who emphasized that warehouse efficiency improves as storage practices develop and that space utilization is among the aspects most sensitive to improvement. It is also consistent with Mohamud et al. (2023), who linked warehouse efficiency to effective warehouse design and the appropriate allocation of storage space.

The results further demonstrated a positive and statistically significant correlation between the quality management dimensions and storage and distribution operations efficiency, with the strongest correlation found with Continuous Improvement. This relationship can be attributed to the direct connection between continuous improvement and the core logistics processes through regular review, waste reduction, and time reduction. Consequently, its effect on operational efficiency becomes more evident than that of the other dimensions. This finding agrees with Batarlienė and Jarašūnienė (2024), who confirmed that improving the quality of warehouse processes has a positive effect on warehouse efficiency. It is also consistent with Abdul Sahib and Hawi (2022), who demonstrated that analyzing and controlling storage processes contributes to improving supply chain efficiency.

The results also demonstrated a statistically significant effect of the quality management dimensions collectively on storage and distribution operations efficiency, with the four dimensions explaining 65.9% of the variance in the dependent variable. Continuous Improvement had the strongest effect among the dimensions. This substantial effect can be explained by the integrated nature of quality management dimensions. Top Management Commitment provides the resources required for quality implementation, Continuous Improvement develops and refines operational processes, Employee Participation supports implementation, and Customer Focus directs the outcomes toward customer requirements. These dimensions therefore work together to improve operational efficiency.

This finding is consistent with Ahmed (2021), who demonstrated a statistically significant effect of quality standards on performance efficiency, and with Al-Sharif (2023), who found that quality principles contribute to positive organizational outcomes. It is also consistent, from a logistics perspective, with Sao et al. (2024), who linked storage dimensions with operational efficiency. The dominance of Continuous Improvement in explaining efficiency is particularly consistent with Batarlienė and Jarašūnienė (2024). However, the finding differs from studies that identified Top Management Commitment as the strongest predictor. This difference may be attributed to the specific nature of logistics operations, where continuous improvement has a more direct connection with daily storage and distribution activities.

Recommendations

In light of the findings of the study, the researcher recommends the following:

- **Strengthen the performance measurement system** in storage and distribution operations by adopting specific quantitative indicators, such as inventory turnover rate, space utilization rate, and order fulfillment accuracy, and monitoring them regularly. The findings showed that

weaknesses in these indicators represent the weakest aspect of the Continuous Improvement dimension.

- **Address the limitations in storage-space utilization** that was the only aspect to fall within the moderate level. This can be achieved by redesigning warehouse layouts, optimizing internal movement paths, and using **Warehouse Management Systems (WMS)** to improve the efficiency of space utilization.
- **Invest in Continuous Improvement** as the dimension with the strongest effect on operational efficiency by establishing a permanent mechanism for reviewing processes, analyzing operational errors, and addressing their root causes based on the **Plan–Do–Check–Act (PDCA) cycle**.
- **Strengthen Employee Participation**, which had the weakest effect, through continuous training programs targeting the aspect that showed the greatest variation in participants' responses. Companies should also expand employees' authority to address errors at their work locations and link employee performance to quality objectives.
- **Maintain the strong performance achieved in Customer Focus** while developing its measurement component by regularly measuring customer satisfaction and activating an effective complaint-handling system, as these two practices recorded the lowest means within this dimension.
- **Strengthen Top Management Commitment** by linking the incentive system to employees' compliance with quality standards. This was the weakest item within the dimension and requires attention to transform management commitment from a general orientation into a sustainable organizational practice.
- **Conduct future studies** that examine mediating or moderating variables in the relationship between quality management and logistics operations efficiency. Future research should also expand the scope of application to include other logistics sectors within the Iraqi context.

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