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The Relationship Between Total Quality Management and Business Performance: An Empirical Study

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Abstract

The Total Quality Management approach, which emerged in Japan and spread all over the world, differs from classical management as a management approach that cares about the process with the efficient use of resources without wasting and the participation of all employees.

Efforts to improve overall performance by focusing on resource efficiency, employee satisfaction and improving the process have an impact on business performance.

The aim of this study is to determine the relationship between Total Quality Management practices and business performance.

For this, a field study was carried out in Libya and the existence of a relationship between the two variables was determined.

Keywords: Quality, Total Quality Management, performance, Business Performance

JEL Code: M11

Toplam Kalite Yönetimi ve İşletme Performansı İlişkisi: Uygulamalı Bir Çalışma

Öz

Japonya'da ortaya çıkıp tüm dühyaya yayılan Toplam Kalite Yönetimi anlayışı, kaynakların israf edilmeden verimli bir biçimde kullanlıması ve tüm çalışanların katılımıyla süreci önemseyen bir yönetim anlayışı olarak klasik yönetimden ayrışmaktadır.

Kaynak verimliliği, çalışan memnuniyetinin önemsenmesi ve sürecin iyileşmesi suretiyle genel performansın iyileşmesine yönelik çalışmalar, işletme performansı üzerinde etkili olmaktadır.

Bu çalışmanın amacı Toplam Kaite Yönetimi uygulamalrıyla işletm eperformansı arasındaki ilişkinin belirlenmesidir.

Bunun için Libya'da bir saha araştırması gerçekleştirilmiş, iki değişken arasında ilişkinin varlığı tespit edilmiştir.
Anahtar Kelimeler: Kalite, Toplam Kalite Yönetimi, performans, işletme performansı
JEL Kodu: M11

1.Introduction

Quality management uses a variety of concepts and tools to investigate the quality of services and internal processes and their scope and sustainability. Total quality management and unlimited improvement are one of the most important applications used for this purpose. In addition, logistics management is one of the vital departments in companies that carry out production and distribution activities. Logistics requires the company and hosting location to have a certain level of infrastructure to serve their needs. The two quality concepts and logistical factors are the real drivers for the manufacturing company's business operations and subsequent business performance.

Various theories have specifically addressed quality as one of the most influential subsidiaries in management to improve other parts of the business, including customer satisfaction, job satisfaction, competitive advantage, and performance. In Europe and the United States, the total quality management model is one of the successful applications that examines quality issues in the organization with a comprehensive approach (Gorji, 2011). The nature of the model focuses on increasing the accessibility of quality tools and continuous application and improvement in different departments, suppliers, processes and systems (Sadıkoğlu and Olcay, 2014). While organizations apply total quality management to find solutions for improvements in product and service quality in addition to the positive effects on cost and waste reduction, the model includes techniques to improve the involvement of management at all levels and the effects of a comprehensive process, tool, and model (Gharakhani, et al., 2013). .

Performance is an indicator of different business aspects such as results in the organization, quality and achieved goals.

Firms that use their resources efficiently and evaluate their superior aspects in the competition process will increase their profitability by displaying high

performance in the competition process (Dilek, et.al. 2017 : 112). Therefore, the definition of the term mainly depends on the goals set for the organization in different aspects such as production, growth, employee development and competitive advantage. Evaluating performance requires considering achievements and behavioral changes within the organization to provide a more comprehensive understanding of the concept. Organizational performance is one of the most used models: This model includes cognitive, emotional and social intelligence in addition to leadership and employee performance (Almatrooshi, et al. 2016).

Based on the results of the short literature review, it is expected that the findings will show the positive effects of unlimited improvement, total quality management and logistics management on the business performance of Libyan industrial companies. Statistical analysis results are compared with the literature and discussed in their context. In the discussion section, the differences and similarities between the relationships in the current study and their counterparts in the literature are emphasized in order to understand the distinctive elements in terms of context and setting. As there are limited studies on quality and logistics issues related to the industrial sector in Libya, the recommendations of the current research are expected to be of great benefit to the participating companies, the industrial sector and the oil and gas industry in the country.

The main limitation of this research is the current security situation in Libya, which is the target location of this research, as well as the global COVID-19 pandemic situation, which may hinder data collection. This situation, which was effective in the period of the field research, may differentiate the answers compared to other times. In addition, the current deteriorating conditions of the industrial sector in the country place additional pressure on finding information and data. However, a list of all oil and gas companies was drawn up by the researcher for effective targeting for the participating population and sufficient data collection through a representative sample. The targeting of the sample to a specific area within the industrial sector in a particular country (Libya) limits the research and its findings to this scope.

2. Literature Review

Industrial companies are one of the most important parts of the economy.

These companies simulate production and other activities in which they drive economic return and include exports. The focus on quality models in the industrial sector in Libya is expected to influence improvements in the sector, which has experienced various challenges arising from the post-war and technological and logistical factors. Just as quality has managed to imitate the industrial sector in Japan and the United States, it is important to follow its successful practices in order to achieve similar results in developing countries such as Libya.

Total quality management is an approach that includes specific systems, techniques and processes, focused on efficiency, profitability, employee and customer. The model is based on process approach, human participation, customer focus, efficient relations with suppliers, leadership as the driving force of quality improvement, system management, continuous improvement and focusing on facts in the decision-making process (Asif, et al., 2014; Evans and Dean, 2003; Sadıkoğlu) and Olcay, 2014).

3. Aim of Study

The aim of the research is to assess the relationship between total quality management and logistics management. This study as whole models and their sub-dimensions, as well as their relationship with business performance based on the industrial companies in Libya.

4. Scope and Methodology

The data of the theoretical study were collected from competent journals, books and periodicals in the models and frameworks included in this research. Closed and open sources were evaluated according to their importance and relevance to the subject. Data for the case study were collected through a questionnaire tool compiled from pre-tested and reliable scales found in the literature. To facilitate a more efficient method of data collection, an online application was used to collect and classify data collection tools.
In Libya, there are nine major industrial companies owned by the Libyan government through the ministry of economy and investment fund. The

companies operate in different fields such as cement, oil and refining, petroleum chemicals and power generation. The total number of employees in these companies, including ministry employees, reaches 14,000. There are other privately owned industrial enterprises operating in the fields of maritime transport, cement production, vehicle assembly and foodstuffs to be included in this research. Depending on the size of the population, the required sample includes 400 personnel randomly selected from the population in question.

The survey, which is the main data collection tool, was compiled from different sources focusing on quality management and logistics management. Indicators in each model were examined for the most relevant and reliable results, and each variable was evaluated on a 5-point Likert scale with its sub-dimensions (Küçük, 2021):

(1) Totally disagree.

(2) Disagree

(3) Neutral

(4) Agree

(5) Totally Agree

Figure 1 shows the references of the scales that are used to measure total quality management and business performance, respectively. The scales are changed to suite the purpose of the study and in accordance with the reliabilities tested in previous researches in the literature.

Figure 1. Scales Referencess

The research consists of theoretical and practical stages. Accordingly, various research methods have been used. In the literature review, an investigative approach is used to understand the variables and models associated with the subject. In addition, a data collection tool, which is a subjective evaluation method and contains necessary and reliable indicators for each of the models used in the study, was used in the data collection phase. After data collection, statistical SPSS applied statistical analysis methods were used to test hypotheses and answer the research question. Data for the theoretical study were collected from journals, books, and periodicals specializing in the models and frameworks included in this research. Closed and open sources are evaluated according to their importance and relevance. The data for the case study were collected with the help of a data collection tool compiled from pre-tested and reliable scales found in the literature.

• Total quality management (Kessler, 1993; Wibowo & Adisty, 2017 and Küçük 2017)
• Business performance (Küçük, 2016, 2020) and (Lingesiya, 2012; Nouara, 2015)

To facilitate a more efficient method of data collection, an online survey tool was used to collect and filter the surveys.

Libya has nine major industrial companies owned by the Libyan government through the ministry of economy and investment fund. The companies operate in different fields such as cement, oil and refining,

petroleum chemicals and power generation. The total number of employees in these companies, including ministry employees, is around 14,000. There are other privately owned industrial enterprises operating in the fields of maritime transport, cement production, vehicle assembly and foodstuffs to be included in this research. Depending on the size of the population, the required sample includes 400 employees randomly selected from the available population.

5. Research Model

The model of the study is shown in Figure 2, which illustrates the tested relationships in this research. While the study is applied to the oil and gas industrial companies in Libya, Two main sets of relationships are tested through the presented model. The first set consists of three sub-relationships, which addresses the relationships between each of total quality management and logistics management.

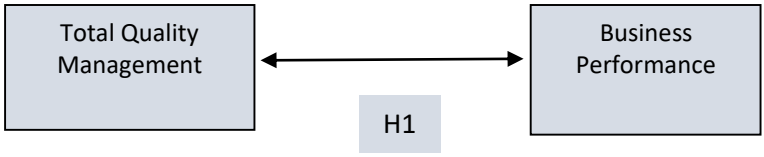

Figure 1. Research Model

The research can be expressed as an explanatory or exploratory research in terms of revealing and determining the variables. Along with this research; It is a cause-effect or relationship research carried out to determine the relationship between variables (Çağlayan, 2022).

6. Hypothesis

In the relationship between total quality management and logistics management, Talib et al. (2011) studied the relationship between supply chain practices and total quality management through an extensive review in the literature. The framework suggested by the study showed potential positive impact of practices of total quality management on supply chain, especially logistics management. Zimon (2017) performed a study on the impact of total quality management on the different aspects of logistics management in more than thirty organizations in Germany and Poland. Four logistics aspects were studied quality of service, quality of processes, quality of infrastructure, and quality of components. The highest impact of

total quality management was found on delivery speed, followed by circulation, time of deliveries, credibility, and supply completeness.
The model for the relationship between total quality management and business performance has been examined for companies in different countries and its impact on different aspects of performance. A positive effect of total quality management practice on the performance of Turkish companies was found (Çetindere, et al., 2015).
Statistical analysis showed that each of the five dimensions of total quality management has a moderate, positive and strong relationship with job performance. Correlations with job performance were as follows: education (r = 0.764), leadership (r = 0.720), continuous improvement (r = 0.656), internal customer (r = 0.676), and foreign customer (r = 0.518). All relationships were significant at the 0.01 level. It has been determined that total quality management has similar positive effects on employee performance, affecting job performance (Gul, et al., 2012).
Other positive effects of total quality management on customer satisfaction, competitive advantage and service quality, which are organizational factors that play different roles in business performance, were found (Alfalah, 2017; Abdulah & Omar, 2012; Powell, 1995). Easton and Jarrell (1998) examined the impact of total quality management on business performance on more than 100 firms in different industries in the United States. The results of the analysis showed that the business performance of the firms increased with the increase in total quality management practice. Psomas and Jaca (2016) investigated the impact of total quality management on business performance in more than 150 service companies in Spain. Regression analysis models showed that total quality management affects operational performance (adjusted R squared = 0.386, Beta = 0.311) and quality performance (adjusted R squared = 0.528, Beta =0.360).
Sadıkoğlu and Olcay (2014) examined the relationship between employee performance, innovation performance and financial performance. This study was conducted on more than 240 participants in this study in Turkey. Correlational analysis of the study included total quality management vs. operational performance (r = 0.52), inventory management performance (r = 0.43), employee performance (r = 0.60), innovation performance (r = 0.42), and market and financial performance (r = 0.49).). All correlations were

significant at the 0.01 level. Munizu (2013) evaluated the relationship through a structural pathway model. The direct effect coefficient was determined as 0.285 at the 0.05 level, and the indirect effect coefficient by means of competitive advantage was determined as 0.208 at the 0.05 level.
H1: There is a statistically significant relationship between total quality management and business performance.

7. Data Analysis

Factor analysis and reliability for total quality management
Table 1. shows the factor analysis for the scale of total quality management. To justify the analysis, the KMO value is studies, where it was found as 0.962, and self-value is 10.510 (Total variance explained 61.822%). The factor loadings for the statements of total quality management are above 0.4, which proves the adequacy of the scale and the sample, as well as exceeding the minimum values required for KMO>0.5 and self-value>1 (Küçük, 2016, 227-232). Cronbach's alpha value is 0.961, which shows the reliability of the scale.

Table 1. Total quality management factor analysis, reliability, and descriptive statistics

		Factor Loading	Self-value	Total Variance Expl (%)	onbach's Alph	Mean Score	KMO
Total Quality Management			10.510	61.822	0.961	2.791	0.962
1	Company top management has knowledge about Quality Management System (QMS) and its implementation	.720				2.80	
2	Company top management is well aware of the quality	.791				2.86	

Table 1. Total quality management factor analysis, reliability, and descriptive statistics

		Factor Loading	Self-value	Total Variance Expl (%)	onbach's Alph	Mean Score	KMO
	related concepts, new work environment and new skills in the implementation of QMS						
3	Company top management allocates adequate resources on education and training of technical and administrative employee	.763				2.82	
4	Company top management discusses many quality-related issues on QMS in their management meetings	.821				2.79	
5	Company top management focuses on how to improve the performance of employees apart from relying on financial criteria	.778				2.78	
6	Company has well defined technical and administrative	.771				2.80	

Table 1. Total quality management factor analysis, reliability, and descriptive statistics

		Factor Loading	Self-value	Total Variance Expl (%)	onbach's Alph	Mean Score	KMO
	processes and performance measures as well as policies						
7	Employees from different levels are involved in developing our policies and plans	.768				2.81	
8	Company regularly audits practices according to policies and strategies	.779				2.77	
9	Company benchmarks our technical and administrative processes with other organizations	.766				2.86	
10	Company meets the expectations of our clients and employees	.793				2.77	
11	Facilities of company (e.g. offices, computers, heating systems and air conditioners) are maintained in good condition according to periodic	.774				2.81	

Table 1. Total quality management factor analysis, reliability, and descriptive statistics

		Factor Loading	Self-value	Total Variance Expl (%)	onbach's Alph	Mean Score	KMO
	maintenance plans						
12	Company collects statistical data (e.g. error rates on employees' records, employee turnover rates) and evaluates them to control and improve the processes	.781				2.72	
13	Clients' requirements are thoroughly considered in the design of technical and administrative processes	.788				2.74	
14	The needs and suggestions from the business world are thoroughly considered in the design of technical and administrative processes	.823				2.76	
15	Company facilities (e.g. offices and equipment) and resources (e.g. Finance and human resources) are	.832				2.82	

Table 1. Total quality management factor analysis, reliability, and descriptive statistics

		Factor Loading	Self-value	Total Variance Expl (%)	onbach's Alph	Mean Score	KMO
	considered in the development and improvement of technical capabilities						
16	Company regularly conducts surveys on job satisfaction of the employees	.809				2.75	
17	Company follows up the success of completed projects with clients	.802				2.78	

Factor analysis and reliability for business performance

Table 2. shows the factor analysis for the scale of business performance. To justify the analysis, the KMO value is studies, where it was found as 0.974, and self-value is 1.181 (Total variance explained 67.928%). The factor loadings for the statements of business performance are above 0.4, which proves the adequacy of the scale and the sample, as well as exceeding the minimum values required for KMO>0.5 and self-value>1 (Küçük, 2016, 227-232). Cronbach's alpha value is 0.983, which shows the reliability of the scale.

Table 2. Business performance factor analysis, reliability, and descriptive statistics

		Factor Loading	Self-value	Total Variance Expl (%)	Cronbachs Alpha	Mean Score	KMO
Business Performance			1.181	67.928	0.983	3.296	0.974
1	Costs of our final product compared to our business's competitors are low	.685				2.93	
2	Product quality of our company compared to competitors is high	.845				3.14	
3	Our new products have high innovation capacity in development compared to our company's competitors	.777				3.21	
4	The range, speed, and variety of our new products are high compared to our competitors	.821				3.27	
5	Cost compared to our company's competitors has high advantage	.811				3.29	
6	Our new products have a high development process and launch success compared to our competitors	.778				3.36	

Table 2. Business performance factor analysis, reliability, and descriptive statistics

		Factor Loading	Self-value	Total Variance Expl (%)	Cronbachs Alpha	Mean Score	KMO
7	The product service quality of our company is high	.753				3.38	
8	Capacity utilization rate of our company is high	.725				3.41	
9	The level of benefiting from modern production methods is high in our company	.778				3.38	
10	Our company has a high level of new technology adaptation compared to our competitors	.771				3.41	
11	Our company has a higher reputation than out competitors	.741				3.33	
12	The harmony between the offered services and products of our company and market expectation is high compared to our competitors	.780				3.38	
13	The brand image of our company is	.803				3.33	

Table 2. Business performance factor analysis, reliability, and descriptive statistics

		Factor Loading	Self-value	Total Variance Expl (%)	Cronbachs Alpha	Mean Score	KMO
	high compared to our competitors						
14	Customers of our company have high loyalty to us than our competitors	.783				3.33	
15	Customer satisfaction is high compared to our competitors	.765				3.30	
16	Our company has a high market share compared to its competitors	.802				3.33	
17	The level of awareness of our company is high compared to its competitors	.816				3.31	
18	The profitability of our company is high compared to its competitors	.715				3.21	
19	Our company has a high sales volume compared to its competitors	.794				3.23	
20	The financial values of our company (current ratio, liquidity ratio, etc.)	.801				3.31	

Table 2. Business performance factor analysis, reliability, and descriptive statistics

		Factor Loading	Self-value	Total Variance Expl (%)	Cronbachs Alpha	Mean Score	KMO
	are high compared to its competitors.						
21	Our company has high pre-tax profitability compared to its competitors	.802				3.30	
22	Our company has a high level of knowledge about financial resources compared to its competitors	.809				3.33	
23	The level of benefiting from financial resources of our company is high compared to its competitors	.795				3.28	
24	Our company has good relations with suppliers and our level of satisfaction is high	.790				3.33	
25	The products and services of our company have a high level of compliance with the delivery time to the customer	.796				3.36	

Table 2. Business performance factor analysis, reliability, and descriptive statistics

		Factor Loading	Self-value	Total Variance Expl (%)	Cronbachs Alpha	Mean Score	KMO
26	The speed and capacity of loading, unloading and storage activities of our company is higher than its competitors	.830				3.37	
27	The number and capacity of our company's logistics vehicles are higher than our competitors	.593				3.08	
28	The job satisfaction level of the employees of our company is high	.808				3.30	
29	Our company has a high ratio of average occupancy / product assets without missing items.	.818				3.30	
30	The level of achieving our business goals is high	.801				3.30	
31	Our company has high efficiency	.812				3.31	
32	The size of our business (number	.773				3.27	

Table 2. Business performance factor analysis, reliability, and descriptive statistics

		Factor Loading	Self-value	Total Variance Expl (%)	Cronbachs Alpha	Mean Score	KMO
	of personnel, machine equipment, open and closed area, organizational structure) is at a good level compared to its competitors.						
33	The morale and motivation of the employees of our company is high	.814				3.34	
34	The morale and motivation of the employees of our business is high	.824				3.33	
35	The environmental awareness of our company is higher than its competitors	.821				3.33	
36	The level of realizing recycling activities of our company is higher than its competitors	.834				3.34	
37	The level of using renewable energy resources of our company is higher than its competitors	.818				3.34	

Table 2. Business performance factor analysis, reliability, and descriptive statistics

		Factor Loading	Self-value	Total Variance Expl (%)	Cronbachs Alpha	Mean Score	KMO
38	The level of contribution of our company to the solution of social problems is higher than its competitors.	.658				3.20	

Table 3 shows the mean scores and standard deviations for the dimensions of business performance. Promotion and marketing had the highest mean score (3.330), followed by management (3.309), and environment (3.302).

Table 3. Means and standard deviations for dimensions of business performance

Dimension	Mean Score	Standard Deviation
Production and Innovation (Q1-Q10)	3.280	.7626
Promotion and Marketing (Q11-Q17)	3.330	.8273
Finance (Q18-Q23)	3.274	.8457
Logistics (Q24-Q27)	3.284	.8328
Management (Q28-Q34)	3.309	.8675
Environment (Q35-Q38)	3.302	.8673

Correlational Analysis

Table 4. shows the correlation factor using Pearson's rho between the four variables. The analysis indicates positive relationships between all variables. The strongest correlation was found between total quality management and unlimited improvement (r = 0.925, sig. at 0.01). Positive strong correlation was found between business performance and each of total quality

management (r = 0.752, sig. at 0.01) and unlimited improvement (r = 0.759, sig. at 0.01). Moderate positive correlation was found between logistics management and each of unlimited improvement (r = 0.609, sig. at 0.01) and total quality management (r = 0.591, sig. at 0.01). A weak positive correlation was found between logistics management and business performance (r = 0.201, sig. at 0.01) (Küçük, 2016; 250).

Table 4. Pearson's Correlation Between Study Variables

		Total Quality Management	Business Performance
Total Quality Management	Pearson Correlation	1	.752**
	Sig. (2-tailed)		.000
	N	401	401
Business Performance	Pearson Correlation	.752**	1
	Sig. (2-tailed)	.000	
	N	401	401

**. Correlation is significant at the 0.01 level (2-tailed).

Table 4. shows the correlation coefficients (Pearson's rho) between the dimensions of business performance and each of total quality management, unlimited improvement, and logistics management where all correlations were found positive. Strong correlations were found between production and innovation with total quality management (r = 0.741, sig. at 0.01) and unlimited improvement (r = 0.757, sig. at 0.01). Total quality management and unlimited improvement has moderate positive correlations with the rest of the dimensions of business performance. Logistics management had significant weak correlations ($p < 0.01$) with all the dimensions of business performance, except for logistics where it showed a moderate positive relationship (r = 0.417, sig. at 0.01) (Küçük, 2016: 250).

8. Results

In the research, the relationship between total quality management principles and business performance was examined. The relationship between total quality management and business performance, which is also included in the research model, has been determined. The study was applied to industrial companies in Libya, where 400 questionnaires were collected and validated.

The reliability of the scales was tested with Cronbach's alpha and found reliable. The results of the reliability analysis were determined as follows:

• Total quality management (α = 0.961).

• Job performance (α = 0.983).

A factor analysis was performed for each of the scales, starting with a KMO test, which showed that all scales had a value greater than 0.95, reflecting higher interrelationships between items in each scale. Items on all scales were above 0.4, confirming the sequence correlation.

Correlational analysis showed significant relationships between all four variables. The results of the Pearson correlation test are as follows:

• A positive and moderate relationship was found between total quality management and logistics management ($r = 0.591$, $p < 0.01$). Therefore, H1 was accepted.

9. Discussion

The relationship between total quality management and business performance was found as positive and strong in the current research ($r = 0.752$, $p < 0.01$), which confirms several findings from the literature. Cetindere, et al. (2015) and Gul, et al. (2012) showed a positive effect in the context of Turkish companies. Similar positive relationships were also found in other international contexts by Alfalah (2017), Abdulah & Omar (2012), and Powell (1995). In the United statement, for example, Easton and Jarrell (1998) demonstrated an increase in business performance with the implementation of total quality management in more than 100 companies. Psomas and Jaca (2016) used 150 companies in Spain to collect data and confirm the moderate positive impact. In Turkey, Sadikoglu and Olcay (2014) showed a positive moderate relationship with a correlational analysis

(r = 0.52 for operational and r = 0.49 for financial). Furthermore, Munizu (2013) found a direct impact with a structural model.

The relationship between logistics management and business performance was found as positive and weak in the current research ($r = 0.201$, $p < 0.01$), which confirms several findings from the literature. Green et al. (2008) showed weak correlational coefficients between the two variables (r = 0.18). Mavis (2020) found a positive weak impact of logistics on performance using a regression model (R square = 0.251, Beta = 0.215) with emphasis on the transport aspect of logistics. However, there were studies that showed a stronger relationship between the two variables. Ay and Yeşilyurt (2017) found a positive strong correlation (r = 0.776) and Yeşilyurt (2019) found a positive moderate correlation (r = 0.528). Using a regression model, Bozma and Başar (2017) found an R square value of 0.980 for the effect of logistics management on business performance.

10. Suggestions

Based on the findings of the study, several suggestions and recommendations are made to the industrial Libyan companies and future researchers in regards with the studied principles:

- A moderate level of total quality management is demonstrated by the employees of industrial companies in Libya. Thus, it is recommended that those companies increase their focus on the different dimensions of the principle, especially that TQM was found to have a significance relationship with business performance.
- The industrial companies in Libya showed a relatively moderate to high level of logistics management, when compared to other principles. However, further enhancements can be achieved through focusing on some key dimensions such as loading and unloading, insurance, and supply chain processes.
- The employees of Libyan industrial companies showed relatively moderate to high business performance levels. Nonetheless, an increased improvement is suggested to product costing, quality, and development of new products.

- Business performance can be elevated within the industrial companies in Libya by focusing on the principles of total quality management and unlimited improvement. The positive strong correlations with these concepts reflect a great impact, especially on production and innovation.
- Future research is suggested to study the principles in different contexts within the Libyan markets. A focus on more logistics driven companies such as cargo and transportation companies could reflect a different nature of impact on business performance by logistics management.

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