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Factors Affecting Logistics Costs: A Survey Study of a Sample of Workers in Iraqi Industrial Companies

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Abstract: The study aimed to identify the factors affecting logistics costs within the Iraqi context. Logistic costs are one of the essential expenditure areas for companies to ensure the provision of resources that sustain operations in the short and long term. Given the importance of these costs, the current research focused on examining the factors that may act as determinants of these costs from the perspective of employees in Iraqi industrial companies. A questionnaire was designed and distributed to these employees, yielding 115 valid responses for analysis. The study was conducted using the descriptive-analytical method, as it aligns with the research approach. The statistical programs (SPSS Ver.22) and (AMOS Ver.20) were utilized to analyze the data and derive results. One of the key findings is that several factors contribute to the expansion of logistic cost burdens in companies. Among these, legal determinants were found to have the most significant impact, followed by technological determinants. The results are expected to contribute to enhancing the strategic planning of Iraqi industrial companies regarding logistic cost management, considering the constraints imposed by these determinants.

Key words: Factors affecting, Determinants, Logistic Costs, Industrial Companies.

Introduction

Interest in logistics activities increased in the late 1950s when costs began to inflate significantly. At that time, management started focusing on cost reduction to increase profits and enhance the organization's competitive position. This focus included improving procedures, methods, and costs associated with transporting materials and delivering them to target markets. Logistic costs are a core subject in the operations of modern organizations aiming to maximize profits and achieve cost savings. Logistics activities typically account for 25% to 30% of an organization's total costs, making the reduction of logistics costs a primary goal for businesses.

The increase and inflation of logistics costs negatively impact financial performance, and the reverse holds true. The research problem lies in the challenges companies face in improving

efficiency and optimizing resource utilization to address fierce market competition, as well as the implications of globalization and the opening of local markets to foreign products. It has become imperative for companies to deliver their products and services in a manner superior to their competitors in terms of quality and cost.

This highlights the importance of logistics as a vital tool for helping companies enhance their logistical performance and competitive advantage, thereby increasing their market share and profitability. Reducing logistics costs at the company, economic sector, or national level can provide a strong competitive advantage, ultimately leading to higher profits. Conversely, rising logistics costs present significant challenges in maintaining competitive standing and may weaken companies' ability to adapt to market competition.

Thus, the study aims to identify the factors determining the level and scope of spending on logistics costs in Iraqi industrial companies. To achieve this goal, the research is divided into five sections. The first section addresses the introduction, as discussed above. The remaining sections are organized as follows: Section Two reviews the literature and develops hypotheses, Section Three outlines the research methodology, approach, and variables, Section Four discusses the results and tests the hypotheses, and Section Five presents the main conclusions.

2. Literature Review and Hypothesis Development

2.1. Historical Evolution of Logistics

The term "logistics" is commonly thought to have originated in the military, referring to all duties associated with supporting armed forces. Nevertheless, the origins of logistics are deeply entrenched in history (DHL, 2008). Logistics has been integral to world civilization for almost 5,000 years. Since the construction of the pyramids in ancient Egypt, logistics has experienced considerable evolution. Innovative logistics solutions have historically underpinned transitions into new economic periods. Instances of this transformative advancement encompass the creation of shipping containers and the establishment of innovative service systems in the 20th century, both of which are essential to contemporary globalization.

During World War II (1939–1945), logistics experienced remarkable advancements. The military logistics of the United States and its allies proved capable of achieving tasks beyond what the German armed forces could handle. German supply depots sustained significant damage, although Germany was unable of delivering comparable harm to its opponents. The U.S. military guaranteed the timely and locationally appropriate provision of services and supplies, aiming for optimal delivery at cost-effective rates.

The best available options were developed to accomplish tasks, leading to the emergence of numerous military logistics techniques that are still in use today, albeit in more advanced forms (Erkan, 2014, 1240).

2.2. The Nature of Logistic Costs

Logistics is characterized as a functional system that amalgamates and synchronizes several transportation modalities to provide effective service delivery. Logistics is a strategic framework employed to oversee the movement of products, services, information, and capital.

Logistics involves increasingly intricate systems of information, communication, and control that are vital in the contemporary corporate landscape. It is described as the process of acquiring, managing, distributing, and substituting personnel and resources. The standard logistics framework encompasses physical supply, internal operations, and the physical distribution of products and services.

Logistics may be described as delivering the appropriate product or service to the correct location, at the designated time, and in optimal condition. Customer expectations are fundamental in

establishing the objectives of the logistics system, which must guarantee the delivery of the correct items, in the proper quantities, in optimal condition, at the designated location, at the precise time, and at a reasonable cost (Erkan, 2014, pp. 1239–1240).

Logistics is a multifaceted and dynamic activity that must exhibit flexibility and adaptability to various restrictions and requirements dictated by its operational environment. Consequently, several words have been employed in literature and the corporate realm, frequently interchangeably. A well recognized viewpoint delineates the link between logistics as follows:

Logistics = Supply + Materials Management + Distribution.

Logistics encompasses the flow and storage of commodities and information, from raw resources to the ultimate distribution of completed products. It pertains to the organization and regulation of material flows and their corresponding information inside entities, regardless of whether they are in the public or private sector. The objective is to provide the appropriate supplies to the correct location at the optimal time, while enhancing certain performance metrics (such as reducing overall operating expenses) and complying with established constraints (e.g., financial restrictions).

The core issue is determining how and when to purchase, move, and classify raw materials, semi-finished goods, and finished products. Logistics challenges also arise in companies and public organizations that provide services (Farahani, 2009, 1–2).

2.3. Components of Logistic Costs

Logistics costs comprise transportation, inventory keeping, administration, customs, risks and damages, handling, and packaging. Table (1) presents a comprehensive analysis of each component, including its pertinent subcategories and a short description.

Table (1): Components of Logistic Costs

Logistic Cost Categories	Description
Transportation	**Freight Charges: Costs incurred during the transportation process using various modes of transport.** Consolidation: Charges applied when small shipments are combined to form larger ones. Transfer Charges: Expenses associated with the movement of products across various transportation modes. Pickup and Delivery: Charges incurred for transferring items between the shipper's warehouse and the air or rail conveyance terminal. Pipeline Storage: Expenses incurred for retaining products during the transit process.
Inventory Holding	Safety Stock: Costs of maintaining additional inventory to prevent shortages.
Administration	- Order Processing: Salaries of employees responsible for purchasing and managing orders. - Communication: Communication costs such as telephone, fax, or the transmission of information related to international logistics. - Overhead Expenses: Rent paid by the international logistics group.
Customs	- Customs Clearance Procedures: Fees imposed by local customs for clearing goods.

	- Agency Fees: Charges levied by an agent acting on behalf of the shipper or consignee according to the terms of delivery. - Allocation Fees: Fees charged for each domestic bill of lading.
Risks and Damages	- Damage / Loss / Delay: The proportion of the value of each unit in transit that may be susceptible to damage, loss, or delay. - Insurance: The cost of insuring goods during transportation.
Handling and Packaging	- Handling at Terminals: Fees charged by carriers for handling materials at terminals. - Material Handling: Labor and equipment costs used for moving goods within the shipper's or consignee's warehouse. - In/Out Handling: Fees imposed by freight agencies for using their facilities. - Disposal Fees: Charges for removing empty containers from the consignee's warehouse. - Packaging Materials: Costs of materials required to prepare goods for shipment. - Storage: Fees for renting space in warehouses.

Source: (Zeng, 2003, p. 793)

2.4. Profitability of the Logistics Sector

Although the logistics sector initially focused on providing only transportation services, logistics services have become increasingly complex over time, as companies began outsourcing non-core services to improve their profitability. According to the 18th Annual Third-Party Logistics Study conducted by Capgemini, the activities most frequently outsourced include domestic and international transportation (81% and 78%, respectively), warehousing (73%), freight forwarding (62%), and customs services (57%). As the scope of activities expands, there is a growing need to understand the broader concept of how logistics has evolved within the context of full supply chain management, which not only includes the flow of goods and services but also the added value at each stage of the supply chain (Saripalle, 2018, pp. 8-9).

2.5. Logistics Service Layers

There are five main interconnected layers of logistics services that involve increasing levels of service and supply chain integration:

a. First-Party Logistics (1PL): Concerns the proprietors of commodities who gain from the services of shippers (for instance, a manufacturing firm supplying consumers) or consignees (such as a shop obtaining items from a supplier). It determines the source (supply) and endpoint (demand) of the items, with distribution being a wholly internal operation overseen by the corporation. Due to globalization, the outsourcing and offshore of production have led to distribution services that were previously thought to be internally outsourced now being supplied by external service providers.

b. Second-Party Logistics (2PL): Denotes carriers that offer transportation services inside designated segments of the transportation chain. This may encompass a shipping firm, a railway operator, or a trucking enterprise contracted to convey products from the origin (e.g., a distribution center) to the destination (e.g., a port terminal).

c. Third-Party Logistics (3PL): Denotes freight forwarders with interests in a particular transport industry and its tangible assets, while offering extensive shipping and distribution services over transportation networks. These services may encompass warehousing, loading, terminal operations, and light manufacturing activities, including packaging and labeling. A third-party logistics provider handles distribution activities to transport components and completed products

from their source to their destination. It offers a diverse range of logistical services to clients and customers.

d. Fourth-Party Logistics (4PL): Generates value through the comprehensive redesign of corporate processes, overseeing logistics for transportation operations, freight agencies, or warehouses. This frequently entails contracts (subcontracting) with third-party logistics providers (3PLs) and second-party logistics providers (2PLs). A 4PL, or Lead Logistics Provider, is a non-asset-based entity that provides consultancy services for the management, planning, and construction of comprehensive supply chains, without owning vehicles or warehousing facilities. Although the logistics and supply chain sector remains uncertain regarding the exact role and definition of 4PLs, many kinds of logistics consulting businesses and growing management organizations have demonstrated their significance in overseeing large-scale, intricate operations.

e. Fifth-Party Logistics (5PL): A fifth-party logistics provider (5PL) aggregates the requirements of third-party logistics providers (3PLs) and others on a substantial scale to get improved pricing with airlines and shipping firms. Non-asset-based, fifth-party logistics operates cohesively across all sectors. These organizations generally offer logistics services, planning, organizing, and executing logistics solutions for a contractual party, utilizing relevant technology as required. Fifth-party logistics is frequently linked to e-commerce. (Erkan, 2014, pp. 1246-1245)

2.6. Importance of Logistics Costs

The absence of knowledge on logistics costs constitutes a substantial impediment to comprehending integrated logistics. Enhancing flow and consolidating resources are critical objectives in integrated logistics services; thus, managers want clear information on logistics costs across all phases of product flow. In the absence of this information, assessing the influence of actions on costs across the supply chain is unfeasible. This matter has been referenced in scholarly literature by scholars as follows:

"Product and service distribution from the point of origin to the point of consumption is a very important part of the Gross Domestic Product (GDP) of any country and indicates the amount of 'money' generated or earned by the country. Therefore, logistics activities represent money for the country.

Measuring logistics costs is a suitable indicator for both the past and the future. As a key indicator, measuring logistics costs supports national policy-making and the targeted deployment of operational and capital resources (transportation infrastructure investment). As a lagging indicator, it enables performance measurement and paves the way for corrective actions. As a result, measuring logistics costs is not a goal in itself but a suitable indicator for monitoring and evaluating national logistics. The importance of logistics costs increases when you realize that the efficiency of logistics activities is an important infrastructure for economic growth.

Research shows that first-world countries have achieved significant reductions in transportation and inventory costs, which are the most important parts of logistics costs, over the past five decades (the first logistics survey of South Africa, 2004). For example, in 1981, logistics costs in the United States were 16.2% of GDP, while in 2003, they were only 8.5% of GDP. We know that the total GDP of the United States in 2003 was approximately 12.4 trillion dollars, so this decrease in logistics costs resulted in a saving of 954.8 billion dollars, as noted in the 17th annual report on the state of logistics services in the United States, 2006.

Another important issue is the ratio of logistics costs to product price. As is known, a lower price for the same product is a competitive advantage that can lead to an increase in market share. Therefore, since logistics costs represent a large percentage of product prices, calculating and attempting to reduce logistics costs is extremely important. Additionally, because the ratio of logistics costs to product prices is not fixed..." (Farahani, 2009, pp. 57-58).

2.7. Economic Impacts of Logistics Activities

Logistics services are pivotal in the contemporary economy, with the logistics business attaining considerable dimensions in many economies. The economic ramifications of logistics can be examined as follows: (Erkan, 2014, pp. 1246-1257):

- Logistical operations enhance economic expansion, productivity improvement, and poverty alleviation. Compelling data currently indicates that trade liberalization is associated with accelerated productivity development in firms inside emerging nations. It is argued that augmented commerce resulting from extensive liberalization, under advantageous circumstances, fosters improved economic and social growth by elevating productivity and diminishing poverty. The logistics industry is pivotal in this process, as highlighted by the World Trade Organization and the Organization for Economic Cooperation and Development (OECD).
- Logistics is one of the major business expenses, influencing and being influenced by other economic activities.
- Logistics facilitates the movement and flow of numerous economic transactions. It is a crucial activity in enabling the selling of almost all products and services. From a systems viewpoint, it is essential to recognize that delays in the arrival of items impede client purchases. If products do not arrive at the correct location or in the appropriate condition, the transaction cannot occur. Consequently, all economic activity at each level of the supply chain will be impacted.
- Logistics services may provide a superior competitive edge for a firm, as they are more challenging to imitate than other components of the marketing mix: product, pricing, and promotion. Establishing a tight and continuous connection with transportation or logistics providers can provide a significant competitive advantage in terms of speed, dependability, availability, or other customer service elements.
- Increased logistics performance leads to delivering products to markets at competitive prices and quality.
- Efficient logistics decreases transportation expenses and transit duration while also diminishing manufacturing costs. Inefficient logistics services compel enterprises to sustain elevated inventories at each level of the production chain, necessitating increased working capital, such as bigger warehouses for inventory storage.
- Enhanced logistics efficiency facilitates the expedited and cost-effective transportation of essential items, such as basic foods, within nations.
- Through logistical efficiency, farmers may reach whole new markets, whether in other areas or globally.
- Logistics serves as a source of employment. Numerous logistical tasks need a labor-intensive crew. Logistics activities are often more labor-intensive in underdeveloped nations than in industrialized countries, attributable to disparities in manufacturing technology (World Trade Organization and OECD).

2.8. Factors or Determinants Affecting Logistics Costs

The efficacy and performance of logistics systems differ among nations. In Namibia, the expenses associated with a whole 20-foot container, encompassing road transport from the ocean vessel to the industrial gate, exceed $3,000; in Georgia, they are marginally below $3,000. In Germany, these expenses amount to $813, whereas in Sweden, they exceed $500 somewhat. These

variations stem from variables influencing logistical expenses. Here are several elements influencing logistics expenses (Farahani, 2009, 62-63):

1. Geographical Location:

Logistics costs can either increase or decrease depending on geographic location. Countries near ports, airports, and economic hubsEntities with sophisticated logistics systems often incur reduced logistical expenses attributable to competitiveness and environmental adaption. Logistics expenses for importing and exporting products are around 50% greater in landlocked nations.

2. Logistics Infrastructure:

This component pertains to the creation and upkeep of logistics infrastructure to provide a comprehensive array of logistical services and transportation modalities. The distribution network and communication network are critical elements of this aspect. Singapore exemplifies this situation effectively. For decades, Singapore has invested substantially in its logistics infrastructure, resulting in logistical excellence and cost efficiency.

3. Human Resources:

The accessibility of trained personnel as a strategic asset may significantly enhance logistics operations and diminish logistical expenses. This matter is particularly significant in underdeveloped nations. Notably, a contributing cause to the rise in logistics costs in the United States in 2005 was the scarcity of truck drivers.

4. Management:

In most national logistics cost estimation methods, it is assumed that the share of administrative costs is 4% of the total costs. However, in reality, these 4% have a significant impact on the remaining 96%. To make logistics activities more effective and efficient, which leads to cost reduction, proper management must be utilized. Proper management prevents resource wastage and leads to savings. For example, the implementation of the gasoline-sharing policy in Iran has saved 20 million liters per day and reduced annual costs by $3.7 billion.

5. Technology:

Technology is an essential element in every facet of logistics services. Technological developments occasionally induce fundamental transformations in logistics operations. In this domain, Information and Communication Technology (ICT) is very efficacious in logistical operations. In certain instances, ICT eradicates the whole physical distribution network, resulting in substantial cost reductions. Researchers assert that developments in information and communication technology (ICT) have contributed to the decline in logistical costs during recent decades. They also contend that technology possesses even greater potential to substantially decrease expenses in the future.

6. Political and Economic Stability:

This aspect can either mitigate or exacerbate hazards and influence insurance expenses. Consequently, the extensive logistics operations at the national level might substantially influence logistics expenses. Moreover, political and economic stability can significantly influence the attraction of investment in national logistics operations. Moreover, instability in this region, including industrial conflicts or work stoppages, may result in elevated logistical expenses.

7. Legal Framework for Business:

Customs, taxation, and insurance regulations constitute elements of this aspect. The congruence of these rules with logistics operations and activities might impact logistics expenses.

8. Interest Rates:

The interest rate is a crucial macroeconomic indicator that significantly influences logistical expenses. This element holds more significance in inventory costs because of their direct correlation. One factor contributing to the $71 billion increase in inventory costs in the United States in 2005 compared to 2004 was the escalation of interest rates.

9. Energy Prices:

The worldwide escalation of energy prices is a significant element influencing logistics expenses. The increase in fuel prices utilized in logistics operations leads to inflation in logistics expenses, especially in transportation due to the inherent characteristics of the associated activities. A key element contributing to the increase in transportation expenses in the United States in 2005, which rose to $92 billion compared to 2004, was the escalation of gasoline prices.

There are a number of other factors (Santarek, 2022, 221-222):

- Lack of Trust Between Parties:

Trust becomes the primary hurdle for users of crowd logistics services. The unknown is an essential attribute of communal resources. To address this difficulty, an efficient online credit rating system for crowd logistics systems is required. Customer reviews of service providers function as criteria for assessing the reliability of service providers linked via the platform. Consequently, several platforms have established methods to alert or communicate with consumers for the purpose of gathering feedback.

- **Transaction Information Security and Transparency:**

In the event of a disagreement, the security and openness of transaction data, as well as the capacity to utilize this information for resolution, are crucial for users, particularly those transporting substantial and precious items. In this instance, blockchain technology is seen as a complementary approach to guarantee the transparency and security of information. Simultaneously, it is important to assist the state with legal rules and well-defined legal frameworks for this endeavor.

- Lack of Alignment in Information Technology Knowledge, Quality, and Professionalism of Service Providers:

A significant problem in implementing crowd logistics is the limited technological proficiency of those with idle resources. Consequently, startups or enterprises operating on crowd logistics platforms require an effective strategy to educate users (customers and service providers) on utilizing GPS, offering directions, and constructing ideal routes, among other functionalities. Conversely, amateur couriers lack the requisite expertise to guarantee the safety of products, perhaps resulting in product damage during transit. This occasionally impacts the reputation of the product owner when there is a delay or inadequate customer service. This need appropriate supervision and training, together with an efficient performance evaluation system.

- **High Delivery Costs:**

A primary difficulty with crowd logistics deliveries is the elevated cost per shipment, which arises from insufficient coordination among orders, necessitating specialized service for each client. This is apparent in the existing delivery methodology of "Grab" in Vietnam.

- **Environmental Impact Issues:**

Although crowd logistics have somewhat alleviated environmental impacts, they are not without the risks of increased pollution due to customers' growing demand for more convenience, faster delivery, and the required quantity. This will lead to an increase in shipping. Owners of crowd logistics platforms need to consider this issue to find solutions to reduce greenhouse gas emissions

in urban environments. In some developed countries, delivery operations have been implemented using bicycles, public transport, or without transport for the last mile. However, the feasibility of these solutions in cities like Ho Chi Minh City and Hanoi remains low.

Factors with a Positive Impact on Logistics Costs (Santarek, 2022, 220):

- The Trend of Online Shopping Opens Opportunities for the Transport and Logistics Sector:

With 70% of Vietnam's population using the internet, and an average of around 28 hours per person per week spent online, this creates a favorable environment for the growth of the e-commerce industry. In 2018, the e-commerce market in Vietnam reached 8 billion USD, with a growth rate of 30% compared to 2017, and it is expected to continue growing at a high rate for several years to come, with a projected value of 10 billion USD by 2020. The development of e-commerce leads to more consumers shifting to online shopping and the creation of new business models for delivery service companies.

- Mergers and Acquisitions (M&A) Continue to Attract Attention in the Transport and Logistics Sector:

Experts surveyed by "Vietnam Report" anticipate that the trend of mergers and acquisitions in the transport and logistics sector will persist over the next 2-3 years, driven by significant competitive pressure amid global economic integration, technological advancements, and the influence of the Fourth Industrial Revolution. The fast expansion of the transport and logistics industry in Vietnam, coupled with the limited competitiveness of domestic firms, presents substantial prospects for several international corporations to into the Vietnamese market via mergers and acquisitions.

- Investment in Warehouses, Logistics Centers, and Cold Chains:

With the sharp rise in e-commerce companies, the need for warehouse leasing, goods classification, and order fulfillment has increased. Many companies have started building their own storage systems and logistics centers that provide transportation, order completion, and distribution services professionally with a focus on modernization and high quality. By early 2019, six large logistics centers were being built in the country and became operational. Recently, the cold chain sector has seen significant growth due to the increase in the number of cold storage warehouses and the rise in the processed food, pharmaceutical, and technology industries.

The researcher can identify the Factors affecting logistics costs as follows:

- ✓ Geography: Proximity to ports and economic centers reduces costs.
- ✓ Infrastructure: Good investment in logistics infrastructure reduces costs and improves performance.
- ✓ Human Resources: Skilled labor contributes to improving logistics activities and lowering costs.
- ✓ Management: Effective management leads to improved activities and cost reduction.
- ✓ Technology: Technological advancement helps reduce costs and increase efficiency.
- ✓ Political and Economic Stability: Stability impacts insurance costs and attracts investment.
- ✓ Laws: Alignment of laws with logistics activities can reduce costs.
- ✓ Energy Prices: Increases in fuel prices affect transportation costs.

Based on the above, the researcher expects that a set of factors determines the level of logistics costs. Thus, the research hypothesis can be formulated as follows:

(H1). There are a number of factors that determine logistics costs in industrial companies.

3. Research Methodology and Data Collection

3.1. Research Methodology

The researcher relied on the field survey method, adopting both the descriptive-analytical and normative approaches for conducting the research and analyzing the relationships between its variables. The statistical software (SPSS Ver. 22) was used to analyze the research data and derive results using a range of methods such as mean, standard deviation, Cronbach's alpha coefficient, Pearson correlation coefficient to determine the relationship between variables, and simple linear regression equation using Ordinary Least Squares (OLS) analysis to measure the effect.

3.2. Research Sample and Data Collection

The research field was represented by the industrial sector, and a number of industrial companies listed on the Iraq Stock Exchange were selected as representatives of this field. The research population included all accountants and administrative staff working in these companies. A random sample was determined by distributing 150 paper and electronic survey questionnaires, of which 115 valid responses were returned, resulting in a response rate of 76.6%. Table (2) shows the number of distributed and retrieved survey questionnaires from the research sample.

Table (2): Number of distributed and retrieved survey questionnaires from the research sample

Statement	TOTAL
Number of Distributed Questionnaires	150
Number of Retrieved Valid Questionnaires for Analysis	115
Percentage of Valid Questionnaires for Analysis	%76.6

Source: Table prepared by the researcher.

3.3. Research Variables

The main research variable was measured using a questionnaire that was prepared and formulated by the researcher. The questionnaire had two primary components. The initial component focused on personal information that illustrated the demographic attributes of the respondents, with three specific details: (A) gender, (B) years of experience, and (C) educational attainment. It was observed that the majority of the sample were males, accounting for 79.2%, while females represented 20.8%. Additionally, most of the respondents had experience within the range of (11-15 years), which represented the largest percentage at 53.9%, followed by the (6-10 years) group at 17.3%. Regarding educational attainment, most respondents held a bachelor's degree, accounting for 59.1%. These results support both the cognitive aspect and the modernity and contemporaneity of emerging technologies, enabling respondents to provide more objective answers to the questionnaire items.

The second section was dedicated to measuring the research variable, which is the factors affecting logistics costs, through 16 statements equally distributed across eight dimensions: (A) geography, (B) infrastructure, (C) human resources, (D) management, (E) technology, (F) political and economic stability, (G) laws, and (H) energy prices. Each dimension was represented by two statements. The five-point Likert scale was adopted to quantify the respondents' answers (Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree) with corresponding values (5, 4, 3, 2, 1).

3.4. Testing the Research Tool

To test the validity of the questionnaire and ensure that the items accurately reflect the variables intended to be measured, the researcher calculated the validity coefficient, which is the square root of the Cronbach's Alpha coefficient. As shown in Table (3), the validity coefficient was found to be (0.969), indicating a high value that confirms the validity of the questionnaire.

The researcher utilized Cronbach's Alpha to assess the reliability of the questionnaire. According to Table (3), the Cronbach's Alpha values were (0.938), which are quite high and beyond the hypothetical threshold of 70%, suggesting that if the questionnaire were administered again to the same participants under comparable settings, analogous findings would be achieved. These results demonstrate the questionnaire's dependability and its appropriateness for later statistical analysis.

Table (3): Validity and Reliability Test of the Questionnaire

Variables	Symbol	Validity Coefficient	(Cronbach's Alpha)
Factors Affecting Logistics Costs	X	0.969	0.938

Source: Table prepared by the researcher using (SPSS) software.

3.5. Sample Adequacy Test

Table (45) shows the sample adequacy test and the significance of correlation, where significance level coefficients, the Determinant matrix, the KMO test, and Bartlett's test were used. The purpose of the sample adequacy test is to determine the sufficiency of the study sample for conducting confirmatory factor analysis. The KMO value for the variable of factors affecting logistics costs was (0.908), which is greater than (0.5), indicating the adequacy of the sample size for conducting statistical analysis. This is also confirmed by Bartlett's test, where the significance of the Chi-Square value is (0.000), which is less than (5%), further validating the sample size for analysis. Additionally, the significance level coefficients tool provides a correlation matrix to examine and ensure the condition of no high correlation, i.e., higher than 90%, between any two variables. Variables showing such a high correlation will be excluded.

It is also noted that the Determinant matrix value for the variable of factors affecting logistics costs was (0.002), which is greater than (0.0001), thus indicating that the correlation matrix does not suffer from multicollinearity issues.

Table (5): KMO Test

Variable	(Determina)	(KMO)	(Bartlett's)	(Sig)
Factors affecting logistics costs	0.002	0.908	681.132	0.000

Source: Table prepared by the researcher based on the statistical software (SPSS) outputs.

4. Discussion of Results

4.1. Description of Research Statements

Table (6) presents the characteristics of the variable and research dimensions based on respondents' answers, detailing the mean averages, standard deviations, and the maximum and minimum values.

Table (6): Descriptive Analysis Results of Respondents' Opinions

Variables	**Symbol**	**Mean**	**Standard Deviation**	**Highest Value**	**Lowest Value**	**Relative Importance %**	(Skewness)
A. Geography	X1	4.165	0.845	1.00	5.00	83.30%	-0.623
B. Infrastructure	X2	4.148	0.800	1.00	5.00	82.96%	-0.777

C. Human Resources	X3	4.022	0.759	1.50	5.00	80.43%	-0.207
D. Management	X4	3.883	0.820	1.50	5.00	77.65%	-0.865
E. Technology	X5	4.148	0.764	1.00	5.00	82.96%	-0.535
F. Political and Economic Stability	X6	4.170	0.808	1.00	5.00	83.39%	-0.773
G. Laws	X7	4.183	0.756	1.00	5.00	83.65%	-0.619
H. Energy Prices	X8	4.109	0.769	1.00	5.00	82.17%	-0.552
Factors Affect	X	4.103	0.646	1.38	5.00	82.07%	-0.913

Source: Table prepared by the researcher based on the (SPSS) software.

It is observed from Table (6) that there is a high level of agreement regarding the factors affecting logistics costs and its eight dimensions (A. Geography, B. Infrastructure, C. Human Resources, D. Management, E. Technology, F. Political and Economic Stability, G. Laws, H. Energy Prices). The dimension (G. Laws) recorded the highest level of agreement, indicated by a mean score of (4.183) and a relative importance of (83.65%). On the other hand, the lowest level of agreement among the dimensions was attributed to dimension (D. Management) with a mean score of (3.883) and a relative importance of (77.65%). Additionally, the low standard deviation indicates consistency and lack of dispersion among the sample respondents. Therefore, this consistency strengthens the level of agreement regarding the factors affecting logistics costs across its eight dimensions in the studied research field, which consists of Iraqi industrial companies.

4.2. Measuring Normal Distribution Using Skewness Coefficient

To allow for the use of parametric tests, it is necessary to examine the sample's distribution for normality. To verify the assumption of normal data distribution, the researcher calculated the Skewness coefficient for all research variables. Data is considered to approach a normal distribution if the Skewness value falls between (1 and -1). As shown in Table (6) above, All skewness coefficients for the research variables and their dimensions reside within acceptable thresholds. Consequently, the data adheres to a normal distribution, permitting the utilization of parametric statistical analysis tools and methodologies.

4.3. Hypothesis Testing

The study is founded on a singular primary hypothesis, as previously detailed in the methodology. The following presents the outcomes of testing this hypothesis along with an explanation of its findings:

Research Hypothesis: There are several factors that determine logistics costs in industrial companies.

To examine the factors that determine logistics costs across its eight dimensions (A. Geography, B. Infrastructure, C. Human Resources, D. Management, E. Technology, F. Political and Economic Stability, G. Laws, H. Energy Prices) from the perspective of the research sample, the One Sample T Test was used. The following Table (7) presents the results of the T test:

Table (7): T Test Values for the Means of Factors Affecting Logistics Costs

Variables	**Symbol**	t Value	Probability (sig)	Differences
A. Geography	X1	14.791	0.000	Significant
B. Infrastructure	X2	15.383	0.000	Significant
C. Human Resources	X3	14.434	0.000	Significant
D. Management	X4	11.542	0.000	Significant
E. Technology	X5	16.118	0.000	Significant
F. Political and Economic Stability	X6	15.521	0.000	Significant
G. Laws	X7	16.774	0.000	Significant

H. Energy Prices	X8	15.464	0.000	Significant
d.f (114) p ≤ 0.05				**N=115**

Source: Table prepared by the researcher based on (SPSS) software.

Table (7) clearly demonstrates substantial consensus among the sample members concerning the presence of variables influencing logistics costs in industrial enterprises within the research domain, as evidenced by the significant (T) value at a significance level below (0.05). Consequently, the research hypothesis is affirmed.

5. Conclusions:

These results confirm that logistics activities are not only a fundamental support for economic activity, but also a critical element in achieving sustainable economic and social development. By focusing on reducing logistics costs, improving infrastructure, and adopting modern technology, companies and countries can enhance their competitiveness in the global economy. It was also concluded that focusing on improving logistics performance can lead to significant economic benefits, such as increased productivity, cost reduction, and improved investment opportunities. Technology and effective infrastructure are key elements in improving logistics services and reducing costs. The challenges associated with rising energy prices and the lack of political stability require strategies to overcome them in order to reduce logistics costs. Additionally, investment in logistics infrastructure improves the efficiency of human resources, and the adoption of modern technology leads to reduced costs and increased efficiency.

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