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The reality and prospects of supply chains in light of digital transformation and its impact on the sustainable Business environment in Palestine

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Abstract: This study investigates the current state and future prospects of supply chains under digital transformation and examines their impact on sustainable business practices in Palestine. The purpose of the study is to provide insights into how digital tools contribute to improving supply chain resilience and sustainability. Adopting a descriptive–analytical design, data were collected through a survey of 100 managers from 49 companies listed on the Palestine Stock Exchange, representing executive, purchasing, marketing, and IT functions. The data were analyzed using Smart-PLS4 and SPSS v26 to evaluate the relationship between digital adoption and sustainability outcomes. The findings reveal that digital transformation significantly enhances supply chain performance, with a strong positive correlation ($p \leq 0.05$) between digital integration and economic sustainability. The results further emphasize the role of emerging technologies in fostering resilience, efficiency, and transparency. The study concludes that accelerating digital adoption is essential for building sustainable business environments in Palestine. Practically, the research suggests that greater investment in artificial intelligence, machine learning, and financial technology (FinTech) can strengthen supply chain operations and support long-term sustainability objectives.

Keywords: *Development, Digital transformation, Economic, Palestine, Supply chains.*

1. Introduction

Digital supply chains are a productive and logistical network that relies on information systems and innovative technologies to enhance the integration and flexibility of supply chains, thereby improving customer service and the sustainable performance of business organizations. These developments have been driven by the digital revolution and the widespread adoption of digital technologies and transformation. The adoption of new technologies is considered one key steps and main factors driving the sustainability of digital supply chains [1].

International economic activity takes place in a variety of business environments, which are largely shaped by global economic conditions and the growing need for sustainable development in business environments worldwide. Sustainable development requires concerted efforts from all participants in the global economy, not only to meet the needs of the present but also to ensure that future generations can meet their own needs [2].

The wave of digital transformation has led to a shift from slow, paper-based supply chains to technology-driven chains by integrating emerging and advanced digital technologies into supply chain operations and activities. These technologies have the potential to enhance the efficiency of many logistical processes within supply chains, improving logistics operations across the entire supply chain and significantly reducing logistical costs [3].

As a tool of digital transformation, blockchain technology is among the most impactful tools in supply chains. It can improve transparency and enhance sustainability. According to a study by Hakawati and Khafsha [4] blockchain technology brings numerous benefits to supply chains, including

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increased security, reduced costs, and enhanced operational efficiency. The study highlights that blockchain can contribute to greater sustainability by improving resource management and reducing waste at various stages of the supply chain.

Today, digital transformation has become the inevitable path for the survival and development of supply chains towards promoting the sustainability of the business environment. With sustainability becoming an urgent concern for business institutions, they are required to develop sustainability solutions based on the digital economy, where data is the primary factor of production. This can be achieved by leveraging cloud computing, big data, artificial intelligence, and other digital technologies to enable various businesses and sectors to integrate into global model economies [5].

The paper is divided into four sections. The first section presents the introduction, research problem, and research gap, while the second section reviews the relevant literature. The third section covers the research methodology, data, and analysis methods. The study concludes with a summary of key findings and recommendations for future digital transformation policies.

2. Research Gap

Although global interest in supply chains and digital transformation is increasing, research on the Palestinian context remains limited. Palestine's unique economic, political, and social conditions present distinct challenges and opportunities. Few studies have examined the integration of digital transformation with sustainability practices in supply chains, particularly its impact on small and medium-sized enterprises (SMEs). Future research should prioritize exploring the environmental and social effects of digital transformation in Palestine.

3. Problem Statement

The Palestinian territories face significant challenges and difficulties that impact the local economy and its business environment. These challenges are largely due to the continuous obstacles imposed by the Israeli occupation, which deplete the resources, energy, and capacity of the Palestinian people to achieve their aspirations of building a strong and resilient economy. Such an economy would promote sustainability in the business environment by leveraging digital technologies and transformations in supply chains. Based on this background, the study seeks to examine the reality and prospects of supply chains under digital transformation and its effect on the sustainable business environment in Palestine.

4. Research Questions

1. What is the current state and future prospects of supply chains under digital transformation in business organizations in Palestine?
2. What is the state of economic sustainability in the Palestinian business environment?

5. Study Objectives

5.1. This Study Seeks to Accomplish the Following Objectives

1. To understand the reality and prospects of supply chains under digital transformation in business organizations in Palestine.
2. To explore the condition of economic sustainability in the Palestinian business environment.

6. Research Hypothesis

There is an impact of the reality and prospects of supply chains under the effect of digital transformation on the sustainable business environment in Palestine.

7. Previous Studies

The study by Al Tera, et al. [6] aimed to examine the role of supply chain digitization in improving its performance and visibility. The study employed a descriptive methodology using a questionnaire

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distributed to a sample of 399 Turkish manufacturing companies. The results showed the effect of supply chain digitization on both performance and visibility, where increased visibility directly enhances performance. The study also revealed that supply chain survivability enhances the relationship between supply chain digitization and visibility. The relationship is stronger when survivability is high, although the positive impact of digitization on performance decreases when supply chain survivability is low.

Kalluri [7] study aimed to explore the impact of digital technology on sustainable business development by enhancing resource efficiency, innovation, supply chain management, and stakeholder engagement. The study was based on a review of existing literature and case studies. The findings revealed that digital technology is crucial for sustainable business development, as it optimizes processes, boosts resource efficiency, fosters innovation, and strengthens supply chain management and stakeholder engagement, making it vital for achieving long-term sustainability objectives.

Gu, et al. [8] aimed to assess the development of the digital business environment and sustainable development strategies in China using the DATA Panel technique, analyzing 272 observations from 2011 to 2020. The study applied the entropy weighting method to evaluate the development level. The results demonstrated a consistent growth in the digital business environment, with an acceleration starting in 2017 and a shift from lower-tier to higher-tier cities. The study also highlighted an increasing gap between cities with higher and medium levels of development, as well as a positive spatial correlation in the efficiency of the digital business environment. Based on these findings, the study recommended increased investment in digital infrastructure and the leverage of spatial effects.

Ning and Yao [9] investigated the impact of digital transformation on supply chain capabilities and competitive supply chain performance in the current external environment, marked by high uncertainty for businesses. The study employed a descriptive methodology with a sample of 255 respondents. The results emphasized the significant role of digital transformation in improving supply chain capabilities, which positively influences sustainable competitive performance. The findings also revealed that supply chain capabilities mediate the relationship between digital transformation and sustainable competitive performance. Furthermore, environmental uncertainty can act as a catalyst for digital transformation, motivating supply chains to further explore digital transformation.

Yuan, et al. [10] explored the effects of digital transformation on supply chain resilience and examined how environmental uncertainty moderates the relationship between digital transformation and supply chain resilience. The study proposed a theoretical model based on survey data from 216 organizations in China. The findings revealed that digital transformation has a significant impact on supply chain resilience. Additionally, the integration of supply chain operations across its dimensions (information flow, physical flow, and financial flow) mediates the relationship between digital transformation and resilience. Furthermore, environmental uncertainty was found to positively moderate the relationship between digital transformation and supply chain resilience.

Sarfraz, et al. [11] conducted a study on the impact of sustainable supply chain strategy on sustainable competitive advantage, focusing on the mediating role of blockchain technology and the moderating role of digital transformation. The model was tested using a sample of 331 managers from hotels and resorts. The results showed that blockchain technology mediates the relationship between sustainable supply chain strategy and sustainable competitive advantage. Digital transformation further strengthens this relationship, suggesting that companies should implement sustainable strategies and leverage advanced technologies to sustain their competitive edge in the market.

In the study by Zhao, et al. [12] the effect of supply chain digitization on its resilience and performance was explored. The study developed a mechanism based on "Supply Chain Digitization → Supply Chain Resilience → Supply Chain Performance" according to dynamic capability theory. Data were collected from 210 Chinese manufacturing companies. The results revealed that digitization enhances supply chain resilience through absorptive, responsive, and recovery capacities, improving the overall performance of the supply chain. Moreover, digitization differentially affects these capacities through structural adjustment measures and resources, enhancing cost-effectiveness and information efficiency.

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Tan, et al. [13] investigated the relationships between blockchain visibility, supply chain integration (SCI), and supply chain performance in Malaysia's semiconductor industry. A survey was conducted with 71 operations and supply chain managers from manufacturing companies. The findings revealed that supply chain integration mediates the relationship between blockchain visibility (including information exchange, business intelligence collection, and asset status) and supply chain performance. The performance analysis also suggested that information technology plays a secondary role and that semiconductor manufacturers should prioritize other areas for improvement rather than focusing heavily on IT advancements.

The study by Nayal, et al. [14] explored the impact of sustainable development strategy on the performance of sustainable supply chain companies in the context of digital transformation and globalization, as well as the role of cooperation and coordination within the supply chain. Using structural equation modeling (SEM), the study analyzed data from 361 participants in the Indian automotive industry. The findings showed that supply chain coordination enhances both sustainable development strategy and digital transformation. Moreover, digital transformation positively impacts sustainable supply chain performance. The study concluded that applying these factors in sequence can lead to achieving sustainable performance.

8. Research Methodology (Approach and Procedures)

8.1. Research Methodology

To achieve the study's objectives, a descriptive-analytical approach was employed, utilizing a quantitative method through the use of a questionnaire. This methodology is considered highly suitable for this type of study, as it aims to describe the phenomenon, analyze it, and clarify the relationships between the variables.

8.2. Research Population

The research population consists of employees in Palestinian business organizations listed on the Palestine Stock Exchange, totaling 49 companies. The population relied upon for filling out the questionnaires includes (executive managers, procurement and storage managers, marketing managers, and information or IT managers). The researcher selected the sampling and analysis unit from these managers, and the questionnaire was distributed to the majority of the business organizations.

8.3. Research Sample

Determining the appropriate sample size is a crucial aspect of research, as an incorrect sample size may prevent the achievement of the research objectives. Among the various methods for determining sample size, this study used the GPower methodology, as it aligns well with the exploratory nature of the research. Notably, there is a lack of previous studies addressing this issue from the perspective of the Palestinian community

Based on the proposed theoretical framework and to achieve a statistical power of 85%, aiming for an R^2R^2R^2 coefficient of no less than 0.25, with a 5% margin of error, the method of least squares is recommended [15]. According to Cohen [16] a sample size of approximately 60 responses is recommended. Therefore, the minimum required sample is 95 responses when using the least squares method for analysis. In this research, the sample size reached 100, meeting the conditions of the least squares method for determining the research sample.

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8.4. Demographic Characteristics of the Sample

Table 1.
The Sample study distribution due to Gender Variable.

Category	Count	Percentage (%)
Male	63	63.0%
Female	37	37.0%

The demographic characteristics of the sample show that the majority of the respondents are male, representing 63.0%, while females make up 37.0%. Figure (1) illustrates the distribution of the sample according to the gender variable.

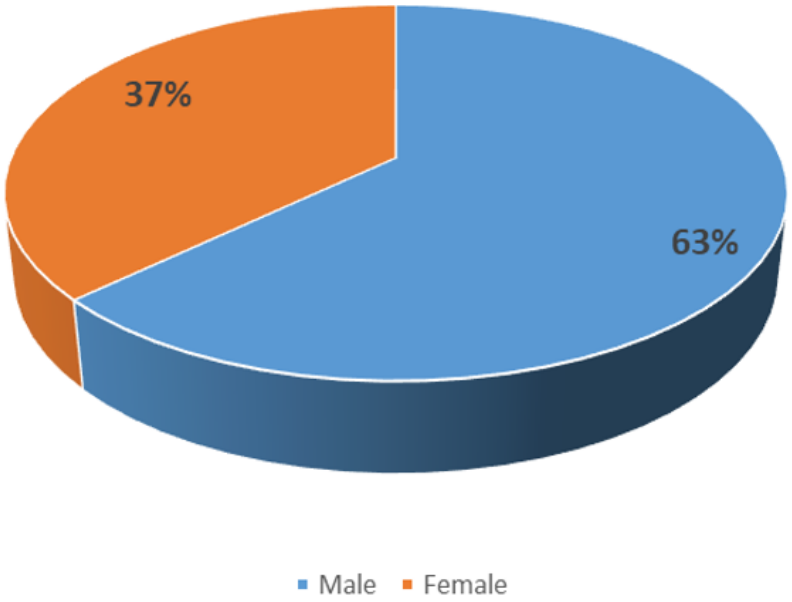

Figure 1.
The Sample study distribution due to gender variable.

Table 2.
The Sample study distribution due to Educational Qualification Variable.

Category	Count	Percentage (%)
High school or less	7	7.0%
Diploma	14	14.0%
Bachelor's degree	49	49.0%
Postgraduate	30	30.0%

Regarding the educational qualification variable, the distribution was not evenly spread. Around 7.0% of the sample had a qualification of high school or less, while 14.0% had a diploma. The majority, 49.0%, held a bachelor's degree, and finally, 30.0% of the sample had a postgraduate qualification. Figure (2) illustrates the distribution of the sample according to the educational qualification variable.

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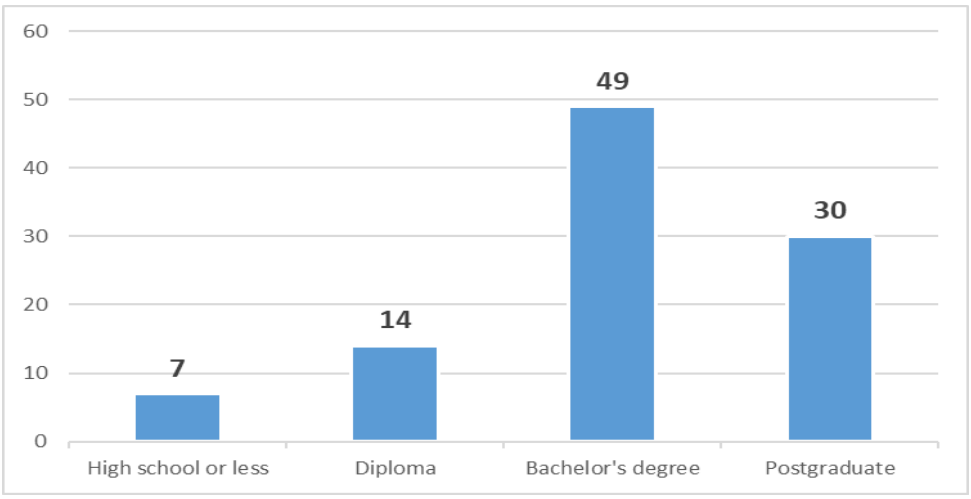

Figure 2.
The Sample study distribution due to the variable of educational qualification.

Table 3.
The Sample study distribution due to Age Variable.

Category	Count	Percentage (%)
Less than 25 years	22	33.0%
25 – 30 years	24	24.0%
30 – 35 years	21	21.0%
More than 35 years	33	33.0%

Regarding the age variable, the distribution was relatively close. Around 33.0% of the sample were under 25 years old, while 24.0% were between 25 and 30 years old. Additionally, 21.0% of the sample were between 30 and 35 years old, and 33.0% were over 35 years old. Figure (3) illustrates the distribution of the sample according to the age variable.

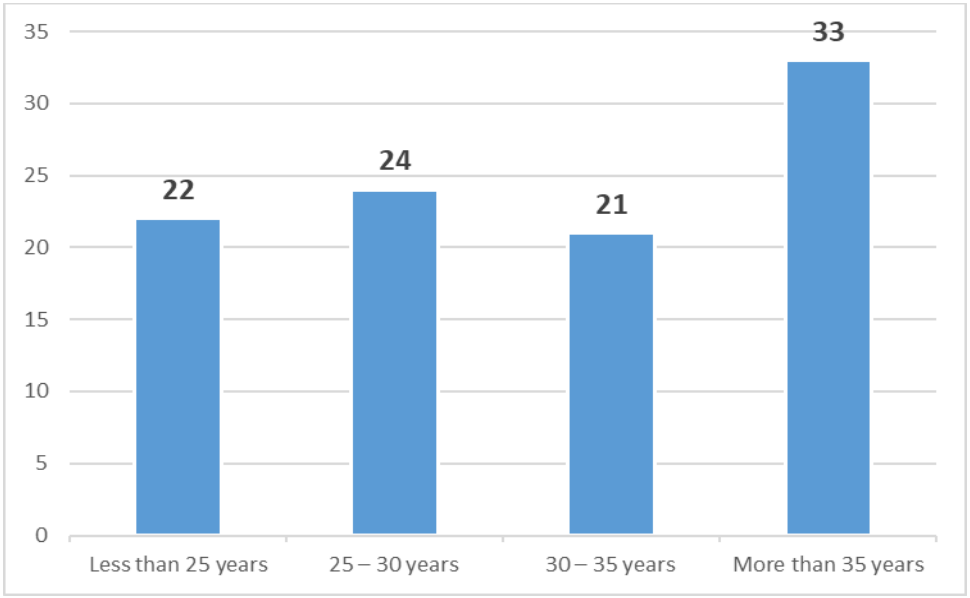

Figure 3.
Distribution of sample members due to age variable.

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Table 4.
The Sample study distribution due to Years of Experience Variable.

Category	Count	Percentage (%)
Less than 1 year	26	26.0%
Less than 5 years	25	25.0%
Less than 10 years	21	21.0%
10 years or more	28	28.0%

Regarding the years of experience variable, the distribution was relatively close. Around 26.0% of the sample had less than 1 year of experience, while 25.0% had less than 5 years of experience. Additionally, 21.0% had less than 10 years of experience, and 28.0% had 10 years or more. Figure (3) illustrates the distribution of the sample according to the years of experience variable.

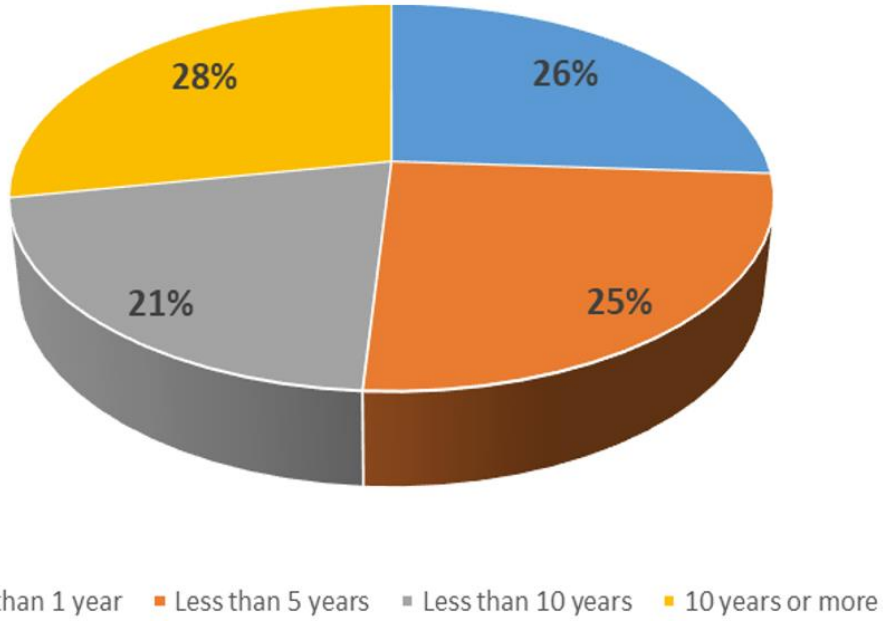

Figure 4.
The Sample study distribution due to the variable of years of experience.

Table 5.
The Sample study distribution due to Job Title Variable.

Category	Count	Percentage (%)
Executive Management	42	42.0%
IT Management	23	23.0%
Supply Chain Management	10	10.0%
Marketing and Sales	25	25.0%

Regarding the job title variable, the distribution was not evenly spread. Approximately 42.0% of the sample worked in executive management, while 23.0% were employed in IT management. About 10.0% of the sample worked in supply chain management, and 25.0% were employed in marketing and sales. Figure 5 illustrates the distribution of the sample according to the job title variable.

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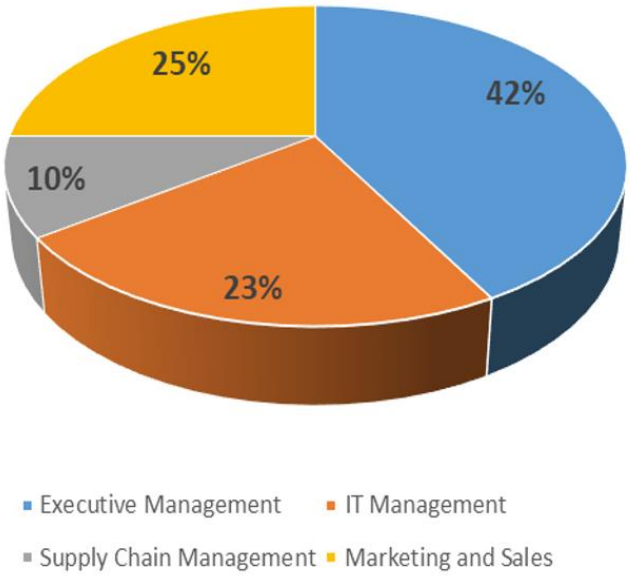

Figure 5.
The Sample study distribution due to job title variable.

8.5. Research Tool

After a thorough review of previous studies and literature on the reality and prospects of supply chains in the context of digital transformation and its impact on the sustainable business environment in Palestine, the research questionnaire was designed to ensure its validity and reliability. The questionnaire was divided into two main sections: the first section focused on the demographic information of the sample, while the second section addressed the study variables, which were measured through 20 items. The questionnaire included questions adapted from prior studies, as well as modified questions to align with the research objectives. Specifically, 10 items were designed to assess the reality and prospects of supply chains under digital transformation, and 10 items aimed at measuring economic sustainability. A five-point Likert scale was used to evaluate the research items, where respondents rated each item as: strongly disagree, disagree, neutral, agree, or strongly agree.

8.6. Data Collection Process

Executive managers were selected as the research sample, procurement and storage managers, marketing managers, and IT managers, totaling 100 individuals from Palestinian business organizations listed of the Palestine Stock Exchange in 2024. This sample was deliberately chosen by the researcher, and an electronic questionnaire was distributed via digital communication channels to all Palestinian business organizations listed of the exchange. Responses were collected for three weeks following the release and sharing of the survey link with the target business organizations. Once 100 valid responses were received, data collection was closed, and all responses were deemed suitable for statistical analysis.

8.7. Statistical Methods

Regarding the statistical methods employed to answer the research questions and hypotheses, the Statistical Package for Social Sciences (SPSS) and Smart-PLS4 were used, with the assistance of various statistical tests and measures, which will be discussed in the following sections.

8.7.1. Descriptive Statistics

Descriptive statistics were employed in the research through frequency distribution tables to describe the characteristics of the study sample. Measures of central tendency, particularly the

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arithmetic mean, and measures of dispersion, especially standard deviation, were used to describe the respondents' responses to the research variables and items. This research relied on interpreting the overall weighted arithmetic mean of the questionnaire using the five-point Likert scale. The range for the scale was calculated by subtracting the lowest value (1) from the highest value (5) and then dividing the range by the number of categories (3) to obtain a result of $4 \div 3 = 1.33$. Thus, the values were incremented from the lowest point (1) to assign the intervals for determining the direction of responses based on the arithmetic mean. Table 6 illustrates this.

Table 6.
Five-Point Likert Scale Interpretation Key.

Arithmetic Mean	Relative Weight (%)	Interpretation
Less than 2.34	Less than 46.8%	Low
2.34 – Less than 3.67	46.8% – Less than 73.4%	Moderate
3.67 or more	73.4% or more	High

8.7.2. Inferential Statistics

The study relied on structural equation modeling (SEM) to test its hypotheses, as this method is suitable for such research. The approach is explained as follows:

9. Structural Equation Modeling (SEM)

The use of statistical techniques for data analysis in social sciences has enabled researchers to enhance their questions and results. Statistical techniques have evolved through two generations. Initially, researchers relied on univariate and bivariate analyses to test and explore relationships between variables. In the second generation, researchers adopted multivariate analysis. This section discusses a second-generation technique known as Partial Least Squares Structural Equation Modeling (PLS-SEM), utilizing the Smart-PLS4 software [17] to study the reality and prospects of supply chains in light of digital transformation and its impact on the sustainable business environment in Palestine.

After the widespread adoption of second-generation techniques in recent years, researchers gradually shifted toward using these techniques to overcome the limitations of first-generation methods. Second-generation techniques are primarily represented by structural equation modeling (SEM), which tests relationships among multiple variables simultaneously, making it more complex than univariate or bivariate analysis. In this research, variance-based SEM (PLS-SEM) is used because it effectively handles relatively small sample sizes [15, 18]. According to recent studies, a sample size of 100 is sufficient to test the study's hypotheses using PLS-SEM [1, 19].

SEM is described as a path analysis model, represented graphically to test the hypotheses and relationships between the variables under investigation [15]. Variables in this model are classified into observed variables (indicators), represented by rectangles, and latent variables (constructs), which are not directly observed and are represented by ovals or circles. Observed variables are used to measure the latent variables, representing the items of the study, while latent variables, which cannot be measured directly, are assessed through a group of observed variables (indicators or items). Latent variables represent the independent and dependent variables.

The path model consists of two main components:

1. The Structural (Inner) Model: This represents the relationships between latent variables.
2. The Measurement (Outer) Model: This represents the relationships between the latent variables and their indicators (items), defining the relationship between them.

Based on the above, Figure 1 illustrates the structural model of the research, according to the independent and dependent variables.

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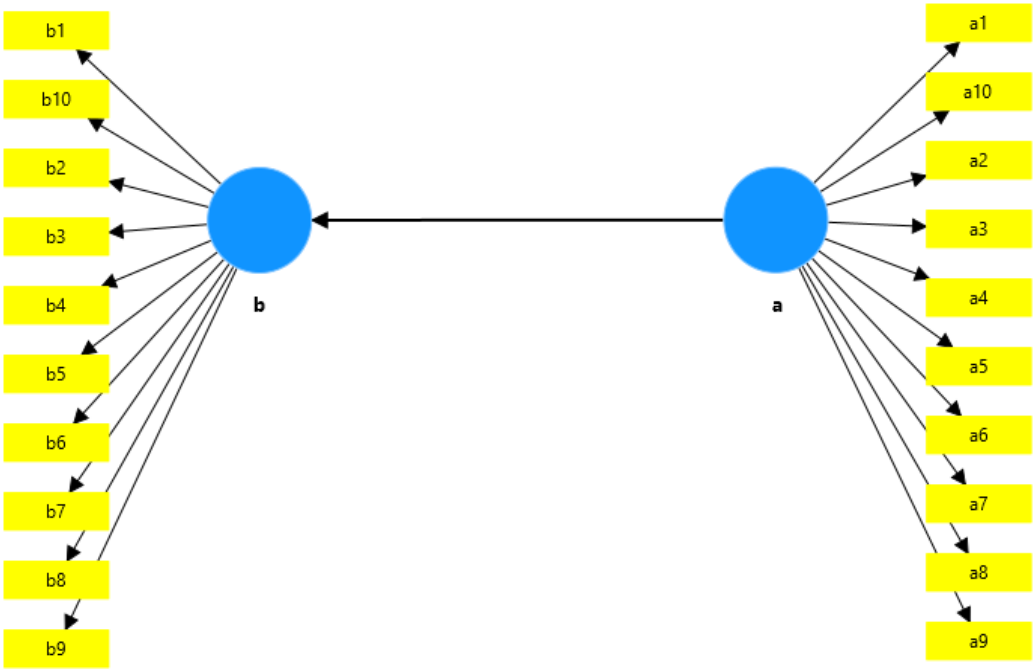

Figure 6.
Structural Model of the Research Variables.

(A) The reality and prospects of supply chains under digital transformation, (B) Economic sustainability.

In Figure (6), the latent independent variable in this research represents the reality of supply chains under digital transformation, measured by the items from A1 to A10. The latent dependent variable represents economic sustainability, measured by the items from B1 to B10.

The research model was evaluated in two stages:

Stage 1: Measurement Model Evaluation – This stage assesses the validity and reliability of the research tool, using three criteria: internal consistency, convergent validity, and discriminant validity.

Stage 2: Structural Model Evaluation – This stage tests the research hypotheses by examining the relationships between the research variables and the model's predictive power. The structural model was evaluated using three criteria: coefficient of determination (R^2), goodness of fit, and path coefficients.

The research model was evaluated in these two stages, as outlined:

1. Measurement model evaluation to verify the validity and reliability of the research tool.
2. Structural model evaluation to test the research hypotheses.

9.1. Validity and Reliability of the Research Tool

Several criteria were proposed to evaluate the standard measurement model and to assess the validity and reliability of the research tool. This research relied on the evaluation of internal consistency, convergent validity, and discriminant validity. Each criterion was evaluated separately.

9.1.1. Evaluation of the Reliability of the Research Tool

Reliability testing evaluates the degree of accuracy with which the research variables are measured, or in other words, it tests the stability and consistency of the results if the tool were redistributed under the same conditions. The reliability of the research tool (internal consistency of the model) is assessed using Cronbach's Alpha (CA) and Composite Reliability (CR). According to Hair Jr, et al. [15] if the value exceeds 0.70, the variables have achieved a good level of reliability.

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The results, as shown in Table (4), indicate that all values of Cronbach's Alpha and Composite Reliability exceeded 0.70. Specifically, the values of Cronbach's Alpha ranged between 0.848 – 0.890, and the values of Composite Reliability ranged between 0.883 – 0.910. Therefore, we conclude that there is a strong correlation between the research items and the latent variables **they** represent, as demonstrated in Table 7.

Table 7.
Evaluation of Internal Consistency for Latent Study Variables.

Code	Latent Variables	CR	CA
A	Reality and Prospects of Supply Chains under Digital Transformation	0.883	0.848
B	Economic Sustainability	0.910	0.890

9.1.2. Evaluation of the Validity of the Research Tool

The validity of a research tool refers to whether the tool accurately reflects the content of the research variables and measures them effectively [18]. The validity of the research tool will be assessed through convergent validity and discriminant validity, which will be examined consecutively.

9.1.2.1. Convergent Validity

According to Hair Jr, et al. [15] convergent validity is defined as "the extent to which a measure positively correlates with alternative measures of the same construct." Convergent validity will be assessed using two criteria:

9.1.3. Outer Factor Loadings

Factor loadings measure the degree of correlation between an item (indicator) and the latent variable to which it belongs. According to Hair Jr, et al. [15] results with correlations greater than 0.50 are accepted, while items with low loadings are excluded. Based on the factor loading results for the research items, items with loadings less than 0.50 were excluded, specifically a1 and a2. The remaining items showed correlation coefficients higher than 0.50, with factor loadings ranging from 0.769 to 0.554, indicating that the research indicators exhibit a good level of validity, as shown in Table (8).

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Table 8.
Outer Factor Loadings for Research Indicators.

Code	Indicators (Items)	Factor Loadings
A	**Reality of Supply Chains**	
A3	Digital transformation in supply chains increases manufacturing efficiency at all levels	0.637
A4	Digital transformation in supply chains requires suppliers to adopt flexible production and supply processes, increasing market share and sales	0.644
A5	Digital transformation of supply chains improves activities and methods used	0.627
A6	Digital supply chains provide transparency and clarity in information exchange between the company and suppliers	0.715
A7	Digital supply chains offer post-supply services aligned with company requirements	0.695
A8	Digital supply chains ensure supplier warranties are credible for what is supplied	0.741
A9	Digital supply chains achieve efficient integration between the company and suppliers	0.773
A10	Digital supply chains contribute to excellent business execution, creating opportunities for company success	0.733
B	**Economic Sustainability**	
B1	Digital supply chains reduce the operating cycle time, enhancing economic sustainability	0.554
B2	The use of digital supply chains improves company productivity, increasing economic sustainability	0.588
B3	Digital supply chains help improve process/production efficiency, positively impacting economic sustainability	0.692
B4	Digital supply chains reduce reprocessing costs, enhancing economic sustainability	0.714
B5	The use of digital supply chains reduces the number of unnecessary departments and personnel, aiding company and economic sustainability	0.693
B6	The use of digital supply chains increases market share, driving growth and economic sustainability	0.840
B7	Digital supply chains increase company profits, contributing to economic sustainability	0.685
B8	The use of digital supply chains reduces natural resource consumption, enhancing resource availability and economic sustainability	0.768
B9	Digital supply chains improve customer responsiveness and service, leading to economic sustainability	0.764
B10	Digital supply chains ensure timely product delivery and reduce inventory levels, enhancing economic sustainability	0.769

9.2. Average Variance Extracted (AVE) Criterion

According to Hair Jr, et al. [19] Average Variance Extracted (AVE) is defined as the sum of the squared loadings of the indicators associated with a latent variable, divided by the number of indicators. This measure is the most widely used metric for testing convergent validity.

The results presented in Table (9) show that all AVE values for the latent variables are acceptable, as they exceed the threshold of 0.50. This means that each latent variable explains more than half of the variance in its indicators, thereby confirming convergent validity in this model [20].

Table 9.
Evaluation of Average Variance Extracted (AVE) for Latent Research Variables.

Code	Latent Variables	AVE
A	Reality and Prospects of Supply Chains under Digital Transformation	0.586
B	Economic Sustainability	0.506

9.2.1. Discriminant Validity

Discriminant validity is defined as "the extent to which a construct is truly distinct from other constructs based on empirical standards" [15]. This means that each latent variable represents a unique phenomenon not represented by any other latent variable. To assess discriminant validity, the Fornell and Larcker [21]. criterion was used.

The results presented in Table (10) indicate that the square root of the Average Variance Extracted (AVE) for each latent variable is greater than the correlations between that variable and others. This demonstrates that there is a distinction between the latent variables, meaning they do not overlap, and each variable represents a unique construct.

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Table 10.
Fornell-Larcker Criterion Results for Discriminant Validity of Latent Variables.

Code	Latent Variables	A	B
A	Reality and Prospects of Supply Chains under Digital Transformation	**0.697**	
B	Economic Sustainability	0.749	**0.711**

10. Research Findings

10.1. Presentation of Research Question Results

To explore the reality and prospects of supply chains under digital transformation in the Palestinian business environment, the following questions were posed:

First Question: What is the reality and prospects of supply chains under digital transformation in business organizations in Palestine?

The results presented in Table (11) show the arithmetic means and standard deviations for the reality and prospects of supply chains under digital transformation in the Palestinian business environment, based on the responses of the research sample to the relevant questions in the study tool, as detailed below:

Table 11.
Arithmetic Means and Standard Deviations for the Reality and Prospects of Supply Chains under Digital Transformation, Ranked by Importance

Importance	Item No.	Statement	Arithmetic Mean	Standard Deviation	Rating
1	1	Digital transformation of supply chains contributes to cost reduction	4.15	0.657	High
2	2	Digital transformation of supply chains provides formal and informal communication channels between the company and suppliers	4.04	0.618	High
3	5	Digital transformation of supply chains improves the activities and methods used	3.99	0.772	High
4	3	Digital transformation in supply chains increases manufacturing efficiency at all levels	3.96	0.764	High
5	6	Digital supply chains provide transparency and clarity in information exchange between the company and suppliers	3.89	0.840	High
5	10	Digital supply chains contribute to excellent business execution, creating opportunities for company success	3.89	0.920	High
6	7	Digital supply chains offer post-supply services aligned with company requirements	3.88	0.891	High
7	9	Digital supply chains achieve efficient integration between the company and suppliers	3.87	0.884	High
8	8	Digital supply chains ensure supplier warranties are credible for what is supplied	3.79	0.880	High
9	4	Digital transformation in supply chains requires suppliers to adopt flexible production and supply processes, increasing market share and sales	3.75	0.809	High
Total Degree			3.92	0.518	High

The data presented in Table (10) indicate that the reality and prospects of supply chains under digital transformation in the Palestinian business environment were rated high, with an arithmetic mean of 3.92 and a standard deviation of 0.52. The most significant aspect of the reality and prospects of supply chains under digital transformation in the Palestinian business environment was item number (1), which stated that "digital transformation of supply chains contributes to cost reduction." This item had the highest mean of 4.15, with a standard deviation of 0.66. The second most important aspect was item number (2), which stated that "digital transformation of supply chains provides formal and

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informal communication channels between the company and suppliers." This item had a mean of 3.99, with a standard deviation of 0.77.

The least important item was item number (4), which stated that "digital transformation of supply chains requires suppliers to adopt flexible production and supply processes, increasing market share and sales," with a mean of 3.75 and a standard deviation of 0.809. This was followed by item number (8), which stated that "digital supply chains ensure supplier warranties are credible for what is supplied," with a mean of 3.79 and a standard deviation of 0.880.

Second Question: What is the state of economic sustainability in the Palestinian business environment?

The results presented in Table (12) illustrate the state of economic sustainability in the Palestinian business environment, based on the responses of the research sample to the relevant questions in the study tool, as detailed below:

Table 12.
Arithmetic Means and Standard Deviations for the Reality of Economic Sustainability, Ranked by Importance.

Rank	Item No.	Statements	Arithmetic Mean	Standard Deviation	Rating
1	13	Digital transformation in supply chains increases manufacturing efficiency at all levels	3.98	0.804	High
2	11	Digital transformation of supply chains contributes to cost reduction	3.95	0.857	High
2	15	Digital transformation of supply chains improves the activities and methods used	3.95	0.869	High
3	14	Digital transformation of supply chains requires suppliers to adopt flexible production and supply processes, increasing market share and sales	3.93	0.844	High
3	20	Digital supply chains contribute to excellent business execution, creating opportunities for company success	3.93	0.977	High
4	17	Digital supply chains offer post-supply services aligned with company requirements	3.91	0.854	High
5	19	Digital supply chains achieve efficient integration between the company and suppliers	3.90	0.847	High
6	16	Digital supply chains provide transparency and clarity in information exchange between the company and suppliers	3.86	0.7790	High
7	12	Digital transformation of supply chains provides formal and informal communication channels between the company and suppliers	3.85	0.845	High
8	18	Digital supply chains ensure supplier warranties are credible for what is supplied	3.65	0.845	High
Total Degree			**3.89**	**0.604**	**High**

The data presented in Table 5 indicate that the state of economic sustainability in the Palestinian business environment was rated high, with an arithmetic mean of 3.89 and a standard deviation of 0.60. The most prominent aspect of economic sustainability in the Palestinian business environment was item number (13), which stated that "digital transformation in supply chains increases manufacturing efficiency at all levels", with an arithmetic mean of 3.98 and a standard deviation of 0.80. This was followed by item numbers (11) and (15), which stated that "digital transformation of supply chains contributes to cost reduction" and "digital transformation of supply chains improves the activities and methods used", both with an arithmetic mean of 3.95 and a standard deviation of 0.86.

The least significant aspect was item number (18), which stated that "digital supply chains ensure supplier warranties are credible for what is supplied," with an arithmetic mean of 3.85 and a standard deviation of 0.85. This was followed by item number (12), which stated that "digital transformation of

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supply chains provides formal and informal communication channels between the company and suppliers," with an arithmetic mean of 3.65 and a standard deviation of 0.85.

10.2. Presentation of Research Hypothesis Results

The current study included a main hypothesis concerning the study of the reality and prospects of supply chains under digital transformation and its impact on the sustainable business environment in Palestine. To test the study's hypothesis, path analysis will be conducted using the Smart-PLS4 software. Testing the hypothesis requires the evaluation of the study's structural model to determine the nature of the relationships between the latent variables and assess their predictive abilities. The structural model will be evaluated to verify the significance of the effects between the latent variables. For this purpose, bootstrapping with 5000 subsamples was applied [15]. The structural model was assessed based on five criteria: collinearity, coefficient of determination, predictive ability, goodness of fit, and path coefficients, or in other words, hypothesis testing [15, 22].

10.3. Evaluation of Collinearity

The first step in assessing the structural model is evaluating the collinearity between the latent variables to examine the degree of multicollinearity in the research model. The results presented in Table (13) show that the Variance Inflation Factor (VIF) values for the latent variables are less than 5, indicating that there is no multicollinearity issue in the research model [15].

Table 13.
Collinearity (VIF) Values Between Research Variables.

Code	Latent Variables	VIF
A	Reality and Prospects of Supply Chains under Digital Transformation	0.333
B	Economic Sustainability	0.357

Evaluating the coefficient of determination (R^2) is the second step in assessing the structural model. R^2 is an important indicator in evaluating the research's structural model. According to Cohen [23]. if the R^2 value is greater than or equal to 0.25, it indicates a strong explanatory power, greater than or equal to 0.12 indicates a moderate explanatory power, and greater than or equal to 0.02 indicates weak explanatory power. If the value is less than 0.02, there is no explanatory power.

The results in Table (13) show that the reality and prospects of supply chains under digital transformation explain 55.6% of the variance in the sustainability of the Palestinian economy. This indicates that the reality and prospects of supply chains under digital transformation account for a high percentage of the variance in economic sustainability.

Table 14.
R^2 Values Results.

Latent Variables	R^2
Reality and Prospects of Supply Chains under Digital Transformation → Economic Sustainability	0.556

10.4. Evaluation of Goodness of Fit (GoF)

The Goodness of Fit (GoF) index is a comprehensive measure of the model's fit, reflecting the overall performance and reliability of the research model [15]. It is calculated using the following relationship $\sqrt{\overline{R^2} \times \overline{AVE}}$.

As Wetzels, et al. [24] The results in Table.(15) indicate that the GoF value for the research model exceeds 0.25 (specifically, 0.304), which signifies that the model demonstrates a moderate level of fit, as shown in Table 14.

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Table 15.
Goodness of Fit (GoF) Index for the Research Model.

Dependent and Independent Variables	R^2	AVE
Economic Sustainability	0.556	0.586
Reality and Prospects of Supply Chains under Digital Transformation		0.506
	$\underline{R^2}$ = **0.556**	$\underline{AvE}$ =**0.546**
GoF = √((Average R^2) × (Average AVE)) = **0.304**		

11. Study Hypothesis Results

The study's hypothesis states:

"There is no statistically significant effect at the significance level ($\alpha \leq 0.05$) of the reality and prospects of supply chains under digital transformation on the sustainable business environment in Palestine."

The results presented in Table (16) indicate a statistically significant positive effect of the reality and prospects of supply chains under digital transformation on the sustainable business environment in Palestine. The p-value was 0.000, which is less than the significance level ($\alpha \leq 0.05$), meaning the null hypothesis is rejected. This suggests a direct impact of the reality and prospects of supply chains under digital transformation on the sustainable business environment in Palestine.

Furthermore, the results show that a one-unit increase in the reality and prospects of supply chains under digital transformation leads to a 54.7% increase in the sustainability of the Palestinian economy.

Table 16.
Study Hypothesis Results.

Hypothesis	Adjusted Regression Coefficient	Standard Deviation	T-Value	P-Value
Reality and Prospects of Supply Chains under Digital Transformation → Economic Sustainability	0.547	0.043	16.826	0.000

Note: Indicates statistical significance at the 5% level.

12. Conclusions

After conducting the statistical analysis and arriving at the results, the following conclusions can be drawn:

1. The reality and prospects of supply chains under digital transformation in the Palestinian business environment were rated highly. The most significant aspect of this is that digital transformation reduces costs in supply chains.
2. The reality of economic sustainability in the Palestinian business environment was also rated highly. The most notable feature of economic sustainability in this environment is that digital transformation increases manufacturing efficiency across all levels of supply chains.
3. There is a significant impact of the reality and prospects of supply chains under digital transformation on the sustainable business environment in Palestine.
4. A positive (direct) statistically significant correlation was found at the 5% significance level ($\alpha \leq 0.05$) between the reality and prospects of supply chains under digital transformation and the sustainable business environment.

13. Recommendations

Based on the results of this study, the researcher recommends that future research focus on several aspects to enhance the understanding and improvement of supply chains in the context of digital transformation. Future studies should explore the impact of artificial intelligence (AI) and machine learning on improving supply chain efficiency and reducing costs. Additionally, the role of financial technology (FinTech) in enhancing transparency and simplifying financial processes in supply chains

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should be investigated. Comparative studies between Palestine and other countries are important for exchanging expertise and best practices in this field. It is also crucial to examine the impact of geopolitical and economic challenges on the sustainability of Palestinian supply chains. Lastly, the researcher suggests exploring ways to strengthen collaboration between public, private, and academic institutions to develop innovative and sustainable solutions for improving supply chains in light of digital transformation.

13.1. Future Studies

1. Investigating how the integration of different technologies such as AI, blockchain, and the Internet of Things (IoT) can improve the efficiency and effectiveness of supply chains.
2. Studying the impact of digital transformation on employment and the skills required in the supply chain sector.
3. Analyzing the economic impact of digital transformation on companies and the economy as a whole.

Institutional Review Board Statement:

Ethical review and approval were waived for this study, as it did not involve direct participation of humans.

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Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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