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Case Report

The Role of Decision Support Systems (DSS) in Enhancing Electronic Supply Chain Performance: A Case Study on Syriatel Using the Oracle System

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Abstract: This study investigates the role of Decision Support Systems (DSS) in enhancing electronic supply chain performance within Syriatel, which relies on the Oracle ERP system as an integrated decision-support platform. Although previous studies have examined DSS and ERP impacts on supply chain performance, most were conducted in stable business environments and outside the Syrian context, leaving a clear research gap regarding the effectiveness of DSS dimensions in developing countries operating under economic and operational constraints. This study contributes to the literature by empirically examining how the four DSS dimensions—data management subsystem, model management subsystem, knowledge management subsystem, and user interface system affect electronic supply chain performance in a real-world, resource-constrained environment. A descriptive analytical methodology was adopted, and data were collected through a questionnaire administered to 34 employees in the Supply Chain Management (SCM) and Management Information Systems (MIS) departments. Simple and multiple regression analyses revealed a positive and statistically significant relationship between DSS and electronic supply chain performance. The knowledge management subsystem emerged as the most influential dimension, followed by the user interface system, while data management and model management subsystems showed no statistically significant effects likely due to sample size limitations and functional overlap among DSS components. The study recommends strengthening knowledge management capabilities, improving database updating practices, enhancing user training, and expanding the adoption of integrated ERP systems such as Oracle to improve electronic supply chain performance.

Keywords: Decision Support System (DSS); electronic supply chain; supply chain performance; Enterprise Resource Planning (ERP); Oracle system

1. Introduction

Electronic supply chains have become a critical pillar of modern organizational competitiveness, enabling firms to integrate suppliers, internal operations, and customers through digital platforms that support rapid information exchange and data-driven decision-making. As global markets become increasingly dynamic and technology-driven, organizations are compelled to adopt advanced digital tools that enhance efficiency, responsiveness, and operational integration across the supply chain. Among these tools, Decision Support Systems (DSS) play a central role by providing analytical capabilities that improve planning, forecasting, inventory control, and coordination across supply chain activities.

Despite the growing global adoption of DSS and ERP systems, many organizations particularly in developing and crisis-affected economies continue to struggle with achieving optimal electronic supply chain performance. Challenges such as fragmented information systems, limited analytical capacity, and difficulties in processing large volumes of data hinder the ability to make timely and accurate decisions. While existing literature has extensively examined the impact of DSS on supply chain performance, most studies have been conducted in technologically advanced or stable economic environments. This leaves a significant research gap regarding how DSS functions in contexts characterized by resource constraints, infrastructural limitations, and operational volatility. Furthermore, limited empirical evidence exists on how specific DSS dimensions data management, model management, knowledge management, and user interface systems contribute to electronic supply chain performance within organizations operating under such conditions.

This study addresses these gaps by examining the role of DSS in improving electronic supply chain performance at Syriatel, one of the largest telecommunications companies in Syria. Syriatel operates within a challenging economic environment and relies on the Oracle ERP system as an integrated decision-support platform. The innovation of this research lies in its empirical investigation of DSS effectiveness within a real-world, resource-constrained setting, offering insights that differ from those documented in studies conducted in more stable or technologically mature contexts. By analyzing the influence of the four DSS dimensions on electronic supply chain performance, the study provides a nuanced understanding of how DSS contributes to operational improvement and organizational responsiveness in environments where digital transformation faces structural and contextual barriers.

2. Previous Studies

Decision-making in the field of supply chains has become increasingly complex for companies and organizations, as it requires decisions to be made at all strategic, tactical, managerial, and operational levels. Undoubtedly, Decision Support Systems (DSS) have played a pivotal role in this field. In this context, the study by Ghate and Baghela [1] reviewed research published between 2015 and 2024 on the application of Oracle Fusion Cloud in improving supply chain operations, with the aim of providing a comprehensive solution to address these challenges. Additionally, the study by Elrayah and Mirzaliev [2] aimed to examine the impact of Decision Support Systems and Artificial Intelligence (AI) on supply chain performance, while also investigating the moderating role of top management support. The results indicated that integrating DSS dimensions with AI technologies significantly contributes to improving supply chain performance. Similarly, the study by Judijanto et al. [3] pointed out that enhancing supply chain efficiency can be achieved through the implementation of advanced decision support systems supported by real-time data integration, artificial intelligence, and Machine Learning (ML). The findings revealed a noticeable reduction in production and transportation costs.

In light of the rapid development of modern technologies and the intensification of market competition, the implementation of Enterprise Resource Planning (ERP) systems considered one of the tools of Decision Support Systems has become a major challenge in selecting the most appropriate system for companies. The study by Asif et al. [4] concluded that the implementation of ERP systems significantly improves supply chain performance by reducing costs, enhancing delivery processes, and increasing efficiency and customer satisfaction. These findings are consistent with the results of Hasan et al. [5], which indicated that the adoption of ERP systems, particularly Oracle, has a statistically significant impact on improving supply chain performance. Likewise, Lukyanova et al. [6] reported that ERP systems used in both the humanitarian and private sectors have substantial effects on supply chain performance.

In the field of knowledge management, the study by Alahmadi and Jamjoom [7] proposed a knowledge-based framework for a Decision Support System aimed at supporting decision-makers in dealing with supply chain-related control decisions. The results emphasized the necessity of considering accompanying factors during the decision-making process, such as information quality and clarity, material costs, lack of funding, and other factors related to the flow of information and materials.

The study by Alamery [8] aimed to identify the factors affecting the efficiency of electronic supply chain performance in industrial companies listed on the Amman Stock Exchange. The study concluded the existence of an impact of hardware and software components, databases, technical support, communication networks, and system integration on electronic supply chain performance.

Several studies have also addressed the requirements for managing supply chain performance under ERP systems and evaluating their capabilities. Forslund concluded that ERP systems generally possess strong capabilities in managing supply chain performance, and that Oracle and iScala systems were the most supportive in this area [9].

However, most of these studies were conducted in stable business environments or outside the context of Syrian companies. Therefore, there is a research gap represented by the lack of field studies examining the role of DSS particularly the Oracle system in improving electronic supply chain performance within Syrian companies. This study seeks to address that gap through a field study conducted at Syriatel.

3. Research Hypotheses

This field study investigates the impact of Decision Support Systems (DSS) and their key components on Electronic Supply Chain Performance (e-SCP). Guided by the theoretical framework and prior literature and as illustrated in Figure 1, Conceptual Framework the following hypotheses are formulated.

- Main Hypothesis:

H-DSS: There is a significant impact of Decision Support Systems (DSS) on Electronic Supply Chain Performance.

- Sub-Hypotheses Based on DSS Components:

H-DM: There is a significant impact of the Data Management Subsystem on Electronic Supply Chain Performance.
H-MM: There is a significant impact of the Model Management Subsystem on Electronic Supply Chain Performance.
H-KM: There is a significant impact of the Knowledge Management Subsystem on Electronic Supply Chain Performance.
H-UI: There is a significant impact of the User Interface System on Electronic Supply Chain Performance.

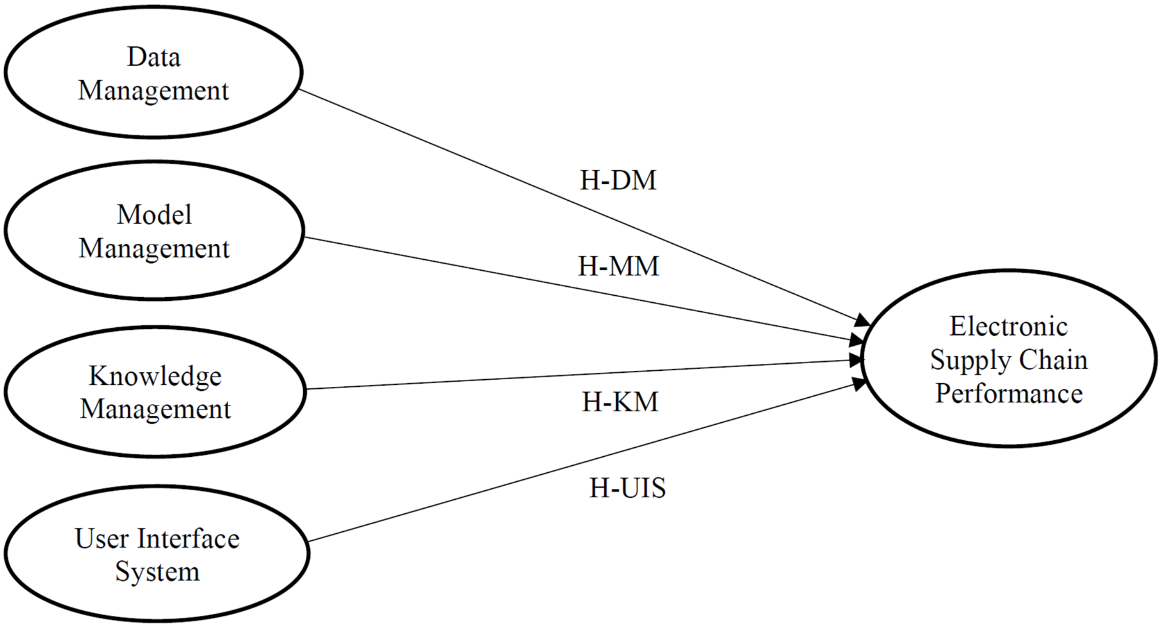

Figure 1. Conceptual framework.

4. Research Problem

The rapid digital transformation of the contemporary business environment has compelled organizations to redesign their supply chains to become more electronic, integrated, and agile. Despite this shift, many firms continue to struggle with achieving optimal electronic supply chain performance due to fragmented information flows and the difficulty of making accurate, timely decisions in the presence of large and complex data streams. Within this context, Decision Support Systems (DSS) have emerged as a critical strategic tool capable of processing and analyzing data, generating insights, and supporting managerial decisions that enhance operational efficiency and overall supply chain effectiveness.

Based on the above, the research problem was formulated through the following questions:

- To what extent does the decision support system contribute to improving the performance of the electronic supply chain?
- What are the main dimensions of decision support systems that affect the efficiency and effectiveness of the electronic supply chain within the company?

- What is the relationship between the level of utilization of the Oracle system as a decision support tool and the improvement of operational responsiveness and integration in the electronic supply chain?

5. Theoretical Review

5.1. Decision Support Systems (DSS)

Decision Support Systems (DSS) are interactive computer-based systems designed to assist decision-makers in analyzing data and solving complex problems. These systems integrate data, analytical models, and knowledge to support managerial decision-making processes. DSS provide intelligent access to relevant information and enable decision-makers to structure problems, evaluate alternatives, and select optimal solutions.

In modern organizations, DSS are widely used to support strategic and operational decisions in areas such as logistics, production planning, and financial management. These systems rely on several analytical methods, including operations research, statistics, decision theory, artificial intelligence, and engineering economics, to improve the quality and speed of decision-making [10].

5.2. Decision Support System Framework

The structure of a Decision Support System typically consists of several interconnected components that facilitate data processing and decision-making. According to Elkady et al. [11], DSS frameworks generally include three main components:

(1) Data component: This represents the input of the system, which may originate from databases, files, or other information sources. The data component stores and organizes information necessary for decision-making and may also incorporate expert knowledge.
(2) Model component: This component includes analytical and computational models used to process the input data and support the evaluation of different decision alternatives. These models help decision-makers simulate scenarios and assess potential outcomes.
(3) Output or processed data: This represents the results generated by the models after analyzing the input data. These outputs provide insights that support the decision-maker in selecting appropriate actions. These components interact to form an integrated decision-support environment, as illustrated in Figure 2.

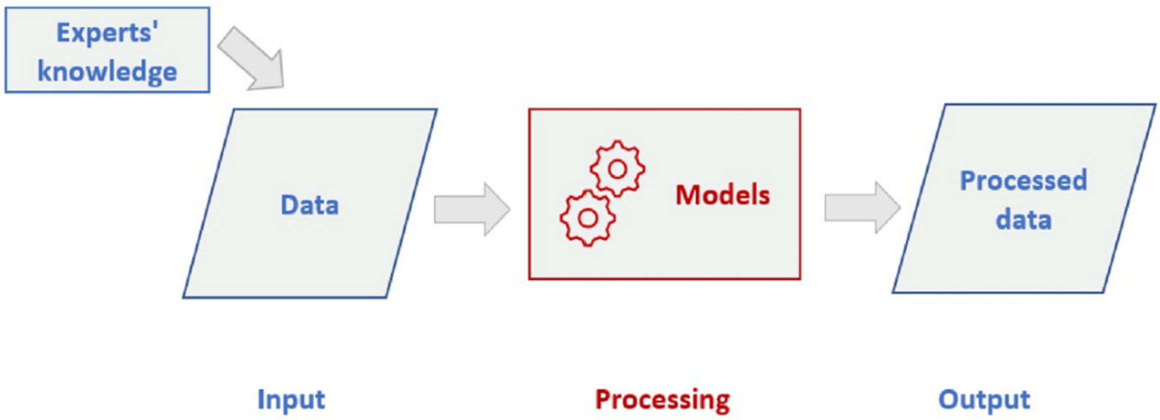

Figure 2. The main parts of a decision support framework.

5.3. Enterprise Resource Planning (ERP) Systems

Enterprise Resource Planning (ERP) systems represent an important technological infrastructure that supports organizational integration and decision-making. ERP systems consist of a set of integrated software modules that manage various business functions such as finance, marketing, manufacturing, logistics, and human resources.

These systems rely on centralized databases that enable organizations to store, process, and share information across departments. Through this integration, ERP systems enhance organizational coordination and improve operational efficiency by ensuring that information related to customers, suppliers, employees, and financial operations is accessible across the entire organization [9].

5.4. The Role of ERP Systems in Supporting Supply Chain Performance

ERP systems play a significant role in improving supply chain performance by facilitating information integration and supporting decision-making processes. Major ERP platforms such as SAP, Oracle, Baan, and PeopleSoft provide organizations with high levels of integration by using unified data models and standardized rules for accessing and sharing information across departments [12].

These integrated systems enable organizations to monitor operations, analyze performance indicators, and reduce operational risks within supply chains. As illustrated in Figure 3, several ERP systems demonstrate strong capabilities in supporting supply chain performance management. Among these systems, Oracle, Lawson M3, and iScala have been identified as particularly effective in supporting performance metrics management and target-setting activities. Additionally, systems such as SAP/R3, Oracle, JD Edwards, IFS, and IBS provide strong support for analyzing performance-related issues [9].

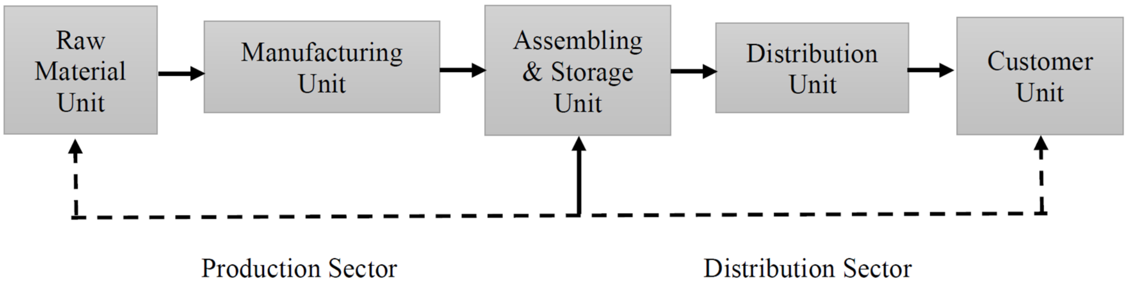

Figure 3. Supply chain management framework.

Overall, Oracle is considered one of the most capable ERP systems in supporting supply chain performance management due to its advanced capabilities in data integration, analytics, and real-time reporting. These capabilities enable organizations to improve operational coordination and enhance decision-making across supply chain activities.

5.5. Supply Chain Management

Supply chain management refers to the network of organizations, people, technologies, and activities involved in producing and delivering goods or services to end customers. A supply chain includes all processes related to sourcing raw materials, transforming them into intermediate and finished products, and distributing them to customers.

The main objective of supply chain management is to deliver the right product to the right place at the right time while minimizing costs and ensuring efficiency in the flow of materials and information across the supply chain [13].

5.6. Supply Chain Management Framework

The supply chain management framework typically consists of several interconnected stages linking raw material suppliers to final customers. These stages can generally be divided into two main sectors: the production sector and the distribution sector.

The production sector includes the preparation of raw materials, manufacturing processes, and product assembly activities. The distribution sector involves storage, transportation, and delivery operations that ensure products reach customers efficiently.

Figure 3 illustrates the structure of the supply chain management framework, beginning with the raw material unit and ending with the customer unit. This framework highlights the flow of materials and information across different supply chain stages and demonstrates the interdependence between production and distribution activities [13].

5.7. Electronic Supply Chain (e-SC)

With the rapid advancement of digital technologies, traditional supply chains have evolved into electronic supply chains (e-SC), which rely heavily on digital platforms and information systems. Electronic supply chains allow organizations to exchange information such as inventory levels, forecasts, financial data, and product specifications in real time.

The adoption of digital tools enhances collaboration among supply chain partners and improves operational efficiency by facilitating faster information exchange and better coordination among stakeholders [14].

An electronic supply chain can be defined as a virtual network of organizations connected through electronic data interchange (EDI) systems or Internet-based applications. These technologies enable organizations to conduct transactions, share information, and coordinate supply chain activities more effectively. Through these systems, firms can manage the flow of products, services, and financial resources across supply chain partners [12].

5.8. Relationship between DSS and Electronic Supply Chain Performance

Advancements in information technology have significantly enhanced the role of Decision Support Systems in supply chain management. DSS enable organizations to analyze large volumes of data, forecast market trends, and evaluate alternative strategies, thereby improving the quality of managerial decisions.

By integrating analytical models, real-time data, and knowledge resources, DSS help reduce decision-making complexity and enhance operational responsiveness within supply chains. Consequently, organizations that effectively utilize decision support systems are better positioned to optimize supply chain performance and respond to dynamic market conditions [13].

5.9. The Concept of Electronic Supply Chain (e-SC)

In the recent complex environment, firms must examine how to enhance the sustainability and performance of their supply chains. Digital tools can be used as they allow companies to share inventory and capacity plans, forecasts, financial data, databases, and data about products which improve the performance of supply chains. The use of digital tools helps firms to become an important part of the supply chain as intermediaries or online e-marketplaces [14].

Electronic Supply Chain (e-SC) can be defined as a chain that is electronically managed in form of EDI-based or Internet based between or among participating organizations. Basically, it is a Virtual Supply Chain, which links organizations to allow them to buy, sell and move products, services and cash by using Internet-based applications to transact and exchange information with their downstream or upstream. American-On-Line and last-minute have achieved innovative results using e-SC [12].

5.10. The Relationship between DSS and e-SCP

The latest advancements in information technology have created a decision support system with the supply chain. The implementation of the decision support system has helped in decreasing the complexity of decision making. Various decisions and forecasting related to the market trends can be easily made using the decision support system. This scheme helps the decision-making authority to make correct decisions [13].

6. Research Significance

6.1. Theoretical Significance

The theoretical significance of this research lies in enriching the existing academic literature related to the role of Decision Support Systems (DSS) in improving the performance of electronic supply chains, particularly within institutional environments that face recurring challenges and crises, as is the case in the Syrian context. The study clarifies how these systems can serve as a scientific framework that supports decision-making processes. Accordingly, this research adds a new theoretical dimension to the understanding of how Decision Support Systems can be effectively utilized within digital supply chain environments in developing countries.

6.2. Practical Significance

The practical significance of this research stems from its field application at Syriatel, as one of the leading organizations that rely on the Oracle system in managing their operational activities. This application contributes to evaluating the actual role of the Decision Support System in improving operational and administrative performance and provides results that may assist decision-makers in developing work methods and enhancing system integration, thereby increasing efficiency and strengthening competitive advantage.

7. Research Objectives

This research aims to analyze and clarify the role of Decision Support Systems (DSS) in improving the overall performance of the electronic supply chain, by determining the extent to which these systems contribute to enhancing the efficiency and speed of decision-making within the electronic supply chain. The study also seeks to analyze the main dimensions of Decision Support Systems and to identify their impact on the efficiency and effectiveness of the supply chain within the company. Furthermore, the research examines the relationship between the level of utilization of the Oracle system as a decision support tool and the improvement of operational responsiveness and integration among the components of the electronic supply chain within the organizational environment, ultimately proposing a set of recommendations that help companies maximize the benefits of these systems, thereby enhancing operational performance and competitive advantage.

8. Research Methodology

This study adopts the Descriptive-Analytical approach, as it is the most appropriate method for examining administrative and technological phenomena and analyzing the relationships among their variables. The descriptive approach aims to describe the current state of Decision Support System (DSS) utilization within Syriatel and to analyze the extent to which these systems contribute to improving the electronic supply chain performance.

8.1. The Research Population and Sample

The study's sample comprises employees from Syriatel, specifically those within the Logistics and Supply Chain Management (SCM) and Management Information Systems (MIS) departments. These departments were strategically chosen because of their pivotal role in managing the electronic supply chain and administrative workflows via the Oracle system.

To ensure data integrity and professional ethics, the researchers established formal communication with Syriatel. A non-disclosure agreement (NDA) was signed, pledging that all provided data would be used exclusively for scientific research purposes.

Despite the inherent complexities of accessing corporate data, this collaborative approach yielded 34 completed surveys. Crucially, this sample represents approximately 50% of the total employees within the targeted departments. Given this high representation rate, the findings serve as a highly reliable indicator of how Decision Support Systems (DSS) enhance electronic supply chain performance within the organization.

8.2. Data Collection Tool

The data was collected through a questionnaire directed at the employees of Syriatel, designed to measure the role of Decision Support Systems (DSS) in enhancing electronic supply chain performance using the Oracle system. The questionnaire relies on a five-point Likert scale, where participants can choose their answers from five categories: "Strongly Agree", "Agree", "Neutral", "Disagree", and "Strongly Disagree". The questionnaire was sent via email to the Training Department head at Syriatel and was electronically published in the Management Information Systems (MIS) department and the Logistics and Supply Chain Management (SCM) department. The questionnaire consists of three main parts:

(1) Part one: Contains demographic information about the respondent: (gender, age, educational qualification, years of experience).
(2) Part two: Focuses on the dimensions of the Decision Support System, designed based on the Turban model [15], which includes four main dimensions aimed at measuring the effectiveness of the DSS components.
(3) Part three: Electronic supply chain performance, which consists of a set of statements adapted from Alamery's study [8], measuring the impact of these dimensions on the electronic supply chain performance, based on indicators such as cost reduction, efficiency improvement, enhanced communication between the company and suppliers, and flexibility in production and supply operations.

8.3. Descriptive Study of the Sample

Table 1 shows that the number of male employees is 16, representing 47.1% of the sample, while the number of female employees is 18, representing 52.9% of the sample. These results reflect a relatively balanced gender distribution in the studied sample, with a slight increase in the number of females compared to males.

Table 1. Respondents gender.

Gender	Frequency	Percent
Male	16	47.1
Female	18	52.9
Total	34	100.0

Source: Program outputs SPSS.

Table 2 shows the distribution of the sample members by age. The number of individuals in the age group under 30 years is 6, representing 17.6% of the total sample. The age group between 30 and 39 years constitutes the largest proportion of the sample, with 22 individuals, representing 64.7%. The age group between 40 and 49 years includes 4 individuals, representing 11.8%. Finally, the age group of 50 years and above consists of only 2 individuals, representing 5.9% of the total sample. Therefore, the majority of individuals are concentrated in the 30–39 age group.

Table 2. Respondents age (years).

Age	Frequency	Percent
Under 30	6	17.6
30–39	22	64.7
40–49	4	11.8
50 and above	2	5.9
Total	34	100

Source: Program outputs SPSS.

Table 3 shows the distribution of the sample members by educational qualification. The number of individuals holding a Bachelor's degree is 22, representing 64.7% of the total sample. Meanwhile, the number of individuals with a Master's degree is 12, representing 35.3%. Thus, the majority of the sample members hold a Bachelor's degree.

Table 3. Respondents education.

Education	Frequency	Percent
Bachelor's	22	64.7
Master's	12	35.3
Total	34	100

Source: Program outputs SPSS.

Table 4 shows the distribution of the sample members by years of experience. The number of individuals with less than 5 years of experience is 6, representing 17.6% of the total sample. The largest number of individuals falls within the 5 to 10 years of experience category, with 18 individuals, representing 52.9%. The number of individuals with 11 to 15 years of experience is 6, representing 17.6%. Finally, the number of individuals with 15 years or more of experience is 4, representing 11.8%. Therefore, the majority of individuals are concentrated in the 5 to 10 years of experience category.

Table 4. Respondents experience.

Experience	Frequency	Percent
Less than 5 years	6	17.6
5–10	18	52.9
11–15	6	17.6
15 years and above	4	11.8
Total	34	100

Source: Program outputs SPSS.

9. Reliability and Validity of the Questionnaire

Reliability refers to the degree of consistency, coherence, and stability of the questionnaire in providing the same results when used at different times. In other words, the questionnaire should yield similar readings each time it is used. Several methods are used to assess reliability, with the most common being Cronbach's Alpha coefficient, which ranges from zero to one. The higher the reliability coefficient, the greater the confidence in the questionnaire used.

Table 5 shows the results of the Cronbach's Alpha test, from which the following conclusions can be drawn:

- Data Management Subsystem (DM) scale, consisting of 5 statements, showed a Cronbach's Alpha value of 0.856, indicating that the internal consistency of this dimension is very good.
- Model Management Subsystem (MM) scale, consisting of 5 statements, showed a Cronbach's Alpha value of 0.720, which is considered acceptable but reflects a moderate internal consistency.

- Knowledge Management Subsystem (KM) scale, consisting of 5 statements, showed a Cronbach's Alpha value of 0.900, meaning that the internal consistency of this dimension is excellent.
- User Interface System (UIS) scale, consisting of 5 statements, showed a Cronbach's Alpha value of 0.858, indicating very good internal consistency.
- Electronic Supply Chain Performance (e-SCP) scale, consisting of 10 statements, showed a Cronbach's Alpha value of 0.945, which is considered very high, indicating excellent internal consistency for this scale.

The high values of Cronbach's Alpha reflect that the items of the questionnaire are homogeneous and consistently measure the concepts they were designed for. It is noteworthy that most of the dimensions exceeded the minimum acceptable reliability coefficient (0.65), indicating the quality and validity of the measurement tool for use in the field study. Additionally, the significant increase in the reliability values for some dimensions, particularly knowledge management and electronic supply chain performance, indicates the clarity and accuracy of the items in measuring the variables under study.

Table 5. Cronbach's alpha coefficient values for the study variables.

Scale	Dimension	N of Items	Cronbach's Alpha
DSS	DM	5	0.856
	MM	5	0.72
	KM	5	0.9
	UI	5	0.858
	e-SCP	10	0.945

Source: Program outputs SPSS prepared by the researcher.

10. Analysis of the Questionnaire Statements

To interpret the study results and assess the level of response, the mean scores were calculated for the questionnaire domains and the individual statements within each domain. Since the variable representing the choices according to the five-point Likert scale is an ordinal scale, the numbers entered into the program are (Strongly Agree = 5, Agree = 4, Neutral = 3, ...) which represent the weights. The weighted mean is then calculated by first determining the interval length, which in our example is the result of dividing 4 by 5. The number 4 represents the number of intervals (from 1 to 2 is the first interval, from 2 to 3 is the second interval, from 3 to 4 is the third interval, and from 4 to 5 is the fourth interval), while 5 represents the number of options. Dividing 4 by 5 gives the interval length, which equals 0.80. Based on these calculations and as presented in Table 6 the evaluation levels were determined according to the following classification:

Table 6. Evaluation levels of the test.

Mean	Level of Agreement
From 1.79 to 1	Very Low
From 1.8 to 2.5	Low
From 2.6 to 3.39	Moderate
From 3.4 to 4.19	High
From 4.2 to 5	Very High

Statements of the first dimension (Data Management Subsystem): Measures the effectiveness of the Oracle Decision Support System in collecting, organizing, and storing decision-relevant data.

The analysis results related to "Data Management Subsystem" as shown in Table 7 that the mean score is 4.1412, indicating high agreement, meaning that the participants in the survey rated this dimension very positively. Additionally, the standard deviation value of 0.45 indicates significant agreement among the participants' opinions, as most responses were close to the mean. The *p*-value of 0.00 further confirms that this dimension shows statistically significant differences.

Statements of the second dimension (Model Management Subsystem): Measures the efficiency of the Oracle Decision Support System in managing the quantitative and analytical models used to support decision-making.

The analysis results related to "Model Management Subsystem" as shown in Table 8 that the mean score is 3.6471, indicating high agreement, but lower than the mean score for data management. This means that participants perceive model management as having a positive impact, but to a lesser degree compared to the first dimension. The standard deviation value of 0.61311 indicates variability in participants' opinions regarding the impact of model management Subsystem, reflecting some differences in their assessment of the importance of this dimension. However, the *p*-value of 0.00 reinforces the statistical significance of these statements.

Table 7. One-sample *t*-test for data management subsystem.

Statement	N	Mean	Std. Deviation	Sig. (2-Tailed)
Comprehensive DSS database	34	4	0.34816	0.00
Regular data updates	34	4.2941	0.57889	0.00
Easy data access	34	4.3529	0.48507	0.00
Integrated data sources	34	4	0.696311	0.00
Secure data permissions	34	4.0588	0.6486	0.00
DM	34	4.1412	0.45	0.00

Source: Program outputs SPSS prepared by the researcher.

Table 8. One-sample *t*-test for model management subsystem.

Statement	N	Mean	Std. Deviation	Sig. (2-Tailed)
Variety of analytical models	34	3.8824	0.8444	0.00
Model customization	34	3.5294	1.05127	0.00
What-if analysis capability	34	3.2941	1.08793	0.00
Risk and sensitivity models	34	3.5294	0.86112	0.00
Regular model updates	34	4	0.49237	0.00
MM	34	3.6471	0.61311	0.00

Source: Program outputs SPSS prepared by the researcher.

Statements of the third dimension (Knowledge Management Subsystem): Measures the ability of the Oracle Decision Support System to store and utilize organizational knowledge and experience.

The analysis results related to "Knowledge Management Subsystem" as shown in Table 9 that the mean score is 3.8353, reflecting high agreement with this dimension. This value indicates that participants recognize the important role of knowledge management, the standard deviation value of 0.63527 indicates variability in participants' opinions regarding the impact of knowledge management, and the *p*-value of 0.00 confirms that these statements have statistically significant differences.

Table 9. One-Sample *t*-test for knowledge management subsystem.

Statement	N	Mean	Std. Deviation	Sig. (2-Tailed)
Organizational knowledge documentation	34	3.7647	0.88963	0.00
Accessible knowledge base	34	4.0588	0.54723	0.00
Experience-based decision support	34	3.7647	0.65407	0.00
Updated knowledge resources	34	3.7647	0.88963	0.00
Conversion of tacit knowledge	34	3.8235	0.7165	0.00
KM	34	3.8353	0.63527	0.00

Source: Program outputs SPSS prepared by the researcher.

Statements of the fourth dimension (User Interface System): Measures the ease and effectiveness of interaction between the user and the system.

The analysis results related to "User Interface System" as shown in Table 10 that the mean score is 3.7294, which indicates that participants view this dimension as having a high degree of agreement. The standard deviation of 0.61078 suggests some variability in participants' opinions about this dimension, with some considering it more impactful than others. However, the *p*-value of 0.00 indicates that these statements also have a statistically significant impact.

Statements of the fifth dimension (Electronic Supply Chain Performance): Measures the effectiveness of electronic supply chain performance.

The statements related to "Electronic Supply Chain Performance" as shown in Table 11 that the mean score is 3.9176, which is a high agreement indicating that participants perceive this dimension to have a positive impact. With a standard deviation of 0.58903, there is relative agreement among the participants in evaluating the importance of these statements. The *p*-value of 0.00 confirms that these statements also have statistically significant differences.

Table 10. One-sample *t*-test for user interface system.

Statement	N	Mean	Std. Deviation	Sig. (2-Tailed)
Easy system interface	34	3.8235	0.7165	0.00
Interactive tools and dashboards	34	3.7059	0.75996	0.00
Immediate system feedback	34	3.5882	0.78306	0.00
Easy system navigation	34	3.7647	0.74096	0.00
Customizable screens/reports	34	3.7647	0.81868	0.00
UI	34	3.7294	0.61078	0.00

Source: Program outputs SPSS prepared by the researcher.

Table 11. One-sample *t*-test for electronic supply chain performance.

Statement	N	Mean	Std. Deviation	Sig. (2-Tailed)
Cost reduction through e-SCP	34	3.9412	0.73613	0.00
Effective communication with suppliers	34	3.8824	0.91336	0.00
Improved manufacturing efficiency	34	3.8824	0.68599	0.00
Flexible supplier operations	34	3.9412	0.6486	0.00
Enhanced process improvement	34	3.8824	0.8444	0.00
Transparent information exchange	34	4	0.69631	0.00
After-supply service alignment	34	4.1176	0.68599	0.00
Supplier reliability	34	3.7647	0.55371	0.00
Efficient integration with suppliers	34	3.8824	0.68599	0.00
Improved business performance	34	3.8824	0.68599	0.00
e-SCP	34	3.9176	0.58903	0.00

Source: Program outputs SPSS prepared by the researcher.

11. Hypotheses Testing

11.1. Main Hypothesis

H-DSS: There is a significant impact of Decision Support Systems (DSS) on Electronic Supply Chain Performance.

Table 12 presents the results of the multiple regression analysis for the main hypothesis (H-DSS). The multiple correlation coefficient reached 0.949, indicating a strong correlation between the independent variables collectively and the dependent variable. The coefficient of determination (R^2) amounted to 0.900, which indicates that the dimensions of Decision Support Systems (DSS) explain 90% of the variance in electronic supply chain performance. Furthermore, the results of the *F*-test showed a value of 26.940, confirming the overall validity of the regression model. The significance level *p*-value was 0.00, which is lower than the adopted significance level of 0.05, indicating the existence of a positive and statistically significant relationship between Decision Support Systems and the improvement of electronic supply chain performance.

Table 12. Multiple Regression of DSS on e-SCP.

Model	R	R^2	F	Sig
H-DSS	0.949	0.900	26.940	0.00

Source: Program outputs SPSS prepared by the researcher.

Based on the results presented in Table 13, it is evident that the significance level corresponding to the multiple regression test is less than 0.05 for H-KM and H-UI. Accordingly, it can be concluded that there is a positive and statistically significant effect for these dimensions—knowledge management subsystem and user interface system—which reflects their importance in supporting the decision-making process and improving the efficiency of information exchange within the electronic supply chain.

Table 13. Multiple regression coefficients of DSS on e-SCP.

Model	B	Beta	T	Sig
(Constant)	−0.591	-	−1.070	0.306
H-DM	0.336	0.257	1.701	0.115
H-MM	−0.004	−0.004	−0.039	0.969
H-KM	0.571	0.616	4.062	0.002
H-UI	0.252	0.262	2.687	0.02

Source: Program outputs SPSS prepared by the researcher.

In contrast, the significance level corresponding to the multiple regression test exceeds 0.05 for H-DM and H-MM. Therefore, it can be concluded that there are no statistically significant differences within the overall model for these dimensions—data management and model management subsystem. This result may be interpreted in light of the limited sample size; as small samples often reduce the statistical power to detect the true effects of certain variables. Additionally, this may be attributed to a relative overlap among the dimensions of Decision Support Systems, which makes some dimensions less capable of demonstrating their independent statistical effect within the DSS model.

To examine the relationship between the independent variables of the Decision Support System and the dependent variable (electronic supply chain performance), the multiple regression equation is employed. This equation allows for identifying the relative effect of each independent variable on the dependent variable, thereby enhancing the ability to obtain more precise results and to estimate the strength and impact of the different factors on e-SCP. This, in turn, supports decision-making based on clear analytical results. The general form of the multiple regression equation is presented as follows:

$$\boldsymbol{Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_n X_n + \epsilon}$$

Where $\boldsymbol{Y}$ represents the dependent variable that is being predicted or explained, while $\boldsymbol{\alpha}$ denotes the constant or intercept, which is the value of the dependent variable when all independent variables are equal to zero. $\boldsymbol{\beta_1, \beta_2 \cdots \beta_n}$ represent the regression coefficients, indicating the magnitude of the effect of each independent variable on the dependent variable. $\boldsymbol{X_1, X_2 \cdots X_n}$ denote the independent variables or dimensions that explain or influence the dependent variable, while $\boldsymbol{\epsilon}$ represents the random error term or unexplained factors not captured by the independent variables included in the mode. Based on the above, the regression equation for the variables can be derived as follows:

$$\text{e-SCP} = -0.591 + 0.336\,(\text{DM}) - 0.004\,(\text{MM}) + 0.571\,(\text{KM}) + 0.252\,(\text{UI})$$

In this equation, –0.591 represents the constant or intercept, 0.336 reflects the effect of Data Management Subsystem (DM), –0.004 represents the effect of Model Management Subsystem (MM), 0.571 indicates the effect of Knowledge Management Subsystem (KM), and 0.252 reflects the effect of the User Interface System (UIS). This equation illustrates how the different dimensions of the Decision Support System influence the improvement of electronic supply chain performance.

11.2. Testing Sub-Hypotheses Based on DSS Components

H-DM: There is a significant impact of the Data Management Subsystem on Electronic Supply Chain Performance.

Table 14 presents the results of the simple regression analysis for the first sub-hypothesis (H-DM). The correlation coefficient reached 0.818, indicating a strong relationship between database management and electronic supply chain performance. The coefficient of determination (R^2) amounted to 0.669, which indicates that database management explains 66.9% of the variance in e-SCP. The regression coefficient reached 1.071, indicating that a one-unit increase in the level of database management leads to an increase of 1.071 units in e-SCP. Furthermore, the significance value was 0.00, which is lower than the adopted significance level of 0.05, indicating the existence of a positive and statistically significant relationship between database management and the improvement of e-SCP.

Table 14. Simple regression for data management subsystem.

Model	R	R^2	B	Sig
H-DM	0.818	0.669	1.071	0.00

Source: Program outputs SPSS prepared by the researcher.

H-MM: There is a significant impact of the Model Management Subsystem on Electronic Supply Chain Performance.

Table 15 presents the results of the simple regression analysis for the second sub-hypothesis (H-MM). The correlation coefficient reached 0.511, indicating a moderate relationship between model management Subsystem and electronic supply chain performance. The coefficient of determination (R^2) amounted to 0.261, which indicates that model management subsystem explains 26.1% of the variance in e-SCP. The regression coefficient reached 0.491, indicating that a one-unit increase in the level of model management Subsystem leads to an increase of 0.491 units in e-SCP. Furthermore, the significance value was 0.036, which is lower than the adopted significance level of 0.05, indicating the existence of a positive and statistically significant relationship between model management subsystem and the improvement of e-SCP.

Table 15. Simple regression for model management subsystem.

Model	R	R^2	B	Sig
H-MM	0.511	0.261	0.491	0.036

Source: Program outputs SPSS prepared by the researcher.

H-KM: There is a significant impact of the Knowledge Management Subsystem on Electronic Supply Chain Performance.

Table 16 presents the results of the simple regression analysis for the third sub-hypothesis (H-KM). The correlation coefficient reached 0.896, indicating a strong relationship between knowledge management Subsystem and electronic supply chain performance. The coefficient of determination (R^2) amounted to 0.802, which indicates that knowledge management subsystem explains 80.2% of the variance in e-SCP. The regression coefficient reached 0.830, indicating that a one-unit increase in the level of knowledge management subsystem leads to an increase of 0.830 units in e-SCP. Furthermore, the significance value was 0.00, which is lower than the adopted significance level of 0.05, indicating the existence of a positive and statistically significant relationship between knowledge management subsystem and the improvement of e-SCP.

Table 16. Simple regression for knowledge management subsystem.

Model	R	R^2	B	Sig
H-KM	0.896	0.802	0.830	0.00

Source: Program outputs SPSS prepared by the researcher.

H-UIS: There is a significant impact of the User Interface System on Electronic Supply Chain Performance.

Table 17 presents the results of the simple regression analysis for the fourth sub-hypothesis (H-UI). The correlation coefficient reached 0.536, indicating a moderate relationship between the User Interface System and electronic supply chain performance. The coefficient of determination (R^2) amounted to 0.287, which indicates that the User Interface System explains 28.7% of the variance in e-SCP. The regression coefficient reached 0.517, indicating that a one-unit increase in the level of the User Interface System leads to an increase of 0.517 units in e-SCP. Furthermore, the significance value was 0.027, which is lower than the adopted significance level of 0.05, indicating the existence of a positive and statistically significant relationship between the User Interface System and the improvement of electronic supply chain performance.

Table 17. Simple regression for user interface system.

Model	R	R^2	B	Sig
H-UI	0.536	0.287	0.517	0.027

Source: Program outputs SPSS prepared by the researcher.

12. Study Results

After testing the study hypotheses, several key findings were identified:

- First, the results revealed a positive and statistically significant relationship between Decision Support Systems (DSS) and the improvement of electronic supply chain performance (e-SCP). This indicates that increasing the efficiency and effectiveness of DSS across its different dimensions contributes to enhancing supply chain performance. These results highlight the importance of adopting DSS as an integrated system in which different components interact to support organizational performance. This finding is consistent with the results reported by Elrayah and Mirzaliev [2], who found that integrating DSS with supporting technologies significantly improves supply chain performance. Similarly, Alamery [8] emphasized the role of information technology components, including hardware, software, and system integration, in enhancing electronic supply chain performance.
- Second, the analysis showed a positive and statistically significant relationship between the data management subsystem and electronic supply chain performance. Effective data collection, storage, and integration facilitate faster and more accurate decision-making processes within supply chains. This result is consistent with the findings of Judijanto et al. [3], who reported that real-time data integration through advanced

decision support systems can significantly improve supply chain efficiency.

- Third, the findings demonstrated a positive and statistically significant relationship between the model management subsystem and electronic supply chain performance. Analytical and predictive models within DSS support managers in evaluating alternatives and anticipating potential outcomes, thereby improving operational efficiency and responsiveness. This result aligns with the study of Ghate and Baghela [1], which highlighted the importance of improving supply chain processes to enhance operational efficiency, reduce costs, and increase organizational responsiveness in dynamic environments.
- Fourth, the results confirmed a positive and statistically significant relationship between the knowledge management subsystem and electronic supply chain performance. Among the DSS components, knowledge management emerged as one of the most influential dimensions in improving performance. This indicates that capturing organizational knowledge and transforming experience into accessible knowledge resources supports better decision-making. These findings correspond with the study of Alahmadi and Jamjoom (2022), which emphasized that knowledge-based decision support frameworks enhance information quality, clarity, and flow, thereby supporting more effective supply chain decisions [7].
- Fifth, the study found a positive and statistically significant relationship between the user interface system and electronic supply chain performance. A well-designed user interface facilitates easier interaction between users and the system, improves information accessibility, and supports efficient decision-making. These findings are supported by the studies of Refs. [4–6], which concluded that implementing ERP systems significantly enhances supply chain performance. Refs. [5–9] confirmed that ERP systems such as Oracle play an important role in strengthening supply chain performance and management.

In addition, the results of the multiple regression analysis indicated that the knowledge management subsystem and the user interface system have a statistically significant effect on improving electronic supply chain performance. This reflects the crucial role these dimensions play in facilitating decision-making processes and improving the efficiency of information exchange across electronic supply chains.

However, the multiple regression results did not show statistically significant effects for the data management subsystem and the model management subsystem within the overall model. This outcome may be attributed to the relatively small sample size of the study and the potential overlap among the different DSS dimensions, which may limit the ability of some variables to demonstrate their independent statistical impact within the proposed model.

13. Recommendations

Based on the findings of the study, the researcher recommends the following:

- Strengthening the adoption of Decision Support Systems (DSS) as an integrated system within organizations, with an emphasis on the integration of their various dimensions to achieve comprehensive improvement in electronic supply chain performance.
- Investing in the development of knowledge management subsystem as the most influential dimension, through documenting organizational expertise and transforming tacit knowledge into explicit, usable knowledge.
- Regularly updating operational and administrative databases to ensure their accuracy and comprehensiveness, while enabling the integration of data from multiple sources to enhance the speed and accuracy of electronic supply chain decision-making.
- Enhancing employee training and qualification programs on the use of Decision Support Systems, thereby improving the efficiency of information exchange within the electronic supply chain.
- Encouraging organizations to adopt integrated ERP systems such as Oracle due to their effective role in improving electronic supply chain performance and supporting the decision-making process.

Author Contributions

M.Y.M.A.A.: conceptualization, methodology, investigation, data curation, writing original draft preparation. A.W.: supervision, validation, writing reviewing and editing, project administration, correspondence with the journal. Both authors have read and agreed to the published version of the manuscript.

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Conflicts of Interest

The authors declare no conflict of interest.

Use of AI and AI-Assisted Technologies

During the preparation of this work, the authors used Grammarly to refine wording and correct spelling errors. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the published article.

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