جـامـعـة الـشـرق الأوسـط
MIDDLE EAST UNIVERSITY

Building A Proposed Model for Supply Chain Decisions Support System in Express Shipping Companies in Jordan

A Comparative Analysis Study

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Authorization

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Sincerely Yours,

Samia Fares AL- Tuaimeh

To my mom, my sisters and brothers for their encouragement and patience

Sincerely Yours,

Samia Fares Al-Tuaimeh

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Abstract

The main objective of this study is Building A Proposed Model for Supply Chain Decisions Support System in Express Shipping Companies at Jordan.

In order to achieve the objectives of the study, the researcher designed a questionnaire consisting of (41) paragraphs to gather the primary information from a study sample of (61) individuals. The statistical package for social sciences (SPSS) was used to analyze and examine the hypotheses. The researcher used many statistical methods to achieve the study objectives, such as simple and multi regressions. The main results of the study were:

1. There is a significant impact of decisions support system for supply chain on supply chain decisions at level ($\alpha \leq 0.05$).

2. There is a significant impact of availability of the system-oriented data to support decision and perceive their benefits on supply chain decisions at level ($\alpha \leq 0.05$).

3. There is a significant impact of sharing ideas and information with customers, suppliers and perceive its benefits on supply chain decisions at level ($\alpha \leq 0.05$).

4. There is a significant impact of exchanging data electronically with customers and suppliers and perceive its benefits on supply chain decisions at level ($\alpha \leq 0.05$).

5. There is a significant impact of cooperation and coordination with customers and perceive their benefits on supply chain decisions at level ($\alpha \leq 0.05$).

6. Through the results reached by the researcher from the descriptive analysis items and variables of the study indicate the importance level of study variables. Therefore, building a proposed model follow the normative approach and “what if " approach.

The main recommendations of the study were:

1. Recommends express shipping companies to apply the supply chain business process, including: instructions for planning, forecasting and cooperation.
2. The express shipping companies must establish supply chain relationships (cooperative and / or strategic alliances) with main customers and suppliers, on the basis of trust and cooperation to maximize the utilization of resources, and sharing of benefits arising among themselves and with beneficiaries of the services provided.

Chapter One
General Framework

(1-1): Introduction

(1-2): Study Problem and Questions

(1-3): Significance of the Study

(1-4): Objectives of the Study

(1-5): Study Hypotheses

(1-6): Study Limitations

(1-7): Study Delimitations (Difficulties)

(1-8): Terminologies

(1-1): Introduction

Due to global competition and increasing customer demand for value, the supply chain concept becomes a concern. Thus, the information must be available in real time across the supply chain partners and this can't be achieved without an integrated software system for supply chain. This integration helps in cooperation and sharing information in order to achieve customer satisfaction. This enables companies to achieve competitiveness and their profit (Mrincas, 2008). Moreover, companies try to improve the performance of their work through knowing more about its customers and suppliers and therefore organizations need new system architecture which provides an integrated environment for decision making that will help managers take smart decisions .

Today, the companies increasingly need the information systems that connect partners all over the world to improve communication across business units and supply chain partners in order to improve productivity and decision making. The companies must be using intelligent technologies to manage large quantities of data as data warehouse and decision support systems to get important information for decision making process at the right time (Mrincas, 2008).

The term supply chain management is used internationally to include every effort involved in producing and delivering a final product and service. It has focus on costs, efficiencies of supply, and the flow of materials from their various sources to their final destinations (Morana et al, 2010).

Effective supply chain management requires concurrent improvements in both customer service levels and internal operating of the companies in the supply chain. Customer service level include high order fill rate, on time delivery rate, very low rate of products returned by customers for whatever reason. Supply chain management has massive influence on organizational performance in terms of competing based on price, quality, responsiveness, and flexibility in global market (Morana et al . , 2010).

Therefore it became essential to manage supply chain process; this will lead to better control aspects of the supply and demand. So it is essential to develop an information system of the highest quality .This should lead to develop a supply chain, which is responsive enough to the changing business environment and effectively manage the inventory according to the demand and supply trends to the market (Leon-Pena, 2008).

On the other hand, the term decision support system provides correct information at the right time so the managers can make timely and more accurate decisions. Therefore, proper design of decision support systems help decision maker to extract useful information from various sources to identifying and solving problems, and making decisions. The cost reduction is challenging for any firm, which would look forward to using predictive modeling technique to forecast the possibilities for success in the firms' new product line.

Choosing the best strategy for managing returns and making the best economic sense to recycle or renew defective products is always challenging for any supply chain process. Decision support system gives an organization's employees, partners, and suppliers easy access to the information they need to do their jobs effectively, and the ability to analyze and easily share this information (Sahay & Ranjan, 2008).

Finally, this study focuses on optimizing the effectiveness and efficiency of supply chain performance by building a proposed model for supply chain decisions support system in express shipping companies in Jordan.

(1-2): Study Problem and Questions

The problem Phenomena of the current study includes three main aspects: first, supply chain, second decision support systems, and potential opportunities to implement supply chain decision support system. The problem of current study will be determined after the discussion of those three aspects as follows:

1. ***Aspects relating to supply chain***

The world has witnessed in recent decades, the phenomenon of a giant multinational corporate, which was formed through the merger of large companies with each other, or buying small companies, as the merger has been horizontal between companies that have similar process, and vertical between the companies having process complementary to each other.

The lack of coordination, cooperation and sharing of information between supply chain members, and non-use of models to support the decisions of the supply chain, lead managers to take decisions based on incomplete information.

2. ***Aspects relating to decision support systems***

Although the growing phenomenon of companies acquisition (DHL, TNT, ARAMEX and FEDEX) of electronic computers during the last years for use in their operations increased, it is used only to operate the data electronically, such as traditional control system, the information systems and database systems. In addition, the rare use of computers to operate the decision supports systems despite the need for it. This point was confirmed by most researchers in the results of their studies in management information systems and decision support systems. One of these studies was done by ***Liao & Hsu*** (2004) entitled: "An Intelligent Decision Support System for Supply Chain Integration".

3. ***Potential opportunities to implement supply chain decision support system***

The previous studies indicate that the implementation of decision support system in supply chain domain solves many problems and achieves many benefits, according to the results of a study by ***Agarwal & Shanker*** (2005) entitled "Modeling Supply Chain Performance Variables", and according to the study of ***Beheshti*** (2010) entitled" A Decision Support System for Improving Performance of Inventory Management in a Supply Chain Network".

From the previous review of the problem phenomena on both sides relating to the supply chain, decision support systems and the potential opportunities to implement supply chain decision support system. The problem of the current study was clear limitations of decision support system level in the companies under study (DHL, ARAMEX, TNT and FEDEX), and the level required from managers to support their decisions making processes in supply chain domain.

Based on the above, that may demonstrate the study's problem via stirring up the questions below:

Question One: Is there an impact of availability of the system-oriented data to support decision and perceive their benefits on supply chain decisions?

Question Two: Is there an impact of sharing ideas and information with customers, suppliers and perceive its benefits on supply chain decisions?

Question Three: Is there an impact of exchanging data electronically with customers and suppliers and perceive its benefits on supply chain decisions?

Question Four: Is there an impact of cooperation and coordination with customers and perceive their benefits on supply chain decisions?

(1-3): Significance of the Study

The significance of the current study comes from the important role of the shipping companies (express companies) selected by the researcher to enhance the Jordanian economy.

As well as, the significance of the current study demonstrated from two sides:

First, ***academic*** through a follow up of scientific studies conducted in this area in order to contribute to scientific accumulation process in the field of decision support systems, supply chain, where it is expected from the findings of this study to propose a model for decision support system of the supply chain, which can be applied in (DHL, ARAMEX, TNT and FEDEX) companies under study.

Second, ***practical*** via the results of this study companies can also benefit from it, by analysts, system designers, and managers who have relationships with the supply chain of these companies, guided by the model that will be proposed, to develop decision support systems for supply chain.

The study will also indirectly contribute to the definition of the issues related to decision support systems for supply chain and their benefits, and then increase the intentions of managers to adopt it. Many researchers found the positive impact perceived by managers in their intentions to use decision support systems, including Davis, et..al, (1989) in their model acceptance of information technology; (Szajna,1996; Venkatesh & Davis ,2000) and in their model of information technology acceptance modified for pre-application technology.

(1-4): Objectives of the Study

This study seeks to achieve the following objectives:

1. Build a proposed model for supply chain decisions support system in express shipping companies in Jordan.
2. Identify the impact of availability of the system-oriented data to support decision and perceive their benefits on supply chain decisions.
3. Represent the impact of sharing ideas and information with customers, suppliers and perceive its benefits on supply chain decisions.
4. Determine the impact of exchanging data electronically with customers and suppliers and perceive its benefits on supply chain decisions.
5. Determine the impact of cooperation and coordination with customers and perceive their benefits on supply chain decisions.

(1-5): Study Hypotheses

Based on the study problem and the literature review, the following research hypotheses were examined:

$H_{O:}$ There is no significant impact of decisions support system for supply chain (*Availability of the system-oriented data to support decision and perceive their benefits; Sharing ideas and information with customers, suppliers and perceive its benefits; Exchanging data electronically with customers and suppliers and perceive its benefits;*

Cooperation and coordination with customers and perceive their benefits) on supply chain decisions at level ($\alpha \leq 0.05$).

H_{O1}: There is no significant impact of availability of the system-oriented data to support decision and perceive their benefits on supply chain decisions at level ($\alpha \leq 0.05$).

H_{O2}: There is no significant impact of sharing ideas and information with customers, suppliers and perceive its benefits on supply chain decisions at level ($\alpha \leq 0.05$).

H_{O3}: There is no significant impact of exchanging data electronically with customers and suppliers and perceive its benefits on supply chain decisions at level ($\alpha \leq 0.05$).

H_{O4}: There is no significant impact of cooperation and coordination with customers and perceive their benefits on supply chain decisions at level ($\alpha \leq 0.05$).

(1-6): Study Limitations

Human Limitations: the study includes managers at the top and middle managerial levels in each of the four shipping companies DHL, TNT, ARAMEX, and FEDEX in Jordan.

Place Limitations: Include the four shipping companies DHL, TNT, ARAMEX, and FEDEX.

Time Limitations: The time needed for study accomplishment from March 2011 to June 2011.

Scientific Limitations: The researcher depends on the availability of the system-oriented data to support decision and perceive their benefits suggested by (*Kimball, et..al; 2002*), (*Holsapplea , et..al; 2005*), sharing ideas and information with customers, suppliers and perceive its benefits (*Kelle& Akbulut, 2005*), exchanging data electronically with customers and suppliers and perceive its benefits (*Zhou, 2003*) , (*Owens & Levary, 2002*) and the cooperation and coordination with customers and perceive their benefits (*Zhou, 2003*).

(1-7): Study Delimitations (Difficulties)

1. Limited sources that link decision support systems with supply chain.
2. The difficulty in distributing the questionnaire to the study sample individuals, which made researcher, keep pace with the companies under study to get responses from them.

(1-8): Study Terminologies

Supply Chain: a network of manufacturers and service providers that work together to convert and move goods from the raw materials stage through to the end user. These manufacturers and service together through physical flows, information flows, and monetary flow (Bozarth & Handfield, 2006: 4).

Supply Chain Management: is a set of synchronized decisions and activities utilized to efficiently integrate suppliers, manufacturers, warehouses, transporters, retailers, and customers so that the right product or service is distributed at the right quantities, to the right locations, and at the right time, in order to minimize system-wide costs while satisfying customer service level requirements. The objective of Supply Chain Management (SCM) is to achieve sustainable competitive advantage (Li, 2007: 3).

Decision Support System: is a system under the control of one or more decision makers that assists in the activity of decision making by providing an organized set of tools intended to impose structure on portions of the decision-making and to improve the ultimate effectiveness of the decision outcome (Marakas, 2003:4).

Availability of the system-oriented data to support decision and perceive their benefits: refers to the availability of data warehouse for all the company's working procedures that is where all the data and the compilation of the company's functional areas and different locations (*Kimball, et..al; 2002*).

Sharing ideas and information with customers, suppliers and perceive its benefits: Shows the extent of the connection that occurs between the company and its suppliers and customers in order to achieve the goals of all parties (Kelle & Akbulut ,2005).

Exchanging data electronically with customers and suppliers and perceive its benefits: Refers to the movement of services and exchange of data and transaction documents in the form of a typical mail between the company and its customers, So that they can relay the data directly and easily with the computer technology and communications (Zhou, 2003).

Cooperation and coordination with customers and perceive their benefits: Refers to the level of coordination and interaction between business units and departments of the company to achieve the goals of the company's in holistic level (Zhou, 2003).

Chapter Two
Theoretical Framework & Previous Studies

(2-1): Introduction

(2-2): Supply Chain

(2-3): Supply Chain Decision

(2-4): Decision Support System

(2-5): Decision Support System for Supply Chain

(2-6): Previous Studies

(2-7): Study contribution to knowledge

(2-1): Introduction

Companies try to increase their profits and sales. This in turn requires accurate data and information at the right time. In addition, they need to provide the necessary materials in production processes in the supply chain. Where companies are interested significantly to achieve customer satisfaction in terms of satisfying demand, delivery appointments, the quality of products and services offered, price, this requires organizations to seek new methods to do their processes.

The process to achieve effective supply chain operations requires planning, forecasting, modeling through test operations in the organization, which includes planning, source, make, delivery, and the return. This requires identification of the problems and how to find solutions to them through providing supply chain intelligent to increase revenue and market share.

This chapter is divided into the following six sections: Supply Chain; Supply Chain Decisions; Decision Support System; Decision Support System for Supply Chain; previous studies and study contribution to knowledge.

(2-2): Supply Chain

The supply chain considered as the logistics network consists of suppliers, manufacturing centers, warehouses, distribution centers, and retail outlets, as well as raw materials, work in process inventory, and finished products that flow between the facilities. In a typical supply chain, raw materials are procured and items are produced at one or more factories, shipped to warehouses for intermediate storage, and then shipped to retailers or customer .Therefore, to reduce cost and improve service levels. (Simchi levi & Kaminsky , 2003: 1).

(2-2-1): Supply Chain Definition

Some definitions of supply chain are given below for better understanding of the concept.

Initiative definition of the term *supply chain* would include the linkage of stages in a process from the initial raw material sourcing through various stages of manufacture, processing, storage, transportation to the final delivery and consumption by the end customer (Zsidisin & Ritchie, 2009: 2).

From Chopra & Meindl in their book Supply Chain Management: Strategy, Planning, and Operations (2007) said that *supply chain* consists of all stages involved, directly or indirectly, in fulfilling a customer request. The supply chain

does not only include the manufacturer and suppliers, but also transporters, warehouses, retailers, and customers themselves.

A supply chain is a network of facilities and distribution options that performs the functions of procurement of materials, transformation of these materials into intermediate and finished products, and the distribution of these finished Products to customers (Hugos , 2003: 2).

Ivanov & Sokolov (2010: 8) look to *supply chain* (SC) as a network of organizations, flows and processes where in a number of various enterprises (suppliers, manufacturers, distributors and retailers) collaborate (cooperate and coordinate) along the entire value chain to obtain raw materials, to convert it into specified final products, and to deliver these final products to customers .

Through the previous definitions for supply chain, the researcher concludes that the *supply chain* includes a range of activities, facilities and functions that work together for delivering products and services to the end-user. Starting from acquiring raw material, through manufacturing processes and storage to distribution and reaching the final customers.

(2-2-2): Supply Chain Management

As the concept of supply chain management has evolved over the last decade, it becomes apparent that savings can be achieved by integrating management of the physical flow of materials and the information along the supply chain.

Network allows for efficient integration. The distribution of information in a supply network leads to reduce transaction costs. These costs include contracting, distributing information, and coordinating transactions. The goal of supply chain management is to control costs and increase the value of the whole supply chain, therefore these transaction costs must be considered. Where the continuous improvements in information technology can reduce these transaction costs (Chen & Nunez, 2006).

Managing the supply chain is a difficult task. Effective supply chain management requires integrating the supplier, manufacturer, distributor, retail outlets, and customer requirements into one cohesive process. This requires utilizing the expertise of all the entities involved in the supply chain. Supply chain management can examine all aspects of the buying, actual use of materials and services and link the resources of major suppliers to strategic company goals. Thus, strengthening competitive advantage in the marketplace (Kocakulah, et...al, 2002).

According to Ramaswamy et...al, (2007) the main objective of the supply chain management is to ensure the efficient delivery of the right product, at the right place, at the right time, in the right quantity, and at a competitive price to the customer. The supply chain is consisting of suppliers, manufacturers, distributors, and retailers whose activities are coordinated through transportation, information flows, and financial flow. Management's objective is to add value to the product or service by focusing on activities along the supply chain.

Effective of any supply chain management practice based on measuring supply chain performance variables, which are focus on increasing customer satisfaction and reducing overall costs. Metrics used ranges from fill rates and response times, such as to measures level of commitment of individual players in the chain and percentage of customization achieved with respect to customer order. Measures related to supply chain flexibility and agility are also used (Mukhtar, et..al, 2009).

Based on the foregoing discussion about the importance of supply chain management and the need to achieve integration between all the participating members in this chain. Chandra & Grabis (2007: 20) presented definition for supply chain management in their book" involves various approaches utilized to effectively integrate suppliers, manufacturers, and distributors in performing the functions of procurement of materials, transformation of these materials into intermediate and finished products, and distribution of these products to customers in the right

quantities, to the right locations, and at the right time to meet the required service level with minimal cost".

(2-2-3): Supply Chain Management Objectives & Operations

Considering the various definitions above for the supply chain and supply chain management must be addressed the main objectives for this chain. According to Chopra & Meindl (2007: 5) the objective of every supply chain should be maximize the overall value generated by the supply chain, this value is represent the difference between what the final product is worth to the customer and the costs the supply chain need to fill customers request .This value associated with supply chain profitability that contains the difference between revenue generated from the customer and the over all cost across the supply chain. Doing this requires the supply chain to achieve appropriate levels of the five operations performance objectives (Slack, et..al, 2007: 403):

1. ***Quality:*** focus on delivering products and services to the target customers, which means product reliability and increase customer satisfaction so each stage in the supply chain should take responsibility for its own and its suppliers' performance, therefore a supply chain can achieve high end customer quality.
2. ***Speed:*** this has two meanings in a supply chain context. The first is how to response to customers on time (the time between placement order by customer and receiving it in full) this is will be achieved by over stocking within the supply

chain this can reduce the chances of stock-out and reducing customer waiting time. The second is the time needed to convert raw material into final product and time need to deliver it to the end customer.

3. ***Dependability:*** it is a more desirable aim because it reduces uncertainty within the chain by keeping overmuch resource. It's essential to deliver order on time .

4. ***Flexibility:*** chain's ability to deal with changes and troubles, and ability to customize and modify the product depending on customer preferences.

5. ***Cost:*** the transaction costs incurred within each operation to transform its inputs into outputs, it may include such things as the costs of finding appropriate suppliers, contractual agreements, monitoring supply performance, transporting products between operations and holding inventories.

The researcher summarizes the main objectives of supply chain management according to (Jespersen & Larson, 2005: 53) as follows:

1- Increased flexibility to satisfy customer's preferences.

2- Quicker and more precise delivery time.

3- Increase customer loyalty and resulting increase in sales.

4- Fewer backorders sold out.

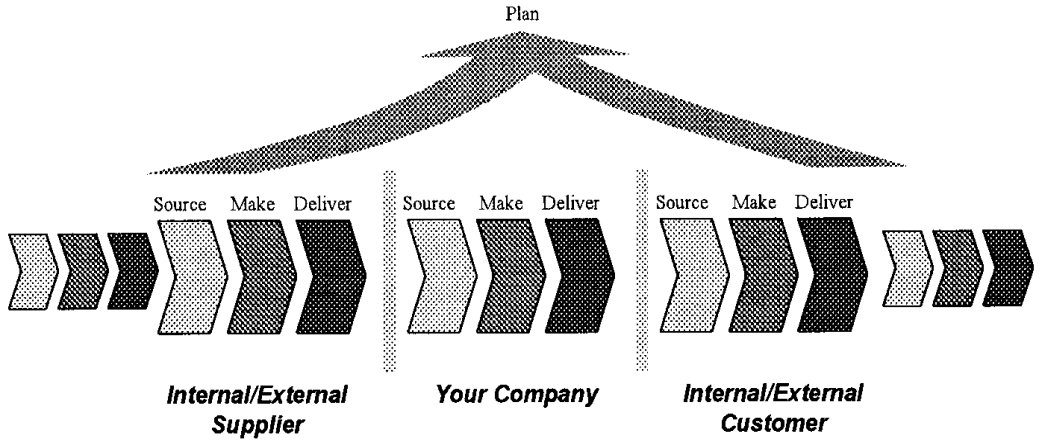
5- Minimize total cost.

To achieve the supply chain objectives successfully the organization needs to make integration between all business processes and among all the business units over the supply chain. This integration will increase revenues and profits.

Supply chain goes about doing its job by performing constant operations, to get comprehensive understanding of these operations and reliability among them, the simplified version model developed by the supply chain council which is called supply chain operations reference or SCOR model (Cohen & Roussel, 2005:44). It's integrating the well known concepts of business process reengineering, benchmarking, and process measurement into a cross functional framework (supply chain council, 2005). This model is designed for effective communication among supply chain partners, and it's based on five distinct management processes, these processes include plan, source, make, Deliver, and Return. As Shown in Figure (2-1).

Figure (2-1)

Supply Chain Process



Source: Ayers, James B, (2001), "***Handbook of Supply Chain Management***", St. Lucie Press is an imprint of CRC Press LLC: 180.

Ayers (2001: 180) indicates that each of these processes implemented in four levels each of them contains different number of activities. ***Level One SCOR planning*** defines the model's scope and content. It also sets basis of competition for improving supply chain performance. ***Level Two SCOR model development*** contains tools for supply chain design. These are conformable to the supply chain environment being modeled, For example, there are models for make to stock, make to order. At ***Level Three in SCOR developed documentation*** consists of standard process for the level two environments. The documentation includes process definition, metrics, best practices, required systems capabilities, and system tools by vendor. ***Level Four is implementation***; each supply chain or

individual company is seen to implement actions for achieving the goals set and fill the gap in performance. Table (2-1) summarizes the definition for each process.

Table (2-1)

SCOR Process Definitions

SCOR Process	Definitions
Plan	Processes that balance aggregate demand and supply to develop a course of action which best meet sourcing, production and delivery requirements.
Source	Processes that procure goods and services to meet planned or actual demand.
Make	Processes that transform product to a finished state to meet planned or actual demand.
Deliver	Processes that provide finished goods and services to meet planned or actual demand, typically including order management, transportation management, and distribution management.
Return	Processes associated with returning or receiving returned products for any reason. These processes extend into post-delivery customer support.

Source: Supply Chain Council, (2005), "***SCOR Version 7***":7.

(2-3): Supply Chain Decisions

Successful supply chain management requires many decisions relevant to the flow of information, product, and funds. These decisions fall into three phases depending on the frequency of each decision and the time frame for each phase must consider uncertainty over the decision horizon (Chopra & Meindl, 2007: 9).

The authors mentioned that the supply chain decisions include three phases; the first one strategic decisions focus on how to structure the supply chain over the next several years. Those decisions include the location and capacities of production and warehouse facilities, the products to be manufactured or stored at various locations, the modes of transportation, and the type of information system to be used. Second phase planning decisions includes which markets will be supplied from which locations, the inventory policies to be followed, and the timing and size of marketing promotions. Third phase operation decisions includes the time horizon for decisions weekly or daily, depending on individual customer orders. Through this phase, firms allocate inventory or production to individual orders, set a date that an order is to be filled, allocate an order to a particular shipping mode, set delivery schedules of trucks, the goal during the operation phase is reduction of uncertainty and enhance performance.

(2-4): Decision Support System

Decision support systems are gaining an increased popularity in various domains, including business, engineering, military, and medicine. They are especially valuable in situations in which the amount of available information is elusive from decision maker and in which accuracy is importance. Decision support systems can help decision maker by providing various sources of information, providing intelligent access to relevant knowledge, and support the process of structuring decisions. They can also provide well defined alternatives to support decision. Also, they can employ artificial intelligence methods to solve complex problems. Appropriate application of decision making tools increases productivity, efficiency, effectiveness and gives many businesses a competitive advantage over their competitors, allowing them to make optimal choices for technological processes, planning business operations, logistics, or investments (Druzdzel & Flynn, 2002).

(2-4-1): Decision Support System Definition

The massive growth of unstructured information lead to the necessity for developing strategies to improve and enhance individual and organizational decision making by using automated tool in decision systems (Power & Sharda, 2007). Traditional decision support system lack of capability to encounter dynamics and ill defined data. Current existing decision support tools are focused on quantitative data processing where the systems are specifically analyses factual

values. According to Froelich & Ananyan (2008: 609), challenges in decision making requires comprehensive analysis of large volumes of both structured and unstructured data.

Drawing various definitions that have been suggested by (Suduc, et..al, 2010; Druzdzel & Flynn, 2002) computer-based interactive systems that help decision makers to use data and models to solve unstructured problems.

Stewart (2003) also said that decision support system is a “computer system which assists decision makers in exploring the consequences of decisions in a structured manner and in developing an understanding of the extent to which each decision alternative or option contributes toward goals”.

However Laudon & Laudon (2007) presented a definition for decision support system by viewing system’s capabilities that “DSS Provide simulation, analytical, and data modeling tools to optimize decision making. This system addresses problems where the procedure for producing the information aids is not fully predefined in advance .Therefore, decision support system has more analytical power than other information systems”.

Based on previous review for decision support system concepts the researcher can develop the following definition. Decision support systems are the interactive systems between the user and computer to support decision-making process for unstructured decisions by using analytical models and databases.

Drawing on various definitions the researcher can list some major capabilities for decision support system suggested by Morana, et..al, (2010):

1. Provides support for decision makers at all management levels, mainly in unstructured situations, by bringing objective information and human judgment.
2. Supports several interconnected decisions.
3. Supports all phases of the decision making process intelligence, design, choice, and implementation.
4. Adaptable by the user to deal with changing conditions.
5. Easy to construct and use in many cases.
6. Usually utilizes quantitative models (standard and/or custom made).
7. Advanced decision support system is equipped with a knowledge management component that allows providing efficient and effective solution of very complex problems.
8. Can be used via the Web.
9. Allows the easy execution of sensitivity analyses.

The foregoing lists refer to capabilities for decision support system Holsapple & Sena,(2005) suggest potential benefits of it including the capacity of this system to enhance a decision maker's ability to process knowledge, handle complex problem, shorten the time associated with making a decision, improves the reliability of decision, encourage discovery by a decision maker, stimulate new approaches to thinking about problems, provide evidence in support of a decision, and create competitive advantage over competing organizations.

Today, decision support systems are developed to generate and evaluate decision alternatives via 'what-if' analysis and 'goal-seeking' analysis in the design and choice stages. Decision support system contains various models such as accounting models to facilitate planning by calculating the consequences of planned actions on estimate of income statements, balance sheets and other financial statements. Representational models estimate the future consequences of actions, including all simulation models. Optimization models generate the optimal solutions. Suggestion models lead to a specific suggested decision for a fairly structured task. (Eom, 2001).

(2-4-2): Decision Support System Components

A properly designed decision support system is an interactive software based system intended to help decision makers to collect useful information from raw data, documents, personal knowledge, and business models to identify and solve problems and make decisions. (Ahmadi & Salami, 2010).

Development of the requirements, characteristics, functionality and contents of the decision support system depend on what we want to use this system for, such as design, operation or construction. All of these areas may need different information, but the type of decision support may be the same.

According to (Andrew, 1991; Druzdzel & Flynn,2002) Basic decision support system (DSS) design consists of Database management system (DBMS), model based management system and Dialog generation management system (DGMS)

1. Database management system (DBMS): serves as a data bank for the DSS. It stores large quantities of data that are related to the class of problems that the DSS has been designed and provides logical data structures with which the users interact. It should also be capable to inform the user about the types of data that are available and how to gain access to them.

2. Model base management system (MBMS): the primary function for this system is providing independence between specific models that are used in a DSS from the applications that use them. The purpose of it is to transform data from the DBMS into information that is useful in decision making. It should also be capable of assisting the user in model building.

3.Dialog generation and management system (DGMS): The broader term of the DGMS is user interface. It helps to interact with a DSS, so DSS need to be equipped with easy to use interfaces. These interfaces aid in model building and interaction with these model, such as gaining recommendations from it.

Mardjono (2002: 20) shows that decision support system (DSS) has the following components: Databases, database management, knowledge management, a rule base, a reasoning engine and a user interface. Databases are a collection of data stored in a systematic way. Through the operation of the database management data can be called, added, and deleted, Dss also has a rule based component that is a collection of rules to be used in the decision making process, knowledge management used to organize the data transaction, a reasoning engine may be needed in Dss construction which is built as a computer programme, an interface is also needed to connect the databases and the main programme to help user interact with system.

Shim, et..al,(2002) presented that the web environment is a very important platform for decision support system development, through using a web infrastructure for building decision support system to improve decision making frameworks and promotes more consistent decision making on repetitive tasks. In this way the DSS categories including data warehousing, online analytical process (OLAP), data mining, web-based DSS, collaborative support systems, and optimization based DSS. A web-based DSS refers to a computerized system that delivers information through a web browser to someone who needs it, by passes the user requests to a database server which generates the query result set and sends it back for viewing, where it works consistently with data warehouses and OLAP.

Druzdzel & Flynn,(2002) Confirmed that the quality and reliability of modeling tools and the internal architectures of decision supports systems are significant, their user interface is the most important aspect, a good user interface to decision support system should support model construction and model analysis, but complex or unclear user interfaces or that require special skills are scarcely useful and accepted in practice. In addition, when the system is based on normative principles, it can play an oversight role; that users will learn the domain model and how to reason with it over time, and improve their own thinking.

Decision support systems use several techniques that Include artificial intelligence. Specially, expert systems as a form of artificial intelligence can be integrated with more traditional techniques of functionality such as statistics, mapping and/or data restore to form systems that provide more effective decision support in a study domain. Also, it is applying guidelines to encode domain Knowledge, together with inference engines, in order to deduce conclusions from information that the users provide (booty, et...al, 2009).

(2-5): Decision Support System for Supply Chain

Because of the rapid change in markets, it is essential for people and organizations to follow current events and understand what these events mean. Business intelligence systems which is collect, store, and analyze data that help

companies to understand what is happening within their own organizations and markets they serve (Hugos, 2006:120)

There are a lot of transactions data which are cumulative over a long period of time in the enterprise and contain historical information. This information is important to achieve supply chain integration and coordination by restoring, analysis, and integration of this information. Because of the various business competitive pressures the integration of supply chain has become an important aspect in business environment. However, to support a supply chain's competitive strategy and help an organization gain a competitive advantage an intelligent decision support system proposes for supply chain integration. (Liao & Hsu, 2004).

Chen & Nunez, (2006) indicate that the integration management of the physical flow of materials and the information along the supply chain will control the costs and increase the value of the whole supply chain. These costs include contracting, distributing information, and coordinating transactions. The amount of these transaction costs must be considered because it is expected that continued improvements in information technology can reduce these transaction costs.

According to Ketchen, et..al, (2008) the main objective of supply chain information system is to link all elements of the supply chain, this means that all participants in the chain should have information about each step of the chain. This allows for planning, tracking, and forecasting lead times based on actual data provided in real time. Also, effective supply chain information systems provide many benefits, including cost reductions, productivity improvements, and alignment

of an appropriate product and market strategy. However, the information system should be constructed in a way that protects each firm's sensitive data.

The supply chain information system is a major data source for decision making purposes tracking all supply chain transactions and contain references to other decision making applications. Furthermore, it supplies the information modeling system with existing enterprise and supplies chain information models. Decision support system is a part of the supply chain information system,which assist in forecasting which is set separately from other decision modeling components. Many forecasts are made on a judgmental basis as a part of overall strategic supply chain management. On the other hand, data warehousing has become a frequently used technology for organizing and presenting data from various sources for decision making purposes. But the groupware module is included to support collaborative decision making (Chandra & Grabis, 2007: 123).

The two most important parts of the decision support system architecture of the supply chain are the information modeling system and decision modeling system. The major function of Information modeling system is to link data sources, including data warehouses, with the decision modeling system and the decision modeling database, as well as use to link the decision modeling system with the supply chain management information system. It also updates the supply chain information system based on modeling results. The decision modeling system manages execution of experiments with multiple decision making models; it is

storing data in various formats, including informal data. The data include models, scenarios, and raw modeling results.

Biswas & Narahari,(2004) suggest that one of the most important decision problems in the enterprise strategic and tactical planning involves the supply chain design and consists in determining the location, size and optimal number of suppliers, plants and distributors to be used in the network. According to (Weber, et...al., 1991; Karpak, et..al.,2001) in the new global business environment purchasing is becoming one of the most significant and strategic decision areas of the physical supply chain, because external suppliers now extend a major influence on a company's success or failure.

According to Morana, et..al,(2010) A proper design decision support system will help decision makers to extract useful information from raw data, documents, personal knowledge and business models to identify and solving problems, and making decisions. Consequently, Decision support system allows computers and people to work together to make better decisions; range from spreadsheets to expert systems, the role of this system in supply chain is to provide information regarding to suppliers, manufacturers, warehouses retail stores, Forecast demands for each store, available transportation modes, transportation and inventory costs.

Goodwin, et..al,(1991) suggested that a decision support system must be customizable to the objectives of the business, which generally include maximizing profit, maximizing customer satisfaction, and minimizing cost. This system optimized problem in our framework, by using a portfolio of algorithms minimum cost flow algorithms, linear programming approximations and greedy algorithms.

Efficient decision support systems are essential to help interested parties across the whole supply chain to evaluate the results of decisions making in real time. This system can identify and analyze the opportunities in terms of their business objectives and increase collaboration in the chain. (Mansouri & Gallear, 2009).

(2-6): Previous Studies

Swaminathan & Tayur (2003) Under title "Models for Supply Chains in E-Business". Aimed to describe the issues in the traditional supply chain management so they focused on supplier relationships, distribution, pricing, and customization, and real time decision technologies that have increased their importance in this time, which led to the emergence of E- Business. The study also provided an overview of analytical research models that are relevant to development in this area and also proposed future models because the traditional models worked on finding the optimal strategy for a single parameter (inventory, forecasting, price, lead time). The study showed that there is a growing need for models to provide insight for the impact of the relatively different parameters in the supply chain. As Indicated that organizations seeking to achieve the integration between online and traditional operations, and exchange a lot of information through the Internet. The study reached that the real-time models of the supply chain has become more important such as the product life cycle management model, dynamic pricing model and production coordination.

Liao & Hsu (2004) under title "An Intelligent Decision Support System for Supply Chain Integration". Proposes for this research is to support a supply chain's competitive strategy and help an organization gain a competitive advantage through using an intelligent decision support system for supply chain integration, mainly there are three major issues and related information technologies (IT),

including a multi-agent architecture, data cube technique, and an ANN-based system, are investigated to explore the integration of supply chain activities. A multi-agent based architecture is proposed to support the selection and negotiation of purchasing bids and assist the decision making. The concept of data cube is used to investigate the multidimensional data of ordering information and evaluating the decision criteria of purchasing and ordering processes. A system combines supplier selection evaluation and artificial neural network (ANN) technique is designed to evaluate and forecast the supplier's performance. The results indicate that the proposed structure and related information technologies can support the decision makers for supply chain management and integration.

Agarwal & shanker (2005) under title "Modeling Supply Chain Performance Variables", proposed a System Dynamics-based model. The model provides an effective framework for analyzing different variables affecting supply chain performance. Among different variables, a causal relationship among different variables has been identified. Variables emanating from performance measures such as gaps in customer satisfaction, cost minimization, lead time reduction, service level improvement and quality improvement have been identified as goal-seeking loops. Study indicated that the model focuses on creating value for ultimate customer through improving integration between trading partners and enhancing the responsiveness capability.

Joyce (2005) under title “Successful Implementation of Decision Support Systems for Supply Chain Management within Manufacturing Companies“. Reports on an in-depth empirical study of development/ implementation Strategies commonly used in Decision support system (DSS) and Enterprise Resource Planning (ERP) systems projects to promote success. The goal of the research was to determine which strategies promote success on DSS projects designed to enable supply chain management (SCM).Through a survey of 80 industry professionals, the study establishes that there are strategies that should be utilized based on system type. Decision support system users must have strong analytical skills. They must be able to analyze, interpret, and act on complex data. These Analytical skills were found to be significantly more important for DSS users to have than ERP users. Intelligent supply chain management systems must include “what if” functionality and allow users to evaluate multiple business scenarios before acting. The “small releases” systems development methodology was found to be more appropriate for decision support system than enterprise resource planning projects The findings for this research are: First, decision support systems are tools designed to assist business users and managers in making better decisions, Second, the project team must understand the actual capabilities of the proposed system, Third, the project team must have enough time allocated for the project to become successful, Fourth, project teams should use a modern development approach that is flexible and accommodating to volatile system requirements finally make sure the decision support system is user-friendly and

allows the user to be in control. “What if” functionality must be included in the system design.

Trkman & Groznik (2006) under title “Measurement of Supply Chain Integration Benefits”. The study dealt with how to renew the business through the effective use of information technology and the role of modeling business process to achieve integration between all parties in the supply chain to improve their performance. Thus, this integration helps to use information effectively between different companies in the supply chain .Theoretical results of this study were to examine the procurement process in the petroleum corporation using the method of simulation for business processes and simulation of supply and demand. By comparing the old models and the renewal of business processes using the method of simulation, the study found the benefits of the renovation of business processes using simulation. These benefits include reduce process costs, lead time and inventory costs.

Lee & Cheng (2007) under title “Development Multi-Enterprise Collaborative Enterprise Intelligent Decision Support System”. Presents an intelligent decision support, which includes business intelligence, customer intelligence, supply chain intelligence and business analysis. The multi-enterprise collaborative conceptual ERP-IDSS framework contains supply chain management and customer relationship management. This framework is an integration solution for the enterprise resource planning, customer relationship management and supply chain

management. This integrates a decision support system with knowledge management, to provide guidance to decision-making during the planning process. This study finds that the intelligent decision support system(IDSS) has an ability to capture the knowledge and provide intelligent guidance during the planning process. While the data and model manipulation are done through the DSS, decision makers can focus on the planning issues.

Falasca, et..al, (2008) under title "A Decision Support Framework to Assess Supply Chain Resilience". Proposes a framework based on the simulation to include the concepts of flexibility in the process of designing the supply chain, where flexibility has been defined as the ability of supply chain system to reduce the probability of disruption and the reduction of problems caused by these distortions. The study suggested a simulation framework based on concepts include flexibility in the process of designing the supply chain and identified different strategies for the initial assessment of the flexibility of the supply chain. This study focused on the design model that takes into account the material flow in the supply chain and the impact of environmental changes on the physical infrastructure of the supply chain. This study shows that the simulation tool used to test the reactions of the supply chain for different strategies to improve ability to resist disasters and strengthening the role of in computer-aided to support decision. The study found that there should be more particular models regarding

to infrastructure, as well as modeling the "local" behavior of sub-networks and their impact on the overall supply chain.

Marincas (2008) under title “Information System for the Supply Chain Management”. Confirmed that the Businesses have to integrate their information systems and applications with those of their suppliers and customers. So, the companies have to redesign their supply chain to create an integrated value system. In conclusion, the implementation of supply chain information system is now a necessity for large and medium sized companies to gain a competitive advantage and a higher profit. Because the information system allows sharing all the information about the demand, supply, manufacturing, delivery, market conditions changes between the supply chain members, this provides to all these companies the possibility to make decisions in real time, fast and efficiently.

Sahay & Ranjan (2008) under title “Real Time Business Intelligence in Supply Chain Analytics”. Studied the issues for using the business intelligence (BI) systems in supply chains and also tried to identify the need for real time BI in supply chain analytics. In addition focusing on the necessity to review the traditional BI concept that integrates and consolidates information in an organization in order to support firms that are service targeted and seeking customer loyalty and retention. The researcher concluded from this study that supply chain analytics using real time BI in organizations will lead better operational efficiency An ideal BI system gives an organization’s employees,

partners, and suppliers easy access to the information they need to effectively do their jobs, and the ability to analyze and easily share this information with others. So business operations find new revenue and saving cost by supplying decision support information.

Vaidyanathan, et..al., (2008) under title "Supply Chain Management Software Systems Integration and Version Upgrade: Vendor and Customer Based Framework". Focuses on identifying the key elements that managers consider when making the decision to upgrade and integrate supply chain management systems that are already in use, and present a framework on both vendor and customer perspectives in the evaluation of supply chain management software systems integration and version upgrades. Future work that has been proposed in this study is to conduct a survey to analyze the integration level of business applications, and expand the survey to test this framework.

Crnkovic, et..al, (2008) under title "A Decision Support Framework for Exploring Supply Chain Tradeoffs". Presents a simulation-based decision-support framework for Exploring the tradeoffs in producing different quantities under a variety of supply chain configurations and alternate forecasting options, given uncertain demand environments. The results represent that the opting for agile supply chain under widely differing circumstances consistently was preferable to opting for enhanced forecasting. Although there are circumstances (e.g. stable environment) under which it would be desirable to emphasize forecasting over

supply Chain agility, nevertheless a preliminary insight, which requires additional research to confirm, is that in general Supply Chain agility may well be more effective in enhancing total profit than forecasting quality, at least when there is a short duration production sales interval.

Gallasso, et..al.,(2008) under title "Decision Support for Supply Chain Planning under Uncertainty", suggested a mixed-integer linear programming model which is embedded in a dynamic procedure simulating a rolling horizon planning process to satisfy the customer demand while respecting the internal constraints of the production unit and those of its supply chain partners. A special attention is given to the temporal features of the production unit and of its suppliers as well as those of the planning process. Moreover, the proposed framework takes into account flexible demands and evaluates different planning strategies to face with these flexible demands. Finally, the study indicates that the framework provide support to a manager in its Short-term planning process using analytical models. Survey results show that the framework is also a tool for studying historical data and finding improvements for the customer's demand anticipation. This approach opens opportunities for a manager to: assess the behavior of the client (link to the concept of risk management); find out critical decisions for continuous improvement; assist the decision making process with possible plans and enhancement of the data transmitted by its customers and suppliers.

Wang & Yeh (2009) under title “A Web-Based DSS Architecture and ITS Forecasting Core in Supply Chain Management”. Presents a web-based Decision Support System (DSS) architecture and its forecasting core to obtain more accurate forecasts. The forecasting core contains three modules: Segmentation Module, Forecasting Module, and Coordination Module. The Segmentation Module categorizes customers into three segments: Loyal Customer Segment, Potential Customer Segment, and Switcher Segment. Based on the three segments, the Forecasting Module employs different forecasting and analysis technologies to make an integrated forecast estimate: time-series forecasting to capture the loyal customer demand trend, Bayesian inference to estimate the predicted value of switcher purchase quantity, and questionnaire analysis and brand choice models to unearth potential customers. The results from these three processes are then synthesized to obtain the integrated forecast, which is then used in the Coordination Module as the base of distribution planning, and provides a minimal system-wide total cost solution for all parties in the supply chain. As a whole, this DSS architecture has been shown to provide an efficient mechanism for collaborative demand planning, help create the maximum profit for the supply chain, provides a managerial implication of planning cost to achieve satisfactory performance by rough segmentation of sub-series.

Galasso, et..al., (2009) under title “Decision Support Framework for Supply Chain Planning with Flexible Demand”. Suggested a model of the decision making parameters to manage networked organizations under an uncertain demand so as to provide a good service to the customer at low cost, on the base of case studies mainly aeronautical industry. A mixed integer linear planning model embedded in a framework simulating a rolling horizon planning process is described on the basis of this analysis. The model takes into account the capabilities of reaction of the planned system and of its environment (suppliers, sub-contractors and customers), as well as the corresponding costs. The suggested simulation framework may assist the decision maker for coping with an uncertain or flexible demand, using various planning strategies. Survey result show that this approach could be applied to each parameter considered in the model (costs, delays, etc.). Each modification in the value of the considered parameter will have an impact over the performance (costs, levels of backorders, etc.). The comparison of such impacts will help the manufacturer to determine which parameter requires to be modified first.

Saxena, et..al., (2010) under title “Simulation Based Decision Making Scenarios in Dynamic Supply Chain”. Objective is to develop general modules for the simulation of supply chain, which can be used for simulation of complex supply chain. Simulation model has flexibility of using different ordering policies and different set of parameters for different nodes of supply chain. The model was tested for many different parameters. It has not been possible to get a range of

workable parameters under which everyone gains. The only conclusion one can surely draw is that in a fine tuned web enabled supply chain; collaboration will reduce inventory levels in the system because of aggregation. It would be beneficial to run a real life model on simulator designed for those conditions before actual collaboration and decision variable is put into practice.

Al - Zu'bi (2010) under title "Applying Electronic Supply Chain Management Using Multi-Agent System: A Managerial Perspective". Proposed Multi-Agent System (MAS) to support Electronic Supply Chain Management (E-SCM). The proposed model consists of a set of agents that are working together to maintain supplying, manufacturing, inventory and distributing. The main operations of the software agents include: (1) receiving information from customer orders (2) check the inventory (3) make the production schedule (4) issue the order of raw materials from the suppliers (5) receive the raw materials (6) production (7) deliver products to the customer. In addition to the interface agents and communication protocols among agents. Through the study the researcher found some directions for future research. First, determining the tasks of each functional agent. Second, developing a standard ontology designed for multi-agent system. Third, developing a standard agent-based language that could be applied within common internet based Protocols.

Yang (2010) under title “Real-Time Optimization of an Integrated Production Inventory Distribution Problem”. Developed an integrated optimization model of production, inventory and distribution with the goal to coordinate important and interrelated decisions related to production schedules, inventory policy and truckload allocation. Because outsourcing logistics functions to third party logistics providers is becoming critical for a company to remain competitive in the market place; the model represents an important decision of selecting carriers with finite truckload and drivers for both inbound and outbound shipments in the model various types of entities in the entire distribution system can be modeled as intelligent agents, such as suppliers, carriers and customers. In order to build the simulation model more realistic, a sealed bid multiunit auction with an introduction of three parameters α, β and ΄Y is well designed. With the help of these three parameters, each agent makes a better decision in a simple and fast manner, which is the key to realizing real-time decision making. The agent-based simulation model gives us an insightful and thoughtful understanding of how to make a decision from different interest perspectives.

Awad & Nassar (2010) under title”Supply Chain Integration: Definition and Challenges”. The main contributions for this study are integrating all the of supply chain integration challenges in one source. These contributions will be very helpful for the organizations that establish the integration in their supply chain. This study

suggested for the future to study the relation between the business domain and the kind of challenges.

Ozceylan (2010) under title “A Decision Support System to Compare the Transportation Modes in Logistics”. The author used an AHP-based model (analytical hierarchy process) to select an optimal Transportation mode which was evaluated for logistic activities. To solve this problem, the best transportation mode is determined and discussed by developed decision support system. The AHP models are using a hierarchical relationship among decision levels. It is capable of handling multiple criteria and enables us to incorporate seven different criteria factors, when assessing the transportation modes. The author concluded that seaway is the best transportation mode with an overall.

Beheshti, H.,(2010) under title “A Decision Support System for Improving Performance of Inventory Management in a Supply Chain Network”. Seeks to present a decision support model for improving supply chain performance. The model aims to provide a holistic view of the supply chain as an integrated system by analyzing inventory options to facilitate the decision making process by business partners in the system. The results for the study show that the model can be used as a powerful Spreadsheet base which can be expanded to answer a variety of supply chain Structures cost saving tools, and negotiation questions.

(2-7): Study Contribution to knowledge

To clarify what distinguishes the current study from previous studies, some comparisons have been made, which are presented as follows:

1. Concerning the environment, most studies have been mainly conducted in American, European and Asian countries. Whereas the current study is carried in an Arab country, namely Jordan.

2. This study deals with an important aspect which is a supply chain decisions as a dynamic system facing many uncertainties that need to manage. so the researcher focuses on these variables , the availability of the system which is support decisions, sharing idea and information, exchange data electronically with customers and suppliers, Cooperation and coordination with customers and the perceived benefits of such variables on supply chain decisions to control the uncertainties .

Chapter Three
Method and Procedures

(3-1): Introduction

(3-2): Study Methodology

(3-3): Study Population & Sample

(3-4): Demographic Variables to Study Sample Population

(3-5): Study Model

(3-6): Study Tools and Data Collection

(3-7): Statistical Treatment

(3-8): Validity and Reliability

(3-1): Introduction

In this chapter the researcher will describe in detail the methodology used in this study, and the study population and its sample .Next, the researcher will design the study model and explain the study tools and the way of data collections. After that, will be discussed the statistical treatment that is used in analysis of the collected data. In the final section the validation of the questionnaire and the reliability analysis that is applied will be clearly stated.

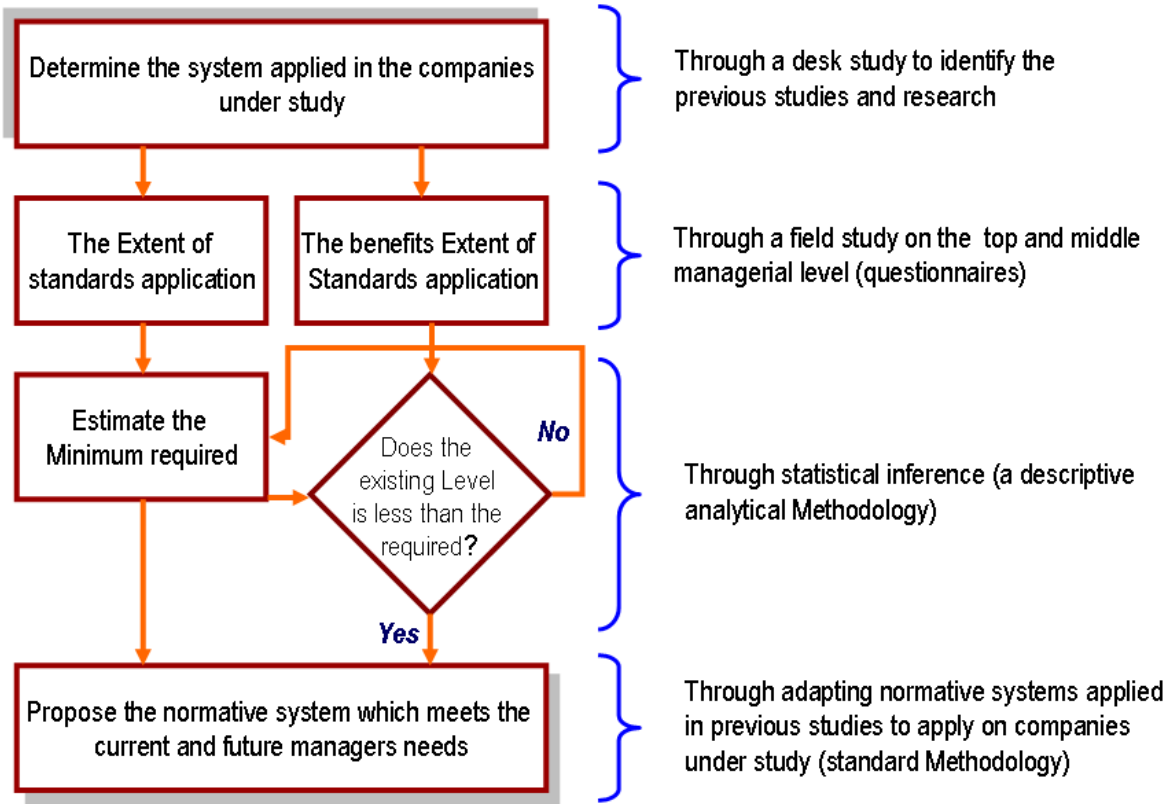
(3-2): Study Methodology

Descriptive research involves collecting data in order to test hypotheses or to answer questions concerned with the current status of the subject of the study. Typical descriptive studies are concerned with the assessment of attitudes, opinions, demographic information, conditions, and procedures. The research design chosen for the study is the survey research. The survey is an attempt to collect data from members of a population in order to determine the current status of that population with respect to one or more variables .The survey research of knowledge at its best can provide very valuable data. It involves a careful design and execution of each of the components of the research process. As well as the Normative Method was used (to identify and propose what should be), where the researcher will initially use a desk study to identify the systems applied on the company under study. As shown in figure (3-1).

Based on the previous phase, the researcher designs a questionnaire to collect and characterize study sample data, analysis data, estimate the parameters of society (an analytical descriptive method), and test hypotheses statistically on the parameters of society by the statistical Inference, emanating from the inductive thinking. The purpose of the questionnaire instrument was to collect data about the respondents on the supply chain; decision support system and decision support system for supply chain. The researcher used deductive thinking from time to time, when it is based on the arguments and theories of general relatively stable to draw conclusions regarding this particular study.

Based on the results of the descriptive analysis study, it will propose a system (standard) to support supply chain decisions, to meet current and future needs for managers in the companies under study, avoid the available systems weaknesses and enhance its strengths.

Figure (3-1) Research Method



It should be noted that many authors in the field of research methods are encouraged to combine research methods, including Jones (2004: 125) and Mingers (2001), in the field of information systems, Cooper & Schindler (1998: 32) in different areas.

(3-3): Study Population and Sample

To increase credibility, it is important to choose the sample that will represent the population under investigation. The populations of the study are the shipping

companies (express companies) in Jordan. The sample of the study was the employees in middle and top management level in these companies.

The questionnaire was distributed through the researcher personally and via mail in English & Arabic. Table (3-1) shows the express companies in Jordan (DHL, TNT, ARAMEX and FEDEX) and the employees number through job position.

Table (3-1) Express companies in Jordan

No.	Company Name	Top Management	Middle Management	Total
1	DHL	4	16	20
2	TNT	2	14	16
3	ARAMEX	3	13	16
4	FEDEX	3	15	18
Total		12	58	70

After distributing (70) questionnaires of the study sample, a total of (66) answered questionnaires were retrieved, of which (5) were invalid, Therefore, (61) answered questionnaires were valid for study. Table (3-2) shows the number of distributed and returned questionnaire for each company and job position.

Table (3-2) the number of distributed and returned questionnaires for each company and job position.

No.	Company Name		Questionnaire Distribution	Questionnaire Retrieved	Questionnaire suitable for analysis	%Questionnaire suitable for analysis
1	DHL	Top Management	4	3	3	5%
		Middle Management	16	15	13	21%
2	TNT	Top Management	2	2	2	3%
		Middle Management	14	14	12	20%
3	ARAMEX	Top Management	3	2	2	3%
		Middle Management	13	12	12	20%
4	FEDEX	Top Management	3	3	3	5%
		Middle Management	15	15	14	23%
Total			70	66	61	100%

(3-4): Demographic variables to Study sample Population

Table (3-3) shows the demographic variables of the study sample (Age; Gender; Education level; Number of Experience Years; Specialization and Job Position).

Table (3-3) Descriptive sample of the demographic variables of the study

No.	Variables	Categorization	Frequency	Percent
1	Age	Less than 30 years	13	21%
		Between 30 – 34 Years	21	34%
		Between 35 – 39 years	17	28%
		40 Years Above	10	17%
Total			61	100%
2	Gender	Male	48	79%
		Female	13	21%
Total			61	100%
3	Education Level	BSc	39	64%
		High Diploma	6	10%
		Master	13	21%
		PhD	3	5%
Total			61	100%
4	Number of Experience Years	5 Years and Less	6	10%
		Between 6 – 10 Years	37	61%
		Between 11 – 15 years	15	25%
		16 Years Above	3	5%
Total			61	100%
5	Specialization	Managerial Science	34	56%
		Engineering Science	7	11%
		Computer Science	18	30%
		Others	2	3%
Total			61	100%
6	Job Position	Top Management	10	16%
		Middle Management	51	84%
Total			61	100%

Table (3-3) the results of descriptive analysis of demographic variables of respondent members of the study sample. The table shows that the (83%) of the sample ranged below (40) years. This indicates that the focus will be on the element of youth and new blood. On the other side the (79%) of the study sample

is male and (21%) is Female. The educational level; all members of the study sample have a scientific qualification which is a good sign in adopting the high educational qualifications to accomplish the work in the shipping Sector.

Descriptive analysis for the Years of experience of the members respondent from the study sample. The table shows that the experience of 5 years and less (10%), and experience between 6-10 years (61%), between 11-15 years (25%), finally above 15 years (5%). At the same time specialization of the respondent members from the study sample Indicates that the specialist of Managerial Science (56%), Engineering Science (11%), Computer Science (30%) and other specialist (3%). Finally, the analysis of the job position represents that the (16%) from the sample of the study are top management and (84%) from middle management.

(3-5): Study Model

The following study model was designed by the researcher.

There are an independent and dependent variables in testing the hypotheses; the main objective is building a proposed model for supply chain decisions support system to express shipping companies in Jordan through investigating the impact of decision support system for supply chain on supply chain decisions.

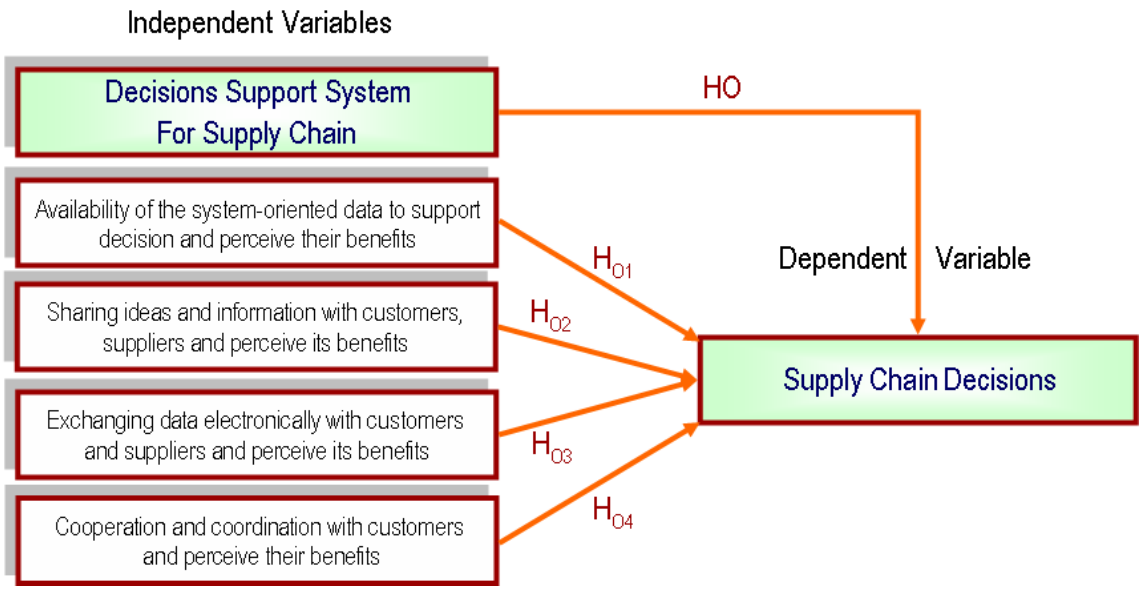


Figure (3 -2)

Study Model

(3-6): Study Tools and Data Collection

The current study is two fold, theoretical and practical. In the theoretical side, the researcher relied on the scientific studies that are related to the current study. Whereas in the practical side, the researcher relied on descriptive and analytical methods using the practical manner to collect, analyze data and test hypotheses.

The data collection, manners analysis and programs used in the current study are based on two sources:

1. Secondary sources: books, journals, theses to write the theoretical framework of the study.

2. Primary source: a questionnaire that was designed to reflect the study objectives and questions.

In this study, both primary and secondary data were used. The data collected for the model were through questionnaire. After conducting a thorough review of the literature pertaining to supply chain; decision support system; decision support system for supply chain, the researcher formulated the questionnaire instrument for this study.

The questionnaire instrumental sections are as follows:

Section One: ***Demographic variables***. The demographic information was collected with closed-ended questions, through (6) factors (Age; Gender; Education level; Number of Experience Years; Specialization and Job Position)

Section Two: ***Availability of the system-oriented data to support decision and perceive their benefits***. This section measured the availability of the system-oriented data to support decision and perceive their benefits through (7) items on a Likert-type scale as follows:

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

Section Three: ***Sharing ideas and information with customers, suppliers and perceive its benefits.*** This section measured through (2) dimensions to measure the sharing ideas and information with customers, suppliers and perceive its benefits through (18) items on a Likert-type scale as follows:

Very High	High	Average	Weak	Very Weak
1	2	3	4	5

Section Four: ***Exchanging data electronically with customers and suppliers and perceive its benefits.*** This section measured the exchanging data electronically with customers and suppliers and perceive its benefits through (8) items on a Likert-type scale as follows:

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

Section Five: ***Cooperation and coordination with customers and perceive their benefits***. This section measured the cooperation and coordination with customers and perceive their benefits through (8) items on a Likert-type scale as follows:

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

Section Six: ***Supply Chain Decisions***. This section measured the supply chain decisions through (4) items on a Likert-type scale as follows:

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

(3-7): Statistical Treatment

The data collected from the responses of the study questionnaire were used through *Statistical Package for Social Sciences* (*SPSS*) for analysis and conclusions. Finally, the researcher used the suitable statistical methods that consist of:

- *Percentage and Frequency*.
- *Cronbach Alpha reliability* (α) $\alpha \frac{K}{K-1} - \left(1 - \frac{\sum \delta_{i2}}{\sum \delta_{y2}}\right)$ to measure strength of the correlation and coherence between questionnaire items.
- *Arithmetic Mean* $\overline{X} = \frac{\sum_{i=1}^{n} X i}{n}$ to identify the level of response study sample individuals to the study variables.
- *Standard Deviation* $S = \sqrt{\frac{\sum_{i=1}^{n} (X i - \overline{X})^2}{n-1}}$ to Measure the responses spacing degree about Arithmetic Mean.
- Simple and Multiple Regression analysis to Measure the impact of study variables on testing the direct effects.
- Relative importance, assigning due to:

$$\text{Class Interval} = \frac{\text{Maximum Class} - \text{Minimum Class}}{\text{Number of Level}}$$

$$\text{Class Interval} = \frac{5-1}{3} = \frac{4}{3} = 1.33$$

The Low degree from 1- less than 2.33
The Medium degree from 2.33 – 3.66
The High degree from 3.67 and above.

(3-8): Validity and Reliability

(3-8-1): Validation

To test the questionnaire for clarity and to provide a coherent research questionnaire, a macro review that covers all the research constructs was accurately performed by academic reviewers from Middle East University specialized in Business Administration, Marketing, and information system. Some items were added, based on their valuable recommendations. Some others were reformulated to become more accurate and that is expected therefore to enhance the research instrument. The academic reviewers are (7) and the overall percentage of respond is (100%), (see appendix "2").

(3-8-2): Study Tool Reliability

The reliability analysis applied to the level of Cronbach Alpha (α) is the criteria of internal consistency which was at a minimum acceptable level (Alpha ≥ 0.60) suggested by (Sekaran, 2003). The overall Cronbach Alpha (α) = (0.916). Whereas the High level of Cronbach Alpha (α) is to *Share ideas and information with customers, suppliers and perceived benefits* = (0.894). The lowest level of Cronbach Alpha (α) is to *Availability of the system-oriented data to support decision and the perceived benefits of it* = (0.802).

These results are the acceptable levels as suggested by (Sekaran, 2003). The results were shown in Table (3-4).

Table (3-4)

Reliability of Questionnaire Dimensions

No.	*Dimensions*	*Alpha Value (α)*
1	Availability of the system-oriented data to support decision and perceive their benefits.	0.802
2	Sharing ideas and information with customers, suppliers and perceive its benefits.	0.894
3	Exchanging data electronically with customers and suppliers and perceive its benefits.	0.827
4	Cooperation and coordination with customers and perceive their benefits.	0.835
5	Supply Chain Decisions	0.763
Total		0.916

Chapter Four

Analysis Results & Hypotheses Test

(4-1): Introduction

(4-2): Descriptive analysis of study variables

(4-3): Study Hypotheses Test

(4-4): A Proposed Model for Supply Chain Decisions Support System

(4-1): Introduction

According to the purpose of the research and the research framework presented in the previous chapter, this chapter describes the results of the statistical analysis for the data collected according to the research questions and research hypotheses. The data analysis include a description of the Means and Standard Deviations for the questions of the study; Multiple and Simple Linear and Regression analysis used.

(4-2): Descriptive analysis of study variables

(4-2-1): *Availability of the system-oriented data to support decision and perceive their benefits.*

The researcher used the arithmetic mean, standard deviation, item importance and importance level as shown in Table (4-1).

Table (4-1)

Arithmetic mean, SD, item importance and importance level of Availability of the system-oriented data to support decision and perceive their benefits

No.	Item	DHL			TNT			ARAMEX			FEDEX			Sample As a one Unit		
		Mean	S.D	Important Level	Mean	S.D	Important Level	Mean	S.D	Important Level	Mean	S.D	Important Level	Mean	Important Level	Item importance
1	The company has a system included quantitative models to predict customer orders based on historical data to services provided	3.63	0.72	Medium	3.29	1.14	Medium	3.64	0.74	Medium	3.18	1.19	Medium	3.44	Medium	6
2	Decision Support System used in a company included quantitative models dealing with one problem	4.13	0.81	High	4.43	0.51	High	4.21	0.70	High	4.29	0.47	High	4.27	High	3
3	Decision Support System used in a company included quantitative models related with time of package delivery	4.56	0.51	High	4.07	1.00	High	4.57	0.51	High	4.18	0.95	High	4.35	High	2
4	Decision Support System used in a company included quantitative models with one objective	4.19	0.40	High	4.36	0.50	High	4.14	0.36	High	4.35	0.49	High	4.26	High	4
5	Decision Support System used in a company Contribute to improve the accuracy for customer order forecasting	3.25	1.13	Medium	3.43	1.02	Medium	3.21	0.97	Medium	3.35	0.86	Medium	3.31	Medium	7
6	Decision Support System used in a company Contribute to Costs Minimize	4.81	0.40	High	4.93	0.27	High	4.86	0.36	High	4.88	0.33	High	4.87	High	1
7	Decision Support System used in a company Contribute to Profits maximize	3.94	0.77	High	4.36	1.08	High	4.07	0.83	High	4.41	1.00	High	4.20	High	5
General Arithmetic mean & standard deviation		4.07	0.68	High	4.12	0.79	High	4.10	0.64	High	4.09	0.76	High	4.10	High	

Table (4-1) clarifies the following:

1. The study sample supports ***the Availability of the system-oriented data to support decision and perceive their benefits*** ranged between high to five items (2,3, 4,6,7) and Medium to two items (1,5).

2. In general the study sample supports ***the Availability of the system-oriented data to support decision and perceive their benefits*** is high with Mean (4.10). At the level of categories covered in study sample class TNT company are the most recognition with mean was (4.12) among the other companies, while the DHL company are the least appreciated with mean was (4.07).

3. The study sample supports level to ***the Availability of the system-oriented data to support decision and perceive their benefits*** are varying. As appears from the arrangement of items based on the support strength. “item 6” (Decision support system used in a company contribute to costs minimize) ranks first with mean (4.87) from other items. On the other hand “item 3” (Decision support system used in a company included quantitative models related with time of package delivery) got second rank with mean (4.35). But also “item 5” (Decision support system used in a company contribute to improve the accuracy for customer order forecasting) got the last rank with mean (3.31).

4. The relative decline of the standard deviations from Arithmetic Mean in supporting the study sample toward items indicates the study sample opinions consistency about the various items.

(4-2-2): *Sharing ideas and information with customers, suppliers and perceive its benefits.*

The researcher used the arithmetic mean, standard deviation, item importance and importance level as shown in Table (4-2).

Table (4-2)

Arithmetic mean, SD, item importance and importance level of sharing ideas and information with customers, suppliers and perceive its benefits

No.	Item	DHL			TNT			ARAMEX			FEDEX			Sample As a one Unit		
		Mean	S.D	Important Level	Mean	S.D	Important Level	Mean	S.D	Important Level	Mean	S.D	Important Level	Mean	Important Level	Item importance
1	Information to predict future requests	3.19	0.91	Medium	3.29	0.83	Medium	3.14	0.86	Medium	3.35	0.79	Medium	3.24	Medium	13
2	expand or Modernization Plans	2.88	1.41	Medium	3.79	1.25	High	2.93	1.33	Medium	3.65	1.17	Medium	3.31	Medium	12
3	Information about capacity distribution	2.75	0.93	Medium	2.79	1.31	Medium	2.50	0.85	Medium	2.94	1.25	Medium	2.75	Medium	14
4	Ideas and suggestions for provided services quality	3.50	1.03	Medium	4.21	0.70	High	3.79	0.89	High	4.35	0.61	High	3.96	High	10
5	financial and non-financial analytical reports	4.06	0.25	High	3.93	0.73	High	4.00	0.39	High	3.82	0.73	High	3.95	High	11
6	Information about service costs	4.38	0.50	High	4.14	0.77	High	4.29	0.61	High	3.94	0.75	High	4.19	High	6
7	Information about competitors companies	4.19	0.54	High	4.36	0.50	High	4.14	0.53	High	4.29	0.47	High	4.25	High	3
8	Ideas and suggestions to maximize profits	2.56	0.89	Medium	2.43	1.16	Medium	2.64	0.84	Medium	2.53	1.01	Medium	2.54	Medium	4
9	Important problems	4.56	0.51	High	3.71	1.20	High	4.36	0.63	High	3.76	1.09	High	4.10	High	7
10	Information about the political, economic or technological changes	4.13	0.50	High	4.43	0.51	High	4.00	0.55	High	4.41	0.51	High	4.24	High	5
11	Reduce bottlenecks	4.56	0.51	High	4.29	0.91	High	4.29	0.61	High	4.12	1.05	High	4.32	High	2
12	Improve the operations performance	4.44	0.51	High	4.43	0.65	High	4.29	0.47	High	4.47	0.72	High	4.41	High	1
13	Exclude activities that do not add value	4.13	0.89	High	3.79	1.12	High	4.21	0.70	High	4.06	0.97	High	4.05	High	8
14	Improve the accuracy of suppliers forecasting for the company's requires	4.31	0.48	High	3.79	0.97	High	4.00	0.78	High	4.00	0.61	High	4.03	High	9
General Arithmetic mean & standard deviation		3.83	0.70	High	3.81	0.90	High	3.76	0.72	High	3.84	0.84	High	3.83	High	

Table (4-2) clarifies the following:

1. The study sample supports the ***Sharing ideas and information with customers, suppliers and perceive its benefits*** ranged between high to ten items (4,5,6,7,9,10,11,12,13,14) and Medium to four items (1,2,3,8).

2. In general the study samples supports the ***Sharing ideas and information with customers, suppliers and perceive its benefits*** is high with Mean (3.83). At the level of categories covered in study sample class FEDEX company are the most recognition with mean was (3.84) among the other companies, while the ARAMEX company are the least appreciated with mean (3.76).

3. The study sample supports level to ***Sharing ideas and information with customers, suppliers and perceive its benefits*** is varying. As appears from the arrangement of items based on the support strength. “item12” (Improve the operations performance) ranks first with mean (4.41) from other items. On the other hand “item 11” (Reduce bottlenecks) got second rank with mean (4.32). But also the “item 3” (Information about capacity distribution) got the last rank with mean (2.75).

4. The relative decline of the standard deviations from Arithmetic Mean in supporting the study sample toward items indicates the study sample opinions consistency about the various items.

(4-2-3): *Exchanging data electronically with customers and suppliers and perceive its benefits.*

The researcher used the arithmetic mean, standard deviation, item importance and importance level as shown in Table (4-3).

Table (4-3)

Arithmetic mean, SD, item importance and importance level of exchanging data electronically with customers and suppliers and perceive its benefits

No.	Item	DHL			TNT			ARAMEX			FEDEX			Sample As a one Unit		
		Mean	S.D	Important Level	Mean	S.D	Important Level	Mean	S.D	Important Level	Mean	S.D	Important Level	Mean	Important Level	Item importance
1	The company exchange data electronically by using intranet and extranet	4.00	0.82	High	3.43	0.94	Medium	3.93	0.92	High	3.59	0.80	Medium	3.74	High	7
2	There is a connection between the computers networks within the company	3.94	0.93	High	3.64	1.15	Medium	3.71	1.07	High	3.76	1.15	High	3.76	High	6
3	The company service buying & selling through website	4.19	0.54	High	3.57	0.76	Medium	3.93	0.62	High	3.47	0.80	Medium	3.79	High	5
4	The electronic exchange of company data lead to increase accuracy	4.44	0.51	High	4.21	0.43	High	4.36	0.50	High	4.18	0.39	High	4.30	High	1
5	The electronic exchange of company data lead to update data rapidly	4.38	0.62	High	3.64	0.63	Medium	4.14	0.66	High	3.53	0.72	Medium	3.92	High	3
6	The electronic exchange of company data lead to improve the accuracy of customer orders forecasting	3.50	0.82	Medium	3.21	0.97	Medium	3.57	0.76	Medium	3.24	0.97	Medium	3.38	Medium	8
7	The electronic exchange of company data lead to responsiveness on time to customer orders	4.44	0.51	High	3.64	1.01	Medium	4.29	0.83	High	3.82	0.81	High	4.05	High	2
8	The electronic exchange of company data lead to increase customer satisfaction	3.94	0.57	High	3.71	0.83	High	3.93	0.62	High	3.76	0.75	High	3.84	High	4
General Arithmetic mean & standard deviation		4.10	0.67	High	3.63	0.84	Medium	3.98	0.74	High	3.67	0.80	Medium	3.85	High	

Table (4-3) clarifies the following:

1. The study sample supports the ***Exchanging data electronically with customers and suppliers and perceive its benefits*** ranged between high to seven items (1, 2, 3, 4, 5, 6, 7) and Medium to one item (8).

2. In general the study sample supports the ***Exchanging data electronically with customers and suppliers and perceive its benefits*** are high with Mean (3.85). At the level of categories covered in study sample class DHL company are the most recognition with mean was (4.10) among the other companies, while the TNT company are the least appreciated with mean (3.63).

3. The study sample supports level to ***Exchanging data electronically with customers and suppliers and perceive its benefits*** are varying. As appears from the arrangement of items based on the support strength. “item 4” (The electronic exchange of company data lead to increase accuracy) ranks first with mean (4.30) from other items. On the other hand “item 7” (The electronic exchange of company data lead to responsiveness on time to customer orders) got second rank with mean (4.05). But also “item 6” (The electronic exchange of company data lead to improve the accuracy of customer orders forecasting) got the last rank with mean (3.38).

4. The relative decline of the standard deviations from Arithmetic Mean in supporting the study sample toward items indicates the study sample opinions consistency about the various items.

(4-2-4): *Cooperation and coordination with customers and perceive their benefits.*

The researcher used the arithmetic mean, standard deviation, item importance and importance level as shown in Table (4-4).

Table (4-4)

Arithmetic mean, SD, item importance and importance level of cooperation and coordination with customers and perceive their benefits

No.	Item	DHL			TNT			ARAMEX			FEDEX			Sample As a one Unit		
		Mean	S.D	Important Level	Mean	S.D	Important Level	Mean	S.D	Important Level	Mean	S.D	Important Level	Mean	Important Level	Item importance
1	Cooperation & Coordination with customer lead to agree with them on the basic rules of trading	4.81	0.40	High	3.86	1.29	High	4.64	0.63	High	3.94	1.20	High	4.31	High	2
2	Cooperation & Coordination with customer lead to agree with them on the list of transactions and delivery dates	4.50	0.52	High	3.71	1.07	High	4.50	0.52	High	4.00	0.87	High	4.18	High	4
3	Cooperation & Coordination with customer lead to develop action plan	4.38	0.89	High	4.07	0.73	High	4.14	0.95	High	4.06	0.83	High	4.16	High	6
4	Cooperation & Coordination with customer lead to improve the accuracy of customer orders forecasting	4.38	0.72	High	4.07	0.47	High	4.21	0.70	High	4.06	0.56	High	4.18	High	4
5	Cooperation & Coordination with customer lead to deliver their needs on time	4.50	0.52	High	4.07	0.47	High	4.36	0.63	High	4.00	0.50	High	4.23	High	3
6	Cooperation & Coordination with customer lead to increase customer satisfaction	3.88	0.81	High	3.29	0.91	Medium	3.86	0.86	High	3.35	0.86	Medium	3.59	Medium	8
7	Cooperation & Coordination with customer lead to maximize profits	4.19	1.05	High	4.14	0.53	High	4.14	1.03	High	4.12	0.49	High	4.15	High	7
8	Cooperation & Coordination with customer lead to increase the achieving objectives set in the plan	4.56	0.73	High	4.29	0.99	High	4.43	0.85	High	4.41	0.80	High	4.42	High	1
General Arithmetic mean & standard deviation		4.40	0.70	High	3.94	0.81	High	4.29	0.77	High	3.99	0.76	High	4.15	High	

Table (4-4) clarifies the following:

1. The study sample supports the ***Cooperation and coordination with customers and perceive their benefits*** ranged between high to seven items (1, 2, 3, 4, 5, 7, 8) and Medium to one item (6).

2. In general the study sample supports the ***Cooperation and coordination with customers and perceive their benefits*** are high with Mean (4.15). At the level of categories covered in study sample class DHL company are the most recognition with mean was (4.40) among the other companies, while the TNT company are the least appreciated with mean (3.94).

3. The study sample supports level to ***Cooperation and coordination with customers and perceive their benefits*** is varying. As appears from the arrangement of items based on the support strength. “item 8” (Cooperation & Coordination with customer lead to increase the achieving objectives set in the plan) ranks first with mean (4.42) from other items. On the other hand “item 1” (Cooperation & Coordination with customer lead to agree with them on the basic rules of trading) got second rank with mean (4.31). But also “item 6” (Cooperation & Coordination with customer lead to increase customer satisfaction) got the last rank with mean (3.59).

4. The relative decline of the standard deviations from Arithmetic Mean in supporting the study sample toward items indicates the study sample opinions consistency about the various items.

(4-2-5): *Supply Chain Decisions*

The researcher used the arithmetic mean, standard deviation, item importance and importance level as shown in Table (4-5).

Table (4-5)

Arithmetic mean, SD, item importance and importance level of Supply Chain Decisions

No.	Item	DHL			TNT			ARAMEX			FEDEX			Sample As a one Unit		
		Mean	S.D	Important Level	Mean	S.D	Important Level	Mean	S.D	Important Level	Mean	S.D	Important Level	Mean	Important Level	Item importance
1	Improve the provided service quality	4.19	0.54	High	3.86	0.86	High	4.14	0.66	High	3.94	0.90	High	4.03	High	3
2	Improve the accuracy for customer orders forecasting	4.63	0.50	High	4.14	0.36	High	4.29	0.83	High	4.18	0.39	High	4.31	High	1
3	Reduce the cost of provided service	4.38	0.89	High	3.79	0.97	High	4.29	0.99	High	3.71	0.92	High	4.04	High	2
4	Maximize the profits from the provided services	3.94	0.93	High	3.79	1.19	High	3.79	1.05	High	3.94	1.03	High	3.87	High	4
General Arithmetic mean & standard deviation		4.29	0.72	High	3.90	0.85	High	4.13	0.88	High	3.94	0.81	High	4.06	High	

Table (4-5) clarifies the following:

1. The study sample supports the supply chain decisions ranged high to three items (1, 2, 3, 4).

2. In general the study sample supports and improves of the accuracy for customer orders forecasting with degree which is high with Mean (4.31).

3. The “item 2” (Improve the accuracy for customer orders forecasting) with degree ranks first with mean (4.31) from other items. On the other hand “item 3” (Reduce the cost of provided service) got second rank with mean (4.04). But also “item 4” (Maximize the profits from the provided services) got the last rank with mean (3.87).

4. The relative decline of the standard deviations from Arithmetic Mean in supporting the study sample toward items indicates the study sample opinions consistency about the various items.

(4-3): Study Hypotheses Test

The researcher in this part tested the main hypotheses and studied sub hypotheses, through Multiple, Simple Linear Regression analysis with (F) test using ANOVA table as follows:

H_0: There is no significant impact of decisions support system for supply chain (*Availability of the system-oriented data to support decision and perceive their benefits; Sharing ideas and information with customers, suppliers and perceive its benefits; Exchanging data electronically with customers and suppliers and perceive its benefits; Cooperation and coordination with customers and perceive their benefits*) on supply chain decisions at level ($\alpha \leq 0.05$).

To test this hypothesis, the researcher uses the multiple regression analysis to ensure the impact of decisions support system for supply chain on supply chain decisions in shipping companies in Jordan. As shown in Table (4-6).

Table (4-6) multiple regression analysis test results of the impact of decisions support system for supply chain on supply chain decisions in shipping companies in Jordan

	(R)	(R^2)	F Calculate	DF	Sig*	β		T Calculate	Sig*
supply chain decisions	0.863	0.745	39.350	4	0.000	Availability of the system-oriented data	0.189	3.508	0.001
				56		Sharing ideas and information	0.006	0.091	0.928
						Exchanging data electronically	0.305	5.452	0.000
				60		Cooperation & coordination	0.141	3.575	0.001

* the impact is significant at level ($\alpha \leq 0.05$)

From table (4-6) we observe that there is a significant impact of decisions support system for supply chain on supply chain decisions in shipping companies in Jordan. The ***R*** was (0.863) at level ($\alpha \leq 0.05$). Whereas the R^2 was (0.745). This means the (0.745) of supply chain decisions in shipping companies in Jordan changeability's results from the changeability in decisions support system for supply chain variables. As ***β*** was (Availability of the system-oriented data: 0.189; sharing ideas and information: 0.006; exchanging data electronically: 0.305; cooperation & coordination: 0.141) this means the increase of one unit in decisions support system for supply chain variables concerned will increase supply chain decisions in shipping companies in Jordan value (Availability of the system-oriented data: 0.189; sharing ideas and information: 0.006; exchanging data electronically: 0.305; cooperation & coordination: 0.141). Confirms significant impact F calculate was (39.350) and its significance at level ($\alpha \leq 0.05$), and that confirms invalid main hypothesis, reject null hypothesis and accepted alternative hypothesis:

There is a significant impact of decisions support system for supply chain on supply chain decisions at level **($\alpha \leq 0.05$).**

To ensure the impact of decisions support system for supply chain variables (*Availability of the system-oriented data to support decision and perceive their benefits; Sharing ideas and information with customers, suppliers and perceive its benefits; Exchanging data electronically with customers and suppliers and perceive its benefits;*

Cooperation and coordination with customers and perceive their benefits) on supply chain decisions the researcher divides the main hypothesis into four sub hypotheses, and uses the simple regression analysis to test each sub-hypotheses ,as a follows:

H_{O1}: There is no significant impact of availability of the system-oriented data to support decision and perceive their benefits on supply chain decisions at level ($\alpha \leq 0.05$).

To test this hypothesis, the researcher uses the simple regression analysis to ensure the impact of availability of the system-oriented data to support decision and perceive their benefits on supply chain decisions in shipping companies in Jordan. As shown in Table (4-7).

Table (4-7) Simple Regression Analysis test results of the impact of Availability of the system-oriented data to support decision and perceive their benefits on supply chain decisions in shipping companies in Jordan

	(R)	(R^2)	F Calculate	DF	Sig*	β	T Calculate	Sig*
supply chain decisions	0.463	0.214	16.088	1 59 60	0.000	0.485	4.011	0.000

* the impact is significant at level ($\alpha \leq 0.05$)

From table (4-7) the researcher observes that there is a significant impact of availability of the system-oriented data to support decision and perceive their benefits on supply chain decisions in shipping companies in Jordan. The ***R*** was (0.463) at level ($\alpha \leq 0.05$). Whereas the R^2 was (0.214). This means the (0.214) of supply chain decisions in shipping companies in Jordan changeability's results from the changeability in availability of the system-oriented data to support decision and perceive their benefits. As ***β*** was (0.485) this means the increase of one unit in availability of the system-oriented data to support decision and perceive their benefits concerned will increase supply chain decisions in shipping companies in Jordan value (0.485). Confirms significant impact F Calculate was (16.088) and it's significance at level ($\alpha \leq 0.05$), and that confirms invalid first sub-hypotheses, reject null hypothesis and accepted alternative hypothesis:

There is a significant impact of availability of the system-oriented data to support decision and perceive their benefits on supply chain decisions at level **($\alpha \leq 0.05$).**

H_{O2}: There is no significant impact of sharing ideas and information with customers, suppliers and perceive its benefits on supply chain decisions at level ($\alpha \leq 0.05$).

To test this hypothesis, the researcher uses the simple regression analysis to ensure the impact of sharing ideas and information with customers, suppliers and perceive its benefits on supply chain decisions in shipping companies in Jordan. As shown in Table (4-8).

Table (4-8) Simple Regression Analysis test results of the impact of sharing ideas and information with customers, suppliers and perceive its benefits on supply chain decisions in shipping companies in Jordan

	(R)	(R^2)	F Calculate	DF	Sig*	β	T Calculate	Sig*
supply chain decisions	0.880	0.774	201.655	1 59 60	0.000	0.754	14.201	0.000

* the impact is significant at level ($\alpha \leq 0.05$)

From table (4-8) the researcher observes that there is a significant impact of sharing ideas and information with customers, suppliers and perceive its benefits on supply chain decisions in shipping companies in Jordan. The ***R*** was (0.880) at level ($\alpha \leq 0.05$). Whereas the R^2 was (0.774). This means the (0.774) of supply chain decisions in shipping companies in Jordan changeability's results from the changeability in sharing ideas and information with customers, suppliers and

perceive its benefits. As **β** was (0.754) this means the increase of one unit in sharing ideas and information with customers, suppliers and perceive its benefits concerned will increase supply chain decisions in shipping companies in Jordan value (0.754). Confirms significant impact F Calculate was (201.655) and it's significance at level ($\alpha \leq 0.05$), and that confirms invalid second sub-hypotheses, reject null hypothesis and accepted alternative hypothesis:

There is a significant impact of sharing ideas and information with customers, suppliers and perceive its benefits on supply chain decisions at level **($\alpha \leq 0.05$)**.

H_{O3}: There is no significant impact of exchanging data electronically with customers and suppliers and perceive its benefits on supply chain decisions at level ($\alpha \leq 0.05$).

To test this hypothesis, the researcher uses the simple regression analysis to ensure the impact of exchanging data electronically with customers and suppliers and perceive its benefits on supply chain decisions in shipping companies in Jordan. As shown in Table (4-9).

Table (4-9) Simple Regression Analysis test results of the impact of exchanging data electronically with customers and suppliers and perceive its benefits on supply chain decisions in shipping companies in Jordan

	(R)	(R^2)	F Calculate	DF	Sig*	β	T Calculate	Sig*
supply chain decisions	0.837	0.701	138.326	1 59 60	0.000	0.579	11.770	0.000

* the impact is significant at level ($\alpha \leq 0.05$)

From table (4-9) the researcher observes that there is a significant impact of exchanging data electronically with customers and suppliers and perceive its benefits on supply chain decisions in shipping companies in Jordan. The ***R*** was (0.837) at level ($\alpha \leq 0.05$). Whereas the $\boldsymbol{R^2}$ was (0.701). This means the (0.701) of supply chain decisions in shipping companies in Jordan changeability's results from the changeability in exchanging data electronically with customers and suppliers and perceive its benefits. As ***β*** was (0.579) this means the increase of one unit in exchanging data electronically with customers and suppliers and perceive its benefits concerned will increase supply chain decisions in shipping companies in Jordan value (0.579). Confirms significant impact F Calculate was (138.326) and it's significance at level ($\alpha \leq 0.05$), and that confirms invalid three sub-hypotheses, reject null hypothesis and accepted alternative hypothesis:

There is a significant impact of exchanging data electronically with customers and suppliers and perceive its benefits on supply chain decisions at level **($\alpha \leq 0.05$).**

H_{04}: There is no significant impact of cooperation and coordination with customers and perceive their benefits on supply chain decisions at level ($\alpha \leq 0.05$).

To test this hypothesis, the researcher uses the simple regression analysis to ensure the impact of cooperation and coordination with customers and perceive their benefits on supply chain decisions in shipping companies in Jordan. As shown in Table (4-10).

Table (4-10) Simple Regression Analysis test results of the impact of cooperation and coordination with customers and perceive their benefits on supply chain decisions in shipping companies in Jordan

	(R)	(R^2)	F Calculate	DF	Sig*	β	T Calculate	Sig*
supply chain decisions	0.807	0.652	110.409	1 59 60	0.000	0.535	10.508	0.000

* the impact is significant at level ($\alpha \leq 0.05$)

From table (4-10) the researcher observes that there is a significant impact of cooperation and coordination with customers and perceive their benefits on supply chain decisions in shipping companies in Jordan. The ***R*** was (0.807) at level ($\alpha \leq 0.05$). Whereas the R^2 was (0.652). This means the (0.652) of supply chain decisions in shipping companies in Jordan changeability's results from the changeability in cooperation and coordination with customers and perceive their benefits. As ***β*** was (0.535) this means the increase of one unit in cooperation and coordination with customers and perceive their benefits concerned will increase supply chain decisions in shipping companies in Jordan value (0.535). Confirms significant impact F Calculate was (110.409) and its significance at level ($\alpha \leq$ 0.05), and that confirms invalid fourth sub-hypotheses, reject null hypothesis and accepted alternative hypothesis:

There is a significant impact of cooperation and coordination with customers and perceive their benefits on supply chain decisions at level **($\alpha \leq 0.05$).**

(4-4): The Proposed Model for Supply Chain Decisions Support System

Through the results reached by the researcher from the descriptive analysis items and variables of the study indicate the level of importance of these variables which is included (*Availability of the system-oriented data to support decision and perceive their benefits, sharing ideas and information with customers, suppliers and perceive its benefits, exchanging data electronically with customers and suppliers and perceive its benefits, and cooperation and coordination with customers and perceive their benefits*), results showed that all variables of the study had reached the high level of importance from the study sample perspective in the companies under study.

Also through findings by the researcher to test the study hypotheses the research showed that there is a combined impact of the decision support systems for supply chain on the supply chain decisions. In addition, the study variables demonstrated the benefits perceived from it, the researcher presents a proposed model to support the supply chain decisions for shipping companies (express) in Jordan, including what conscious from the study sample for these companies, and perceived benefits. Moreover, to what will be generated by this system in the future. Therefore, building a proposed model follow the normative approach and “what if " approach. This model included five main types of support

systems that can be supported more than step(s) for supply chain decision making, these types are:

1- Business process to support supply chain decisions.
2- Communication-driven system to support supply chain decisions.
3- Data-driven system to support supply chain decisions.
4- Model-driven system to support supply chain decisions.
5- Knowledge -driven system to support supply chain decisions.

These types are interacting with each other and overlap many times, although all of them have distinctive features to support supply chain decisions. These types explain the following in detail :

(1) Business process to support supply chain decisions.

The business process for the supply chain is the most important sources of information and communication technology which can support the supply chain decisions. The main business processes include the following:

1- Planning, forecasting and cooperation

The process of planning and forecasting consists of the following nine steps:

Step 1: Agree on detailed arrangements for cooperation, clear planning and forecasting between the parties relationship. Those arrangements identify the objectives, points of cooperation, the roles of each party, the information that must be involved and the criteria to predict for each buying and selling orders.

Step 2: Develop common business plan agreed by the parties relationship for a specified period. The plan clearly specifies that sales target which will be

discussed cooperation, promotion and pricing plans, and this plan will be the basis of the prediction.

Step 3: Prepare common sales forecast for a certain period to come, by using forecasting tools. This is based on the output of the previous step, and other factors affecting in the sales, which are usually explored from historical data collected.

Step 4: Determine the exceptions terms for sales forecasting resulting from changes of any parties relationship in the common business plan.

Step 5: Cooperate to separate exceptions terms to modify the sales forecasting and to reach a common forecast. In order to achieve this step, shipping companies must use decision support data of both parties relationship.

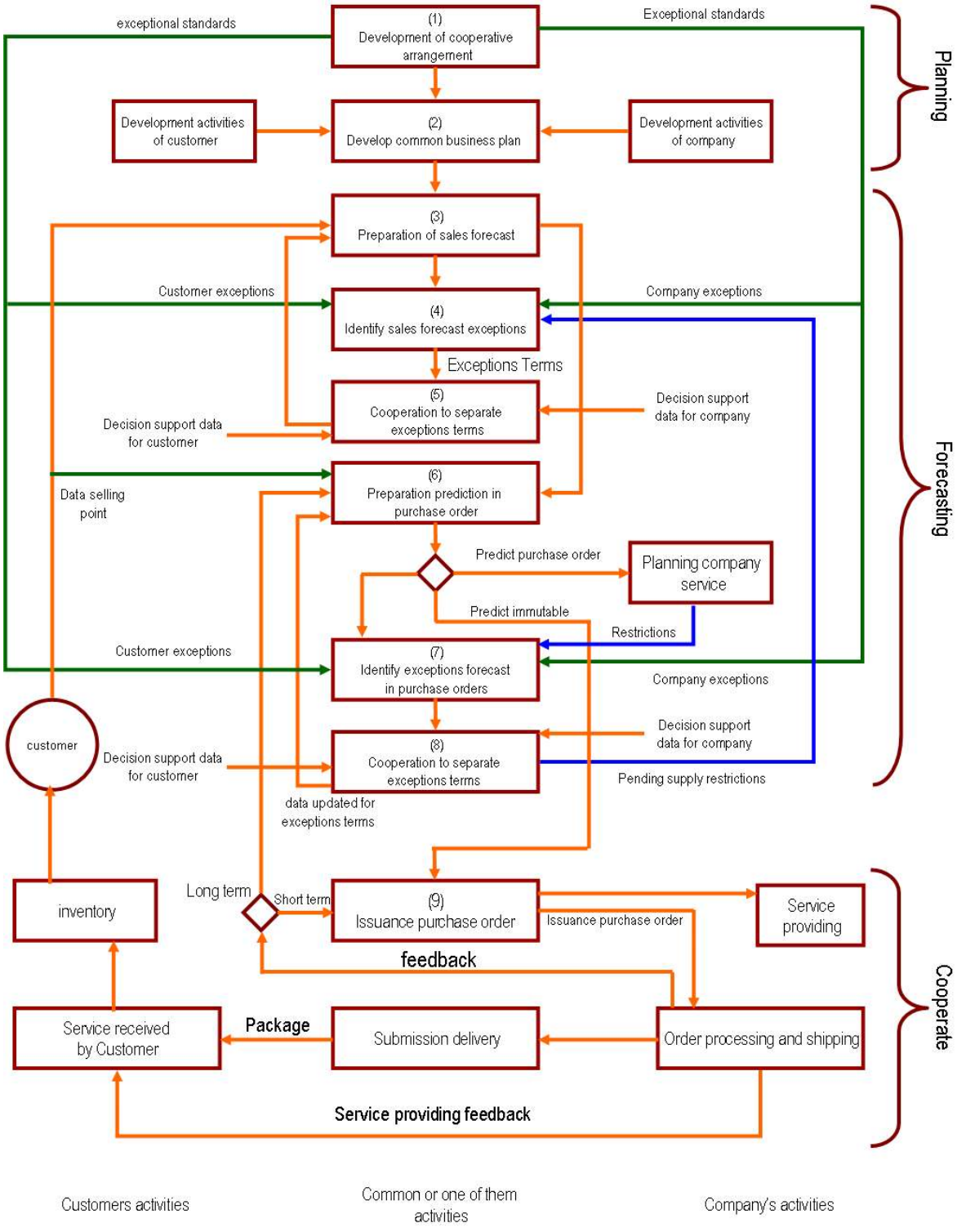
Step 6: Prepare common prediction of purchase orders during a specified time period, based on the outcomes of sales forecasting for the customer, building restrictions on the supply capacity, current transport and delivery times.

Step 7: Determine exceptions to predict purchase orders.

Step 8: Cooperate to separate exceptions terms to modify the prediction of purchase orders.

Step 9: Issue of the purchase order automatically at the moment entered predictions of purchase order and then complete the order processing, shipment and delivery to the customer at the agreed times. As shown in figure (4-1).

Figure (4-1)
Planning, forecasting and cooperation



Source: Prepared by Researcher

2- Business process cooperation

Consists of the following steps:

Step 1: Agree on cooperative arrangements determined in preliminary service groups, usually those groups which have greater size of promotion, then set goals and specific quantitative standards to measure the achievement of goals, set up a list of detailed events, and prepare tools to exchange data, interviews scheduled for the planning committee, finally, implementation and evaluation of various events.

Step 2: Develop common business plan agreed for a specified period, to be determined the details for various events (types, start date and end of it, tactics followed with each of them, services involved in the event, and selling prices).

Step 3: Sales forecasting for the customer during the event and focusing on the event details specified in the previous steps.

Step 4: Plan purchase orders during the event, by transferring the customer's sales predictions into predictions of purchase orders, after account inventory information in warehouses or on its way to warehouses, then fragmentation of purchase orders into actual shipments by referring to the data about shipping patterns to customers.

Step 5: Issue purchase order and response for this order in the cooperative event.

Step 6: Manage of exceptional cases, if available.

Step 7: Analysis after the event, which includes:

A) Review performance indicators such as: index difference ratio between actual value of sales and sales target, accuracy forecasting sales and demand.

B) Discuss and document the activities of competitors and other external influences.

C) Review the cooperation process in the event, and adjusted if necessary depending on the learning outcomes of the last event.

(2) Communication-driven system to support supply chain decisions.

Communication-driven system to support supply chain decisions, such as electronic data interchange systems via intranet, extranet and communication systems.

Therefore, express shipping companies could interchange data electronically with other members of the supply chain, via the Internet through using e-mail to send electronic messages, or enable the beneficiary to fill data in pages designed for the company's website.

Data that can be exchanged electronically between members of supply chain represent data related to sales orders, notifications and approval of such orders, delivery schedule, shipping notifications ,delivery notifications, and changes to those orders ,schedules ,notification and invoices .

For example, the activation of cooperation business process in many types of data between the parent company and its branches to coordinate the

requirements for completion of the work, and those data included: the historical sales, performance indicators and events details.

(3) Data-driven system to support the supply chain decisions.

This system is mainly based on a data warehouse, query and analysis tools. The data warehouse achieves integration not only between data related to the functional areas and different locations for the shipping companies, but with customers and suppliers information systems. Where it can access and extracts data from operational databases, at any time, and then store these data in multi-dimensional approach (temporal, and location ... etc.). In unified data warehouse, which can merge data from several sources, each of them serves a particular set of decisions at all stages of decision making , starting from the investigation and discovery of the problem, and end with selection the most appropriate alternative.

The software that enables to achieve integration mentioned above in companies called enterprise resources planning software (ERP) or supply chain management software. These software contains query tools and traditional reports (exist in the simplest database), but the advanced database contains tools such as online analytical process (OLAP), which works with multidimensional relational databases, (MDRDB), enable ease display the data graphically and ease of movement between dimensions.

The multidimensional relational database for shipping companies supply chain can focus on marketing, sales, and delivery.

In the field of marketing and sales there can be found a real table for sales is linked by several tables, each of them is called dimension, such as dimension for service, time, client, region, and promotion at every competitor ... etc. Each table contains several attributes (columns), which help users to reach the information related to the value, the cost, net profit or sales average of certain services delivered.

In the area of delivery, there is a real table linked with several dimensions such as dimension for: service, time, service line etc... Each table contains several attributes (columns), which help users to know the quantity or cost of service delivery, and provide easy transition from detail levels to summarized levels and vice versa.

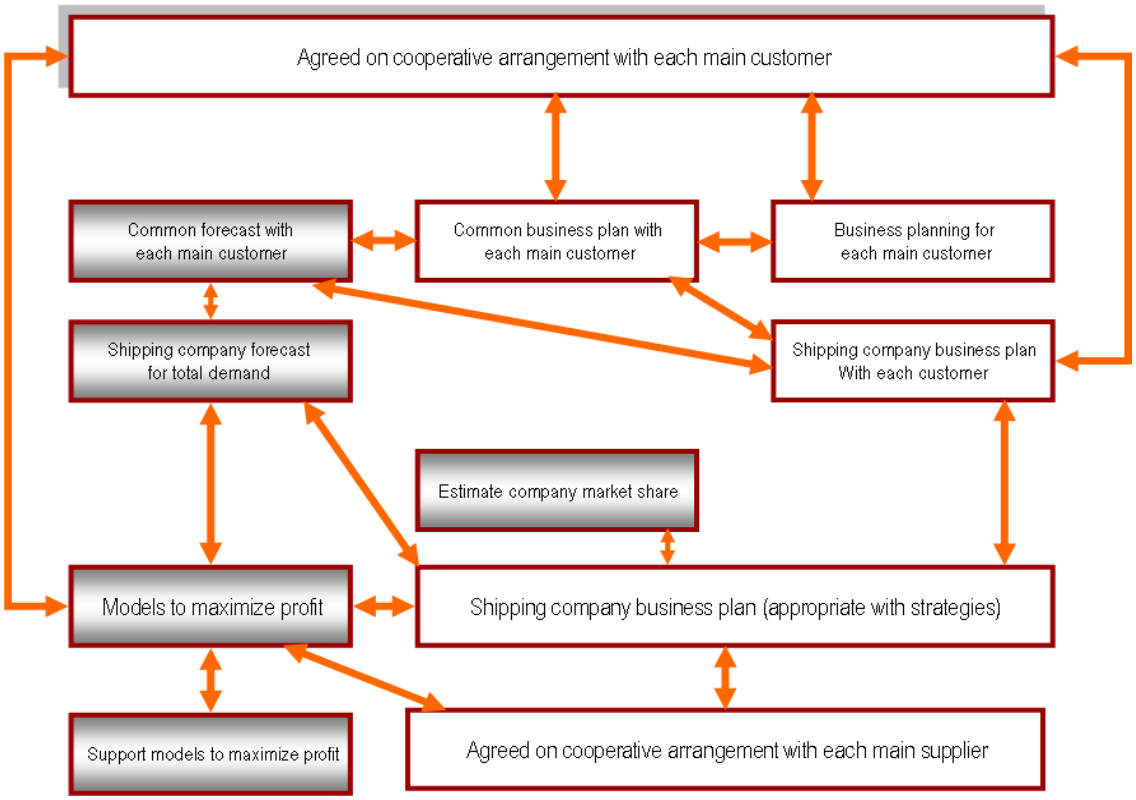
To support executive managers in supply chain management could provide data system of their own and contain the performance balanced indicators for the key success factors in the supply chain, and provide summaries for the good and bad performance indicators (internal and external), or can be done advanced system for information to the executive managers running by dashboard for each executive managers. So it can be represented as graphs to develop the key success factors, in a limited number of key performance indicators based on balanced score card.

(4) Model-driven system to support supply chain decisions.

This system is characterized by existence the models base and the system for managing it , which helps to create, modify ,save and use of models. As well as, the existence of database, or special data port to support specific decisions, this is extracted from the company's multidimensional data warehouse, or from operational database. The researcher will focus here on the most important quantitative models (large and small) suitable for supply chain in express shipping companies, and the relationship of these models with each other and with other support sources, the following figure (4-2) shows the relationship.

Figure (4-2)

Relationship between Models



Source: Prepared by Researcher

Figure (4-2) describes the quantitative models (with gray rectangles) in shipping companies (express) and their relations with the arrangements for cooperation with members of the supply chain to manage the business process, where there is a mutual influence between them .So the researcher finds it should build large and integrated models to maximize the net profit from the supply network in each company, which consists of company's strategy, objectives and priorities, and operate this model that depends on the output of demand forecasting model, and the actual fact data, then the estimated data for several alternative scenarios for the relationships and supply chain operations, to reach the net profit appropriate in light of business processes and supply chain relations.

Based on the output for the most appropriate solution that mentioned above, is to agree on cooperative arrangements with every major client, then develop the business plans and forecasts with each of them. It is preferred to use data for services selling to client as an input in appropriate forecasting models. The researcher prefers to use neural network method, to predict the sales of each service based on input factors that affect sales, after that he will assemble those plans, and estimate the sales to customers not involved with the company in the supply chain relations. To develop a business plan, take into account the current and target market share, therefore, it will be agreed on cooperative arrangements

with every major supplier, then develop common business plans and forecasts with each of them.

After using the large model strategically for design supply chain business processes (as mentioned in the previous paragraph), it is used again tactically (with the complementary and small models) for planning medium time period and operationally for planning a short time period, based on the outcomes of these models. Common business plans and forecasts can be developed with each member of supply chain, for a time period coming, then group those plans, and estimate the sales to customers not involved with the company in the supply chain relations, to set a business plan for specific time period.

(5) Knowledge - driven system to support supply chain decisions.

Knowledge-driven system that can support supply chain decisions consist of: Intelligent Agent (which takes some of the decisions automatically) and data mining tools (which helps in knowledge discovery). These will be explained as following:

1- Intelligent Agent in supply chain

Intelligent agent plays a major role in achieving integration between the internal and external supply chain processes. It is an automated expert system that can make certain decisions, particularly among supply chain members. Caridi, et..al. (2005) specifies four areas to apply intelligent agent in supply chain to solve supply chain problems, such as:

A) Automate supply chain process: the intelligent agent is acting here as a dynamic system to exchange data electronically in real time, which works in coordinated reaction.

B) Supply chain integration: The agents are more intelligent than the previous case, where they can evaluate new solutions, and they have the ability to negotiate and interact with each other.

C) Simulation of the supply chain processes: The representation or simulation supply chain processes as a multi-agents system, it is a good way to do “what if analysis”, in order to predict or re-engineering the supply chain, and the agents have different levels of intelligence and effective social capabilities to interact among them.

D) Supply chain formation: agents working cooperatively and effectively to develop mechanisms for a complex negotiation among themselves, for example, to identify the appropriate supplier or client.

2- Data mining and knowledge discovery

Data warehouse provides a huge quantity of internal and external historical data for the managers, concerns of a large amount of different variables, related to the supply chain. Thus, the role of data mining tools in this case, is to assist managers in the detection of new knowledge, as the following:

In sales and Marketing area :prospecting in the historical data related to that variables (services, distribution channels, customers and their regions ,method of transport for them, the price and value, discounts, and costs), historical data related to economic and political conditions for the clients countries. Through that exploration can be identified, the relationships and new

rules explain the behavior of those variables, to take advantage of them when making decisions for design the distribution network (open or close the distribution channels, establishment supply chain relationships with main customers).

In Purchase and inventory area: prospecting in the historical data relating to that area (suppliers, method of shipping, storage period, costs) in addition to the variables of economic and political conditions of the suppliers countries. Through that prospecting in data can identify the relationships and new rules explain the behavior of those variables, to take advantage of them when making decisions regarding to the establishment of supply chain relationships (based on the alliance and cooperation) with some suppliers.

At all levels of all the above areas, it can be prospecting in the data warehouse, which contains the most important variables related to most of the activities necessary for the distribution of services , suppliers , shipping methods, storage period, distribution channels, customers and their regions ,method of delivery, and the costs. Through that prospecting in the data, can identify relationships and new rules explain the behavior of those variables to take advantage of them when making decisions.

The Required Resources to Implement the Proposed Model in the Companies under Study

The researcher can be identifying the required resources to implement the proposed model to support supply chain decisions includes: human resources, hardware components, software, and information.

Human resources: Set up elected working teams each of those teams apply business process instructions, which deal with many elements of supply chain decision support system component such as: collaborative arrangements, tools to exchange data electronically, forecasting, intelligent agent and communications, etc.).

Hardware component resources: The use of server / client computers and intranets, extranet and Internet networks. These resources are available in the companies under study with good performance levels and low cost, and it is expected to continue improvement in their performance level and cost minimized.

Software resources: There is strong business software fit to the companies under study, which meet their needs, such as mySQL and postgreSQL systems.

Examples of statistics and data mining applications: STATISTICA, MINITAB and SPSS.

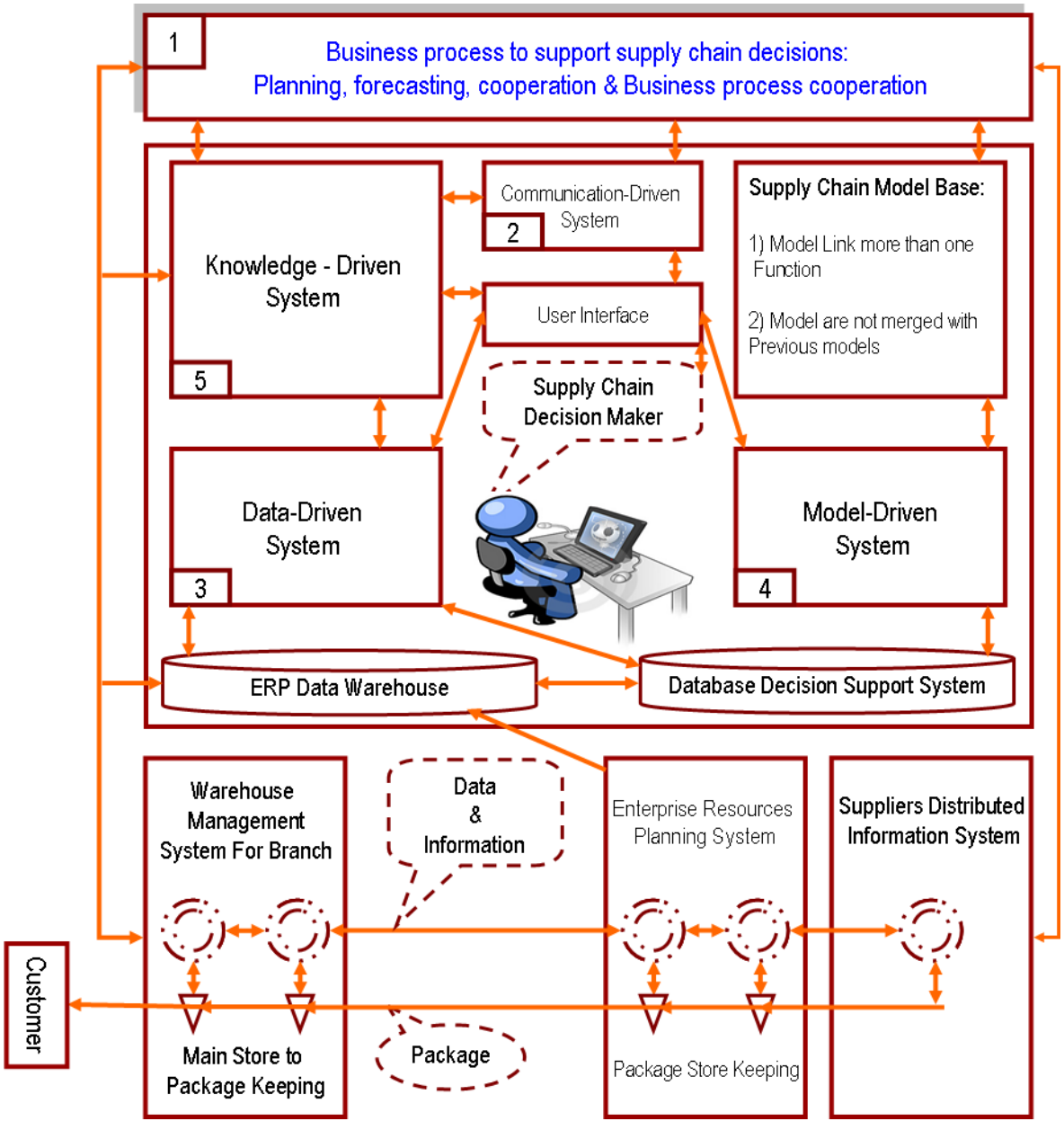
Information resources: There are new and cheap way to exchange data electronically via the Internet between members of the supply chain, and through Extensible Markup Language XML messages, or use the applications of the

extranet, which makes data invisible to the trading partners, as there is free software for communications, meetings and forums.

Figure (4-3) shows the Proposed Model for Supply Chain Decisions Support System to companies under study.

Figure (4-3)

A Proposed Model for Supply Chain Decisions Support System to companies under study



Source: Prepared by Researcher

Figure (4-3) show that the proposed model consists of three main parts:

Part one: planning and forecasting

In this part there is a planning for the entire decision making requirements for supply chain decision support system, as well as forecasting and cooperation between all departments and relevant managerial levels. This is confirmed by the study for *Seethamraju* (2006), which showed that "the Reliability of data is the key to the effective and successful collaboration between supply chain partners, The issue becomes critical in a supply chain context since this information is the basis on which partners in the supply chain make decisions and carry out collaborative planning".

Part two: Infrastructure and main systems

This part contains these components communication driven system, knowledge driven system, Data driven system, Enterprise resource planning data warehouse, Database decision support system, Model driven system Supply chain model base and User interface, where there is interaction among these components as in figure (4–3). This interaction confirms by *Sahay & Ranjan* (2008) shows that "the supply chain analytics using real time business intelligent in organizations will lead better operational efficiency an ideal business intelligent system gives an organization's employees, partners, and suppliers easy access to the information they need to effectively do their jobs, and the ability to analyze and easily share this information with others", the study for *Deti*

(2008) confirms that “the supply chain management is the integration and management of supply chain organizations and activities through collaboration, effective business processes and high levels of information sharing. Thus, the information must be available in real time across the supply chain and this can not be achieved without an integrated software system for supply chain management”. Finally, *Harris, et..al*, (2007) indicates in their study that “the Infrastructure is a strategic decision process which influences tactical and operational level decisions for the long term efficient operation of a network. It determines the optimum number, capacity, location and allocation of facilities”.

Part three: Support systems

These consist of warehouse management system for branches, Enterprise resource planning system and Suppliers distributed information system. That is where the interaction and transmission of data from system to system until service delivery to the customer. This is emphasized by *Fliender* (2010) this study indicate that “the enterprise resource planning is being used successfully to standardize the internal financial and transactional processing needs of an organization, the next step is engaging distributors in partnerships using Internet technologies to standardize external financial and transactional processing needs”.

Figure (4–3) shows that in the beginning of the process it is supposed to identify business processes that support supply chain decisions, when identified ,these process will started to plan how to accomplish these processes and

predict their requirements for completion .Then send it to all units concerned to cooperate in achieving it .This requires a technological infrastructure and systems interact with each other to support supply chain decisions, such as interaction between communication driven system and knowledge driven system where the interaction between the communication driven system, which can be assist express shipping companies (DHL,TNT,ARAMEX,FEDEX) to interchange data electronically with other members of the supply chain, via the Internet through using e-mail to send electronic messages, or enable the beneficiary to fill data in the pages designed for the company's website. And knowledge driven system, which gives companies greater ability to know what's going on around them, this requires companies to develop systems such as enterprise resource planning, data and information, which is reflected finally to the customers. This is confirms by Helo & Szekely (2005) in their study that emphasis flexible IT-systems can deal with large amounts of data and are easy to interconnect. In turn this will lead to the growing importance of system integration software and the process of creating standards. As well as Vaidyanathan & Sabbaghi (2010) Decision support systems (DSS) constitute a class of computer-based information systems that support decision-making activities in organizations.

Chapter Five

Results, Conclusions and Recommendations

(5-1): Introduction

(5-2): Results

(5-3): Conclusions

(5-4): Recommendations

(5-1): Introduction

This chapter is divided into the following three sections: Results; Conclusions; and Recommendations.

(5-2): Results

The current study posed a set of questions, placing the hypotheses and their relation to the impact within the study variables. The study arrived at many results that contributed to solve the study problem described in chapters (1-2), answering the questions and hypotheses of the study. The study sample supports the following main results:

1. The availability of the system-oriented data to support decision and perceive their benefits is high with Mean (4.10). At the level of categories covered in study sample class TNT company are the most recognized with a mean of (4.12) among the other companies, while the DHL company is the least appreciated with a mean of (4.07).

2. Sharing ideas and information with customers, suppliers and perceive its benefits is high with Mean (3.83). At the level of categories covered in study sample class FEDEX company are the most recognized with mean a of (3.84) among the other companies, while the ARAMEX company is the least appreciated with a mean of (3.76).

3. Exchanging data electronically with customers and suppliers and perceive its benefits is high with a Mean of (3.85). At the level of categories covered in study sample class DHL company are the most recognized with a mean of (4.10) among the other companies, while the TNT company is the least appreciated with mean (3.63).

4. The cooperation and coordination with customers and perceive their benefits are high with Mean (4.15). At the level of categories covered in study sample class DHL company are the most recognized with a mean of (4.40) among the other companies, while the TNT company is the least appreciated with mean (3.94).

5. The supply chain decisions are high with Mean (4.31). The "item 2" (Improve the accuracy for customer orders forecasting) with degree ranks first with a mean of (4.31) from other items. On the other hand the "item 3" (Reduce the cost of provided service) got second rank with a mean of (4.04). But also the "item 4" (Maximize the profits from the provided services) got the last rank with mean (3.87).

6. There is a significant impact of decisions support system for supply chain on supply chain decisions at level ($\alpha \leq 0.05$).

7. There is a significant impact of availability of the system-oriented data to support decision and perceive their benefits on supply chain decisions at level ($\alpha \leq 0.05$).

8. There is a significant impact of sharing ideas and information with customers, suppliers and perceive its benefits on supply chain decisions at level ($\alpha \leq 0.05$).

9. There is a significant impact of exchanging data electronically with customers and suppliers and perceive its benefits on supply chain decisions at level ($\alpha \leq 0.05$).

10. There is a significant impact of cooperation and coordination with customers and perceive their benefits on supply chain decisions at level ($\alpha \leq 0.05$).

(5-3): Conclusions

On the basis of the study results, the researcher concludes the following points.

1. To measure the effectiveness of any supply chain management practice, it should be measured in general supply chain performance variables, which are centered on increased customer satisfaction and reduced overall costs.
2. To achieve supply chain objectives successfully, the organization needs to make integration between all business processes and among all the business units over the supply chain.
3. The main objective of the supply chain management is to ensure the efficient delivery of the right product, at the right place, at the right time, in the right quantity, and at a competitive price to the customer.

4. The transaction costs in the supply network must be considered because the goal of supply chain management is to control costs and increase the value of the whole supply chain.

5. Successful supply chain management requires many decisions relating to the flow of information, product, and funds. These decisions fall into three phases depending on the frequency of each decision and the time frame for each phase must consider uncertainty over the decision horizon.

6. Decision support systems can help human Knowledge gap by providing various sources of information, providing intelligent access to relevant knowledge, and aiding the process of structuring decisions.

7. Decision support systems are the interactive system between the user and computer to support decision making process for unstructured decisions by using analytical models and databases.

8. Decision support systems can help the manager to take a good decision about the quality of services and also improve electronic registration organization management.

9. Participants in the supply chain should have information about each step of the chain this allows for planning, tracking, and forecasting based on actual data.

10. A lot of transaction data are accumulated over a long period of time in the enterprise and contain historical information and trading patterns. These

information and trading patterns are important for the integration of supply chain intelligent decision support system proposes for supply chain integration to support a supply chain's competitive strategy and help an organization gain a competitive advantage.

11. The Decision support systems in supply chain and logistics management can be a model, communication, data, document and knowledge driven

(5-4): Recommendations

Based on the study results and researcher conclusions, the researcher suggests the following recommendations to meet the study objectives.

1. The express shipping companies must build an integrated model to maximize net profit from the supply network in each company, in line with the company's strategy, objectives, and priorities. As well, it operates the proposed model based on the outcomes of demand forecasting model, the data of actual fact, estimated data for several alternative scenarios for the relationships and supply chain operations, to reach appropriate net profit in light of business processes and supply chain relationships.
2. The express shipping companies must establish supply chain relationships (cooperative and / or strategic alliances) with main customers and suppliers, on the basis of trust and cooperation to maximize the utilization of resources, and

sharing of benefits arising among themselves and with beneficiaries of the services provided.

3. The express shipping companies must apply the supply chain business process, including: instructions for planning, forecasting and cooperation.
4. The researcher recommends conducting case studies, each of them building a model to maximize supply network for the company.
5. The researcher recommends conducting research about the impact of collaborative planning and forecasting in the supply efficiency and effectiveness.

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Appendices

Appendix (1)

Names of arbitrators

No.	Name	Specialization	University
1	Prof.Dr. Kamel AL-Mugrabi	Business Administration	MEU
2	Prof.Dr. Najim AL-Azawi	Business Administration	MEU
3	Dr. Sabah Hameed Agha	Business Administration	MEU
4	Dr. Laith AL-Rubaie	Marketing	MEU
5	Dr. Ali Abas	Business Administration	MEU
6	Dr. Talal Nsair	Business Administration	MEU
7	Dr. Younes Megdadi	Marketing	MEU

Appendix (2)

Questionnaire

Mr/Mrs ..... Greeting

The researcher purposed to ***Building A Proposed Model for Supply Chain Decisions Support System in Express Shipping Companies in Jordan: A Comparative Analysis Study***

This Questionnaire is designed to collect information about your Company. I would be very grateful if you could answer ALL questions as completely and accurately as possible.

Thanks for answer all the items in the Questionnaire

Demographics Information

(1) Age

Less than 30 years	☐	Between 30 – 34 Years	☐
Between 35 – 39 years	☐	40 Years Above	☐

(2) Gender

Male	☐	Female	☐

(3) Education level

BSc	☐	High Diploma	☐
Master	☐	PhD	☐

(4) Number of Experience Years

5 Years and Less	☐	Between 6 – 10 Years	☐
Between 11 – 15 years	☐	16 Years Above	☐

(5) Specialization

Managerial Science	☐	Engineering Science	☐
Computer Science	☐	Others	☐

(6) Job Position

Top Management	☐	Middle Management	☐

Part (1): Availability of the system-oriented data to support decision and perceive their benefits.

No.	Items	Answer Alternatives				
		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	The company has a system included quantitative models to predict customer orders based on historical data to the services provided					
2	Decision support system used in a company included quantitative models dealing with one problem					
3	Decision support system used in a company included quantitative models related to the time for package delivery					
4	Decision support system used in a company included quantitative models with one objective					
5	Decision support system used in a company contribute to improve the accuracy for customer order forecasting					
6	Decision support system used in a company contribute to Minimize Costs					
7	Decision support system used in a company contribute to maximize profits					

Part (2): Sharing ideas and information with customers, suppliers and perceive its benefits.

No.	Items	Answer Alternatives				
		Very High	High	Average	Weak	Very Weak
To What Extant there is a Sharing ideas and information with customers, suppliers in:						
1	Information to predict future requests					
2	expand or modernization plans					
3	Information about capacity distribution					
4	Ideas and suggestions for provided services quality					
5	financial and non-financial analytical reports					
6	Information about service costs					
7	Information about competitors companies					
8	Ideas and suggestions to maximize profits					
9	Important problems					
10	Information about the political, economic or technological changes					

No.	Items	Answer Alternatives				
		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Assume there is Sharing in ideas and information with customers, suppliers it will leads:						
11	Reduce bottlenecks					
12	Improve the operations performance					
13	Exclude activities that do not add value					
14	Improve the accuracy of suppliers forecasting for the company's requires					

Part (3): Exchanging data electronically with customers and suppliers and perceive its benefits.

No.	Items	Answer Alternatives				
		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	The company exchange data electronically by using intranet and extranet					
2	There is a connection between the computers networks within the company					
3	The company service buying & selling through website					
4	The electronic exchange of company data lead to increase accuracy					
5	The electronic exchange of company data lead to update data rapidly					
6	The electronic exchange of company data lead to improve the accuracy of customer orders forecasting					
7	The electronic exchange of company data lead to responsiveness on time to customer orders					
8	The electronic exchange of company data lead to increase customer satisfaction					

Part (4): Cooperation and coordination with customers and perceive their benefits.

No.	Items	Answer Alternatives				
		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	Cooperation & Coordination with customer lead to agree with them on the basic rules of trading					
2	Cooperation & Coordination with customer lead to agree with them on the list of transactions and delivery dates					
3	Cooperation & Coordination with customer lead to develop action plan					
4	Cooperation & Coordination with customer lead to improve the accuracy of customer orders forecasting					
5	Cooperation & Coordination with customer lead to deliver their needs on time					
6	Cooperation & Coordination with customer lead to increase customer satisfaction					
7	Cooperation & Coordination with customer lead to maximize profits					
8	Cooperation & Coordination with customer lead to increase the achieving objectives set in the plan					

Part (5): Supply Chain Decisions

No.	Items	Answer Alternatives				
		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	Improve the provided service quality					
2	Improve the accuracy for customer orders forecasting					
3	Reduce the cost of provided service					
4	Maximize the profits from the provided services					