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Analyzing and Evaluating Business Processes of Supply Chain Management SCM System

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Abstract: The study aimed to analyze and evaluate business processes of supply chain management system. The study applied case study scenario. The first step in this work is a comprehensive study about the business processes generated from stakeholders of SCM in any business organization. Secondly, this analysis lead to build a model for business processes of SCM. Thirdly, the evaluation process started to discover the degree of weakness in the localized SCM systems. The evaluation criterion is based on the valuable of activities in each business process. The findings of the study showed that the percentages of the activities that don't add value to the processes are very high. These activities were as follows: 1) the percentage of activities that don't add value to the purchase goods process is %71, 2) the percentage of activities that don't add value to the source goods process is %54, 3) the percentage of activities that don't add value to the replenish stock process is %59, 4) the percentage of activities that don't add value to the supply finished goods process is %33, and 5) the percentage of activities that don't add value to the manufacture finished goods process is %50. According to the observation, almost of activities that don't add value to the processes are communication activities. Communication activities like sending and receiving feedback. The recommended solution to decrease these percentages is using the cloud-based systems for SCM instead of the localized systems for SCM.

Key words: Business Processes, Supply Chain Management System, stakeholders, cloud-based systems.

Introduction:

Supply chain is one of the significant paradigm of today's business management that can merely compete as an individual business. Business management initiated internetwork competition in which a single business depends on the management ability to integrate the complex network of business relationship [1]. Moreover, the significant change in the market is due to competition is not only in single firms [2]. However, the change has also observed in the entire chain of stakeholders and those who are linked closely to it and involve in the competition of another production chain. Therefore, linking together these separate chains are more significant with the use of advance software applications. Supply chain management (SCM) is the alignment of firms that bring products or services to market, it includes

manufacturer, suppliers, transporters, warehouses, wholesalers, retailers, other intermediaries and even customers themselves [3]

The overall process and steps of the current study is represented in the research framework (figure 2) which clarifies the steps and techniques that used to achieve the objectives.

The problem of study:

Supply chain management is an important and emergent initiative in a competitive marketplace for any business organization. The main focus of this study is to evaluate and asses the supply chain management that are local in organizations by analyzing and evaluating the business processes of a general scenario of the localized SCM systems and providing recommendations.

Research Objectives:

1. To analyze the entire business processes of SCM system based on qualitative approach.
2. To building a comprehensive SCM framework based on the result of analysis.
3. To evaluate the framework of SCM system based on the valuable of activities.
4. To improve the framework of SCM system based on the result of evaluation by providing solutions for the used SCM systems.

Literature review:

Shipsey (2010) indicated to that Business information systems (BIS) can be classified into two perspectives, which are functional perspective and Constituency perspective [4]. Functional perspectives are Sales and marketing, Systems for manufacturing and production, Systems for finance and accounting, Systems for human resources. Constituency perspectives are Transaction processing systems, Management information systems, Decision support systems and Executive support systems. These systems can be interacted together by using enterprise applications that named as enterprise systems [5].

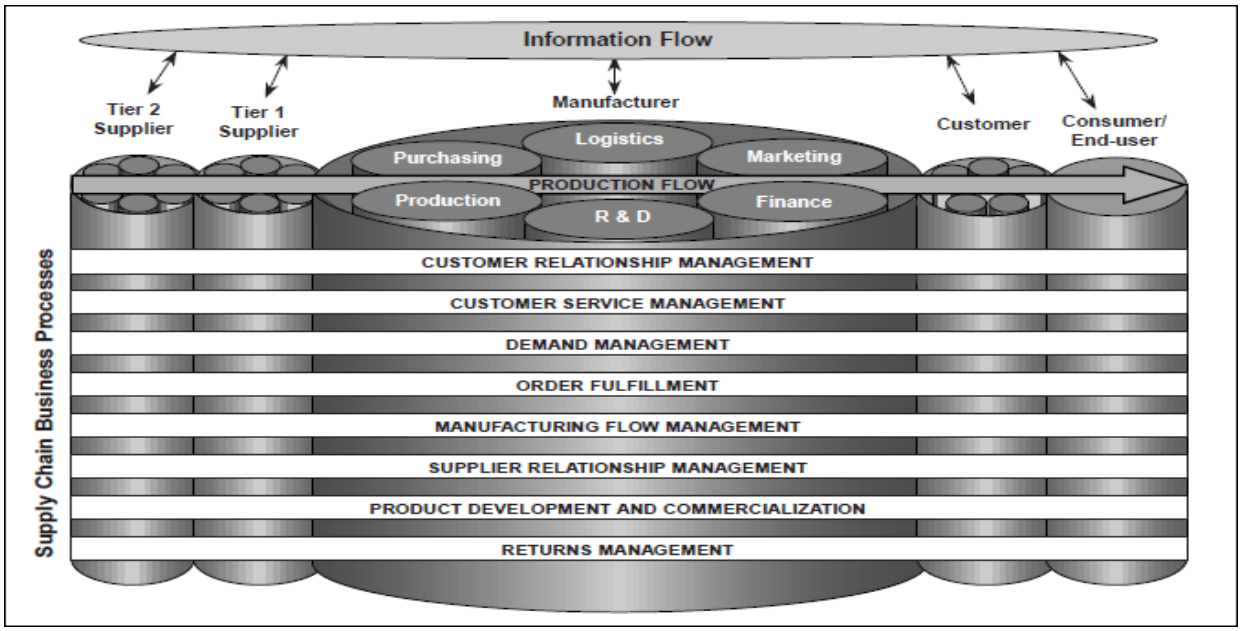
Enterprise systems represented as integrated of applications built within packaged enterprise system software [6]. It consists of many systems like Enterprise Resource Planning (ERP), Supply chain management (SCM), Customer Relationship Management (CRM). It allows companies to integrate multiple business processes together [10]. For example, ERP integrates deliveries, bills, sales, orders and accounts into one system that allow all processes to use the same data and interact with each other's [7].

The technology boost has captured the business market to take rapid initiative, build and update by powerful integrated business environment with maximizing the information technology resources to optimize benefits and business growth. Supply chain management (SCM) is one of the essential tools which is a major concern for all growing organization to take care about. It is the combination of several stockholders, which are directly or indirectly serving the enterprises [8].

Generally, business organizations are no more required to compete individually within the premises, but currently it's about the competition with inter-connected network such as SCM where the businesses are scalable throughout the world physically or even virtually [9,10,11]. It is further embossed by several researches discussing about the growing organization's competitive environment has become more challenging due to inter-organizational activities and business relationships [12, 13, 14]. Supply chain management has different entities which are dealing with the inter-connected network required good business relationship as well. It has further discussed in several researches [15] that none of the enterprise can run without supporting and initiating SCM processes as it always coordinating and preforming several tasks within and outside of the company.

SCM's essential requirements is to convert each function into business process to be connected with centralized database. The database which contains all the information flowing between supplier, purchaser, production, customer and etc., as shown in Figure (1), showing the range and type of business processes operating under the limits of supply chain management system [16]. In addition, the integration between the business processes of SCM that, the secret key of SCM is not to perform individual activities rather integrated environment of SCM is a standard tool for running business more effectively [17]. The processes such buyer-supplier communication [18], and SCM other processes mentioned by [19], cannot run without managerial and personnel support, it need to pay high attention to avoid and discrepancies and miscommunication between supplier-buyer.

Figure 1: Integrating and managing Business Processes across Supply Chain [5]



Due to its vast applicability and unlimited boundaries, the performance measurement is even drastically changes its attributes. The measurement occurs between the inner and outer environment of the

organizations through which an enterprise connected to perform several business processes. Also, the SCM performance measurement need to assess all activities performing within and between the organizations, which help to find out unique analysis. Jaimez-González & Luna-Ramírez (2013) has presented agent based architecture for SCM to improve its efficiency, provide several strategies to provide more efficiency to perform its operation [20]. Several other ideas proposed by researchers to improve the performance of SCM using decision making system [21], and e-commerce based architecture system [22] for SCM. The purpose behind these approaches are to provide sufficient amount of information to support SCM. The main purpose of this research is also to perform different analysis on previously built SCM based on some selected organization. The result will further evaluate using different criterion.

Previous studies (related works):

Rolón et al (2006): "Applying Software Metrics to evaluate Business Process Models" [23]

This paper used an existing framework namely FMESP (Framework for the Modeling and Evaluation of Software Processes). FMESP has metrics used to evaluate the business process model. It works by counting the different kind of elements of a business process model. The authors used this framework to described two proposal metrics for evaluating business process models and software process models. In which, they defined metrics on two different meta-models, namely BPMN for business process models and SPEM (Software Process Engineering Meta-model) for software processes. In addition, they aimed to evaluate the structural complexity of business process model. The result is BPMN presents some aspects that are not contemplated for software processes and this means that new specific metrics are needed. In other word, this need to define new base measures for these elements which are not included in FMESP.

Chang (2009):" An empirical study of evaluating supply chain management integration using the balanced scorecard in Taiwan" [24]

This study aimed to integrate SCM and BSC based on a thorough discussion of BSC measures in Kaplan and Norton. The main objectives of this study are to evaluate SCM performance using the BSC to thereby assess the business performance of many of Taiwan's industries that have implemented SCM. This study initially utilizes case studies; a research model and hypotheses are modified according to the case study findings. A questionnaire-based survey forms the second phase of data collection and data analysis. The research framework is analyzed and validated. Case study findings indicate that companies use varying degrees of SCM integration. Data analysis supports a positive correlation between SCM integration and BSC and a direct correlation between SCM integration and each BSC dimension.

Siddiqui et al (2009):" Role of Supply Chain Management in Context of Total Quality Management in Flexible Systems: A State-of the-Art Literature Review" [25]

This study aimed to review and analyze those surveys studies that have been reported on the relationship between SC, TQM & FS integration, and to highlight a number of concerns with regard to this type of research. It also aimed to focus more on relatively unexplored categories, as they offer potential for further exploration and research. Classification developed to show supply chains and Flexible System in TQM context from a wider perspective. A literature review seems to be a valid approach, as it is a necessary step in structuring a research field and forms an integral part of any research conducted. The main findings of this study showed that the depth of research in various categories has been different. Many specific empirical studies have been carried out, and categories such as types of flexibility & total quality management have been studied to a great depth. Tt focused more on relatively unexplored categories, as they offer potential for further exploration and research. On the other hand, based on the problem context classification and scope for future practice and research, an evolutionary timeline has been prepared taking into account all the relevant and seminal papers published in the area of Flexible system and TQM.

Simone (2012):" Supply Chain Management Practices as a Support to Innovation in SMEs" [26]

This study aimed to identify the contribution of SCM practices that are developed between the SMEs and their clients and suppliers for the innovation of products and processes in SMEs. The study also attempted to capture the asymmetric small supplier-large client relationship in order to discuss the role of SCM practices as a support to innovation in SMEs. The data used in this study were drawn from the database of the project 'Demography of the Regional SMEs", carried out by researchers from the Entrepreneurship and the SME Center (CEMP) of the Universidad Católica del Norte, Chile. The data were analyzed by multinomial logistic regression. The main finding of the current study showed that the support of the overall construct of SCM practices changes in function of the type of innovation. In terms of the dimensions of the construct, i.e. collaboration and IT integration, collaborative practices, such as 'clients as source of ideas for innovation' that represent close partnership with clients, positively influence innovation simultaneously in products and processes and also in products alone. In terms of IT integration in the supply chain, there are positive and/or negative associations of different variables with the innovation.

Bellamy, M.A. Basole (2013). Network Analysis of Supply Chain Systems: A Systematic Review and Future Research" [27]

This study aimed to (1) identify and provide a systematic review of network analysis studies in the supply chain literature, (2) organize these into an integrative framework, and (3) suggest future research directions for network analysis in SCS design and management, in particular, and complex enterprise systems. The current study dependent basically on systematically reviewing and analyzing the relevant literature and, drawing on a multidisciplinary theoretical foundation, to develop an integrative framework. on the literature review. It was concluded with future research directions for network analysis in SCS design and management,

in particular, and complex enterprise systems, in general. The results also indicated that there was a significant jump in articles from the first to the second period. Only 19 articles were published between 1995 and 2003, while 107 contributions were published between 2004 and 2011. Interestingly, nearly half of all studies were published in the past 4 years (2008–2011).

Yurov et al (2014):" Trust and IT Innovation in Asymmetric Environment of the Supply Chain Management Process "[28]

This study aimed to examine the effect of trust and IT innovations on organizational performance under asymmetric conditions in the context of collaborative agreements in the Supply Chain Management (SCM) process. The study effort is timely and novel as it focuses on the current transition, on the part of SCM organizations, to a more electronically integrated environment. IT innovations, in this respect, hold a promise to enhance quality of inter-organizational information exchange and to make supply chains more transparent. The results indicated that the interaction between trust and innovation varies in different markets. Having studied behaviors of companies in asymmetric environments of the SCM process in mature and emerging markets, we found that a higher level of maturity is more conducive for IT innovations despite the effect of asymmetries. The results also indicated that organizational performance suffers due to a slow pace of adoption of IT innovations designed to electronically integrate disparate organizational IT systems.

1. General Research Framework

1.1. The problem of study:

Supply chain management is an important and emergent initiative in a competitive marketplace for any business organization. The main focus of this study is to evaluate and asses the supply chain management that are local in organizations by analyzing and evaluating the business processes of a general scenario of the localized SCM systems and providing recommendations.

1.2. The importance of study:

The technology boost has captured the business market to take rapid initiative, build and update by powerful integrated business environment with maximizing the information technology resources to optimize benefits and business growth. Supply chain management (SCM) is one of the essential tools which is a major concern for all growing organization to take care about. In which, it is the combination of several stockholders, which are directly or indirectly serving the enterprises. The importance of study is to investigate the practice of linking different chains of business processes of SCM from several kinds of stakeholders. In addition, the study investigates the used system is more effectively and efficient as well as low cost in case of maintenance, updating, and employee learning.

1.3. Research Objectives:

5. To analyze the entire business processes of SCM system based on qualitative approach.
6. To building a comprehensive SCM framework based on the result of analysis.
7. To evaluate the framework of SCM system based on the valuable of activities.
8. To improve the framework of SCM system based on the result of evaluation by providing solutions for the used SCM systems.

3.2 Materials and Methods:

3.2.1 Research design:

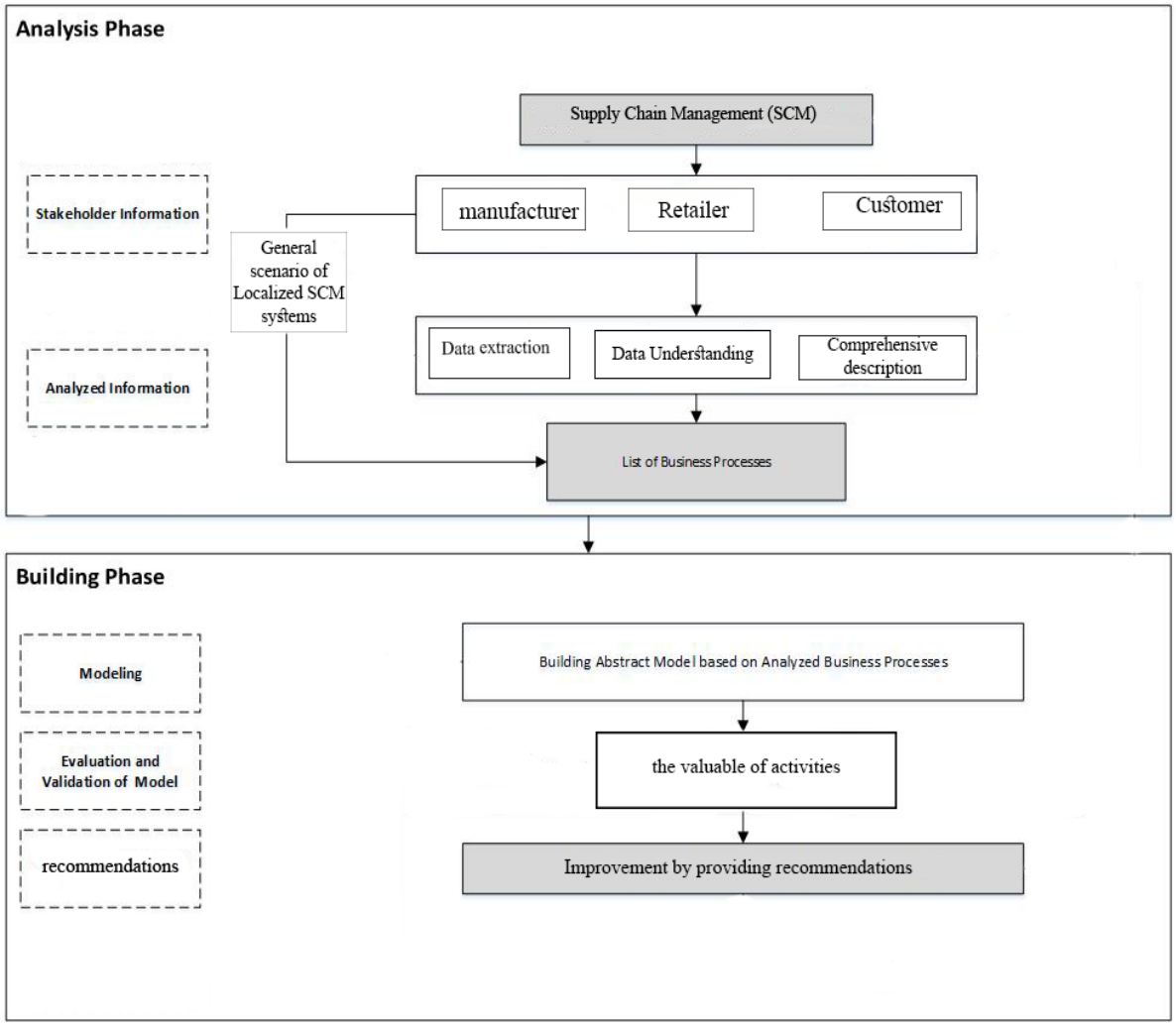
The research type is applied research to solve realistic and practical problems. As the research depends on the evaluation, this evaluation falls into Narrow and Depth category. In addition, the evaluation technique is case study. This design was being selected because it meets all needs to achieve the research goal and objectives. In addition, it is widely applied, flexible and adaptable. It provides in-depth analysis of the processes of discovery.

3.2.2 Data Gathering and Pre-processing:

In this study, the research framework is to follow as shown in Figure (2) The first step is to collect all possible datasets related with business processes of supply chain management of general scenario for an application that often used for supply chain management at very famous organizations. The basic purpose of data gathering is to find out the list of stakeholders connected to organization. Stakeholders are further associated with different business processes to perform transactions within enterprise connected with centralized databases. The comprehensive information related with general scenario need to access for analysis in the next step.

Finally, the number of dataset will be gathered as discussed above such as, SCM's stakeholder information and SCM's list of business processes. In the end of this phase, the gathered data will be ready to use for qualitative analysis discussed in the next phase.

Figure 2: Research Framework for Analyzing and Evaluating



3.2.2.1 Data collection:

Data collection is an important aspect of this research. Proper data collection steps will be taken in this study to gather data into an efficient manner. The data will be converted to different format depending on the analysis and modelling tools requirements.

3.2.2.2 Data Pre-processing:

In this step, the data will be pre-processed through several techniques for many reasons such as; noise reduction, attributes filtering, instances modification, etc. Furthermore, filling the missing values of attributes, normalization and other standard techniques will be applied accordingly.

3.2.2.3 Variable Identifications:

The last step in this phase is to identify the variables, which need to be measured or used in further analysis. There are different kind of variables use in scientific research such as Dependent Variables, Independent Variables, etc. Identifying the variables is important to keep the progress of research properly. Here we need to find out the list of variables, which can help to define and enhance the business processes of SCM.

3.2.3 The stages of study:

3.2.3.1 Analysis:

In this phase, comprehensive analysis will help to study and investigate the data accurately. Misleading facts of analysis and investigation will achieve false acquisitions and execution of business processes of SCM. In this phase, investigation will start by analyzing all gathered data discussed in previous phase. The collected data need to be analyzed by verification, which means the necessity to investigate if there is not errors or problems, and validation, which means the work as a particular context. It will be analyzed by defining the name of each process, its activities, and their relationship, understand the workflow of processes, define the stockholders, the boundaries of the process (start and end points) and understanding the process rules. Therefore, descriptive analysis and graphical representation of the data sets will be used to explore the boundaries of the data. Identically, data analysis is based on the type of data sets collected throughout this work.

In this study, the analysis depends on identifying the precondition, post-condition, name, activities, number of activities, and actors of each process. In addition, the activities must be described in detailed. Finally, the overall assumptions and requirements for analysis must be determined.

3.2.3.2 Building Framework (modeling):

In this phase, the model will be based on the wide-ranging analysis performed in previous phases. The used language for this stage is the business process model and notation (BPMN). The tool that used for this language is Bizagi process modeler. Bizagi modeler is a BPMN process modeling software that facilitates the creation and implementation of flowcharts and workflows, it creates efficient flowcharts, models and maps business processes, generates documentation, and facilitates collaboration. Moreover, this language is widely used and clear for business process modeling. While the analysis was based on the qualitative approach, the abstract model will reflect the number of steps to be taken for improving the business processes, rules and patterns for supporting SCM system. At this stage, the model itself not integrated with all requirements and suggestions, as the validation process will help to develop final output of this research in the next phase.

In which, the modeling stage defines the name of each process, its activities, and their relationship, understands the workflow of processes, declares the stockholders (actors), determines the boundaries of each process (start and end points) and illustrates the process rules.

As mentioned before, the used tool for business process modeling is Bizagi Process Modeler. It has been created by Bizagi which is a privately-owned software company

3.2.3.3 Evaluation:

The presented models in previous stage will be evaluated depending on the valuable of activities. In which, each activity in each process has been check if it is adding value to the process or not. Then, the activities that add value to the process have been counted and their percentage will be calculated. The same action will be applied to the activities that don't add value to the process.

The purpose of this evaluation is to find out the weaknesses and complexities in the previous models.

3.2.3.4 Results and recommendation:

Re-Modeling of the framework is actually based on the evaluation process described in previous phase. All unusual steps and processes will be discarded if the SCM system is not benefited with it. In other word, if these activities do not add value to the process. all complicated processes will be simplified if it is possible by automating their activities using the available techniques, combined or detaching activities according to the needs of the process. Finally, the result will be used as a reference suggestion for improving business processes of SCM in growing enterprises.

3.3 The limits of study:

The researcher focuses on the following three axes':

3.3.1 Topic limits:

The analysis and evaluation has been done to only the business processes of supply chain management that is directly related to the general scenario of the localized supply chain management systems.

3.3.2 Place limits:

This study has been applied to a general scenario of the localized SCM systems. In which, the study targets all companies that use the localized SCM systems.

3.3.3 Time limits:

In This study, the duration is not very critical because the study only depends on the business processes of supply chain management of the current year.

3.4 The determinations of study:

The study only depends on a general scenario of localized SCM systems. This scenario describes how the localized SCM systems work in details. It only focuses on the computing system. In which, it discards the other processes that are not computerized.

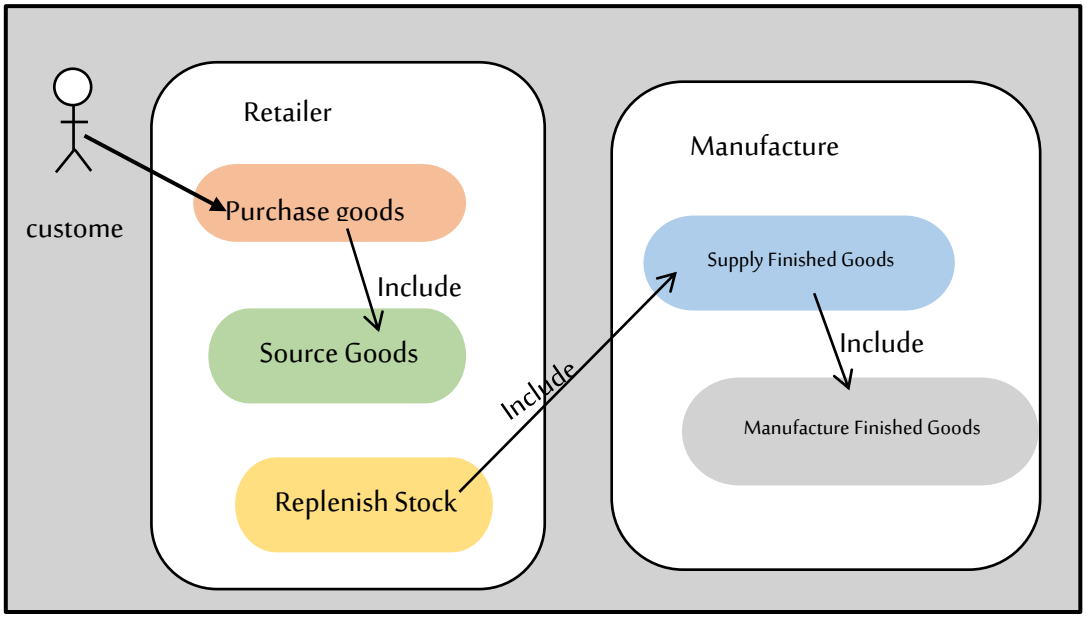
4. The Study and Analysis (Discussion)

4.1 Studying:

This study applied on a general scenario for supply chain management applications [29]. It had been written by Scott Anderson, who is a member in Visual, Martin Chapman, who is a member in Oracle, Marc Goodner, who is a member in SAP, Paul Mackinaw, who is a member in Accenture, and Rimas Rekasius, who is a member in IBM. They are members in very known organizations. The software of these organizations characterized as the most known, used, active and strongest systems in supply chain management field.

The scenario described the business processes of SCM that accomplished by using the SCM application which use much of web services. The editors assume that the application used for online order only. The total number of processes is five processes. These processes are represented in figure (3). The main actors of this scenario are retailer system, manufacture system, demo system and customer.

Figure 3: the processes to fulfill online order by using application



In this scenario, the customer always starts by make order and he/she related only to the first process which its name is purchase goods. The source goods process represented as a part of purchase goods process. The replenish stoke process must be activated after fulfillment each order. Retailer system must check the stock level in warehouses periodically to reach it into the maximum level. Supply finished goods process is a

part of replenish stock process. In addition, manufacture finished goods is a part of supply finished goods process. Finally, the scenario assumed that the retailer has three warehouses.

Table (1).Description of the actors of the business processes

#no.	Actor name	Description
1	Customer	The part who need to shop and buy goods online from retailer.
2	Retailer system	The part that get the product from the manufacturers and sell the products to customer.
3	Manufacturing system	The part that manufactures the products and sell to retailers.
4	Demo System	The third part of system which runs electronically. It is available 24 hours per 7 days.

4.1.1 Analysis:

The analysis depends on identifying the precondition, post-condition, name, activities, number of activities, and actors of each process. In addition, the activities must be described in detailed. The overall assumptions and requirements for analysis has already been determined by editors of this scenario and they are as following:

1. They assume that the retailer has exactly three warehouses which are A, B and C.
2. For each product, the minimum level and maximum level have been determined in its stock. They are set back to them predefined values before each purchase order process.
3. There is not minimum quantity for order. This condition has been applied to both customers to retailer and retailer to manufacturer.
4. The information that needed from customer, which are name, country, address, payment details and so on, must be known when the customer logs on the retailer website. This requirement is necessary to allow him/her to submit purchase order.
5. Consumer must pre-register the credit card details. That means the billing happens out of band.
6. The manufacturer has unlimited capability to manufacture the requested product that means it can always manufacture any amount of products and ship them to warehouses.
7. The time of each production run has been pre-determined. It must exactly take the determined duration to complete and it cannot exceed the predetermined duration.

4.1.1.1 purchase goods process:

In this process, the customer goes to the website of retailer to browsing his products. The consumer selects products and quantity of product. Then, he submits the order to the retailer system through demo system.

Demo system provides access to the website 24 hours per 7 days for a week. It also views the catalog to customers and receive the order from customer and send the order to the retailer system. This is only the role of demo system.

When retailer receives the order, it must check availability of fulfillment the order to reject the order or validate it. In the case of the order has been validated, the retailer system moves toward checking the availability of products in the warehouses. If it is available, the conformation has been sent to the customer for payment and ship the order. Otherwise, the system send feedback to customer to tell him/her that the shipment of order is not available currently.

- **Precondition**: the catalog of product must be prepared and existed. The values of warehouse levels and other state must be set back to the predefined values. The payment information and address of customer are known because the customer records the payment method, payment's information and his address when he logs in retailer's website.
- **post-condition**: The retailer can ship order and the customer receive the conformation of shipment. Then, the retailer asks the warehouse to ship the products. Finally, customers have to pay by credit card.
- **Number of activities**: twenty-one processes.
- **Actors**: retailer system, customer, and demo system.

4.1.1.2 Source goods process:

The role of source goods process is to identify the location of ordered products in the warehouses. After locate the ordered products, the warehouse checks the available quantity. If the product is available, the warehouse ships the order. The process starts from the first warehouse by presenting the line items of order and checking the availability of supplement and shipment. If they are available, the order will be supplied and shipped. Then, the warehouse will decrease the quantity of supplied products from the stock level. Otherwise, the current warehouse sends the order to the next warehouse to check the availability of supplement and shipment. The previous process will has applied to the next warehouse and so on until the last warehouse, if the supplement and shipment are not available, the feedback about unavailability will be sent to retailer system. The retailer system will send feedback to customer. The replenish goods process will start to supply the warehouses and reach the stock levels into the maximum value.

- **Precondition**: the stock level must be checked after each purchase goods process. In which, each product has a maximum and minimum value for its stock level identified by warehouse management.
- **post-condition**: the supplement and shipment are available and the order will be supplied and shipped. Then, the warehouse will decrease the quantity of supplied products from the stock level.
- **Number of activities:** they are thirteen processes.
- **Actors**: retailer system.

4.1.1.3 Replenish stock process:

The retailer system must continuously check the stock levels of products in its warehouses to reach them to the maximum level. The retailer system can reach the stock level into the maximum level by sending a request to the manufacturer to replenish the stock with a specific quantity of products.

- The inventory system will check the stock levels of products in warehouses. If the stock of any product falls below the minimum level of the stock level, the retailer system must replenish the stock to reach the stock level to the maximum level. The replenish stock process will start by constructing purchase order for specific product to bring it up to the maximum level in its stock level. the purchase order will be done by sending a request from retailer system to the manufacturer system. The relevant manufacturer receives order and check it. If the order is malformed, invalid product or quantity, the manufacturer will present error message and send feedback to the retailer system. Otherwise if the order is complete, the manufacturing system validates order. Then, it sends acknowledgement back to retailer system. The retailer system will receive the acknowledgement. The manufacturing system constructs transaction for the shipment of requested quantity of product. The supply finished goods process will start. When the supply finished goods process finished, the manufacturing system ships the products to retailer and sends shipping notice to retailer. When the retailer system received shipping notice, it sends acknowledgement to manufacturing system. Then, it receipts the shipment and updates the inventory level of product. the process will stop at this point.
- **Precondition**: After inventory, the stock of some product falls below the minimum level of the stock level.
- **post-condition**: the stock of product reaches to the maximum level of the stock level.
- **Number of activities**: They are seventeen processes.
- **Actors**: retailer system and manufacturing system.

4.1.1.4 Supply finished goods process:

The supply finished goods process aims to supply the warehouses of retailers. It depends on the minimum and maximum level of stocks at warehouses. In which, the retailer depends on manufacturing system to fulfill the purchase order. The supply finished goods process checks the inventory to check if the manufacturer's finished goods can fulfill the order that came from the retailer or not. If the finished goods level can't fulfill the order, the manufacturing finished goods process must be used. Then, the supply finished goods process will be completed as if the finished goods level can fulfill order. The other case is the finished goods level can fulfill order. In this case, the order will be shipped. Then, the manufacturing system updates their inventory. If the minimum threshold is exceeded, the Manufacture finished goods process will be used. Otherwise if the finished goods level is perfect, the supply finished goods process will be finished at this point.

- **Precondition**: it depends on the maximum and minimum level of the inventory at the manufacturing system. In which, the minimum and maximum threshold must not be exceeded. The following expression describes the precondition:
  Min < manufacturer finished goods inventory level< max
- **post-condition**: the manufacturing system fulfills the order that came from the retailer.
- **Number of activities**: There are nine processes.
- **Actors**: Manufacturing system.

4.1.1.5 Manufacture finished goods process:

The manufacture finished goods process aim to initiate the production run of particular products to replenish the stock of these products. At the beginning, the manufacture finished goods process determines parts list that are needed to fulfill order that came from retailer or to replenish stock of warehouses. Then, the quantity of each part must be determined. The production run will be started. After that, the process will continue until the production run finishes. Finally, the finished goods will be stacked in warehouses.

- **Precondition**: the current stock level can't fulfill the order. Otherwise the stock level of particular product falls below the minimum level.
- **post-condition**: the stock level of specified products have been replenished.
- **Number of activities**: there are four process.
- **Actors:** manufacturing system.

4.1.2 Modeling:

In analysis stage, the collected data has been transformed into usable information. In this study, this information must be modeled. The used language for this stage is the business process model and notation (BPMN). The tool that used for this language is Bizagi process modeler.

This stage describes the five processes in detail, which are purchase goods process, source goods process, replenish stock process, supply finished goods process and manufacture finished goods process. In which, the modeling stage defines the name of each process, its activities, and their relationship, understands the workflow of processes, declares the stockholders (actors), determines the boundaries of each process (start and end points) and illustrates the process rules.

The modeling of the five processes of this study, which are analyzed before in analysis stage, will be as following:

4.1.2.1 purchase goods process:

The purchase goods process has three stakeholders, which are customer, demo system and retailer system. In which, customer is considered as an outer stakeholder. Whereas demo system and retailer system are considered as inner stakeholder. It starts by customer. It has three ends according to cases. Two cases stop at the customer. The third case stops at retailer system.

4.1.2.2 Source goods process:

The source goods process has one stakeholder, which is retailer system. In which, retailer system is considered as inner stakeholder. It has three warehouses according to its products. It starts by warehouse A. It also has four ends according to cases. One case stops at the warehouse A. Other case stops at the warehouse B. Last two cases stop at warehouse C.

4.1.2.3 Replenish stock process:

The replenish stock process has two stakeholders, which are manufacturing system and retailer system. It starts by retailer system. It has two ends according to cases. One case stops at the retailer system. The other case stops at manufacturing system.

4.1.2.4 Supply finished goods process:

The supply finished goods process has one stakeholder, which is manufacturing system. It starts and stops at manufacturing system. In which, it has two ends according to cases.

4.1.2.5 Manufacture finished goods process:

The supply finished goods process has one stakeholder, which is manufacturing system. It starts and stops at manufacturing system. In which, it has only one ends according to its cases.

4.1.3 Evaluation:

In this study, the evaluation depends on the valuable of activities. In which, each activity in each process has been check if it is adding value to the process or not. Then, the activities that add value to the process have been counted and their percentage will be calculated. The same action will be applied to the activities that don't add value to the process. The value-added activities are indicated as VA and non-value-added activities are indicated as NVA.

5. The Result and Recommendation:

5.1 Results and recommendation:

According to the previous evaluation in chapter 4, the percentages of the activities that don't add value to the processes are very high. The processes that have a high percentage of activities that don't add value to them has been categorized as weak and unreliable processes. In addition, these percentages decrease the effectiveness of the processes.

In which, the percentage of activities that don't add value to the purchase goods process is %71, the percentage of activities that don't add value to the source goods process is %54, the percentage of activities that don't add value to the replenish stock process is %59, the percentage of activities that don't add value to the supply finished goods process is %33, and the percentage of activities that don't add value to the manufacture finished goods process is %50**.**

These percentages must be decreased. According to the observation, almost of activities that don't add value to the processes are communication activities. Communication activities like sending and receiving feedback. The recommended solution to decrease these percentages is using cloud-based systems for SCM instead of localized supply chain management.

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تحليل وتقييم العمليات المتضمنة في نظام إدارة سلسلة التجهيز

الملخص: هدفت الدراسة الحالية إلى تقييم وتحليل العمليات الإدارية المتضمنة في إدارة سلسلة التجهيز. وطبقت الدراسة منهاج دراسة الحالة، حيث تم جمع البيانات من العديد من المنظمات المشهورة، كما وتم التركيز في جمع البيانات على العديد من السيناريوهات الخاصة بإدارة سلسلة التجهيز في هذه المنظمات، وذلك بهدف التعرف على أصحاب المصالح المرتبطين بها، وتم تحليل هذه البيانات وبناء نموذج لإدارة سلسلة التجهيز فيها، وبعدها تم تقييم نقاط الضعف في هذا النموذج عبر تحليل العمليات الإدارية المتضمنة في هذه السلسلة. أشارت نتائج الدراسة إلى وجود الكثير من العمليات والأنشطة التي لا تضيف قيمة لسلسلة التجهيز، وكانت هذه النشاطات بالنسب الآتية:

1) نسبة الأنشطة التي لا تضيف قيمة لعملية شراء البضائع كانت 71%.
2) نسبة الأنشطة التي لا تضيف قيمة لعملية توريد البضائع كانت 54%.
3) نسبة الأنشطة التي لا تضيف قيمة لعملية تحديد النقص وتجديد مخزون البضائع كانت 59%.
4) نسبة الأنشطة التي لا تضيف قيمة لعملية توريد البضائع الجاهزة كانت 33%.
5) نسبة الأنشطة التي لا تضيف قيمة لعملية تصنيع البضائع كانت 50%.

كما وأظهرت النتائج أن هذه الأنشطة تتركز في نشاطات التواصل مثل التراسل واستقبال التغذية الراجعة. وأشارت توصيات الدراسة إلى أهمية استخدام نظام التخزين الوهمي (Cloud-based systems) في إدارة سلسلة التجهيز بدلا من الأنظمة المحلية وذلك بهدف تقليل نسبة الأنشطة ذات القيمة المنخفضة.

الكلمات المفتاحية: العمليات التجارية، إدارة سلسلة التجهيز، أصحاب المصالح، نظام التخزين الوهمي.