

# Adopting Lean Supply Chain at Unipharma Syria to Improve its Response to Clients

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**Abstract**— This research aims to test the impact of the adoption of lean supply chain standards in improving Unipharma Syria response to its clients post the Syrian crisis of 2011. The researcher used descriptive and analytical approach to study Universal Pharmaceutical Industries. “UNIPHARMA” one of the well-known highly developed firms in the Pharmaceutical Industries in Syria. The data was collected from a questionnaire distributed to 100 employees working at Unipharma Damascus, 98 valid responses were received. The hypotheses were tested using SPSS software. The result of the research showed that the company's reliance on process standardization and industrial standards was relatively high and the adoption rate for industrial standards are the highest. The company's response rate to its customers in terms of flexibility and delivery is not high and convergent for both variables. The novelty of this study stems from the introduction of critical influences that determine an effective employment of lean production to Syrian Manufacturing Companies.

**Keywords**— *lean supply chain, customer response, Process Standardization, Industrial Standards.*

## 1. Introduction

The rapid response of the organization to its customers is an effective competitive weapon in the business environment in the face of multiple competition. In the current era where the emergence of major environmental challenges such as globalization, information and communications technology and changes in meeting the needs and demands of customers with limited resources available to business organizations, therefore, no wonder that organizations are racing to find out how to improve the speed of response to their customers. The process standardization and industrial standards are key pillars of the lean supply chain that can contribute to the enhancement of the organization quick response to

its customers by delivering products to the customer as soon as possible without delay, and increase the flexibility to suit multiple customer requirements.

### 1.1 Research Problem

Since the beginning of this century, many organizations have emerged seeking the agility in the supply chain. Utilizing the scarce resources effectively and non-waste in order to achieve high efficiency in their use. This was done through the availability of a set of core standards that characterize the lean supply chain. For example, the adoption of process standardization and industrial standards, to reflect positively on the rapid response of the organization to its customers. Through its ability to respond to changes in customers' requests, especially through the unexpected ones by enabling the organization to have the flexibility to deliver a wide range of products and deliver them on time to customers. Based on that, the problem of the research can be framed through a set of questions in order to answer scientifically during the proposed hypotheses and field-testing in the company understudy:

1. What is the process standardization and the industrial standards of lean supply chain and what are the adoption ratios of these two variable in the studied company?
2. What are the ratios of the speed of organization's response to its customers in terms of flexibility and delivery?
3. Does process standardization and industry standards affect the speed of the company's response to its customers?

## 1.2 Research Importance

This research gains its importance by adopting a relatively recent topic dealing with how enhancing agility in the performance of the lean supply chain through two important pillars of the chain to enable organizations to meet their commitments to the customer in the fast delivery and provide flexibility in their products mix. Also, to add the accumulation of knowledge in the field of administrative literature in terms of the two research dimensions. In the other hand, the research draws its attention from the results of the empirical study, which will show the management of the company the positive and negative aspects of their response to their customers. In addition, what contribution they can make in achieving the adoption of process standardization and industry standards as important pillars of the lean supply chain

## 1.3 Research Objectives

The aim of this research is to identify the impact of process standardization and the industrial standards in improving the company's ability to respond quickly to its customers in terms of flexibility and delivery, as well as to identify the adoption rates of process standardization and industrial standards in relation to flexibility and delivery variables.

## 1.4 Research Hypothesis

H1: The rate of adoption of process standardization and industrial standards is high by the company understudied.

H2: The Company's response rate to its customers is high in terms of flexibility and delivery.

H3: The standards of process standardization and the industrial standards significantly affect the company's ability to be flexible and deliver to its customers.

## 1.5 Methodology

The research used descriptive approach where the problem characteristics have been identified its nature and the relationship between its variables, and analyzing the primary data by testing the research hypothesis.

The secondary data was collected from scientific journals, textbooks, and websites. As for the preliminary data, the researcher relied on a questionnaire designed to measure the two variables based on the theoretical section, 100 copies were distributed to the individuals surveyed and 98 valid responses were returned.

The researcher tested the questionnaire reliability by calculating Cronbach's alpha for the main variables of the research: the standards of the lean supply chain and the rapid response of the organization to its customers and the results were as follows:

All Variables	Cronbach's Alpha
Process Standardization	.73
Industrial Standards	.71
Flexibility	.77
Delivery	.63

The above results show that the Cronbach coefficient values for the research variables within the standard range more than (60%) indicating the reliability of the scale

## 1.6 Brief History of UNIPHARMA Syria

Universal Pharmaceutical Industries "UNIPHARMA" is one of the well-known Pharmaceutical companies in Syria; UNIPHARMA is located in Damascus suburbs.

Its products includes nearly all of essential treatment fields such as Respiratory Tract medicines, Dermatological medicines, Cardio-vascular medicines, Anti-biotic medicines, Central Nervous System medicines, Antiseptics, Gastrointestinal medicines, Metabolism Disturbance medicines, etc. Currently, its production lines includes: Dermatological + Eye "Creams & Ointments Capsules, Plain Tabs, Syrups & Suspensions, Sugar Coated Tabs & Slow Absorbed Tabs., Dental paste., Effervescent Tabs., and Medical shampoo. UNIPHARMA annual production is about 25,000,000 units and its full annual capacity can reach 80,000,000 units. UNIPHARMA products conform to the international standards and specifications, where imports of raw materials are exclusively from the Licensors such as Glaxo

Smith Kline, Pfizer, and Bristol – Mayer’s Squibb, Abbott Labs, Bayer AG, Schering Plough Corporation, MENARINI – International, Sanofi-Aventis, NOVARTIS, and many more.

UNIPHARMA main goal is to distribute its products for its consumers at any place in Syria. UNIPHARMA products are available at the farthest of the distribution channels at all the pharmacies in Syria, as well as their availability at hospitals, clinics, public and private medical centres [1].

## 2. Literature Review

### 2.1 Definition of lean Supply Chain

The term lean appeared early in a study conducted by [2], after noting the system of production and supply in the automobiles sector, which was a reason for Toyota to achieved a competitive advantage by adopting a lean manufacturing philosophy. Similarly, the acceptance of the term extended beyond the limits of manufacturing, as the use of the term spread in other areas such as supply and distribution. [3] put forward the concept lean supply chain in 1994, which focused on the value added to customers by responding quickly to their requests, get rid of waste in resources in all of its forms to ensure smooth production processes and matching the production processes with products demand [4].

According to [5] lean supply chain is all the activities through which goods, services and information flow in two directions from raw materials phase to the finished goods phase without adding any waste. [6] pointed out that the lean supply chain is well designed chain for quick delivery of products to the end customer with reduction of waste to minimal level, and response to change. Also lean supply chain is a catalyst for organizations that strives to become more efficient and agile, and be able to provide the best value for the customer through its ability to respond efficiently to the requirements and needs of customers. Also [7] sees that the supply chain is a network of activities through which products flow seamlessly cross the supply chain and seek to provide added value to customers by satisfying their requests with no waste and errors along the chain.

### 2.2 Importance of Lean Supply Chain

[8] emphasized the importance of the lean supply chain by the following:

1. Remove or at least reduce waste in any form.
2. Establish cooperative relationships by balancing cooperation and competition.
3. Reduce the time cycle.
4. Reduce storage during the supply chain.
5. Increase the capacity.
6. Increase customer satisfaction.
7. Eliminate suffocation.
8. Improve communications.

### 2.3 Components of Lean Supply Chain

The essential pillars of the lean supply chain are an integrated set of activities designed to achieve the organization's rapid response to its customers through improving the performance of the chain, it includes (Cultural change, process standardization, industry standards, relation with suppliers, and reduction of waste). According, the researcher will focus on the adoption of (process standardization and industrial standards) as an explanatory variable in the research. These variables will be the basis in building the study tool (the questionnaire) in order to measure the empirical section in the company understudied. In addition, to identify the gap between what is adoption requirement by the two variables and what is actually applied in the company investigated and reflected on the speed the chain responds as a transponder variable.

#### 2.3.1 Process Standardization

The concept of process standardization is one of the vital pillars of the lean supply chain. It is an integral part of a comprehensive and successful quality system because it provides individuals with important information to perform their functions properly and involves making supply chain activities consistent and frequent by providing a consistent approach accepted by all partners in the chain [9].

In addition, process standardization is defined as a predefined set of rules and conditions or requirements for completion activities or processes regularly and optimally. The standard defines the smooth work that will be done as well as describing the activities correctly [10]. Finally, process

standardization is defined as group of interrelated tasks that provide employees with knowledge in the domain of supply chain [11].

In the same context, lean supply chain requires the consolidation of all operations or activities related to the performance of the chain. Namely, the adoption of modular operations of the supply chain activities to reduce or eliminate duplication of processes or actions that have no value to the organization and customers from the stage of raw materials to the delivery of products to customers [12].

Benefits of Process standardization: Process standardization achieves many benefits to all partners in the supply chain. According to [10], [14] also [15], these benefits are:

- a. Enables the organization to move from one supplier to another.
- b. Reduces the cost of purchasing raw materials and inventory of all types while improving response times.
- c. IT costs are reduced by connecting all members of the chain to the electronic exchange system data.
- d. Increase the quality of the product as it reduces the variance in the quality of the product, and enable the workers to perform the process in a manner that allows them to reduce the number of errors when they realize how to do their job.
- e. Maintain scheduling levels making flow easier as well as balancing all the process.
- f. Improve product lifecycle and increase productivity.
- g. The organization is able to deal with a certain number of suppliers through which it can understand and strengthen the relationship with them to unify processes that allow the flow of products seamlessly to the end customer.
- h. Allows continuous flow of materials to the organization.
- i. Reduce or eliminate non-value activities.

### 2.3.2 Industrial Standards

Industrial standards are important pillars of the lean supply chain that unify standard specifications for raw materials to reduce complexity and waste

along the supply chain [16]. Industrial standards are a systematic method of quality management (classification and quality assurance). The standard specification ensures that the variance in raw materials is minimized. It monitors any variation in the specification of raw materials due to random error and works to identify and remove them. It is also defined as a document that specifies requirements, specifications and principles guidelines or characteristics that can be used consistently to ensure that raw materials are suitable for this purpose. In the same context, [17] argues that unification of industry standards should also include information across the supply chain because Communicating with partners requires consolidation of data and information that is increasing consistently. Managing this level of data requires lean supply chain partners to adhere to standards by exchange of information whenever possible and to improve communication among partners through consolidated data forms.

#### (a) Benefits of Industrial Standards

The consolidation of industrial standards achieve many benefits for all partners in the supply chain as mentioned by [18], [19], and [20] these benefits are:

- a. It enables the organization to deliver high quality products and get the materials from any supplier because of the specifications standard for all components or materials are one.
- b. The adoption of industrial standards leads to lower production costs, due to lower capital spent on purchase of machinery and equipment with high efficiency, also reduce the purchase prices of raw materials, saving in administrative expenses to simplify office procedures.
- c. Increase production efficiency by increasing the efficiency of workers and machines, improving quality control and reducing the percentage of defective products.
- d. Optimal use of raw materials through improved product design and emphasis on diversification in production.
- e. The concentration on production design by working with a few materials and the increased experience of the workers leads to high quality products.

- f. Reduce inventory costs and increase flexibility in meeting customer requests through product grouping in one order.
- g. Achieving real economic benefits such as access to new markets as well as the use of certain technologies at lower costs.
- h. The organization can negotiate with multiple suppliers and obtain materials and components at a lower price.

## 2.4 Response to Speed

The speed of organization response to its customers is essential for success and a measure for performance evaluation [21]. In addition, it is defined as the organization's ability to make changes in the market and the environment quickly, effectively and in timely manners with the ability to modify the product mix quantity and quality without additional costs [22].

In the same context [23] indicated that the response speed is the organization's ability to deal with external disturbances easily and intuitively. Also will be able to respond to the market quickly to meet the demand in peak situations. [24] adds the main goal of response speed is to achieve the basic requirements of end-customers through delivery of suitable goods in case of demand, quantity, quality, and competitive cost.

### 2.4.1 Response to Speed (flexibility)

Flexibility is essential to assess the speed of the organization's response to its customers and help them express their preferences for products, as the organization's potential increases the ability to meet customers' demands [25]. Flexibility is defined as rapid response to change in customer demand as well as increased customer satisfaction who was informed that the product is delivered in time [26]. [21] defined flexibility as the activities related to the organization's work that enable it to respond efficiently and quickly to customers' needs of products with multiple specifications. [27] sees that flexibility refers to the ability of organizations to adapt and adjust their activities to market demands imposed by environmental variables, which requires all resources to be made available to achieve such change. Also, [27] believes that flexibility reflects the ability to change and respond with less cost, time and performance.

### 2.4.2 Response to Speed (delivery)

Organizations are seeking to expand their base of customers after the growing importance of time to the customer through the Focus on delivery speed, as delivery reflects the organization's ability to manage its production through meeting customer requirements regularly and deliver them in a timely manner according to specific schedules [28]. [28] points that delivery refers to the organization's ability to deliver its product to the customer in specified place and time. Others seen delivery as cut time and speed in delivery of products to customers in the shortest possible time. [24] see delivery as one of the basic dimensions which reduces the costs of operations and reduces the cost of storage, damage and risk through speed in delivery. Also [29] believe that delivery reflects the chain's ability to provide an excellent reputation or service to customers on time and as quickly as possible.

## 3. Empirical Study

### 3.1 Demographic Characteristics

**Table 1.** Demographics

Academic Qualification									
Secondary School		Ass. Degree		Bachelor Degree		Graduate Diploma		Master Degree	
N	%	N	%	N	%	N	%	N	%
8	8.1	25	25.5	50	51.1	6	6.1	9	9.1
Academic specialization									
Engineering		Scientific		Administrative		Vocational		Other	
N	%	N	%	N	%	N	%	N	%
23	23.4	14	14.2	49	50.1	7	7.1	5	5.1
Work Experience									
1-5 years		6-10		10-20		> 21			
N	%	N	%	N	%	N	%		
6	6.1	41	41.9	32	32.6	19	19.3		
Work specialization									
Head of Dept.		Head of Unit		Marketing Dept.		Other			
N	%	N	%	N	%	N	%		
29	29.6	35	35.7	7	7.1	27	27.5		

Table (1) shows the personal characteristics of the sample where the majority of respondents had bachelor degree (51.1%). Concerning academic major, the majority were specialized in business (50.1%). The highest work experience group were

between 6-10 years (41.9%). Finally, the highest work position was head of unit around (35.7%).

### 3.2 Testing Hypothesis 1

Statistical analysis for the first hypothesis test required extraction of adoption rate of process standardization and industry standards.

#### 3.2.1 Adoption rate of process standard at UNIPHARMA

Table (2) shows the adoption rate for process standardization of the responses of the our respondents where the general average of the arithmetic mean (4.00) and a standard deviation was (0.69), and the average of adoption rate for process standard by the company understudied (80%) which confirms the homogeneity of answers. The variable (Q4) had the highest mean (4.15) and was standard deviation of (0.73) with adoption rate of (81.4%), this indicate that the company's has interest in clarifying procedures to all the participants. Next, in terms of reliability, the company's development of standard measures to avoid confusion in the performance and the pursuit of smooth flow of products to customers seamlessly, and to balance the demand for productivity and production capacity available. This was included in variables (Q2, Q5, and Q6) with adoption rate of (81.8%) per each variable. While the lowest variable was variable (Q1) with (72.4) adoption rate and with an arithmetic mean of (3.61) and with a low standard deviation of (0.58) which indicate a homogeneity of the answers of respondents

**Table 2.** Rate of adoption for Process Standard at UNIPHARMA

Variables	Mean	Std. Deviation	Depend. %
Q1	3.61	0.58	72.4
Q2	4.15	0.64	82.8
Q3	3.92	0.69	80
Q4	4.15	0.73	81.4
Q5	4.11	0.78	81.9
Q6	4.06	0.76	81.7
Average	4.00	0.69	80

#### 3.2.2 Adoption rate of process standard at UNIPHARMA

Table (3) illustrates the general adoption rate of industrial standards at Unipharma where it reached (84.2 %) with mean score of (4.36) and standard deviation of (0.63). the highest rate belong to variable (Q8) with the highest mean score of (4.69) and (0.52) standard deviation. This indicates that Unipharma test it raw materials before the production process to eliminate defects. (Q7) followed with average rate of (91.8) with mean score of (4.73) and standard deviation of (0.57). In addition, (94.9) of respondents assured us that the company is working on matching its products with international standards. (Q12) had the lowest adoption rate of (76.2) and less mean score of (3.62) and standard deviation of (0.62). Therefore, hypothesis 1 is accepted.

**Table 3.** Rate of adoption for Industrial Standards at UNIPHARMA

Variables	Mean	Std. Deviation	Depend. %
Q7	4.73	0.57	91.8
Q8	4.69	0.52	95.8
Q9	4.12	0.84	81.8
Q10	4.08	0.55	82.2
Q11	4.36	0.63	84.2
Q12	3.62	0.62	76.2
Average	4.26	0.62	85.33

### 3.2 Testing Hypothesis 2

The statistical analysis of the second hypothesis required the extraction of the response rate achieved by the company understudied regarding flexibility and delivery towards customer requests.

*Flexibility:* Table 4 shows the results of the company's rapid response to its customers in terms of flexibility, where the mean score of (3.63) and with a standard deviation of (0.79) with a response rate of (74.2%).

(Q15) had the highest flexibility response rate with a response rate of (79.7%) and high mean score of (3.88) and a standard deviation (0.69), with (79.7%) of respondents said that the company has the practical ability to offer various products

according to customers' requests. Followed by variable (Q14) with implementation rate of (77.3%) and mean score of (3.82) and with a standard deviation of (0.75) and with the agreement of (78.7%) of the respondents that the company was able to change the amount of production increasingly or decreasingly to adapt to change at the level of customers' requests.

**Table 4.** Rate of Response at UNIPHARMA Regarding Flexibility

Variables	Mean	Std. Deviation	Response %
Q13	3.57	0.79	74.1
Q14	3.82	0.75	77.3
Q15	3.88	0.69	79.7
Q16	3.61	0.72	74.3
Q17	3.47	0.87	71.9
Q18	3.43	0.91	67.9
Average	3.63	0.79	74.2

Delivery: The overall rate of the company's response to delivery was (73.33%) with mean score of (3.73) with a standard deviation of (0.71). The company's highest response was its commitment to delivery appointments of products to customers on the date specified by them (Q19). It came at (76.8%) and higher mean of (3.79) and a standard deviation of (0.77) followed by the company's response rate to the change in production scheduling (Q22) with a response rate of (76.6 %) and with a mean of (3.84) and a standard deviation of (0.67). The most important variables that contributed to weaken the company's ability to achieve high response to its customers is the variable (Q20), as respondents' answers show that suppliers have no sufficient capacity to deliver materials on time set by the company and have the lowest response rate of (68.4%) and the lowest mean (3.24) and the highest standard deviation (0.92).

Based on the results of the tables, the speed of the organization's response to its customers, the second hypothesis was accepted.

**Table 5.** Rate of Response at UNIPHARMA Regarding Delivery

Variables	Mean	Std. Deviation	Response %
Q19	3.79	0.77	76.8
Q20	3.24	0.92	68.4
Q21	3.72	0.85	74
Q22	3.84	0.67	76.6
Q23	3.97	0.60	75.4
Q24	3.82	0.58	76
Average	3.73	0.71	73.33

**3.3 Testing Hypothesis 3**

In order to demonstrate the impact of process standardization and industrial standards in enhancing the ability of the company understudied concerning flexibility and delivery, the researcher used multiple regression to estimate each component of company response to customers as shown in table 6.

**Table 6.** The effect of process and industrial standards on flexibility

DV	Flexibility							
	B	t value	Sig.	F value		R <sup>2</sup>	D W	
				F	Sig. level			
IV								
PS	0.32	2.66	0.01	14.6	0.000	0.22	2	
IS	0.34	1.91	0.05					
				<i>P</i> ≥ .05	<i>N</i> - 98			

Table (6) showed a significant impact of the two processes on strengthening company's ability to respond to customers in terms of flexibility, with weak (R<sup>2</sup>) only (22%). A follow-up of regression coefficients shows that if the company's capacity is

increased by adopting the process criteria by one unit, the company's ability to respond to customers in terms of flexibility will increase by (0.32%) which is considered a significant increase by (t) calculated value (2.66) and the significant level of (0.01) below the level (0.05). It was also found that the company's increased reliance on industrial standards was increased by one unit, the company's response to customers will increase in terms of flexibility by (0.34%), which is also significant by the value of (t) calculated of (1.95) and significance level of (0.05).

It was also found that the estimated equation is significant overall based on (F) calculated for a model as a whole which was (14.6) at the minimum level of (0.05). The equation is devoid of standard problems in terms of the Durbin Watson test, which was (2), and equal to the standard (2).

**Table 7:** The effect of process and industrial standards on delivery

DV	Delivery						
	B	t valu e	Sig.	F value		R <sup>2</sup>	DW
				F	Sig. level		
IV							
PS	0.35	2.85	0.01	17.5	0.00 0	0.28	1.8
IS	0.26	2.03	0.04				
<i>P</i> ≥ .05				<i>N</i> - 98			

Table (7) shows the results of the process standardization and the industrial standards effect on delivery. The table shows that there is a major impact of the two processes on improving the company's capacity in responding to its customers. (R<sup>2</sup>) was weak only (28%) and from following-up the regression coefficients which shows that if the company's adoption of the process standardization increases by one unit, which means an increase in

the response rate by (35%). Which is significant by the value of (t) calculated (2.85) at a significant level of zero (0.000), and if the company's adoption of industrial standards by one unit means that the response speed is increased by (26%). It is also significant in terms of the (t) calculated value (2.03) with significant level of (0.04) which is less than (0.05), and it was clear from the estimated equation the total value of significance is excellent in terms of the calculated F value of (17.05) at (0.000). The value of the (DW) of 1.8 is below the standard level of (2), therefore we accept hypothesis 3.

#### 4. Conclusion and Suggestions

##### Conclusions

1. The company's reliance on process standardization and industrial standards was relatively high and the adoption rate for industrial standards are the highest. However, despite these high rates, the company has a problem in tracking the flow of raw materials from one process to another and this may affect the company's ability in responding to customers' requests.
2. A low rate of the company's adoption of standardized data formats with the partners in the chain may lead to an impact in response to customers because the lack of adoption of standardized data formats may delay the exchange of data between them. This is also reflected in delays in the supply of raw materials, completion of operations, provision of goods in time, and the quantity and quality specified by customers.
3. The company's response rate to its customers in terms of flexibility and delivery is not high and convergent for both variables. The decline in these rates was affected by the low efficiency of the company's major suppliers to meet emergency demands and their ability to deliver materials as scheduled.
4. Third hypothesis test prove a significant effect of speed for both process standardization and industrial standards in responding to the company's customers in terms of flexibility and delivery according



to B, R<sup>2</sup> values, but the effect of lean supply chain anchors of flexibility was relatively higher than the impact of the company's ability to deliver. This was due to weakness in some elements of the process standardization and industrial standards as indicated by the results of the adoption rates for both variables.

### Suggestions

Here are some suggestions that can strengthened the company's ability to invest in process and industrial standards to achieve positive impact on the company's response speed to its customers.

1. The company should pay more attention to the flow of raw materials from one process to another to enable the company in improve its ability to respond to diverse customer demands.
2. Giving greater attention to the relationship with suppliers and cooperate with them and encourage them to adopt data formats standard cross the chain to achieve the objective of supplying of raw materials in time for the company.
3. Urge existing suppliers to meet emergency requests from the company in response to the demands of its customers or look for new suppliers with the ability and effectiveness to achieve company's demands.
4. The company should be more interested in following process standardization and industrial standards requirements to improve its ability to respond quickly to its customers, as the results of the study, we have seen some weakness of the requirements of both two variables, which reflected negatively and showed some weakness in the speed of response to the company's customers. Whenever the company improve its ability to adopt the process' standard and industry standards, an increased and improvement in the company's ability to respond quickly to its customers exist.

The novelty of this study stems from the introduction of critical influences that determine an effective employment of lean production to Syrian Manufacturing Companies. The results would offer companies an indicators and strategies for a

successful adoption of lean philosophies. Finally, the study outcomes will provide a path to forthcoming researches by suggesting a framework that improve the implementation of supply chain components and comprehensive training techniques to increase the response to customers.

### References

- [1] Unipharma-sy.com. [http://www.unipharmasy.com/en/ArtView/171/2/About\\_company.aspx](http://www.unipharmasy.com/en/ArtView/171/2/About_company.aspx). Retrieved on March 11, 2018).
- [2] Womack, J., Jones, D. T. and Roos, D. (1990). *The Machine That Changed the World*. New York, Rawson Associates.
- [3] Womack, J. and Jones, D. T. "From Lean Production to the Lean Enterprise." *Harvard Business Review*, Vol.72, PP. 93-104. March-April (2) (1994).
- [4] Bruce, Margaret and Lucy Daly, "Lean or agile A solution for supply chain management in the textiles and clothing industry?" *International Journal of Operations & Production Management* Vol. 24 No. 2, pp. 151-170, (2004).
- [5] Khanna, Nitin, "an ontology for a lean supply chain "a thesis of bachelors of engineering Agra University India, p. 25, (2007).
- [6] Sezen, Bulent and , Sema Frdogan, "lean philosophy in strategic supply chain management and value creating", *journal of global strategic management* Vol.3, No.1, PP. 68-73, (2009).
- [7] Johansson, Emma, "Can lean be mean?, A study of negative consequences of lean in supply chains", Master's Thesis in Business Administration, Uppsater University, Sweden, P. 17, (2010).
- [8] Plenert, Gerhard, " Reinventing lean: introducing lean management into the supply chain", Butterworth-Heinemann, P. 145, (2007).
- [9] Agard, Bruno, and Andrew Kusiak, "Standardization of components, products and processes with data mining." *International Conference on Production Research Americas*, P. 7, (2004).
- [10] Lamb, Caroline Twomey, and Donna H. Rhodes. "Systems Thinking as an Emergent Team Property: Ongoing research into the enablers and barriers to team-level systems thinking." *Systems Conference, 2008 second Annual IEEE*. IEEE, P. 3, (2008).
- [11] Wüllenweber, Kim, Beimborn, Daniel, Weitzel, T., & König, W., " The impact of

- process standardization on business process outsourcing success*”, Information Systems Frontiers journal Vol 10(2), PP. 211-224, (2008).
- [12] Vitasek, Kate, Manrodt, Karl and Abbott, Jeff, "What makes a lean supply chain?" Journal Supply chain management review, Vol. 9, no. 18, P. 43, (2005).
- [13] Lamb, Caroline Twomey, and Donna H. Rhodes. "Systems Thinking as an Emergent Team Property: Ongoing research into the enablers and barriers to team-level systems thinking." Systems Conference, 2008 second Annual IEEE. IEEE, p. 4, (2008).
- [14] Loukakou, Maria Doriza, "Product standardization and adaptation in International Marketing: A case of McDonalds, Thesis in Business Administration Department of Economics and IT. B: Articles and Journals, P, 19, (2012).
- [15] Manrodt, Karl, Vitasek, Kate, and Thompson, Richard, "Lean practices in the supply chain" Journal of Logistics Management", Vol 11, PP. 1-27, (2008).
- [16] Thompson, Richard, "Lean practices in the supply chain", Journal of Logistics Management, Vol.20, No 9, P. 16, (2008).
- [17] Manzouri, Malihe, "Increasing production and eliminating waste through lean tools and techniques for halal food companies." Journal of Sustainability, Vol .6, No.12. P. 189, (2014).
- [18] Srinivasan, Vijay, "Standardizing the specification, verification, and exchange of product geometry: Research, status and trends." Journal of Computer-Aided Design Vol .40, No .7, P. 11, (2008).
- [19] Lamberti, John-Paul, "The Adoption of Industry Standards , Processes, Tools and Public Work's CRE Vision " public works and government services Canada, P. 18, ( 2013).
- [20] Sharma, Sourabh, "Standardization and Certification in Lean Manufacturing for Technology and Product Development in Service Oriented Industries" ,IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE) ,Vol .11, No .4, P. 78, (2014).
- [21] Krajewski, J. Lee & Ritzman, P. Larry & Malhotra, K. Manoj, "Operations management processes and supply chains ", 9th Ed, Pearson, New Jersey, P. 15, (2010).
- [22] Al-Sha'ar, Isaac Mahmud, "The impact of supply chain integration through the supply chain response in operational performance in Large and Medium Size Jordanian Industrial Companies", A Field Study ", Jordanian Journal of Business Administration Volume 10 Issue 3. P. 493, (2014).
- [23] Fan, Lei, and Hua Yi "The Influence Factors Analysis on Response Speed of Agile Supply Chain." Journal of Advanced Materials Research. Vol. 472. Trans Tech Publications, P. 3269, (2012).
- [24] Slack, N., chambers, S. & Johnston, R., "Operation Management" , 5th Ed., prentice-Hall, London, P. 403, (2007).
- [25] Kumar, V., Fantazy, K., Kumar, U, Boyle, T. "Implementation and management framework for supply chain flexibility", Journal of Enterprise Information Management, 19 (3), PP.303 – 319, (2006).
- [26] Ibrahim, Louay Ismail Supply Chain performance Evaluation: A comparative study in Fallujah and Janabi Hospitals, a letter to the Board of Technical Quantity Administration, Baghdad, P. 47, (2011).
- [27] Ahga, Omar and Owni, Hasan, "The Role of Logistics Activities in achieving Competitive Advantage", Master Thesis, Department of Management and Economics, Mosul University, P. 41, (2010).
- [28] Dulaimi, Emad Khalil Ismail, "Management of the Supply chain and performance of the production process and its impact on service delivery Logistics: Field Research in the General Company for Electrical Industries ", Master Thesis submitted to the Board of the College of Management at Baghdad University, P. 54, (2014).
- [29] Arif-Uz-Zaman, Kazi, and A. M. M. Nazmul Ahsan "Lean supply chain performance measurement." International Journal of Productivity and Performance Management, Vol. 63, No.5, PP. 588-612, (2014).