

The Impact of Knowledge Management Processes on the System of Lean Production: Analytical Study in the Ur General Company for the Production of Electrical Cables and Aluminum

Prof. Dr. Firas Adnan Abbas

Researcher: Rusul Kareem Abed

University of Alqadisyah

University of Alqadisyah

College of Administration and Economics

College of Administration and Economics

firas.a.abbas@qu.edu.iq

rosol.kaream@gmail.com

Abstract

The importance of the present paper is reflected in identifying the modern concept that is usually used in the few past years it is the concept of the knowledge management and the related operations as it has causal links that provide meaning for the concerned data. As this research seeks to know the relationship between knowledge management processes in its dimensions (knowledge acquisition, knowledge storage, knowledge transfer and knowledge application) and the lean production system that is represented by the dimensions (5S work site organization, continuous improvement, comprehensive productive maintenance and production on time JIT). Accordingly, the Ur General Company for the production of electrical and aluminum cables was chosen as a research community, and in order to achieve the purpose of the research, a hypothetical model was created for the research that clarifies the nature of the relationship between the research variables. Also, the questionnaire was designed as a main tool for data collection.

The questionnaire was distributed on the sample of the study (the higher and the middle administrative in the Ur General company for Production of Cables and Aluminum. (200) questioners and (194) were collected in return. The program f (spss.v25) was used in examining the hypotheses to extract the approaches of descriptive statistics. The study had reached many conclusions among the important of them, the validity of each of the main

and secondary hypotheses related to the research has been proven through the existence of a correlation and influence between the variables of the study.

Keywords: Knowledge Management Processes, lean Production System.

المستخلص

تتبع أهمية البحث الحالية من خلال التعرف على مفهوم حديث عادة ما يستخدم في السنوات القليلة الماضية هو مفهوم إدارة المعرفة والعمليات المتعلقة بها باعتبارها تمتلك روابط سببية توفر معنى للمعلومات ذات الصلة. إذ يسعى هذا البحث إلى معرفة العلاقة ما بين عمليات إدارة المعرفة بأبعادها (اكتساب المعرفة، تخزين المعرفة، نقل المعرفة وتطبيق المعرفة) ونظام الإنتاج الرشيق المتمثل بالأبعاد (تنظيم موقع العمل 5S، التحسين المستمر، الصيانة الإنتاجية الشاملة والإنتاج بالوقت المحدد JIT). وعليه تم اختيار شركة أور العامة لإنتاج القابلات الكهربائية والألمنيوم كمجتمع للبحث، ولأجل تحقيق غرض البحث تم إنشاء نموذج افتراضي للبحث يوضح ما هي طبيعة العلاقة بين متغيرات البحث وإيضاً تم تصميم الاستبانة كأداة رئيسة لجمع البيانات.

تم توزيع الاستبانة على أفراد عينة البحث (الإدارات العليا والوسطى في شركة أور العامة لإنتاج القابلات الكهربائية والألمنيوم) وكان عددها (200) استبانة وتم استرجاع (194) استبانة. وتم استخدام برنامج (SPSS V.25) في اختبار الفرضيات لاستخراج أساليب الإحصاء الوصفي. وقد توصل البحث إلى العديد من الاستنتاجات أهمها أنه تم إثبات صحة كل من الفرضيات الرئيسية والفرعية التي تتعلق بالبحث من خلال وجود علاقة ارتباط وتأثير بين متغيرات البحث.

الكلمات الدالة: عمليات إدارة المعرفة، نظام الإنتاج الرشيق.

Introduction

The application of lean system production is not only restricted to the redesigning of some processes of production, however, the most important change must be made in people's knowledge. Otherwise these changes would not be sustainable. Most of the implementation processes describe the sequence of the necessary tasks, But do not take into account the integration of knowledge in the organization. Therefore, it is essential to describe how to analyze knowledge and the flow of knowledge. Studies have shown that a variety of different knowledge flows may occur during the implementation of lean production systems, a decentralized approach to roles can assist in identifying appropriate knowledge management methods.

Hence, the present research is to shed light on the role of the knowledge management processes in the lean production system, to achieve the objective of the research, the study is divided into four main topics, the first topic is represented by the research methodology, the second is the theoretical framework, and the third topic is the practical side of the study, and the fourth topic included the conclusions and the recommendations that the researcher has reached at.

The First Topic

Research Methodology

(I) Problem Statement

The problem of the study is represented by the following questions:

1. What is the impact of applying knowledge management processes to the lean production system in the Ur General Company for the production of electrical cables and aluminium?

2. What are the dimensions of knowledge management processes and are they applied in the Ur general Company for the production of electrical cables and aluminium?
3. What are the dimensions of the lean production system, and are they applied in the Ur general Company for the production of electrical and aluminium cables?
4. Is there an influence relationship for the dimensions of knowledge management processes on the dimensions of the lean production system?
5. Is there a correlation between the dimensions of knowledge management processes and the dimensions of the lean production system?

(II)The Significance of the Study

The importance of the study is illustrated in the following points:

- 1-. The importance of research emerges from the importance of the topic itself, as knowledge management processes are of interest to researchers and organizations alike, as knowledge management processes play a major role in the success of these organizations.
- 2- Identify the concept and dimensions of knowledge management processes and explain their impact on the application of a lean production system.
- 3- Learn about the concept and dimensions of the lean production system and its contribution to continuous improvement.

(III) The Objectives of the Study

1. Clarifying the nature of the relationship and the type of influence between the dimensions of knowledge management processes and the dimensions of lean production.
2. Clarifying the ability of knowledge management processes to influence the lean production system.
3. Reaching a series of conclusions and recommendations that can help organizations apply the principles of a lean production system and improve performance.

(IV) Hypothesis of the Study

According to the outline of the study there emerged the following hypotheses:

The first main Hypothesis(H1): There is a significant correlation between knowledge management processes and the lean production system. And the sub hypotheses stem from it:

- There is a significant correlation between knowledge acquisition and a lean production system.
- There is a significant correlation between knowledge storage and a lean production system.
- There is a significant correlation between knowledge transfer and a lean production system.
- There is a significant correlation between the application of knowledge and the lean production system.

The Second Main Hypothesis(H2): There is a significant impact relationship between knowledge management processes and the lean production system.

-There is a significant impact of the dimension of knowledge acquisition in the lean production system.

- There is a significant impact of the knowledge storage dimension in the lean production system.

There is a significant impact of the knowledge transfer dimension in the lean production system.

- There is a significant impact of the knowledge application dimension in the lean production system.

(V) The Hypothetical Outline of the Study

Based on the problem statement and the objectives of the study the hypothetical outline of the study was designed.

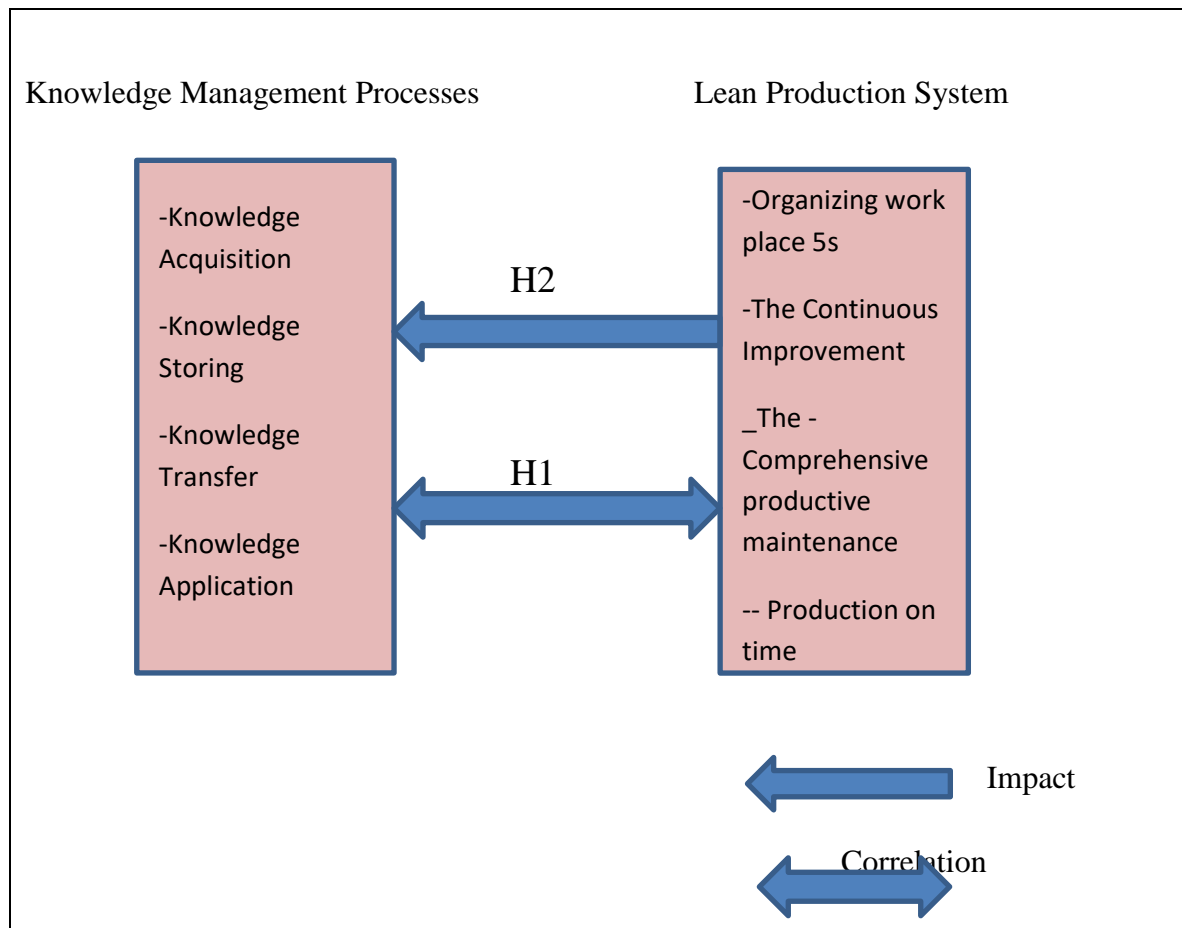


Figure (1) The Hypothetical Outline of the Study

The Second Topic

Conceptual Framework of the Processes of Knowledge Management and Lean Production

(I) The Concept of Knowledge management

Knowledge management and management are considered as main source for competition in every organization, therefore, many of the organizations by merely obtaining the knowledge, they would be more successful in a competitive market. And that may be implemented with proficiency through the knowledge management processes.(Lou& Rezaeenour,2016:1). Thus, the views of the researchers about the concept of the knowledge management processes have varied and table (1) illustrates what have been obtained in form of knowledge management processes.

Table(1) viewpoints of some researchers about the concept of Knowledge management processes

S.No.	Researcher/ Year	Concept
1	Gonzalez& Martins, 2014: 134	Management's attempt to enhance and facilitate the activities of acquiring, storing, distributing and using knowledge by individuals and groups.
2	Alharithy,2015:728	All foundational and sub-branch activities related to knowledge with the different nature of the mentioned processes from one organization to another.
3	Shahzad et al., 2016: 159	It is a purposeful, continuous and streak network of people interactions to manage activities, components, and other people who participate in basic knowledge processes, as it creates a unified, directed and planned circle that moves, acquires, enhances, maintains and produces the knowledge base of the organization.
4	Alosaimi, 2016:65	A continuous set of practices anchored in the social and physical structure of the organization with knowledge as its final product.
5	AL-Hayaly& Alnajjar, 2016:74	The extent to which the company creates knowledge at work, participates in it, and distributes and benefits from it.
6	Migdad et al., 2017:4	Categories of embedded activities and / or procedures undertaken by the organization to achieve specific knowledge-related goals.
7	Kordab& Raudeliuniene, 2018: 144	All knowledge-related activities carried out by organizations by internal or external parties
8	Raudeliuniene et al., 2018:545	Processes by which knowledge is created, captured, organized, shared, transferred, standardized and used, measured and evaluated
9	Al Ahbabi et al.,2019:4	Basic procedures that an organization takes in processing and manipulating its knowledge resources.
10	Alshenti&Alshrif,9:2019	(A continuous group of operations that works on acquiring knowledge from different sources, preserving it, creating an encouraging environment for its exchange and spreading among employees, and urging them to use it in performing work tasks, solving problems and making decisions. This contributes to gaining the organization's competitive advantages)

(II) The Dimensions of Knowledge Management

The present literature on knowledge management has classified the knowledge management process into several parts, these types of knowledge management processes are interdependent periodically.

Table (2) the viewpoints of some researchers about knowledge management processes

S.No	Researchers& Year	Gold et al., 2001	Allameh 2011	Al-hakim& Hassan 2012	Sensuse et al., 2015	Cepeda-Carrion et al., 2017	Paschek et al., 2018	Raudeliuniene& Kordab, 2019	Hasballah et. al.2020
	Dimensions of KM								
1	Knowledge Creating	*	*	*			*	*	*
2	Knowledge Acquisition						*		
3	Knowledge Sharing			*	*		*	*	
4	Knowledge Storing		*	*			*	*	*
5	Knowledge Application	*	*		*	*		*	*
6	Knowledge Distributing								*
7	Knowledge Organizing		*	*					
8	Knowledge Usage			*					
9	Knowledge Discovering				*				
10	Knowledge Picking		*		*				
11	Knowledge Transfer					*	*		
12	Capacity of Knowledge					*			
13	Knowledge Spreading		*						
14	Knowledge Conversion	*							
15	Knowledge Protecting	*							
16	Polishing and Improving Knowledge						*		

Thus, it was found that researchers had not reached agree on a specific knowledge management process. But most studies agreed that knowledge management depends on four main types of knowledge management processes and for the purpose of the present study and its objectives the following will be relied on:

- 1- Knowledge acquiring
- 2- Knowledge storing
- 3- Knowledge transfer
- 4- Knowledge application

(III) The Concept of Lean Production System

Lean is the philosophy applied mostly around the world. However, the concept of Lean is not static in reality as the concept changes with the passage of time, in the beginning the Lean philosophy was to reduce all waste while the new point of view is to create value along with minimizing waste(Ahmad,2012:14).

Table (3) illustrates the opinion of some researchers regarding the concept of a lean production system.

Table (3) The Concepts of the system of Lean Production

S.NO.	Researcher/year	Concept
1	Alves et al.,2014:1	The National Institute of Standards and Technology (NIST) defines lean production as "a series of tools and techniques for managing your organization's operations"
2	Elnadi, 2015:34	lean production system is described as one that seeks to eliminate unnecessary processes, to align processes in a continuous flow and to use resources to solve problems in a never-ending process.
3	Krajewski,2016:228	A process system that increases the added value of the organization's various activities by eliminating waste and trying to delay it
4	Rasi et al.,2016:2	Lean production is a business system for organizing and managing product development, processes, processors, and customer relations with the aim of minimizing the use of manpower, capital capacity and time in product production, and minimizing defects to satisfy the customer compared to a large production input.

5	Wickramasinghe & Wickramasinghe, 2017:536	Lean production is a system that uses less everything when compared to mass production, half the human effort in the factory, half the manufacturing space, half the investment in tools and half the engineering hours to develop a new product in half the time. It also needs to maintain less than half of the inventory required on site, results in fewer defects, and produces larger and more diverse products.
6	(Jacobs & Chase, 2018:351)	Integrated activities designed to achieve high-volume, high-quality production with minimal stocks of raw materials, work-in-progress and finished goods
7	Yahya et al., 2019: 2	Lean production is known as zero-waste manufacturing
8	Nwanya & Oko, 2019:3	Lean production can be defined as an alternative integrated production model because it combines the distinctive tools, methods and strategies in product development, processing management and operations management as a whole interconnected.
9	Skobleva et al., 2020:230	Effective management of production processes by eliminating waste, that is, processes that do not add value and are not necessary
10	Pushina et al., 2020:1	Lean production is a business management philosophy that is based on the continuous effort to eliminate all the waste known as "muda", namely the loss of excess production "wait / lost time",

		losses during unnecessary transportation, losses resulting from unnecessary additional processing stages, excess supply losses , losses due to unnecessary suggestions and losses due to defects, etc.
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(V): The Dimensions of Lean Production

Table for illustrates the viewpoints of some researchers about the dimensions of the lean production

Table (4) viewpoints of some researchers about the dimensions of the lean production

S.No	Researcher & Year The Dimensions of the Lean Production	Greene 2002	Basha & Toweny 2012	Shalal & Alhesnawi 2014	Dombrowski et al., 2016	Altahir & Alshibli 2017	Wesenberg 2017	Wagner et al., 2017	Schroeder & Goldstein 2018	Alsarayra.et.al., 2020
1	Organizing the Workplace 5s	*	*		*		*			*
2	The Continuous Improvement Kaizen	*	*	*	*		*			*
3	JIT		*	*		*		*		
4	Comprehensive Productive Maintenance			*		*				*
5	Kanban			*						
6	Automation		*					*		
7	Dividing the Product							*		
8	Unification		*		*			*		
9	Wastage Reduction							*		
10	Customer's Value	*					*		*	
11	Value Stream	*		*			*		*	
12	Flow	*			*		*		*	

13	Perfection	*					*		*	
14	Zero Defective				*					
15	Management with Objectives				*					
16	Map of Value flow									*
17	Individuals and Teamwork							*		
18	Withdrawal	*			*		*	*	*	
19	System of Withdrawal/ Kanban									*
20	Finishing Time							*		
21	Tendency of Jobs				*					
22	Differentiation Between Man and Machine							*		

Through this, four dimensions of the lean production system will be relied upon, in line with the requirements of the current research:

- 1- Organizing the workplace 5S.
- 2- The continuous Improvement.
- 3- The comprehensive maintenance productivity.
- 4- Production on time.

The Third Topic

The Practical Aspect of the study

(I):- the Normal Distribution of the Variables of the Study

The results of the table (5) show that the internal variables in the analysis follow the normal distribution, which indicates that the data undergo the tests of normal distribution and prepare to use these statistical approaches, thus it can be said that the results that the study arrives at can be generalized to the studied community.

S.No.	Variable	Kolmogorov- Smirnov Test Statistic	Standard D Value	Sig.
1	Knowledge Acquisition	0.183	0.098	P=.000
2	Knowledge Storing	0.171	0.098	P=.000
3	Knowledge Transfer	0.178	0.098	P=.000
4	Knowledge	0.204	0.098	P=.000

	Application			
5	Organizing Workplace	0.211	0.098	P=.000
6	Continuous Improvement	0.282	0.098	P=.000
7	Comprehensive Maintenance Productivity	0.212	0.098	P=.000
8	Production on time	0.256	0.098	P=.000

(II) :- The stability of the Measuring tool

The results of Table (6) show that the value of the stability coefficient (Cronbach's Alpha) for all items of the independent variable expressing knowledge management processes amounted to (0.95). Which indicates a high stability as well as the four dimensions due to being more than the value specified in management and behavioral research, which is (0.70) As for all the items of the second independent variable information technology, the stability factor was recorded (0.94), and this value indicates that the items of the second independent variable to test the stability were well skipped.

Table (6) Alpha Cronbach coefficients for the search variables

Variables	Cronbach Alpha for Measurements	Dimensions	Cronbach Alpha of the Dimension
Knowledge Management Processes	0.95	Knowledge Acquisition	0.83
		Knowledge Storing	0.87
		Knowledge Transfer	0.83
		Knowledge Application	0.85
Lean Production System	0.91	Organizing workplace	0.74
		Continuous Improvement	0.90

		Comprehensive maintenance Productivity	0.71
		Production on Time	0.70

(III): - Descriptive statistics for the research

1- The variable of Knowledge Management Processes

The results of table (7) display that the general average of the arithmetic of the variable of the knowledge management processes has reached (3.87) with standard deviation about (0.667) with a relative significance equal to (0.46) which indicates the attention that the studied sample pay to the dimension of knowledge transfer with an arithmetic of (3.93) with a standard deviation equal to (0.625) and a high relative significance value of (0.76), in addition to the attention of the studied sample to the dimension of knowledge application with an arithmetic of (3.80) and standard deviation value (0.688) and relative significance equal to (0.76).

Table (7) the statistical Description of the variable of the Knowledge management processes

S.No	Arithmetic	Standard Deviation	Relative Sig.	Sig. Order	S.No.	Arithmetic	Standard Deviation	Relative Sig.	Sig. Order
1	4.06	0.462	0.81	1	1	3.77	0.608	0.75	5
2	4.01	0.744	0.80	2	2	3.80	0.593	0.76	4
3	3.76	0.669	0.75	3	3	3.87	0.598	0.77	3
4	3.72	0.751	0.74	4	4	4.02	0.740	0.80	2
5	3.69	0.701	0.74	5	5	4.18	0.587	0.84	1
After Knowledge Acquisition	3.85	0.665	0.77	Third	After Knowledge Transfer	3.93	0.625	0.79	First
1	4.07	0.601	0.81	2	1	3.73	0.688	0.75	5
2	4.14	0.675	0.83	1	2	3.84	0.667	0.77	3
3	3.95	0.714	0.79	3	3	3.85	0.826	0.77	2
4	3.76	0.737	0.75	4	4	3.86	0.667	0.77	1
5	3.67	0.730	0.73	5	5	3.75	0.591	0.75	4
After Knowledge Storing	3.91	0.691	0.78	Second	After Knowledge Application	3.80	0.688	0.76	Fourth
The General Average of Knowledge Management Processes Variable						3.87	0.667	0.46	***

2- Lean Production System

It is noticed from the data of Table (8) that the dimension of production at the specified time was ranked first in the order of dimensions according to the answers of the research sample, either less dimension was the share of continuous improvement, and in general the general arithmetic mean of the variable of the lean production system was high (3.96) with a general standard deviation reached (0.597).

Table (8) the descriptive Statistic of the variable of Lean Production System

S.No	Arithmetic	Standard Deviation	Relative Sig.	Sig. Order	S.No.	Arithmetic	Standard Deviation	Relative Sig.	Sig. Order
1	4.10	0.502	0.82	2	1	3.74	0.792	0.75	5
2	3.97	0.513	0.79	4	2	3.94	0.600	0.79	2
3	3.96	0.666	0.79	5	3	3.91	0.673	0.78	3
4	4.11	0.478	0.82	1	4	3.80	0.487	0.76	4
5	4.03	0.622	0.81	3	5	3.99	0.503	0.80	1
After Workplace Organization	4.03	0.556	0.81	Second	After Comprehensive maintenance productivity	3.87	0.611	0.77	Third
1	3.88	0.846	0.78	2	1	4.03	0.512	0.81	4
2	3.89	0.646	0.78	1	2	4.02	0.498	0.80	5
3	3.80	0.740	0.76	5	3	4.09	0.355	0.82	2
4	3.86	0.621	0.77	4	4	4.12	0.514	0.82	1
5	3.87	0.765	0.77	3	5	4.10	0.605	0.82	3
After Continuous Improvement	3.86	0.724	0.77	Fourth	Production on Time	4.07	0.497	0.81	First
The General Average of Lean Production Variable						3.96	0.597	0.79	***

(IV): Hypotheses of the Study

1- Correlation Hypothesis

In order to accept the first main hypothesis or the value of simple correlation coefficient among between the variable of knowledge management processes (Independent Variable) and the lean production variable (The dependent variable) whereas the table (9) refers to the significant and positive correlation relationship between the variable of knowledge management processes and the variable of the lean production system, , since the value of the simple correlation coefficient between them reached (.729 **), and this value indicates the strength of the direct relationship between the variable of knowledge management processes and the lean production system, what supports this is the significance of the correlation relationship, which appeared at a level of significance (1%) and with a degree of confidence amounting to (99%). Table (9) clarifies that relationship, As it becomes

evident to accept the first main hypothesis, which states that (there is a positive statistically significant correlation relationship between the variable of knowledge management processes and the variable of the lean production system). At the level of significance (1%), that is, the result of the decision is acceptable with a degree of confidence of (99%).

Table(9) A matrix of correlation coefficients between the variable of knowledge management processes with its dimensions and the variable of the lean production system

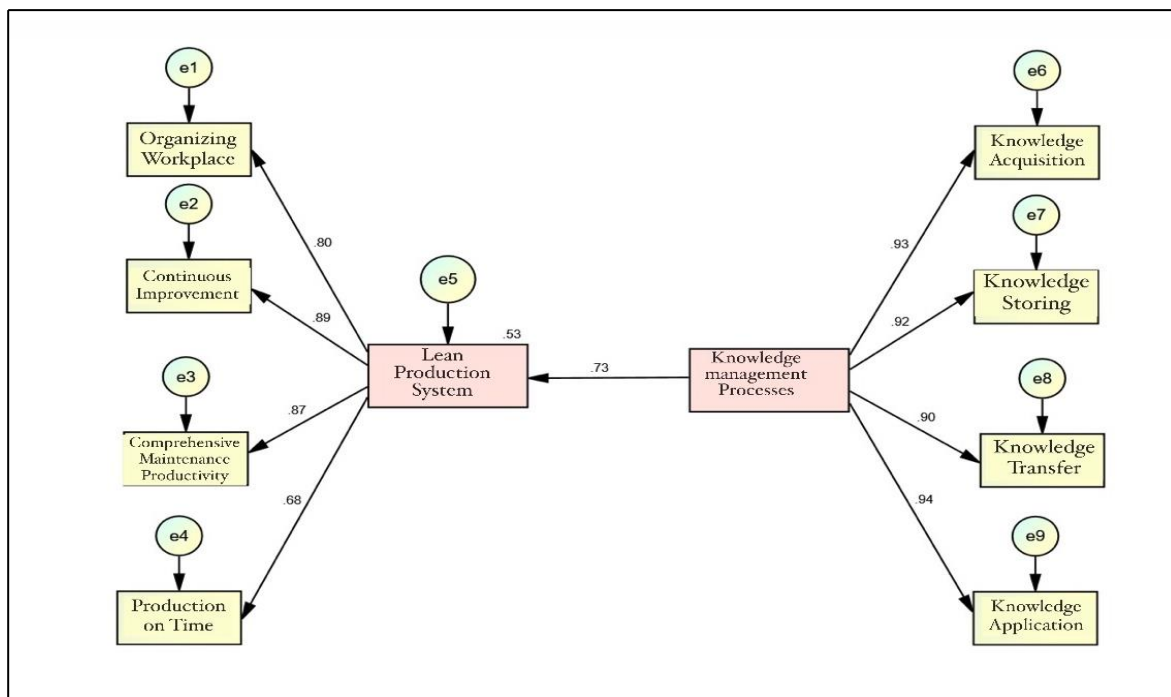
		Knowledge Acquisition	Knowledge Storing	Knowledge Transfer	Knowledge Application	Knowledge Management Processes
Knowledge Acquisition	Pearson Correlation	1	.848**	.770**	.817**	.932**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	194	194	194	194	194
Knowledge Storing	Pearson Correlation	.848**	1	.725**	.799**	.920**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	194	194	194	194	194
Knowledge Transfer	Pearson Correlation	.770**	.725**	1	.827**	.896**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	194	194	194	194	194
Knowledge Application	Pearson Correlation	.817**	.799**	.827**	1	.935**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	194	194	194	194	194
Knowledge Management Processes	Pearson Correlation	.932**	.920**	.896**	.935**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	194	194	194	194	194
Lean Production System	Pearson Correlation	.591**	.642**	.733**	.724**	.729**
	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	194	194	194	194	194

2- Impact Hypothesis

Testing the second main hypothesis: (There is a significant impact relationship between knowledge management processes and the lean production system) figure (2) is the structural model for research that shows the independent variable (knowledge management processes) and the dependent variable (the lean production system) .As for the one-way arrows from the independent variables to the adopted variable, they represent the standard regression coefficients. As for the apparent value above the variable of the lean production

system, it represents the interpretation coefficient (the determination factor), which is called the standard coefficients (used to test hypotheses) (R^2), which indicates that the variable of knowledge management processes is able to explain 53% of the changes that occur to the variable of Lean production system in the public company Ur. As for the remaining percentage (47%), it is attributed to the contributions of other variables that are not included in the research model.

It is also clear from Table (10) that the value of the marginal slope coefficient (β) of (0.73). That increasing the levels of availability of knowledge management processes by one unit of standard deviations will lead to an increase in the levels of the lean production system by (73%) from one standard deviation unit, and based on the outputs of the structural model of the impact relationship between the independent variable and the dependent variable, the first main hypothesis of the impact hypotheses is accepted.



Figure(2) The regression path of the first main hypothesis according to the structural equation modeling method

Table (10) Estimates of the impact model between the variable of knowledge management processes and the variable of the lean production system

Variable and Dimensions	Track	Variables	S.R W	Estimate	S.E.	C.R.	P
Lean Production System	<---	Knowledge Management Processes	.729	.541	.037	14.802	** *

The Fourth Topic

Conclusions and Recommendations:-

Conclusion

- 1- The results that are related to Ur General Company for the production of electrical and aluminum cables showed that there is a statistically significant correlation between knowledge management processes and the lean production system. Which contributed to improving the company's ability to acquire, store, transfer and apply knowledge.
- 2- The results showed that all the variables dimensions of knowledge management processes (knowledge acquisition, knowledge storing, knowledge transfer and knowledge application) have a positive impact on the lean production system.
- 3- The company's interest in improving and developing the capabilities of its employees through training and development courses, which contributed to improving the company's ability to apply knowledge efficiently and effectively.
- 4- The company pays attention to use a flexible and conceptual approach in stating its vision and mission to employees and applying knowledge through its various operations and activities, which contributes to improving the company's ability to meet business requirements.
- 5- The lean production system is considered as one of the most recent systems in production, as it is an integrated social and technological system that contributes to improving operations, whose main goal is to eliminate waste and activities that do not add value to the customer, and to obtain better production results.

(III) Recommendations

1. Investing knowledge management processes well in the researched company because knowledge is usually not sufficiently invested. Unless properly managed knowledge, this enable organizations to benefit from reducing recurring errors and creating new opportunities.
- 2 .The company must provide the various resources necessary to acquire information and knowledge to develop employees, which requires it to develop new means and methods that encourage employees to be creative at work.
3. Conducting seminars, courses or workshops for the employees of the company to introduce them to knowledge, its management and processes, to increase their

awareness about knowledge management processes because of their effective role in raising the efficiency of the company's performance.

4. Training the company's employees on lean production systems to eliminate waste and thus reduce costs.

5- Ur General Company for the production of electrical cables and aluminum should focus its attention on eliminating all forms of waste and in all stages of the production process, as eliminating waste is one of the basic principles on which a lean production system is based.

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