



Lean Manufacturing Dimensions and Its Relationship in Promoting the Improvement of Production Processes in Industrial Companies

Sahar A. Mady¹, Samer M. Arqawi², Mazen J. Al Shobaki³ and Samy S. Abu-Naser⁴

¹Management Department, Islamic University –Gaza, PALESTINE

²Assistant Professor, Industrial Management Department, Palestine Technical University –Kadoorei, PALESTINE

³Dean of Bait Al-Mqds College for technical Science, Gaza, PALESTINE

⁴Professor, Department of Information Technology, Al-Azhar University, Gaza,, PALESTINE

(Corresponding author: Samy S. Abu-Naser)

(Received 11 March 2020, Revised 13 May 2020, Accepted 15 May 2020)

(Published by Research Trend, Website: www.researchtrend.net)

ABSTRACT: The aim this study aimed to identify the dimensions of lean manufacturing (continuous improvement, comprehensive maintenance, production on time) and its relation to enhancing the productivity of employees in the supervisory and administrative positions of Aziza Poultry Company-Tulkarem. The main challenges that face the Palestinian Economy: Poor purchasing power at the local market, Lack of insurance systems, Price fluctuation, Israeli Competition, Poor coordination among companies. The researchers used the structural equation modulation method; the questionnaire was distributed to the 140 employees in the factory, according to the data of the employees at the factory. The most important results of this study were: A positive correlation was achieved between the combined manufacturing. The productivity at the plant level in question, which was indicated by the results of statistical analysis, achieved a positive correlation between the dimensions of the small manufacturing process and the improvement of productivity. This was indicated by the results of the statistical analysis. Between displacements in terms of the strength of the link to Improvement of Production, there is a significant effect of excluding the lean manufacturing combined in Improvement of Production, which explicitly indicates that organizations that seek to apply these dimensions well and continuously will certainly have the ability to achieve productive improvement. Several recommendations have been reached: Corporate management should adopt the good and proper application of the lean manufacturing philosophy and ensure that this application is successful because of its significant impact on cost reduction and Improvement of Production. Special training sessions for managers and employees of industrial companies on how to implement the lean manufacturing system, pay adequate attention to the integration of all the pillars of lean manufacturing because one complement the other in order to achieve a direct impact on the achievement of the advantage of improving productivity, increasing cooperation between companies and teaching staff in universities with expertise in modern manufacturing systems In order to benefit from their experiences.

Keywords: Improvement, Industrial Companies, Lean Manufacturing, Productive Operations, Palestine.

Abbreviations: CR: composite reliability; AVE: average variance extracted.

I. INTRODUCTION

It seeks that the development of external conditions, both administrative and manufacturing, and the expectations surrounding industrial economic units in our time have had a major impact in such a way that these conditions have distinct characteristics, advantages, and characteristics that are different from the previous one. These developments and characteristics had a very important impact on the various systems surrounding modern institutions, especially manufacturing and cost systems that take a prominent place among those systems and concepts, and what the institution does and the surrounding systems of work and technology in open, continuous and changing environments. Therefore, we find that the success of these systems in general and the costs system in particular are based and take the lead in the first place on the adoption and adaptation of these

systems with the environment surrounding the institution and take into account the ongoing changes taking place in the work environment (www.accyarak.com).

This is considered lean manufacturing as one of the most important criteria that business owners and managers go in following, and the main idea of this system is to get rid of unnecessary matters in manufacturing that do not add value to the product, and companies applying to this type of system seek to adopt manufacturing standards in order to improve their operations and reduce costs Production, and responding to customer needs and desires, hence the importance of lean production for industrial and service companies [26, 47].

Hence, we find that industrial companies of all kinds have become a high degree of awareness to improve their performance in light of competition; this is what led them to adopt lean production to obtain continuous improvement [2, 3] on the one hand. On the other hand,

we find that industrial companies work to create the conditions and requirements to increase productivity, and because productivity is important for any industrial company, it is necessary to continuously strive to improve it through the application of modern technologies, the most important of which are technology, employees, and product. The application and improvement of any technology, in whole or in part, will contribute to improving productivity and when proceeding to Improvement of Production, Create a plan to improve your performance Coronary aimed at identifying and adopting technologies [27,29,31].

II. PROBLEM STATEMENT

There is a need to go to the care of the poultry sector in Palestine, and this requires the existence of institutions capable of supporting and optimizing the poultry sector in Palestine.

The researchers found a lot of challenges in Production Processes in Industrial Companies, especially in Poultry Production sector. These challenges include but are not limited to:

➤ **Poor purchasing power at the local market**

The Palestinian local market is relatively small in size. This results in a surplus in production of **Poultry** commodities. Farmers of Poultry are the most vulnerable to this problem, especially because of the product's relatively high price in comparison to Israeli produced Poultry.

➤ **Lack of insurance systems**

The Palestinian companies suffer from the absence of an insurance system. Therefore, companies incur huge losses due to natural disasters and harsh weather conditions, without any remuneration.

➤ **Price fluctuation**

The Palestinian market witnesses price fluctuations on daily basis, due to a lack of a management system that coordinates production activities, resulting in lack of information about supply and demand of many products.

➤ **Israeli Competition**

Israeli Poultry products flooding Palestinian market have a price competitive advantage, thus weakening the profitability of Poultry products.

➤ **Poor coordination among companies**

Poor coordination results in surplus or deficiency in the production of Poultry, and increase competition between Palestinian local companies.

The study problem is represented in the following main question: Is there a relationship between the application of lean manufacturing techniques (continuous improvement, comprehensive maintenance, production on time) as an input in promoting the improvement of production processes) in Aziza Poultry Company-Tulkarem?

This question gives rise to a set of the following sub-questions:

- Is there a statistically significant relationship at the significance level ($\alpha \leq 0.05$) between the applications of the continuous improvement strategy as an input in promoting the improvement of production processes in Aziza Poultry Company-Tulkarem?
- Is there a statistically significant relationship at the significance level ($\alpha \leq 0.05$) between the implementation of the production strategy on time

as an input in promoting the improvement of production processes in Aziza Poultry Company-Tulkarem?

- Is there a statistically significant relationship at the significance level ($\alpha \leq 0.05$) between the applications of a comprehensive maintenance strategy as an entry point in promoting the improvement of production processes in Aziza Poultry Company- Tulkarem?
- Are there differences in the responses of the individuals in the study sample about the application of lean manufacturing techniques and the arrival of continuous improvement of production processes in Aziza Poultry Company- Tulkarem attributed to the following variables (educational qualification, years of experience, gender, section).

III. RESEARCH OBJECTIVES

This study aims to achieve the following objectives:

- The main objective is to identify the extent of the lean manufacturing strategy in improving the production process through consumption rates of broiler chickens ;, in terms of (continuous improvement, production on time, comprehensive maintenance) for employees in Aziza Poultry Company- Tulkarem
- Detecting the differences in the responses of the study sample individuals on the applications of lean manufacturing techniques and their extent in promoting the improvement of production processes according to demographic variables (gender, educational qualification, years of experience, section)
- Work on submitting proposals to these factories on how to transform into a graceful company and an appropriate environment to apply lean manufacturing strategies and take advantage of them to enhance the improvement of production processes.

IV. RESEARCH IMPORTANCE

Improving productivity is one of the most important responsibilities of managers of industrial companies in the world because of the importance of increasing productivity and it was necessary to create new strategies such as lean manufacturing to increase productivity, hence the importance of research, which is the following:

1. Provide a detailed framework on lean manufacturing concepts, methods, and tools, and move to lean manufacturing to be a tangible reality.
2. Contribute to putting forward a production philosophy in the company, which is lean manufacturing, which has received widespread attention in industrialized countries.
3. Contribute to companies improving their products, work steps and stages, and reducing waste through applying lean manufacturing strategies.
4. The research provides a benefit at the practical and scientific level, by providing advice to the owners of companies to apply lean manufacturing strategies, either on the scientific side by presenting the research as references that will be used to the owners of subsequent studies and those interested in the scientific field.

V. RESEARCH HYPOTHESIS

With the aim of providing an appropriate answer to the research arguments put forward, the research seeks to test the validity of the following hypotheses:

Ho 1: There is a statistically significant relationship at the significance level ($\alpha \leq 0.05$) between applying lean manufacturing techniques strategies and improving production processes in Aziza Poultry Company-Tulkarem.

It divides the following hypotheses:

H1: There is a statistically significant relationship at the level of significance ($\alpha \leq 0.05$) between after continuous improvement and after improvement of productivity.

H2: There is a statistically significant relationship at the level of significance ($\alpha \leq 0.05$) between after production on time and after improving productivity.

H3: There is a statistically significant relationship at the significance level ($\alpha \leq 0.05$) between after comprehensive maintenance and after Improvement of Production.

H4: There are statistically significant differences at the level of significance ($\alpha \leq 0.05$) in the responses of the study sample individuals on the application of lean manufacturing techniques and the arrival of continuous improvement of production processes in Aziza Poultry Company- Tulkarem attributable to the following variables (educational qualification, years of experience, gender, section).

Model and Research Variables

- **Independent Variable:** lean manufacturing techniques and contains three variables:
 1. Continuous Improvement
 2. Production on Time
 3. Comprehensive Maintenance
- **Dependent Variable:** improve production processes

VI. RESEARCH LIMITS AND SCOPE

The scope of the study shall be as follows:

1. **Human Limit:** This study was applied to employees in the supervisory and administrative sites of Aziza Poultry Company- Tulkarem
2. **Objective limits:** The independent study examined lean manufacturing techniques, namely: (continuous improvement, comprehensive maintenance, production on time) as well as the dependent variable (improvement of production processes)
3. **Time limits:** The study was conducted during the year (2020).
4. **Spatial limits:** The study was conducted on Aziza Poultry Company- Tulkarem, Palestine

VII. LITERATURE REVIEW

— The researchers will discuss in this axis a comprehensive review of all previous Arab and foreign studies that dealt with the subject of the study on the dimensions of lean manufacturing and its relationship to promoting the improvement of production processes.

— The study of [39] aimed to identify the reality of the application of strategic agility in the Palestinian civil organizations in Gaza Strip, and the concept of strategic agility has included a number of areas which are (strategic sensitivity, clarity of vision, choice of strategic goals, rapid response, joint responsibility, taking

actions, core capabilities) and the study used An analytical descriptive approach, and the questionnaire as a main tool for collecting data from the employees of the associations operating in the governorates of Gaza Strip. The relative weight of the strategic agility scale reached (79.04 %), and there were statistically significant differences in the dimensions of the measure due to the gender variable in the dimensions of strategic agility (strategic sensitivity, clarity of vision, choice of strategic goals, rapid response, and taking measures) and the differences were in favor of females. While there were no statistically significant differences in my dimension (shared responsibility, core capabilities) attributable to the gender variable, there were no statistically significant differences between the mean dimensions of strategic agility due to the age group variable, the educational qualification.

— Study of Al-Rubaie [16] that aimed at this study to show the importance of lean manufacturing and some of its technologies as one of the modern and contemporary systems and what this system benefits from small aspects of the company represented in reducing costs, waste and waste. The researcher used the inductive approach through the official documents of the company and a personal interview with some of the company's officials. The study concluded several results, the most important of which is that lean manufacturing helps in eliminating all kinds of waste, improving quality, and increasing sales.

—The study of Abu Salimet al [52] aimed to identify the reality of the lean management in Jawwal from the point of view of its employees, and to indicate the availability of lean management tools (organization of the work site, continuous improvement, standard work, multi-function employees, Six Sigma) The study used the analytical descriptive method. The study was applied to Jawwal Company in Gaza Governorate - North Branch. The number of employees was (85) employees. The questionnaire was used as a tool for study. Comprehensive method and (75) questionnaire were recovery at a rate (96%). The study concluded with a number of results, the most important of which were the application of lean management dimensions at Jawwal, and the dimensions that received the least attention from the perspective of the employees of Jawwal (Six Sigma and Multifunctional Employees). There are also no differences between the opinions of employees on the availability of lean management dimensions in terms of (type, qualification, and years of service).

— Study of Dawood and Hashim [26] aimed this study to clarify the concept of green productivity and lean production and its goals and requirements or elements of application of the system in the course refinery, and the study relied on the descriptive analytical approach and a questionnaire was distributed to the heads of departments, divisions and units of the refinery to reach the views of the study sample in Keeping away the two major variables, green productivity and graceful production, which aims to reduce waste and loss in times and delete some unnecessary steps and activities in the production process. The study concluded several positive results by reducing the volume of solid and gas waste, which in turn It reduces the environmental impact and there is a big relationship between green productivity and graceful production.

— The study of Al Shobaki *et al.*, [10] aimed at identifying the extent of the technical colleges' commitment to the application of the lean management. The analytical descriptive method was used through a questionnaire randomly distributed to 289 of 1168 employees of the technical colleges in the Gaza Strip with return ratio of (79.2%) out of the sample study. The results of the study showed that the technical colleges achieved a high level of lean management with a relative weight of 76.69%. The results of the study showed that there is a high level of flexible management (loss reduction, cost reduction, service improvement, customer satisfaction, maximization of competitiveness and profitability) in technical colleges in Gaza Strip. The field of waste reduction came first and with a relative weight of 79.56% In the second place came the field (responding to customer requirements) and a relative weight (79.14%), in the third place came the field (cost reduction) and a relative weight (75.68%), in the fourth place came the field (maximizing competitiveness and profitability) and relative weight (74.59%), in the fifth and final place came the field of (service improvement) and relative weight (74.52%). The results confirmed the existence of statistically significant differences in the application of the flexible management dimensions between technical colleges. The results showed that there were no differences in the application of the lean management according to the levels of experience except after the reduction of costs, where there were differences from the point of view of those with low experience.

— The study of [53] aimed to identify the lean management and its impact on the achievement of creativity among the employees of Jawwal, and to indicate the availability of flexible management tools (organization of the work site, continuous improvement, standard work, multi-function employees, Six Sigma), and to determine their ability to achieve creativity in its different dimensions (problem solving and decision making, changeability, accept risk, encourage creativity). The researchers used the analytical descriptive method. The study was applied to the Jawwal Company in Gaza Governorate - the North Branch (85 employees). The questionnaire was used as a tool for study, and the comprehensive inventory method was used. (75) Questionnaires were recovered with a recovery rate of (96%). The study concluded with a number of results, the most important of which is the impact of the flexible management tools and the achievement of the elements of creativity through: (standard work, multi-function employees, and six sigma). There are also no statistical differences between the opinions of the sample of the study due to the graceful management and creativity in Jawwal Company in terms of (Gender, qualification and years of service).

— Study of Al-Hashlamoun [14] aimed at this study to demonstrate the effect of applying lean manufacturing foundations in competitive advantage strategies, and this study is descriptive and causal, where data was collected through the questionnaire that was built, and 152 questionnaires were distributed to 7 companies out of 14 companies registered with the Jordanian Federation of Pharmaceutical Producers, 122 questionnaires were returned, of which 101 were valid for analysis. The study concluded several results, the

most important of which is that there is a high application of lean manufacturing foundations and competitive advantage strategies in Jordanian pharmaceutical companies and there is a relationship between lean manufacturing pillars and competitive advantage, as there was a statistically significant effect of lean manufacturing foundations in each of the differentiation strategy.

— Study of Gabba and Bin Wareth [34] aimed to shed light on one of the most important methods of modern production management, which is the lean management method and a review of the various forms of waste facing the institution during the production process. The questionnaire tool has reached several results, the most important of which is that the institutions represented in the senior management are largely committed to providing all the necessary capabilities for the application of this method, but the prevailing culture in this study, especially the absence of a spirit of cooperation between management and employees, remains the major obstacle a What is the application of this management philosophy?

— Study of Abbas [1] that raised a set of negotiations is the extent to which there is a clear perception of the philosophy of lean manufacturing, its dimensions and its availability in the researched organization? What is the level of impact that lean manufacturing has in achieving and strengthening competitive advantages and then achieving the goals of the organization? A significant correlation relationship between exclusion of lean manufacturing and the exclusion of organized competitive advantage. This study aims to build a philosophical cognitive perception to spread awareness and awareness and direct attention towards it for the advancement of this organization, and highlight the role of lean industrialization that receives the required attention by specialists and to identify the reality and the possibility of applying its exclusion m Before the researched organization in order to help it find solutions to its problems the most important results of this study The organization's desire to adopt lean manufacturing as a successful business philosophy to elevate it and make it in the competition site, the results of statistical analyzes between the two variables of the study and their exclusion showed a direct and moral correlation. This leads to that the relationship between them is real, not random, which indicates complementarity to create an effective framework.

— Study of Agusand Hajinoor [7] aimed to examine the relationship between lean production and the quality of product performance in the performance of business organizations as a way to improve the industrial competitive advantage in Malaysia. Within the Malaysian lean production index, the study reached the lean production requirements represented in: reducing the preparation time, continuous improvement of operations, using the withdrawal system, production in small quantities. The study found that there is a positive impact of the quality of product performance in its dimensions (quality, performance, conformity, reliability, design quality, and reliability of the product) on the performance of Malaysian industrial organizations.

— Study of Angelis *et al.*, [21] aimed to know the role of employees commitment in providing an appropriate environment for the application of lean production, and the study was applied in the United Kingdom, and the

study community consisted of 300 factories for assembling equipment and machines. The questionnaire was used as a study tool, whereby the researcher collected 1391 questionnaire devoted to statistical analysis. The study concluded that the commitment of employees requires effective management in designing the transition to lean manufacturing in a manner compatible with making changes in the basics of human resources and training.

— Study of Forrester, *et al.*, [33], which aimed at this study to examine the relationship between adopting lean production with market share and finding value in companies operating in the agricultural machinery industry in Brazil, this study used the questionnaire as a tool to collect data where the study population consisted of 38 factories for the manufacture of agricultural machinery that appeared Through its strategic directions, it adopts lean production. Among the most prominent findings of the study is that the administration focuses its efforts on reducing waste only, while applying lean production requires efforts to develop a work system that encourages value creation, raising the level of employees' capabilities and securing the financial allocations necessary to effect implementation.

—Study of Taher [46] which focused the problem of the study on the use of modern systems in maintenance operations (comprehensive productive maintenance system) in order to obtain efficient and effective maintenance operations that have the ability to improve the performance of operations in the Iraqi Drilling Company to meet the challenges of competition and expand the area of production processes to the company. The corresponding study (personal, group) was used as a main tool for data collection, and the study also used the method of the hierarchical analysis process to analyze the data, and the study reached a number of conclusions, the most important of which is the presence of a very strong impact of the comprehensive productive maintenance system in improving the performance of operations as well as the arrangement of competitive dimensions (indicators Process performance measurement (varies with competition conditions).

—Study of Al-Dulaimi [13] aimed to address the impact of using lean manufacturing techniques in improving product quality aiming to uncover the relationship between lean production by adopting its tools which are (workplace organization, production on time, continuous improvement, value stream map) Comprehensive productive maintenance, standard work) and improving the quality of products in their dimensions (performance, reliability, conformity, durability, serviceability, aesthetic quality, perceived quality). The researched perception is clear about n Production or slim and keep quality products?, And the aim of the research to know the extent of adoption of the organization surveyed the concept of production Volant in improving the quality of products.

—Study of Al-Hasnawi [15] aimed to identify the impact of the lean production system on the dimensions of performance of operations, and this research provided a theoretical framework to highlight what the writers and researchers presented about the research variables as well as the analytical framework for the views of the selected sample of research within the research community included administrative leaders in The

laboratory and the sample size reached 100 people. The study concluded several results, the most important of which is the existence of a correlation between the research variables.

Comment on previous studies:

The previous studies dealt with the topics of the management of agility and creativity, and applied to the various sectors including: pharmaceutical companies, banks, universities, telecommunications companies, which provide mostly services to customers, and is consistent with the current research that the application on Industrial companies, which provides production services in economy sector, It is noted that there is a scarcity in the studies that dealt with the subject of Lean management, especially in Arabic, which gives special importance to the current research.

All the previous studies have used descriptive analytical methods, and different in the method used, some used the method of comprehensive survey, the other used the sample method, and others used the method of case study on some companies, and the current study agrees with the methodology used descriptive analytical approach as agreed in the tool, In terms of the sector to which it was applied, the dimensions studied in the study, and the period of time.

VIII. THEORETICAL FRAMEWORK

First: Lean Manufacturing:

Genesis of Lean Manufacturing:

The concept of lean manufacturing in Japan appeared in the Toyota Motor Company in the 1940s, because Japanese industrial companies faced a shortage of resources after the Second World War, which prompted them to search for a production system to face their deficit. This concept came as one of the solutions to face the scarcity of resources[6].

Both [2] are individuals who have a great role in developing this concept, when they increased Ford to learn the auto industry, and their focus was on how Ford's production success met the low and highly diversified demand that characterized it. Japanese market in that era [19].

The founders of Toyota were able to study and identify the strengths and weaknesses of the large production system adopted by the American company at that time, and the first core of a new alternative system to the traditional system emerged, known as the Toyota Production System. His first designs were initiated by Engineer Ohno, whose goal was to reduce waste on all purchases and production stages [42].

The Japanese prefer economics and reduce losses, and their interest in this concept increased after the publication of a book entitled (The Machine That Changed the World) and was presented by [48]. The term lean manufacturing was coined as a description of the emerging manufacturing model in Toyota and according to them; the term lean manufacturing is a system that uses fewer inputs to create the same output that would be achieved by using a traditional production system [17, 54].

Lean Manufacturing Concept:There are many concepts and names of programs and administrative applications in organizations that are determined by competition and the need to survive and grow innovation and creativity in all that will achieve them for continuity, growth and survival. These concepts include:

Total Quality Management, Obstacle Theory, Engineering, and Goal Management.

Among those concepts are those programs that Toyota Motor Manufacturing has adopted, with the aim of improving production processes and reducing losses from them, which have proven effective through the level of profitability and competitiveness, which is known as lean manufacturing.

The most important definitions of lean manufacturing were that the system of manufacturing and production is free from waste and unwanted outputs, which is often expressed in the term losses, and losses are classified into (excessive production, waiting, wasting time, unnecessary transport or unloading, improper treatments, increasing assets in Factory, unnecessary movement, un-invested creativity of employees [11,12,23,24,40,41] defined it as a group of integrated activities designed to accomplish and manufacture products in large quantities and with the least possible stock of raw materials and semi-manufactured materials and final products and be processed and moved to the other station within the process and quickly. It is based on the idea that confirms not to do production unless there is a need.

Lean Manufacturing Goals: The goals of lean manufacturing varied, but the researchers agreed with these goals, as follows:

1. **Quality Improvement:** To maintain competitiveness in the market today, the company must understand the needs of its customers and design specific operations to meet their expectations and requirements.
2. **Eliminate Impurities:** Impurities are any activity that consumes time, resources or space but does not add any value to the product or service.
3. **Reducing Time:** Reducing the time it takes to finish an activity from start to finish is one of the best ways to eliminate impurities and reduce costs.
4. **Reducing Total Costs:** To reduce costs, the company must produce only as per the customer's request. Overproduction increases the company's inventory costs due to the need for additional storage space.

Slim Manufacturing Dimensions: The dimensions of lean industrialization that researchers and writers addressed varied according to the sector that dealt with the study and through our review of these dimensions we find that the most dimensions are consistent with the study of the sector that applied the goals that researchers seek in this study, here are these dimensions detail:

- **Continuous Improvement:** The philosophy of continuous improvement is the most powerful guide for change in organizations if it wants to survive and grow, and this philosophy requires an initial commitment to make improvements and reduce differences and achieve customer satisfaction, as it requires commitment, participation and a sense of personal responsibility from those who participate in processes, as it also requires working with suppliers, and understanding the flow of operations to prevent bottlenecks and reduce wasted time and effort, and this reinforces one of the basic principles of total quality management, which is that all individuals in the organization of different levels and departments have a relationship with the

process of continuous improvement, and must be managing their knowledge and skills to improve operations, through careful coordination between the departments through which these processes go to achieve a mutual understanding of the internal and external customer needs. One of the important elements of any initiative for continuous improvement of operations is the selection of key processes that directly lead to customer benefit, The effective performance of the operations is strengthened, or the TQM approach focuses on identifying and improving the simple lot of operations rather than focusing on the little critical, and the TQM planners must build a clear selection criterion for the processes that are strongly related to the inner and outer customer satisfaction badges. One of the important ways to define a customer satisfaction index is to evaluate the feedback that assesses customer satisfaction [22].

- **Comprehensive Maintenance:** Also known as an innovative approach to maintenance to maximize equipment effectiveness, eliminate breakdowns and spread the concept of self-maintenance by the operator during the daily work of all the workforce of the company.
- **Production on Time:** It is a storage strategy that companies employ to increase efficiency and reduce costs by obtaining goods as required in the production process, thus reducing inventory costs. This method requires that the producers accurately forecast the demand. The inventory supply system represents a shift away from the old standby strategy, as the producers would bear large store costs in case of need to meet the high demand..

Lean Manufacturing Application Requirements: The adoption of the lean management method as an administrative philosophy in the organization requires the availability of a set of conditions and requirements that guarantee the success of this method and the achievement of its goals. Among the most important of these requirements we mention[34,40,41,43]:

- **Supporting Senior Management:** The success of the method depends on how well the senior management feels and wants to provide the capabilities and conditions necessary to implement this philosophy through the following points:
 - A. Total commitment to provide all material, human, financial and time capabilities for the successful implementation of the method.
 - B. Total acceptance of management to abandon classic methods of running production and moving towards the modern philosophy of lean management.
 - C. Changing the administration system in the institution from the bureaucratic system that prevails in most institutions in developing countries to a decentralized democratic system that gives freedom for initiative and creativity.
- **Cooperation Between Management And Employees:** Employee suggestions should receive the necessary support from the administration by providing all the necessary capabilities to make the change, and this is called participatory management where the manager consults the employees and discusses problems and come up with a collective solution to them as employees are

given new responsibilities to improve the organization's production processes, these actions allow for employees to divide their effort on the one hand in routine businesses accustomed to them, and on the other hand, non-routine tasks to think about how to improve the performance of the institution and solve production problems and eliminate waste.

- **Attention to Training In Kind and as:** Training is defined as an attempt to change the behavior of individuals by making them use different methods in performing work in a way that differs after training from what they were following before. Possible opportunities for loss and waste of resources, and this is by following a training policy based on objective grounds in all its aspects, characterized by the following:
 - A. The Foundation's training programs are in conformity with the content of the mechanisms used to eliminate waste, such as the D.E.M.S method or the Five-Year method.
 - B. Relying on multi-skill training in order to gain time and enable the executive employee to perform preventive or immediate maintenance operations without relying on the maintenance department, and enabling the employee on the production line to discover quality defects without relying on the analysis of the quality department.
 - C. Relying on allergic training courses for all employees without exception in order to explain the various forms of waste within the institution, how dangerous it is for the institution and how to deal with it.
- **Change In The Culture Of The Institution:** The success experienced by the lean management method in a private Toyota company is due mainly to the culture of the Japanese employee, his beliefs and his strong loyalty to his organization, so the conditions for the success of this method in developing countries, including the Arab ones, are based on the necessity of changing mentalities and mentalities, whether it is for employees or as for the official, he must be proactive and accept the initiative from any administrative level that would provide the institution with its resources, and the same applies to the simple employee who must be aware of the necessity of preserving the institution's resources and works to reduce as much as possible of the waste and waste on makes the continuity of his work associated with maintaining the continuity of the institution's resources.

Second - Improving the Production Process:

Improving the productivity of a facility is based on raising the efficiency of the work being performed. Hence, it can be said that the ideal successful enterprises have an efficient work environment, and that the elements of production in them are interconnected, and this is the human factor is the most important factor in the production process, without this element will not be available ability on the exploitation of raw materials, application of production processes to them, facility management, etc. In order for the human factor to improve and perform its work as fully as possible, it should provide comfort, job security for it, and be given a remuneration commensurate with the effort that it exerts, in addition to the importance of dealing with it,

with humanity and mercy, and shortening the distances between it and the employer, so all these measures help to raise the efficiency of the employee, thus improving productivity. Besides, in order for the productivity of the facility to rise, there must be a wise administration capable of exploiting resources, organizing the production process, and taking appropriate decisions, and if all the factors that help to reach a correct production process are available, efficient management is not available for the entire production process has failed, and wasted raw materials, and human endeavors in vain [50].

Characteristics of the Improvement Process:

To Improvement of Production, several characteristics are the most important [20]:

- The improvement process is a permanent and continuous process. Stability of productivity or achieving the goals set for productivity does not mean stopping development and improvement.
- The improvement process should not be merely ambitions or intentions, but rather should be in the form of specific programs that have their goals, temporal, financial and human elements.
- The process of improving productivity should be comprehensive for all departments and units within the facility and involving external parties, clients, suppliers and government agencies in the program.
- The means and methods of improving productivity are infinite. The phenomenon of change in productivity is a very complex phenomenon, due to many technical and human factors that are difficult to count.

Improvement of Production Levels:

To Improvement of Production, three levels are represented in the following [16,17]:

- **Scientific Level:** is represented in studies and scientific research that lead to new knowledge in various fields such as production processes and information technology.
- **Technical Level:** which reflects the adaptation and application of new knowledge
- **The Operational Level:** which aims to develop procedures for applying new technologies

Steps To Improve The Production Process:

There are six steps to Improvement of Production [20,27]:

- Setting productivity measures for all operations. Measurement is the first step in managing and controlling operations.
- Examining the system as a whole to make decisions and determine which processes are more critical.
- Developing methods to achieve Improvement of Productions through ideas submitted by employees, re-examining the way in which operations are carried out, and conducting a study of other companies to learn how to increase their productivity.
- Set reasonable goals for improvement.
- Management support and encouragement of Improvement of Production efforts, and taking into account incentives to reward employees for their contribution to Improvement of Production
- Improvement of Production metrics and make them popular.

Improvement of Production Technologies: There are six techniques for Improvement of Production as follows [18]:

1. **Technology:** The set of equipment, processes, number, and methods used to produce products and provide services which includes:
2. **Computer Aided Design (CAD):** It is the effective use of computer capabilities to design products and prepare their engineering documents.
3. **Computer Aided Manufacturing (CAM):** Using computer programs to design production processes, directing and controlling production equipment, controlling the flow of materials in a production batch, and operating machines automatically through a set of instructions. Machines can also be changed continuously when producing a small batch size.
 - Computer Integrated Manufacturing (CIM): The technology that combines computerized design and manufacturing technologies.
 - Employees: The human element is a sub-system that requires analysis of its components, motives and desires to be achieved from work, its behavior in terms of its loyalty to work, the degree of cooperation, love of work, and keenness on the tools it uses. Employees technology includes:
 - Material and moral incentives for individuals and groups
 - Promotion of employees
 - Job design, job expansion, job enrichment, job rotation.
 - Participation of employees in decision-making.
 - Quality rings.
 - Individual development.
4. **Materials:** It includes all the concrete units that are used in the production process such as raw materials, plastic, iron, and others. Material technology includes:
 - Material planning
 - Logistics Purchase (Supply)
 - Store and retrieve items
 - The supplier's choice and material quality measures
 - Cancellation of losses
5. **Process:** It is the addition of completion or conversion of inputs to outputs. The process technology includes:
 - Engineering the way it works
 - Work design assessment, and job safety
 - Human Factors Engineering
6. **Product:** The physical object that a customer touches from the company and it must fit their expectations. The product technology includes:
 - Value engineering and value analysis
 - Product announcement
 - Product standardization and simplification
 - Reliability engineering
 - Mix product
7. **Management:** Responsible for providing capital and labor and using it efficiently to increase productivity. Management technology includes:
 - Management style
 - Telecommunications
 - Work culture
 - Motivation

Productivity Factors

Several studies focused on productivity attempted to reach a specific framework that governs them with a view to increasing them, and the study concluded that productivity determinants can be grouped into three basic groups (Arab Forum for Human Resources Management, 2015):

1. **Direct Determinants:** Directly affect the relationship that governs the inputs of the production process to its outputs, in addition, a better distribution of resources can bring productivity to its maximum extent.
2. **Indirect Determinants:** invisibly affects the relationship that governs inputs to outputs.
3. **Strategic Determinants:** are the policies and laws that affect productivity directly or indirectly.

The division of determinants into three groups does not mean that they are separate from each other, but rather they have an overlapping effect. If, for example, technical development raises productivity, this development may be a result of government policies and laws that encourage scientific research, but as for competition, it provides an incentive an important and powerful engine for increasing productivity by institutions in an attempt to gain a new marketing share or maintain the status quo.

The relationship of dimensional manufacturing to improved productivity:

Through previous studies carried out by researchers on the topic of the study related to the exclusion of lean manufacturing and its relationship to promoting Improvement of Production, it can be said that these exclusion below show the nature of their relationship to improving productivity, which is as follows:

— **Continuous Improvement And Improvement Of Productivity:** As a result of developments that occur in the continuous business environment, continuous improvement has emerged as one of the techniques that helps to Improvement of Production from the beginning of the production stages to the end, since continuous improvement reduces the economic costs of the product - and the reference comparison method reduces the processes that are not making use of them, therefore, continuous improvement affects a positive and effective effect on improving the production process.

— **Comprehensive Maintenance And Improvement of Production:** Comprehensive maintenance is focused on preserving equipment and machinery from malfunctions and increasing its shelf life, as it aims to train individuals to do self-maintenance (themselves), · Establish a comfortable and safe work site that allows everyone to benefit from the maximum amount of information and skills available Acquired in the development work, that maintenance of equipment works to reduce costs by a large percentage, because it helps to reduce losses, whether from raw materials, semi-manufactured or final-made, and it also improves the level of occupational safety that in turn keeps the company employees from malfunction, and thus As the overall maintenance helps to Improvement of Production dramatically and positively.

— **Production On Time And Improvement of Production:** The specified production improves productivity by pulling materials through the customer's request for the product, and through quality as it reduces scrap and reduces sales, and through work

flexibility where the employee can do more than one job at the same time, Therefore, on-time production and improving the production process are linked by a strong positive relationship.

Methodology and Procedures:

Study Methods: It includes describing the method and procedures that the researchers followed in their research, defining the study population and its sample, using the study tool, in addition to describing the variables, methods, and statistical treatments used in analyzing the data [25].

Study Methodology: The researchers used the descriptive method as a method of study, due to its suitability and the nature of this study and its objectives, because the descriptive method studies the reality or phenomenon as it exists in reality and is interested in being accurately and expresses qualitative and quantitative expression, so the quantitative expression describes the phenomenon and clarifies its properties, either the quantitative expression gives us a numerical description that shows the amount or size of this phenomenon and the degree of its association with other different phenomena [8, 44, 45].

Study Population: The study population consists of the employees of the Aziza Poultry Factory, which number 140.

Study Sample: The researchers distributed 35 questionnaires to employees on the administrative supervisory positions in Aziza Poultry Factory, and one questionnaire was retrieved due to incomplete data, so that the number of valid questionnaires for statistical analysis became 34 questionnaires by 97%. A random intentional sample was taken.

Study tool: The researcher used the questionnaire as a tool to study it. The questionnaire included two parts:

The first section: Lean manufacturing techniques and contains three variables:

1. Continuous Improvement
2. Production on Time
3. Comprehensive Maintenance

Section Two: Improving Productive Operations the responses to these paragraphs were measured by a Likert pentatonic scale

IX. DATA ANALYSIS

After completing data collection through a questionnaire prepared through the research team for the purpose of collecting the data necessary to test the study model,

which was distributed to the targeted study sample among employees in supervisory tasks in Aziza Poultry Company- Tulkarem Governorate. In this chapter the data was analyzed and its results presented, in order to Verification or negation of the hypotheses presented in the proposed study model. In order to verify the denial or validation of the hypotheses, the current study will analyze the data using the Structural Equation (Modeling) methodology SEM using the Smart-PLS3 advanced statistical analysis program.

Structural Equation Modeling (SEM):The (Structural Equation Modeling) SEM method is one of the best modern methods that are used to test multivariate models, because it gives the researcher the ability to test the relationship between these variables at once while determining the suitability of the model for the data collected through a set of indicators called conformity quality indicators [12,30].

Accordingly, the Structural Equations Form (SEM) will be used to test the suitability of the proposed model, through the provided statistical analysis program Smart-PLS3, which is used to ensure the suitability of the model with the sample data used and that it actually measures what was developed for its measurement.

Rate Responses on the Study Tool

The way the questionnaire was distributed was in the personal approach of the study community in Aziza Poultry Company- Tulkarem, so that the questionnaire was distributed to the employees who hold supervisory positions in the company and they are 35 employees according to the personnel affairs data in the company, and they are in the following positions: the general manager, head of department or one of the company employees. A week after the distribution date, the company was consulted and questionnaires received. 35 questionnaires were distributed, and after the collection process, 35 questionnaires were obtained, 100%. During the data entry process, one questionnaire was excluded due to incomplete data, bringing the number of valid questionnaires to statistical analysis 34 to 97%.

Analysis of Sample Properties: Before starting the data analysis using the Smart-PLS3 program, the demographic results of this study were presented as the study tool includes many demographic characteristics, namely: gender, educational qualification, job position, experience, and the distribution was as follows:

Table 1: Results of the descriptive statistics analysis of the demographic characteristics of the study sample individuals.

Properties	Categories	Repetition	Percentage
Gender	Male	23	0.68
	Female	11	0.32
Qualification	Secondary and lower	0	0
	Diploma	5	0.15
	Bachelor	28	0.82
	Postgraduate	1	0.03
Job Position	Officer	30	0.88
	Head Of The Department	4	0.12
	Manager	0	0.00
Practical Experience	Less than 5 years	16	0.47
	5-10 years	16	0.47
	Over 10 years old	2	0.06

The Validity and Reliability of the Study Tool:The study tool was presented to a group of arbitrators in order to ensure the apparent sincerity of the

questionnaire, and then we made the proposed amendments from the arbitrators before distributing the questionnaire to the respondents.

With regard to the stability test to ensure the validity of the study tool as a data collection tool before analyzing

it, the Cronbach Alpha factor shown in Table 2 was used:

Table 2: Stability coefficients for the study tool hubs (Smart-pls3 research team preparation).

Variable	Cronbach's Coefficient Alpha
Continuous Improvement	0.914
Production on Time	0.906
Comprehensive Maintenance	0.880
Improvement of Production	0.896

It is noted in the previous table that all the alpha values for the dimensions of the study were greater than 0.70 and they are excellent values as recommended for economic and human studies according to [35], which means that the stability of the study tool is scientifically acceptable.

It is noted in the previous table that all the alpha values for the dimensions of the study were greater than 0.70 and they are excellent values as recommended for economic and human studies according to [35], which means that the stability of the study tool is scientifically acceptable.

Analyze and Display the Results of the Study Data Analysis

The analysis using the Smart-PLS advanced statistical analysis program is divided into two main parts:

- Measurement Model:** This is part of the structural equation model, which deals with study variables and their indicators as it determines the relationships between observed variables (indicators or questions) and unobserved (latent) variables, and it also describes the validity and consistency of observed variables. .
- Structural Model Analysis:** An internal model that explains the causal relationships that exist between study variables, as it clarifies the nature of the relationship between independent and dependent factors, as well as the ratio of impact and interpretation factor to each of the independent factors in the dependent factor. Through the results of the structural model, it is possible to clarify the results of the study hypotheses and the value of

relationships and indicate them (positive or negative).

Based on the basic stages of statistical analysis through the PLS3 program, data analysis will be carried out in two phases in order to first verify that the data collected has passed the criteria of the Measurement Model, and secondly, the structural model is evaluated in order to reach the results of the assumptions and achieve the goals of these studying.

Measurement Model

The Measurement Model analysis is divided into two main sections:

- Convergent validity
- Discriminant validity

One of the primary advantages of the PLS program is its ability to assess the structural validity of standards. Structural honesty refers to the degree to which it reflects the elements of the theoretical and conceptual structure scale that you are designed to measure. Structural validity of the scale is verified by testing the availability of both proximity and differential honesty of the same scale. Below are the test results for both types of honesty

1. Convergent validity

Convergent Validity indicates the degree of consistency of the elements used to measure the concept with each other. According to [36], it is estimated that convergence honesty is based on three criteria: (A) Individual Reliability - Factor Loading, (B) Reliability Scale - Composite Reliability. (CR), (C) Average Variance Extracted (AVE).

The following are the scientifically approved criteria for accepting the elements of convergence honesty:

Table 3: Criteria for accepting elements of convergent honesty.

Standards	Type
Internal consistency Factor loading	The saturation value of the Factor loading for all questions must be greater than 0.50, according to [36].
Composite Reliability (CR)	Compound CR values should be greater than 0.70 to reflect the internal consistency between indicators of the year, according to [36].
Average Variance Extracted (AVE)	The values of the explanatory variance (AVE) must be greater than 0.50 to reflect the success of all factor questions in its measurement, according to [36].

A. **Individual reliability- Factor Loading** :Below are the results of the analysis of the approximate

validity of the measures, starting with the saturation of the phrases Factor Loadings for all study factors.

Table 4: Results of the saturation of the questions for all dimensions of the study form.

Factor	Code	Item	Saturation Values
Continuous Improvement	Improvement 1	Factory management motivates employees towards development to provide the best products.	0.876

	Improvement2	Factory management encourages the application of new ideas.	0.808
	Improvement 3	Factory management evaluation of performance for employees to develop it.	0.877
	Improvement 4	The factory management has a mechanism to deal with complaints and suggestions submitted by employees.	0.783
	Improvement5	The factory management seeks to spread the culture of eliminating waste among employees.	0.881
	Improvement6	The company attaches importance to research and development efforts.	0.750
	Improvement7	The company eliminates production activities that do not add value to the product.	0.713
Production on Time	Production 1	The company provides its products according to the specified time.	0.830
	Production2	The company cuts all kinds of stock from raw materials.	0.756
	Production3	The company adopts the production scheduling system.	0.785
	Production4	The company has a comprehensive quality control system (from the receipt of raw materials to the delivery of the product to the customer's final form).	0.841
	Production5	The company is keen to manufacture limited quantities of products that customers demand on time	0.768
	Production6	The company selects reliable suppliers.	0.791
	Production7	The company is working to improve communication between employers and employees of the company.	0.817
Comprehensive Maintenance	Maintenance 1	The company uses a computerized system for the maintenance department.	Deleted
	Maintenance2	Ethical responsibility is a consistent approach for maintenance personnel.	0.806
	Maintenance3	The company provides equipment for the maintenance department.	0.783
	Maintenance4	The company trains employees in basic maintenance skills.	0.691
	Maintenance5	The company follows a comprehensive system of preventive maintenance on an ongoing basis.-	0.832
	Maintenance6	The company applies planned maintenance programs.	0.888
	Maintenance7	The company adopts the equipment safety improvement programs.	0.738
Improvement of Production	Productivity 1	Ethical responsibility is a consistent approach for maintenance personnel.	0.851
	Productivity2	The company has programs to improve the quality of the products it provides.	0.846
	Productivity3	The factory management is deeply committed to achieving high quality in the company's products	0.795
	Productivity4	The company's management focuses on adopting a clear, reliable quality strategy.	0.710

	Productivity5	The company depends on determining the quality of its products on the skills that its employees possess to realize the needs of the customers desires.	0.709
	Productivity6	The employees and employees of the company possess various high skills.	0.761
	Productivity7	The factory has great flexibility in responding to changes in customer needs and desires.	0.808
	Productivity8	Factory performance evaluation method reduces waste in time.	0.601
	Productivity9	The company's management seeks to adopt the best marketing strategies.	Deleted

According to the previous table, it is worth noting that the study tool included 30 questions and when performing the internal consistency test, some phrases (maintenance 1) were removed from a variable after (comprehensive maintenance) and the question (productivity 9) from the variable (Improvement of

Production) due to low coefficients. Their saturation is less than 0.50, which affects the stability of the factor, leaving 28 questions to measure the standard model.

B. Composite Reliability

As for the results of the Composite Reliability (CR) results are as shown in the following table:

Table 5: CR Complex Reliability Results.

Variable	Composite Reliability (CR)
Continuous Improvement	0.932
Production on Time	0.925
Comprehensive Maintenance	0.910
Improvement of Production	0.917

The results of the compound reliability scale CR indicate that all values are greater than 0.70 as in Table (5), and it can be said that the compound reliability scale has

been achieved, that is, the level of internal consistency between the study factors is acceptable.

C. Average Variance Extracted (AVE).

As for the results of the Average Variance Extracted (AVE), they are as in the following table:

Table 6: AVE results.

Variable	Average Variance Extracted (AVE)
Continuous Improvement	0.664
Production on Time	0.638
Comprehensive Maintenance	0.628
Improvement of Production	0.584

Results of Average Variance Extracted indicate, as in Table 6, that all values exceed the recommended standard. Any standard explanatory mean contrast was achieved.

2. Discriminant Validity

Discriminant Validity refers to the degree to which the variables are spaced from one another or in other words, each variable represents itself and does not represent other variables in order to make sure that the variables used are not repeated.

Fornell and Larcker [32] was used so that there is truth Differentiation of the study tool. The Fornell-Larcker criterion for each of the study variables should be the largest that can be compared with the rest of the variables, that is, the variable represents himself more than his representation of the rest of the variables, and therefore there is no overlap between the study variables and table (7) shows that there is no overlap Thus, the differential honesty of the study instrument is realized.

Table 7: Results of differential validity.

	Production On Time	Continuous Improvement	Comprehensive Maintenance	Improvement of Production
Production on Time	0.799			
Continuous Improvement	0.589	0.815		
Comprehensive Maintenance	0.425	0.613	0.792	
Improvement of Production	0.690	0.740	0.737	0.764

Based on the above, the results show the validity of the questions used to measure the variables through the analysis of the standard model Measurement Model Convergent validity and Discriminant validity, it is

possible to start analyzing the structural model, which will be discussed in the next section.

Structural Model Analysis:

After accepting the results of the convergent and differential honesty measures of the standard model, the next step is to evaluate the results of the structural model.

This involves studying the predictive capabilities of the model and the relationships between study variables. A set of criteria has been tested and should be used to evaluate the structural model. The basic criteria for testing the structural model include the following:

- A. Interpretation coefficient R^2 of the internal variables
- B. Effect size f^2 of the external variables Effect size
- C. Hypotheses testing.

The following table shows the recommended values for accepting the structural model:

Table 8: Structural Model Evaluation Criteria.

Standards	The Description
Coefficient of interpretation	If the value R^2 is between 0.02 - 0.12, it is average if the value is between 0.12 - 0.25, and it is large if the value R^2 is between 0.25 - 1.
Effect Size f^2	According to Hair, Ringle, and Sarstedt [36], the value of the f^2 effect size is small if f^2 value between 0.02 - 0.1, and it is average if the value of f^2 between 0.15 - 0.35, and is large if f^2 value greater than 0.35.
Check path parameter using Boot Strapping	The path factor should be estimated in terms of size, suitability, and value usually used as follows: <ul style="list-style-type: none"> - At the level of significance 10% it is 1.65 - At the 5% level of significance it is equal to 1.96 - The significance level 1% is 2.59 according to [36]

A. Interpretation Coefficient R^2 of Internal Variables: Depending on the standard model in Error! Previously, Table 9 below shows the results of the interpretation factor R^2 as the result showed that the dependent variable (productivity improvement) was explained by 79% by independent factors (continuous improvement, time production, comprehensive maintenance). This means that 21% of the remainder of the interpretation rate for other factors was not studied in the current study model. According to the established values of the interpretation factor R^2 79% is a high interpretation rate.

B. Effect Size f^2 For External Variables Regarding the magnitude of the impact values f^2 . The following table (10) shows the results of the effect size f^2 which in turn explains the ability of each independent variable (separately) to interpret the dependent variable. The results indicate that the magnitude of the effect of a variable (continuous improvement) in the dependent

variable (productivity improvement) is a form of 0.336, which in turn is considered a major impact according to the values approved in Table No. (8). In addition, the results indicate that the magnitude of the effect of a variable (production at the time) in the dependent variable (productivity improvement) was 0.290, which in turn was considered an average effect. Either with respect to the size of the influence of the independent employee (comprehensive maintenance) on the dependent variable (productivity improvement), a form of 0.405 was considered, which in turn is considered a major impact.

C. Hypotheses Test After confirming that all of the coefficients are interpreted R^2 and the magnitude of the effect size f^2 , the results of the three hypotheses have been tested, and Table (11) shows the results of the study hypotheses.

Table 9: Interpretation coefficient results R^2 .

Variable	R^2	Result
Improvement of Production	0.788	High

Table 10: Impact size results f^2 .

Variable	Effect Size f^2	Result
Continuous Improvement	0.336	Small effect
Production on Time	0.290	Small effect
Comprehensive Maintenance	0.405	Small effect

Table 11: Results of the hypotheses.

S.N.	Hypotheses	Link Value	T-Value	P Values
1.	Continuous Improvement -> Improvement of Production	0.380	2.556	0.011
2.	Production at a time -> Improvement of Production	0.308	2.495	0.013
3.	Comprehensive maintenance -> Improvement of Production	0.373	2.731	0.007

Discuss the results of the hypotheses

1. **H1:** There is a statistically significant relationship at the level of significance ($\alpha \leq 0.05$) between after continuous improvement and after improvement of productivity.
The results of the analysis of the structural model show that there is a positive and significant correlation between the dimension of continuous improvement and the dimension of Improvement of Production, where the value of correlation reached (0.380) at the level of significance (0.05), which means that when the factor of (continuous improvement) is enhanced by one degree, it is improved (Improvement of Production) By 38%. From the follow-up of the values (t-value), we notice the significance of this relationship, where the value of (t) was greater than 1.96, and this value reflects the acceptance of the first hypothesis H1.
2. **H2:** There is a statistically significant relationship at the level of significance ($\alpha \leq 0.05$) between after production on time and after improving productivity.
The results of the analysis of the structural model show that there is a positive and significant correlation between after production at the appointed time and after improving productivity, where the value of correlation reached (0.308) at the level of significance (0.05), which means that when the factor of (production at time) is enhanced by one degree, it is improved (Improve your productivity) by 31%. From the follow-up of the values (t-value), we notice the significance of this relationship, where the value of (t) was greater than 1.96, and this value expresses acceptance of the second hypothesis H2.
3. **H3:** There is a statistically significant relationship at the significance level ($\alpha \leq 0.05$) between after comprehensive maintenance and after Improvement of Production.
The results of the analysis of the structural model show that there is a positive and significant correlation between after comprehensive maintenance and after improving productivity, where the value of correlation reached (0.373) at the level of significance (0.05), which means that when strengthening the factor (comprehensive maintenance) with one degree is improved (improvement Productivity) increased by 37%. From the follow-up of the values (t-value), we notice the significance of this relationship, where the value of (t) was greater than 1.96, and this value expresses the acceptance of the third hypothesis H3.

X. RESULTS

The hypotheses demonstrated the following results:

- There was a positive correlation relationship between the lean manufacturing dimensions combined and the improvement of productivity at the plant level under discussion, and this was indicated by the results of the statistical analysis. This result agree with [9, 51,52,53].
- There was a positive correlation relationship between the dimensions of lean manufacturing individually and improving productivity and this was indicated by the results of statistical analysis, as

after continuous improvement ranked first among the dimensions in terms of the strength of correlation with improving productivity. This result agree with [7,14,51].

- There has been a significant effect of aggregate industrialization dimensions in improving productivity, and this clearly indicates that organizations that seek to implement these dimensions well and continuously will certainly have the ability to achieve Improvement of Production. This result agree with [1,23,26,46].

XI .RECOMMENDATIONS

In light of the results, the study recommends:

- Urging the corporate management to adopt the good and sound application of the lean manufacturing philosophy and work to ensure the success of this application because of its great impact in reducing costs and achieving Improvement of Production.
- Conducting special training sessions for managers and employees in industrial companies on how to implement the lean manufacturing system
- Paying enough attention to achieve integration between all pillars of lean manufacturing because one complements the other in order to achieve a direct impact in achieving the advantage, improving productivity.
- Increase cooperation between companies and the teaching staff in universities with specialization in the field of modern manufacturing systems in order to benefit from their expertise.
- Carrying out other studies on other sectors to know the extent of applying the pillars of lean manufacturing and its impact on improving productivity.
- Encouraging researchers to conduct test studies aimed at determining the extent of application of manufacturing foundations in the various companies operating in the industrial companies sector in order to Improvement of Production and thus increase competitiveness and raise the efficiency of this sector.

REFERENCES

- [1] Abbas, T. (2015). Dimensions of Lean Manufacturing and its Impact on Achieving the Competitive Advantage of the Industrial Organization. An Exploratory Study in Al-Diwaniyah Textile Lab.
- [2] Abdalmenem, S. A., et al. (2019). "Increasing the Efficiency of Palestinian University Performance through the Implementation of E-Learning Strategies." International Journal of Academic Management Science Research (IJAMSR) 3(7): 15-28.
- [3] Abdalmenem, S. A., et al. (2019). "Relationship between e-Learning Strategies and Educational Performance Efficiency in Universities from Senior Management Point of View." International Journal of Academic Information Systems Research (IJAIRS) 3(6): 1-7.
- [4] Abu Naser, S. S., et al. (2016). "Promoting Knowledge Management Components in the Palestinian Higher Education Institutions-A Comparative Study."

International Letters of Social and Humanistic Sciences 73: 42-53.

[5] Abu Naser, S. S., et al. (2017). Technical Education and its Role in Promoting Entrepreneurship in the Gaza Strip. Second Scientific Conference on Sustainability and enhancing the creative environment of the technical sector Palestine Technical College - Deir Al Balah 6-7 December 2017.

[6] Abdullah, F. (2003). Lean Manufacturing tools & Techniques in the process industry with focus on steel, school of engineering, university of Pittsburg .

[7] Agus, A., & Hajinoor, M.S. (2012). Lean production supply chain- management as driver towards enhancing product quality and business performance: Case study of manufacturing companies in Malaysia International Journal of Quality & Reliability Management, 29 (1), 92-99.

[8] Ahmad et al., (2020). The Reality of Applying Recruitment Criteria for Coastal Municipalities Water Utility Company, International Journal of Academic Information Systems Research (IJASIR), 4(3): 31-52

[9] Al Shobaki, M. J., & Abu Naser, S. S. (2017). "The Role of the Practice of Excellence Strategies in Education to Achieve Sustainable Competitive Advantage to Institutions of Higher Education-Faculty of Engineering and Information Technology at Al-Azhar University in Gaza a Model." International Journal of Digital Publication Technology 1(2): 135-157.

[10] Al Shobaki, M. J., et al. (2018). "The Extent to Which Technical Colleges Are Committed To Applying Lean Management." International Journal of Engineering and Information Systems (IJEAIS) 2(1): 23-42.

[11] Alayoubi et al., (2020). "Requirements for Applying the Strategic Entrepreneurship as an Entry Point to Enhance Technical Innovation: Case Study - Palestine Technical College- Deir al-Balah", International Journal of Business and Management Invention (IJBMI), 9(3): 1-17

[12] Alayoubi et al., (2020). "Strategic Leadership Practices and their Relationship to Improving the Quality of Educational Service in Palestinian Universities", International Journal of Business Marketing and Management (IJBMM), 5 (3): 11-26.

[13] Al-Dulaimi, A. (2014). The Impact of Using Lean Manufacturing Techniques in Improving Product Quality: An Exploratory Study at the General Organization for Automotive Industry Alexandria, Karbala University / College of Business Economics

[14] Al-Hashlamoun, Y. (2017). approved the application of the pillars of lean manufacturing in competitive advantage strategies - Jordanian pharmaceutical companies, Middle East University

[15] Al-Hasnawi, J. (2013). The Impact of the Lean Production System on Operations Performance - International Cement Company (Kufa Cement Factory), Al-Qadisiyah Journal of Administrative Sciences, Issue 4, Iraq

[16] Al-Rubaie, M. (2018). A study titled applying some lean manufacturing techniques to reduce costs and waste and improve the performance of production processes, at Ur Electrical Industries Company, Muthanna University.

[17] Alshaer, I. M. A., et al. (2017). "Governance of Public Universities and Their Role in Promoting

Partnership with Non-Governmental Institutions." International Journal of Engineering and Information Systems (IJEAIS) 1(9): 214-238.

[18] Al-Shammari, Z. (2010). Evaluation of Modern Technologies to Improve Production, Al-Mustansiriya University, Iraq

[19] Alves, A., CarvalH., & Souse R. (2012), Lean production as promoter of thinkers to achieve companies agility, learning organization, 3(19), 219-237.

[20] Amin, S. (2017). Production and Operations Management, Middle East University.

[21] Angelis, J., Conti, R., Cooper, C., & Gill, C. (2011). Building a high-commitment lean culture, Journal of Manufacturing Technology Management, 22(5), 569-586.

[22] Arqawi, S. M., et al. (2020). "Clients Satisfaction as a Mediating Variable between Brand Dimensions and Enhancing Loyalty in Commercial Banks Operating in Palestine". Technology Reports of Kansai University 62(02): 35- 54.

[23] Badran, L. (2010). The Philosophy of Lean Manufacturing in Industrial and Service Organizations, Damascus University, Syria.

[24] CHASE, R., & Davis M. (2004). Fundamentals of operations management (4th ed.) mcgraw-hill, irwininc, new jersey, USA.

[25] Cohen, J. (1988). Statistical Power Analysis for the Behavioral Sciences. 2nd edn. Hillsdale, New Jersey: L. In (2nd edn ed.). New Jersey: Lawrence Erlbaum Associates.

[26] Dawood, F. & Hashim, A. (2018). Lean Production Strategy According to Green Productivity Standards, Study at Al-Dora Refinery, University of Baghdad

[27] El Talla, S. A., et al. (2017). The Creative Environment and Its Relationship to the Lean Management of Technical Colleges Operating in Gaza Strip. Second Scientific Conference on Sustainability and enhancing the creative environment of the technical sector Palestine Technical College - Deir Al Balah 6-7 December 2017.

[28] El Talla, S. A., et al. (2018). "The Availability of the Focus Standards on Human Resources and Processes as a Potential for Excellence in Palestinian Universities According to the European Model." International Journal of Academic Management Science Research (IJAMSR) 2(11): 58-69.

[29] El-Hadrawi, H. (2013). Leadership as an entry point for contemporary business organizations in light of adopting the concept of intellectual capital. A field study at Baghdad Teaching Hospital. Al-Ghari Journal of Economic and Administrative Sciences, 9 (27), 85-128.

[30] FarajAllah, A. M., et al. (2018). "The Impact of Technological and Human Requirements for Re-Engineering Processes in Improving Productivity." International Journal of Academic Information Systems Research (IJASIR) 2(9): 29-38.

[31] Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. Journal of marketing research, 18(1), 39-50 .

[32] Forrester, P., Shimizu, U.K., Meier, H.S., Arturo, J., Reyes, G., & Basso, L.S. (2010). Lean production, market share and value creation in the agricultural machinery sector in Brazil, Journal of Manufacturing Technology Management, 21(7), 853-871 ;..

- [33] Gabba, A., Bin W., & Abdel R. (2016). The Role of Institutions in Applying the Lean Management Method - A Field Study on Algerian Pharmaceutical Institutions, University of BajiMokhtar Annaba, Algeria.
- [34] George, D. (2003). SPSS for windows step by step: A simple study guide and reference, 17.0 update, 10/e: Pearson Education India.
- [35] Hair, J., Hult, G. T., Ringle, C., & Sarstedt, M. (2016). A primer on partial least squares structural equation modeling (PLS-SEM): Sage Publications.
- [36] Hair, J. F., Ringle, C. M., & Sarstedt, M. (2013). Editorial-partial least squares structural equation modeling: Rigorous applications, better results and higher acceptance. *Long Range Planning*, 46(1-2), 1-12 .
- [37] Hair, J., Hult, G., Tomas, M., Ringle, C., & Sarstedt, M. (2013). A primer on partial least squares structural equation modeling (PLS-SEM): Sage Publications.
- [38] Hamdan et al., (2020). Creative Behavior in Palestinian NGOs between Reality and Expectations, *International Journal of Academic Multidisciplinary Research (IJAMR)*, 4(3): 91-107
- [39] Keshta et al., (2020). Strategic Creativity in Islamic Banks in Palestine between Reality and Implementation, *International Journal of Academic Accounting, Finance & Management Research (IJAAFMR)*, 4(3): 79-98
- [40] Keshta et al., (2020). The Perceived Organizational Reputation in Islamic Banks, *International Journal of Academic Accounting, Finance & Management Research (IJAAFMR)*, 4(3): 113-133
- [41] Nicholas J & Soni A. (2006) *The Portal to lean production , principles and practices for doing more with less , bocaraton, Taylor &Franci group .*
- [42] Owda, M. O., et al. (2019). "Personal Variables and Their Impact on Promoting Job Creation in Gaza Strip through Business Incubators." *International Journal of Academic Accounting, Finance and Management Research (IJAAFMR)* 3(8): 65-77.
- [43] Shahada et al., (2020). Reality of Improving Performance of Business Incubators, *International Journal of Academic Management Science Research (IJAMSR)*, 4(3): 34-51
- [44] Shahada et al., (2020). The Reality of Using the Balanced Scorecard in Business Incubators, *International Journal of Engineering and Information Systems (IJEAIS)*, 4(3): 67-95
- [45] Taher, R. (2014). The Role of Comprehensive Productive Maintenance in Improving Process Performance Using the Hierarchical Analysis Process Method: A Field Study at the Iraqi Drilling Company - University of Basra, Volume VI, Twelfth Issue
- [46] Tinoca J. (2004), implementation of lean manufacturing, university of Wisconsin- stunt Menomonie , united states .
- [47] Womack. P., & Jones D.T, (1990). *The machine that changed the world*, Harper perennial, Network.
- [48] <https://trading-secrets.guru/>
- [49] <https://mawdoo3.com/>
- [50] Hamdan, M. K., et al. (2020). "The Reality of Applying Strategic Agility in Palestinian NGOs." *International Journal of Academic Multidisciplinary Research (IJAMR)* 4(4):76-103.
- [51] Abu Salim, S. S., et al. (2018). "The Dimensions of the Lean Management of Jawwal between Theory and Practice." *International Journal of Academic Management Science Research (IJAMSR)* 2(10): 52-65.
- [52] Abu Salim, S. S., et al. (2018). "The Role of the Lean Management in Promoting the Creativity of Jawwal from the Point of View of Its Employees." *International Journal of Academic Information Systems Research (IJASIR)* 2(11): 15-33.
- [53] Rajeev C., Pushpinder K., Neeraj N., & Vinod D. (2012). An Empirical Study on Role of Lean Manufacturing in Manufacturing Industry. *International Journal on Emerging Technologies*. 3(1): 185-192.

How to cite this article: Mady, S. A., Arqawi, S. M., Al-Shobaki, M. J. and Abu-Naser, S. S. (2020). Lean Manufacturing Dimensions and Its Relationship in Promoting the Improvement of Production Processes in Industrial Companies. *International Journal on Emerging Technologies*, 11(3): 881–896.