

# System Effect Production Graceful on Organizational Effectiveness in Factor Iraqi Cement Industry for the Central Region

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DOI: 10.37648/ijps.v17i01.009

<sup>1</sup>Received: 24 Jan 2024; Accepted: 10 Mar 2024; Published: 13 Mar 2024

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## ABSTRACT

The study is based on identifying the effect of the first variable, which is the lean production system, on the second variable, organizational effectiveness, in the Iraqi cement industry factories in the central region. The descriptive analytical approach was relied upon, and the questionnaire was designed and distributed to members of the sample consisting of working managers, directors of departments and units, their deputies and assistants, department heads, and employees of workers in each department of the Iraqi cement industry organizations. These departments include both the sales department and the purchasing department. And the Finance Department. The study reached a number of results, the most important of which is the presence of a statistically significant impact of a lean production system on organizational effectiveness in Iraqi cement industry organizations. The study recommended increasing the activation and application of the production scheduling system in the factories subject of the study and adopting methods and procedures aimed at increasing the attraction of skilled workers, and working To follow up on production conditions and developments through conducting further studies and research.

**Keywords:** *lean production system; organizational effectiveness*

## INTRODUCTION

In our contemporary world, organizations face many challenges and rapid and successive developments in various fields, especially in the fields of business and economics, which has led to them seeking to improve their production capabilities to be able to face these challenges and quickly adapt to these changes. Therefore, it has become necessary for these organizations to pay attention to modern production systems, specifically the lean production system, and apply it in all their activities and operations, to achieve outstanding performance. These developments reflect many challenges to the work. To meet the challenges, it must increase its ability to retain customers and grow and expand its market shares by improving its organizational effectiveness. These developments have also contributed to bringing about many changes in the contemporary business environment, and the lean production system is considered an inevitable necessity to confront these challenges, as it is a system that focuses on reshaping production systems, by simplifying operations and maximizing the added value of each of the organization's activities, whether Service or productivity, in terms of focusing on eliminating forms of waste, losses and bottlenecks on the one hand, and continuous improvement of operations on the other hand, which leads to reducing costs and providing desired customer requests accurately and on time without waste or delay.

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<sup>1</sup>How to cite the article: Al-Janaby M.A.K.A. (March 2024); System Effect Production Graceful on Organizational Effectiveness in Factor Iraqi Cement Industry for the Central Region; *International Journal of Professional Studies*; Jan-Jun 2024, Vol 17, 93-107; DOI: <http://doi.org/10.37648/ijps.v17i01.009>

### ***The importance of the study***

The importance of the study is demonstrated by the study population (Iraqi cement industry organizations), which is considered one of the vital and influential industries that contribute to the employment of many workers. Given the manufacturing operations carried out by these organizations and the provision of various products to customers with high quality and low costs, this has increased. It is necessary to pay attention to modern production systems, especially the lean production system, and to ensure its application in these organizations. The importance of the study also stems from its treatment of the topic of organizational effectiveness, which is one of the modern topics in the field of administrative sciences, which contributes significantly to increasing the profits of organizations and obtaining larger market shares, enabling them to outperform their competitors, which leads to increased awareness of senior management in that field. Organizations recognize the importance of the role they play, to achieve outstanding organizational effectiveness and achieve their goals.

### ***Objectives of the study***

The study aims to identify the impact of applying the lean production system on organizational effectiveness in Iraqi cement industry organizations. It also aims to achieve the following sub-objectives:

- Identifying the dimensions of the lean production system (continuous improvement, comprehensive production maintenance, on-time production, preparation/rapid change) of Iraqi cement industry organizations.
- Identifying the impact of applying the lean production system in its dimensions (continuous improvement, comprehensive productive maintenance, on-time production, preparation/rapid change) on organizational effectiveness in its dimensions (job satisfaction, productivity, quality of outputs, organizational adaptation) in Iraqi cement industry organizations.
- Identifying the extent to which organizational effectiveness is applied in its dimensions (job satisfaction, productivity, quality of outputs, organizational adaptation) in Iraqi cement industry organizations.

### ***Study problem***

Organizational effectiveness is one of the important indicators that indicate the efficiency and effectiveness of factories, especially with regard to customers and their level of satisfaction. It has been shown, through observation, follow-up, and conducting interviews with experts and specialists, that there is a problem in organizational effectiveness in the Iraqi cement industry organizations to continue working efficiently and effectively. Therefore, the availability of a production system Agile in these organizations helps enhance organizational effectiveness. Hence, the need emerged to study lean production in its dimensions (continuous improvement, comprehensive productive maintenance, on-time production, preparation/rapid change), and to demonstrate the impact it has on achieving organizational effectiveness (job satisfaction, Productivity, quality of outputs, organizational adaptation) in Iraqi cement industry organizations.

### ***Study questions***

Based on the above, the problem of the study is represented by its following main question: What is the impact of the lean production system on organizational effectiveness: in Iraqi cement industry organizations?

From this question, the following sub-questions emerge:

- 1- What is the relative importance of lean production in its dimensions (continuous improvement, comprehensive productive maintenance, on-time production, preparation/rapid change) in Iraqi cement industry organizations?
- 2- What is the relative importance of organizational effectiveness in its dimensions (job satisfaction, productivity, quality of outputs, organizational adaptation) in Iraqi cement industry organizations?
- 3- What is the impact of applying lean production in its dimensions (continuous improvement, comprehensive productive maintenance, on-time production, preparation/rapid change) on the organizational effectiveness in its dimensions (job satisfaction, productivity, quality of outputs, organizational adaptation) of Iraqi cement industry organizations?

**Study hypotheses**

To achieve the objectives of the study in identifying the impact of lean production on organizational effectiveness in Iraqi cement industry organizations, the following hypotheses were formulated:

The first main hypothesis: Ho1: There is no statistically significant effect at a significant level ( $P \geq 0.05$ ) of the lean production system in its dimensions (continuous improvement, comprehensive productive maintenance, on-time production, preparation/rapid change) on organizational effectiveness in its combined dimensions (job satisfaction), productivity, quality of outputs, organizational adaptation) in Iraqi cement industry organizations.

The following sub-hypotheses emerge from it:

Ho1.1: There is no statistically significant effect at a significant level ( $P \geq 0.05$ ) of continuous improvement on organizational effectiveness in all its dimensions combined in the Iraqi cement industry factories.

- o 2. Ho1: There is no statistically significant effect at a significant level ( $P \geq 0.05$ ) of comprehensive production maintenance on organizational effectiveness with its combined dimensions in Iraqi cement industry factories.
- o 3. Ho1: There is no statistically significant effect on d Significance level ( $P \geq 0.05$ ) for on-time production on organizational effectiveness with its combined dimensions in Iraqi cement industry factories.
- o 4. Ho1: There is no statistically significant effect at a significant level ( $P \geq 0.05$ ) of preparation/quick change on organizational effectiveness with its combined dimensions in the Iraqi cement industry factories.

**Procedural definitions**

	<b>Dimensions</b>	<b>Concept</b>
Wael Abdel Fattah and others, 2020: 14)	Lean production is defined as: “A production strategy that aims to flow the production process with complete flexibility while eliminating all forms of waste and waste during the production process. Without adopting this strategy, the organization becomes unable to stand in the face of intense competition.”	Production Graceful
Cameron, K. S., 1981:25	It is based on the principle of congruence or symmetry, meaning that effectiveness is achieved through the degree of congruence between organizational goals and the results obtained, that is the comparison between the planned goals and the achieved results. Another view also depends on subjective factors by achieving the minimum level of satisfaction with the desires of the various parties related to the organization.	Organizational effectiveness

**PREVIOUS STUDIES*****1- Study by Abbas, 2016 entitled: “Dimensions of Lean Manufacturing and their Impact on Achieving Advantage”***

The study aimed to build a cognitive and philosophical perception of lean manufacturing, direct attention toward it, and identify the reality and possibility of applying its dimensions by the organization under study in order to help solve its problems. The questionnaire form was mainly adopted for collecting data and information related to the practical aspect. Statistical methods were used to process the data. The study came out with a set of conclusions and recommendations, the most important of which is the necessity of ensuring the dimensions of lean manufacturing represented by the value stream map, continuous improvement, organization of the workplace, and rapid preparation/change in the Diwanayah textile factory, as they play a role in achieving competitive advantages represented by cost, quality, delivery time, and flexibility.

***2- Al-Hashlamoun study, 2017 entitled: “The impact of applying the principles of lean manufacturing on competitive advantage strategies in Jordanian pharmaceutical manufacturing plants”***

This study sought to demonstrate the impact of applying lean manufacturing principles on competitive advantage strategies in pharmaceutical manufacturing laboratories. This study is considered descriptive and causal by preparing a survey list that was distributed to seven laboratories out of fourteen companies registered in the Jordanian Federation of Pharmaceutical Manufacturers, and then statistical methods were used. The results showed that there is an impact of the lean manufacturing pillars on competitive advantage strategies with the exception of cellular manufacturing. This study recommended that Jordanian pharmaceutical industry laboratories consider the lean manufacturing pillars together because they affect each other.

***3- Dendis study, 2018 entitled: “Challenges of applying lean manufacturing principles in small and medium-sized factories in Palestine”***

The study aimed to identify the most important challenges facing owners of small and medium-sized factories in the West Bank when applying the principles of lean manufacturing. The descriptive approach was used. As for the study sample, a comprehensive survey method was used for the study community. The most important findings reached by the study are challenges related to workers and educational matters. And cultural obstacles, in addition to administrative, organizational and financial obstacles, and finally challenges related to the nature of applying lean manufacturing

***4- Study (Hanan Saber Jabr 2021), entitled: “Using Lean Manufacturing Tools to reduce waste and loss in the production process. A case study in a water bottling production plant.”***

The problem of the study was that there are many problems that accompany the application of traditional accounting, and the most important of these are The problems of loss and wastage of time, resources, and process performance. It also centered on the role of lean manufacturing tools in reducing waste and loss in the production process. The study aimed to identify lean manufacturing in terms of the concept, goals, and steps of its application, and determine the areas of its use, as well as highlighting the important role that lean manufacturing plays. In reducing waste and loss and the production process, study concluded that applying the principles of lean manufacturing leads to reducing waste and loss in production processes, and also leads to the production of products that meet the market need and that the customer does not want to pay a price for activities that do not add value.

***5- A study (Al-Mahdi 2002) entitled “The relationship of situational factors and the matrix structure and their impact on achieving organizational effectiveness.”***

The study was applied at the university hospital/college of medicine, explaining the most important approaches and models of organization effectiveness and defining the dimensions, indicators, and approved measures, in addition to identifying the most important situational factors. In the matrix structure and the effectiveness of the organization by determining the impact of the most important of these factors on the matrix structure, and determining the impact of the matrix structure on organizational effectiveness. The study sample consisted of 40 department directors, a division official, and a unit official who were elected randomly. The study concluded that there was a positive relationship and impact between its variables.

**6- Study (Al-Ajili and Ahmed) 2019 entitled “The Role of Strategic Alliances and Human Resources in Enhancing Organizational Effectiveness.”**

This study sought to find the role of strategic alliances in achieving organizational effectiveness and to measure the extent of the impact of strategic alliances on organizational effectiveness. Organizational effectiveness in private colleges was highlighted as one of the ways through which high quality and efficiency are achieved and through which an effective model is also built. Strategic alliances have a significant and positive impact on organizational effectiveness. The most important finding of this study is that organizational effectiveness contributes to the progress and advancement of the organization or projects toward achieving its goals.

**LEAN PRODUCTION CONCEPT**

Lean production was started in Japan by Toyota, which saved the Japanese automobile industry during World War II. (Al-Najjar and Jawad, 2012: 28). Japanese industrial plants, especially after World War II, faced a shortage of resources, which prompted them to search for production systems through which they could meet this deficit. This concept came as one of the solutions or ways that can be relied upon to confront the state of scarcity of resources. Both Eiji Toyoda and (Taich Ohno) is one of the individuals who played a major role in developing this concept (Abdullah, 2003: 76). Many researchers and writers have defined lean production, and we present some of this definition, where it is defined as: “A production strategy that aims to flow the production process with all flexibility, with Eliminating all forms of waste and losses during the production process, and without adopting this strategy, the organization becomes unable to stand in the face of intense competition.” (Wael Abdel Fattah et al., 2020: 14) Heizer also defines it as: “Lean production begins from the outside by focusing on the customer and understanding his needs, which include inputs and feedback, and that the means of lean operations are what distinguish the customer’s value through the activities required in the production process.” And then work to completely improve the process according to the customer’s perspective” (Khawla Radi, 2011: 229). As for Chase, he defines: “Lean manufacturing is a set of integrated activities designed to complete and manufacture products in large quantities and with the least possible stock of raw materials and materials.” “Semi-manufactured and finished products, as the parts and components arrive at the work station when they are needed, and are processed and moved to the other station within the work quickly” (Yasmine Hatem, 2017: 12), and thus it is based on the idea that emphasizes not undertaking production unless it is There is a need, and the researchers can define lean production as an integrated work system that includes all stages of the production process, with the aim of reducing waste, surplus production, and defective products, and reducing waiting times and losses that result from transporting goods, defective products, and unwanted movement of workers, at all stages, which in turn does not It brings added value to the product. Paying attention to the creativity and skills of workers through scientific and practical techniques that rely on agility and flexibility in production, which enables production on time, preparation, rapid change, and continuous search for the best ways to continuously improve the production process.

**Lean production goals**

Swartwood points out that the lean production system focuses on reducing wasted time and increasing the speed of operations, and its goal is to remove all process steps that do not add value. The lean system is considered a good way to help arrange work areas and spaces, reduce work in progress, and accelerate the flow of materials during the manufacturing process. Completely, he adds, it achieves lower production costs, high productivity, greater flexibility, and quick response time to the customer.

The application of the lean production system allows dealing with many products that the organization may want to produce, and provides the possibility of making changes quickly and with high flexibility in the production process, in addition to saving effort and time, and works to reduce costs and reduce losses. Lean production has many benefits that can be achieved in business organizations. The most important of which is:

(Saleh, 2014:79), (Al-Jarjari, 2014:458)

(Swartwood,2003, p01), (Stevenson, 1993, 706)

1. Increasing production levels and profits and reducing losses and defects through regular production flow.
2. Reducing production cycle times and waiting periods.
3. Reducing storage levels and spaces required for storage
4. Raising quality and improving work productivity.

5. Full use of the equipment and workspace.
6. Emphasize flexibility.
7. Increase market share.
8. Reducing processing errors in requests.
9. Reducing costs by reducing the need for indirect labor

### **Dimensions of lean production**

The study based on the dimensions of lean production was based on a group of previous studies that dealt with the topic, which are as follows:

#### ***1-Continuous improvement***

The concept of continuous improvement came as a translation of the Japanese word Kaizen. The word Kaizen consists of two syllables, the first (Kai) meaning change and the second (Zen) meaning good. Therefore, Kaizen means change for the better or continuous improvement. After World War II, Japan began what was called rebuilding. Hence, Japanese factories, led by Toyota, adopted the principle of continuous improvement, while Masaaki Imai, who is the godfather of the philosophy of continuous improvement and director of the Institute for Improvement, describes continuous improvement as the secret of Japan's success in competition, as it includes striving for continuous gradual improvement and performing small things in a better way. And establishing and achieving higher levels of performance. Venkatesh believes that Kaizen means making good and continuous improvements that do not end at a certain point. These are small improvements, but they are implemented on an ongoing basis and include all individuals working in the company, which is the opposite of great innovations. Nazaruk defines continuous improvement as one of the tools of lean manufacturing, which represents any approach or program that continually seeks to improve all processes by improving the level of quality, delivery, productivity, customer satisfaction, and a decrease in lead times, cost, and defective items. Render & Heizer believe that continuous improvement includes individuals, equipment, materials, and procedures and that its basic idea is to improve processes, which is achieved through the participation of individuals working in developing good suggestions and ideas in the company (Hassan Taher, 2018, pp. 27, 28).

#### ***2-Comprehensive productive maintenance***

Maintenance cannot be limited to occasional or remedial maintenance aimed only at repairing faulty equipment. Even the best designed and manufactured equipment and machines are not immune to damage, and a machine's cessation of operation is sometimes caused by the poor way humans use it. However, reducing Failure and downtime rates and saving time, involves preventive maintenance and reducing corrective maintenance as much as possible. Preventive maintenance is carried out through two types of maintenance: Gratacap et Médan, 2009:216)

***Regular maintenance:*** It requires inspecting and monitoring the machine and changing its parts at fixed times, regardless of the use of the equipment. The change takes place after each production of a specific volume of production, or after each specific period of time has passed when the machine is running.

***Conditional maintenance:*** It is called predictive maintenance and requires regular monitoring of the use of equipment, in order to change parts that have been damaged by intense use. This type of maintenance uses systems that help detect defects such as vibration sensors, corrosion detectors, etc., and its purpose is to discover parts that are in the process of Malfunctions and replace them before they stop completely. The advantage of this maintenance is avoiding changing unnecessary parts.

#### ***3- Just-in-time (JIT) production***

The right time, as its name indicates, means producing and supplying products at the time specified for them. Any delay or increase in time results in the product not reaching the customer at the time he wants and at the price he desires. To work in a timely manner, the right product must be selected at the right time, in the right quantity, and with the right quality. Occasion. (Javal,2004:290)

**4- Quick setup/change**

In many factories today, a large quantity of a specific product is produced. The reason for this is the long preparation times for producing this product, which may reach 50% of the total production time, the accompanying increase in inventory levels, and reduced energy when production lines stop during preparation. In addition, the final assembly operations must wait for the preparation to begin production to be completed, since lean production aims to reduce unnecessary machine downtime resulting from either preparing and preparing the machines or changing the size of orders and production. Trovinger & Bohn 2001:4.

**ORGANIZATIONAL EFFECTIVENESS*****Definition of effectiveness***

Each of the research specialists in the field of management used many definitions for the concept of organizational effectiveness. These definitions differed according to the criteria by which organizational effectiveness was measured. Here we will review more than one definition in order to reach a clear picture of the nature and concept of organizational effectiveness: as it was defined as: “readiness and The organization’s ability to make the best use of the resources available to it can be expressed in terms of “productivity,” and it is also linked to the evaluation of the organization’s control over operations from a technical-economic perspective. ETZIONI also considers it as “the number of units of resources used to produce one unit of a specific product” (Souissi 2004: 48). There are organizational patterns that suit certain circumstances more than others, and the competent manager is the one who distinguishes between the appropriate and inappropriate type at the right time and the right place. (Ben Nawar: 2005: 273)

***The importance of organizational effectiveness***

The importance of organizational effectiveness is evident in that its use gives laboratories the ability to sustain productive agility and the ability to address problems, avoid surplus and waste, and improve production processes. It includes the following:

- 1- **Continuity:** Organizational effectiveness is the justification for the organization’s existence, continuity, development, and success.
- 2- **Comprehensiveness:** It is also considered an administrative thermometer to measure the extent of the institution’s success and excellence, in all areas of its activity, as it is a comprehensive and comprehensive characteristic that describes and summarizes the distinctive dimensions of the institution.
- 3- **Diversification:** where different and diverse parties benefit from it, including society, individuals, and shareholders.
- 4- **Performance evaluation:** Measuring organizational effectiveness is considered an evaluation of the organization’s overall performance. (Al-Qallaf, 2021: 50)

***Dimensions of organizational effectiveness***

Hambrick, 1980, Narayanan & Nath, 1993, Daft, 2001, Robbins, 1999

- 1- Job satisfaction
- 2- Productivity
- 3- Quality of outputs
- 4- Organizational adaptation

***1- Job satisfaction***

The concept of job satisfaction has multiple intellectual opinions derived from developments in the environmental factors that embody it. Therefore, researchers’ ideas varied regarding formulating a specific definition of job satisfaction, and this variation is due to the exposure of some of those interested in it according to the nature of specialization at work (Haddad-Farih, 2002: 7). Hubick, one of the first researchers in the field of job satisfaction, defines it (Harem, 1997: 47) as the expression of feelings of happiness resulting from the individual’s perception of the job. Therefore, these feelings give the job value, represented by the individual’s desire to work and what surrounds him. It is noted from the previous definitions that they explain job satisfaction. According to several factors, including psychological factors and professional factors, there are those who define it on the basis that it is the satisfaction of

the individual's needs, some of them on the basis of the individual's feeling of happiness, and some of them expressed it in terms of individuals' attitudes toward values that are important to them, such as wages, job security, and so on. Although the book differs in precisely defining the concept of job satisfaction, it can be said that job satisfaction is viewed as a level of degree of satisfaction of the individual's needs, and this satisfaction is achieved from multiple factors, including, what is related to the work environment and some of which are related to the job that the individual occupies, and these factors make the individual Satisfied with his work and achieving his ambitions and desires (Abdel Baqi, 2004: 173)

## ***2- Productivity***

The term productivity is defined as a measure of the ability of establishments to achieve outputs from inputs. It is also defined as the possibility of achieving the largest possible quantity of outputs from a specific quantity of inputs. The term productivity is considered one of the most prominent and widely used terms in the economic, industrial, and various fields of work. It is a strong indicator of the ability of production elements to work together in order to carry out a correct production process. Hutton expressed it - "productivity more broadly as a way to measure the effectiveness of... The use of resources by individuals, machines, organizations, and equipment. It means the most efficient use and optimal exploitation of available resources represented by manpower, raw materials, and the production capacity of machines and equipment, to produce the required goods and services."(Huhon, 1980:20)

Productivity is defined as the amount of production factors produced by one unit.

It is related to the effectiveness of the use of inputs and technology related to the productive relationship. As for Svend, he defined it as the relationship between outputs and inputs represented by a percentage, which is the quantity of production attributed to an element of the production, meaning the quantity of production resulting from the use of a productive element, especially labor, and capital, and in this context, we usually distinguish Between two types of productivity concepts: Svend, 2011: 59)

Partial productivity: Partial productivity is an indicator between one output and one input. It means the amount produced by one of the factors of production, such as labor and capital. It is a ratio between the outputs and one of the elements necessary to obtain the outputs. Hence, it is possible to talk about the partial productivity of capital, labor, materials, equipment and machines...etc.

Total productivity, which means the amount produced by the total factors of production, is therefore the relationship between the output and all the production factors that were used to obtain the inputs.(Awqara, 2005, p. 21)

## ***3- Quality of outputs***

The quality of output depends on many factors - production in terms of the time plan, the degree of specialization and interest, in terms of need, the quality achievement factor, the efficiency factor, and the performance factor. (Al-Obaidi, 2006:14) It also refers to the ability of the outputs to meet or exceed the expectations of the beneficiaries, as the quality of the outputs represents the ability to carry out some of the functions and roles expected of societies (Al-Salhi, Al-Saqqal, and Al-Sultani, 104:2021)

## ***4- Organizational adaptation***

The process through which the individual worker moves from being an individual outside the organization to being an effective and integrated member within it. This process includes acquiring or modifying common values, attitudes, skills, knowledge, and work relationships. (Thomas & Anderson: 2007:581) The process through which the individual, in terms of his values, abilities, expected behavior, and social knowledge, conforms to the organizational role and his participation as a member of the organization. Therefore, it is a basic process through which the individual can adapt to the new work required of him and the organizational roles he is expected to perform.

## **STUDY METHODOLOGY (METHOD AND PROCEDURES)**

The study describes the methodology, presenting the type and nature of the study, the strategies used, and the methods and procedures used to analyze the data and test the hypotheses. It also includes a description of the study population, how to determine the chosen sample, the sampling unit, and the analysis tools used, in addition to the data collection methods used to obtain primary and secondary data for the study, revealing the stages of preparing and designing the



study tool, verifying its validity and reliability, and clarifying the statistical methods used. It was used to analyze data and extract results.

### *Type and nature of the study*

In terms of its nature, this study is considered a field study, and in terms of its purpose it is an explanatory study, as it depends on the causal relationship between variables, and in terms of its reliance on previous studies and administrative theories, it is considered a deductive study. In terms of planning and controlling the study, it is non-contrived because it takes place in the organization's natural environment without interference from the researchers. In terms of the time horizon, it is considered cross-sectional because it is conducted one time and targets a sample at the same time.

### *Study Approach*

To achieve the objectives of the study and answer its questions, the researchers used the descriptive analytical approach to describe the phenomenon that is the subject of the study, represented by lean production and its impact on organizational effectiveness in cement factories. A questionnaire was designed to measure the independent variables represented by the dimensions of lean production, and the dependent variables represented by the dimensions of organizational effectiveness, and to find the relationship Between variables, analyzing and interpreting them in order to reach meaningful generalizations that increase and enrich the stock of knowledge about the subject and build interpretations of data and information to obtain the desired results.

### *Study population*

The study population consisted of (7) Iraqi cement industry factories in the central region, namely the Kufa Cement Factory, Al-Najaf Al-Ashraf Cement Factory, Kar Cement Factory, Samawah Cement Factory, Al-Muthanna Modern Cement Factory, Saman Cement Factory, and Karbala Cement Factory.

### *The study sample*

The study adopted an equal stratified random sample, where 24 questionnaires were distributed to each laboratory, numbering (168) questionnaires, at a rate of 6 questionnaires in each section to include all categories of the sampling unit. (162) questionnaires were retrieved, of which 11 questionnaires were not subject to analysis due to their incompleteness. The number of questionnaires recovered and analyzable was 151, i.e. a recovery rate of 89.9%, which is a statistically acceptable percentage.

### *Unit of analysis*

The inspection and analysis unit consisted of all general managers, department and unit directors, their deputies, assistants, department heads, and workers in each Iraqi cement industry factory department. These departments include the production department, the sales department, the purchasing department, and the financial department.

### *Testing the stability of the study tool*

The stability of the tool used to measure the variables it includes was tested using the Cronbach Alpha Coefficient test, where the result of the scale is statistically acceptable if the Cronbach Alpha value is greater than (0.70) (Sekaran & Bougie, 2016), and the closer the value is to (100). %) This indicates higher degrees of reliability for the study tool, and given the data contained in the following table, the Cronbach Alpha internal consistency coefficient was measured for the study variables, their dimensions, and the study tool as a whole, to determine the extent of consistency in the answers, as follows:

**Table 1:** Internal consistency coefficient values for the study tool items

value alpha	The dimension	the number
0.939	Production Graceful	
0.868	Optimization Continuous	1
0.897	Maintenance Productivity Overall	2
0.882	Production in the time Specified	3
0.827	Setting/changing The fast one	4

0.952	Organizational effectiveness	
0.902	Job Satisfaction	5
0.833	Productivity	6
0.871	Output quality	7
0.923	Organizational adaptation	8

We note from Table (1) that the values of the Cronbach Alpha internal consistency coefficient for the study tool items ranged (0.827-0.952), in addition to the alpha value for all items reaching (0.976), and therefore all values are greater than (0.70) and this is an indication of consistency between the paragraphs of the study tool, the reliability of the study tool and its ability to rely on it to conduct statistical analysis.

**Testing the study hypotheses**

In this part of the study, we review hypothesis testing, where the first main hypothesis was subjected to a multiple linear regression analysis, and the sub-hypotheses were subjected to a simple linear regression analysis, and the results were as follows:

**Testing the first main hypothesis H 01.**

“There is no statistically significant effect at a significant level ( $P \geq 0.05$ ) of lean production in its dimensions (continuous improvement, comprehensive production maintenance, on-time production, preparation/quick change) on organizational effectiveness in its combined dimensions (job satisfaction, productivity, quality of outputs, Regulatory adaptation) in Iraqi cement industry factories.

**Table 2:** Results of multiple regression analysis to test the impact of lean production on organizational effectiveness

Schedule Transactions Coefficients					analysis variance ANOVA				summary Sample Model Summey		variable Subordinate
*Sig	T	SE	B	Statement	* Sig	Df	F	R2	R	Organizational .effectiveness	
0.000	4.126	0.058	0.239	continuous improvement	0.000	4	71.056	0.661	0.813		
0.014	2.489	0.056	0.139	Productive maintenance Overall							
0.002	3.144	0.058	0.183	Production in the time Specified							
0.000	5.042	0.059	0.296	Setting/changing The fast one							

The results of Table No. (2) indicate that the correlation coefficient ( $R = 0.813$ ) indicates the relationship between the independent variables and the dependent variable, and the effect of the independent variables lean production on the dependent variable organizational effectiveness is statistically significant, as the calculated F value was 71.056, at a level The significance of ( $Sig = 0.000$ ) is less than 0.05, as it appeared that the value of the coefficient of determination  $R^2 = 0.661$ , which indicates that (66.1%) of the variance in organizational effectiveness can be explained through the variance in the dimensions of lean production. As for the coefficients table, it showed that the value B in the continuous improvement dimension reached (0.239) with a standard error of (0.058) and the value of T in it was 4.126) with a level of significance ( $Sig=0.000$ ), which indicates that the effect of this dimension is significant. As for the value of B in the comprehensive productive maintenance dimension, it reached 0.139, with a standard error (0.056), and its T value is 2.489, with a significance level ( $Sig=0.014$ ), which indicates that the effect of this dimension is significant. The B value for the on-time production dimension reached 0.183, with a standard error (0.058), and its T value is 3.144, with a significance level ( $Sig=0.002$ ), which indicates that the effect of this dimension is significant. The value of B was at the (preparation/quick change) dimension.

(0.296) with a standard error of (0.059) and its T value is (5.042), with a significance level (Sig=0.000), which indicates that the effect of this dimension is significant. Based on the above, we reject the first main hypothesis and accept the alternative hypothesis which states: “There is a statistically significant effect at a significant level ( $P \geq 0.05$ ) for lean production in its dimensions (continuous improvement, comprehensive productive maintenance, on-time production, preparation/rapid change) On organizational effectiveness in its combined dimensions (job satisfaction, productivity, quality of outputs, organizational adaptation) in Iraqi cement factories. The hypotheses branching from this hypothesis were subjected to simple linear regression analysis, and the results were as follows:

H 01-1: There is no statistically significant effect at a significant level ( $P \geq 0.05$ ) of continuous improvement on organizational effectiveness with its combined dimensions in the Iraqi cement industry factory

**Table 3:** \* Results of testing the impact of continuous improvement on organizational effectiveness

Schedule Transactions Coefficients					analysis variance ANOVA			summary Sample Model Summary		Dependent variable
*Sig t	T	SE	B	Statement	Sig F*	Df	F	R2 _	R	Organizational effectiveness
0.000	10.318	0.056	0.575	continuous improvement	0.000	1	106.46	0.417	0.646	

The results of Table (3) indicate that the value of ( $R = 0.646$ ), which means that there is a positive relationship between the dimension of continuous improvement and organizational effectiveness. It turns out that the value of the coefficient of determination is =  $0.417R^2$ , which means that the continuous improvement dimension explained 41.7% of the variance in (organizational effectiveness), with the other factors remaining constant. It also appears that the value of (F) reached 106.463 at the confidence level (Sig=0.000), and this confirms the significance of the regression at the level of ( $P \geq 0.05$ ) and at one degree of freedom. It is also clear from the coefficients table that the value of ( $B=0.575$ ) has a standard error of (0.056) and the value of ( $T=10.318$ ) is at a confidence level (Sig=0.000). This confirms the significance of the coefficient at the  $P \geq 0.05$  level. Based on the above, we reject the first sub-null hypothesis and accept the alternative sub-hypothesis, which states: “There is a statistically significant effect at a significance level of  $P \geq 0.05$  of continuous improvement on organizational effectiveness with its combined dimensions in cement industry factories.”

2-Ho1: There is no statistically significant effect at a significance level of  $P \geq 0.05$  for comprehensive production maintenance on organizational effectiveness with its combined dimensions in the Iraqi cement industry factory.

**Table 4:** \* Results of testing the impact of comprehensive productive maintenance on organizational effectiveness

Schedule Transactions Coefficients					analysis variance ANOVA			summary Sample Model Summary		Dependent variable
*Sig t	T	SE	B	Statement	Sig F*	Df	F	R2 _	R	Organizational effectiveness
0.000	11.354	0.045	0.512	Comprehensive productive maintenance	0.000	1	128.906	0.464	0.681	

The results of Table (4) indicate that the value of ( $R=0.681$ ), means that there is a positive relationship between the comprehensive productive maintenance dimension and organizational effectiveness. It turns out that the value of the coefficient of determination ( $R^2 = 0.464$ ), which means that the dimension (comprehensive productive maintenance) explained 46.4% of the variance in organizational effectiveness, with the other factors remaining constant. It also appears that the value of (F) reached (128.906) at the confidence level (Sig = 0.000), and this confirms the significance of the regression at the level of  $P \geq 0.05$  and at one degree of freedom. It is also clear from the coefficients table that

the value of (B=0.512) has a standard error of (0.045) and the value of (T=11.354) is at a confidence level (Sig=0.000). This confirms the significance of the coefficient at the level of  $P \geq 0.05$ ). Based on the above, we reject the second sub-null hypothesis and accept the alternative sub-hypothesis which states: “There is a statistically significant effect at a significance level of  $P \geq 0.05$  for comprehensive production maintenance on organizational effectiveness in Iraqi cement factories.”

3-1Ho: There is no statistically significant effect at a significant level ( $P \geq 0.05$ ) of on-time production on organizational effectiveness with its combined dimensions in the Iraqi cement industry factory.

**Table 5:**\* Results of testing the impact of on-time post-production on organizational effectiveness

Schedule Transactions Coefficients					analysis variance ANOVA			summary Sample Model Summary		Dependent variable
*Sig t	T	SE	B	Statement	Sig F*	Df	F	R2	R	Organizational effectiveness
0.000	10.457	0.054	0.568	Production in the time Specified	0.000	1	109.344	0.423	0.651	

The results of Table (4) indicate that the value of (R=0.681), means that there is a positive relationship between the comprehensive productive maintenance dimension and organizational effectiveness. It turns out that the value of the coefficient of determination ( $R^2 = 0.464$ ), which means that the dimension (comprehensive productive maintenance) explained 46.4% of the variance in organizational effectiveness, with the other factors remaining constant. It also appears that the value of (F) reached (128.906) at the confidence level (Sig = 0.000), and this confirms the significance of the regression at the level of  $P \geq 0.05$  and at one degree of freedom. It is also clear from the coefficients table that the value of (B=0.512) has a standard error of (0.045) and the value of (T=11.354) is at a confidence level (Sig=0.000). This confirms the significance of the coefficient at the level of  $P \geq 0.05$ ). Based on the above, we reject the second sub-null hypothesis and accept the alternative sub-hypothesis which states: “There is a statistically significant effect at a significance level of  $P \geq 0.05$  for comprehensive production maintenance on organizational effectiveness in Iraqi cement factories.”

3-1Ho: There is no statistically significant effect at a significant level ( $P \geq 0.05$ ) of on-time production on organizational effectiveness with its combined dimensions in the Iraqi cement industry factory.

**Table 6:**\* Results of testing the impact of on-time post-production on organizational effectiveness

Schedule Transactions Coefficients					analysis variance ANOVA			summary Sample Model Summary		Dependent variable
*Sig t	T	SE	B	Statement	Sig F*	Df	F	R2	R	Organizational effectiveness
0.000	11.615	0.054	0.625	Quick setup/change	0.000	1	134.914	0.475	0.689	

The results of Table (6) indicate that the value of (R = 0.689), means that there is a positive relationship between the dimension (preparation / rapid change) and (organizational effectiveness). It turns out that the value of the coefficient of determination is 0.475 ( $R^2 =$ ), which means that the (preparation/rapid change) dimension explained an amount of (47.5%) of the variance in (organizational effectiveness), with the other factors remaining constant. It also turns out that the value of (F) It reached (134.914) at a confidence level (Sig = 0.000), and this confirms the significance of the

regression at the level of ( $P \geq 0.05$ ) and at one degree of freedom. It is also clear from the coefficients table that the value of ( $B = 0.625$ ) with a standard error of ( $0.625$ ) and that the value of ( $T = 11.615$ ) at a confidence level ( $\text{Sig} = 0.000$ ), and this confirms the significance of the coefficient at the level of ( $P \geq 0.05$ ). Based on the above, we reject the fourth sub-null hypothesis and accept the alternative sub-hypothesis, which states: "There is a statistically significant effect at a significant level ( $P \geq 0.05$ ) Preparation/rapid change on organizational effectiveness in Iraqi cement factories.

## RESULTS OF TESTING THE STUDY HYPOTHESES

The results of testing the first main hypothesis showed that there was a statistically significant effect at a significant level ( $P \leq 0.050$ ) of lean production in its dimensions (continuous improvement, comprehensive productive maintenance, on-time production, preparation/rapid change) on organizational effectiveness in its combined dimensions (job satisfaction, productivity), quality of outputs, organizational adaptation) in Iraqi cement factories, where the moral effect appeared in all dimensions of lean production. The study attributes the reason for the existence of this effect to the fact that lean production is an integrated production philosophy, based on meeting needs in a timely manner, with appropriate quality and good quality, and reducing Produced unit costs by reducing non-value adding activities, and introducing continuous improvements to products, operational and productive processes by adopting a set of activities aimed at reducing waste and defective items and increasing the efficiency and effectiveness of operational and production processes, which would affect the level of organizational effectiveness and contribute In improving it by enhancing the ability to plan and compete, fulfill obligations, and generate and maximize profits. This philosophy is also based on raising and increasing the production capacity of the factories in question, achieving quality in products, obtaining customer satisfaction, eliminating waste in production activities and processes, and achieving organizational adaptation. It reduces inventory volume and costs, enhances the effectiveness of the production system, and ensures that the production and operational process proceeds as planned. This would contribute to improving organizational effectiveness in factories by increasing production speed, smooth flow of materials, and enhancing their ability to deliver products. More quickly, and increased flexibility in the face of rapid changes in customer requirements and desires.

## STUDY RECOMMENDATIONS

Based on the findings of the study, it recommends the following:

1. Increase the activation and application of the production scheduling system in Iraqi cement factories, and adopt methods and procedures aimed at increasing the attraction of skilled workers.
2. Increasing the level of Iraqi cement factories' application of the continuous improvement strategy, viewing it as an ongoing strategy, and holding training courses and workshops on an ongoing basis, which contribute to achieving the goals and requirements of this strategy.
3. Directing the administrations of Iraqi cement factories to implement a greater self-maintenance system, increasing the number of training courses and workshops concerned with maintenance matters, and encouraging workers to participate in them.
4. Increasing the level of use of external preparation times by Iraqi cement factory departments, and reducing the preparation time for machines.
5. Directing the departments of the Iraqi cement industry factories towards continuing to redesign their operations and working to adopt methods and procedures that help spread the culture of productive work further.
6. Increasing the level of commitment of Iraqi cement industry factory departments by emphasizing continuous improvement programs in all their operations.
7. Further verifying the ease of flow of materials in the company's production processes, and working on rapid preparation/change.
8. Increasing the level of responsiveness of the Iraqi cement industry's factory departments to the ideas and suggestions of their customers in developing their products, and working to improve the level of workers' competencies and skills and constantly updating them.

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