



## Improving Product Quality under the Application of Lean Accounting Tools within the Behavioral Approach

Dirar Abdulhameed Altoum Alotaibi<sup>1\*</sup>, Salah Mahdi Jawad Al-Kawaz<sup>2</sup>, Ali Abdulhassan Abbas<sup>3</sup>

<sup>1</sup>King Khalid University, KKU-College of Business Administration —ABHA – Saudi Arabia, <sup>2</sup>Department of Accounting, University of Kerbala, College of Administration and Economics, Iraq, <sup>3</sup>Department of Accounting, University of Kerbala, College of Administration and Economics, Iraq. \*Email: [dalotaibi@kku.edu.sa](mailto:dalotaibi@kku.edu.sa)

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### ABSTRACT

The current research aims to study the importance of applying lean accounting technology with its important tools such as (value stream, points box, continuous improvement) and pointing to the role of correct behaviors by the decision maker that helps in making the right decision in improving the quality of the product and its reflection on reducing its cost Reducing waste and wasting of resources, meeting customer requirements, and trying to apply it in one of the factories of the Southern Cement Company represented by the Kufa Cement Factory, the sample of the research, and to achieve this goal, it was adopted in the application of lean accounting tools on the laboratory data obtained by the result of coexistence field Take a look at the laboratory records for the sample. The researchers reached several conclusions, the most important of which is that the research sample represented by the Kufa Cement Factory is far from the concept of lean accounting, including the important tools and what it reflects in its application of a role in improving the quality of the product, including this concept holds multiple meanings, in addition to not paying enough attention to achieve customer satisfaction Which is one of the important constituents of the newly targeted, because the customer has become the starting point for the business of economic units and the basis of their survival in the market. Also, not taking into consideration the behavior of the decision-maker, which may not be in harmony with the organization and reflected in making weak decisions that affect the concept of lean accounting.

**Keywords:** Product Quality, Lean Accounting Tools, Behavioral Approach

**JEL Classifications:** M41, L15, M11

### 1. INTRODUCTION

In light of the rapid developments in the business environment and the huge technological progress, the economic units have faced a major challenge represented in increasing the intensity of competition between them, and the main driver of the competitive advantage requires the awareness of these units of the quality of the product and what it reflects in its improvement of different meanings represented in reducing costs, eliminating waste Lost resources, work according to customer requirements, and others.

So it can be said that the intensity of competition has imposed on these units more attention to the level of quality in terms of

customers requesting high-quality products, so the process of improving the quality of products provided to customers has become a key to success for many of these economic units and a primary strategic goal for these units, in terms of The improvement of quality leads to achieving customer satisfaction, and this leads to an increase in the unit's share in the market, and as a result, the strengthening of its competitive position.

In view of all these developments, it was evident that the economic units think about reconsidering the traditional accounting systems due to the increasing criticism that these systems are facing due to their neglect of the market conditions and the developments witnessed by the most important of which are the emergence of

various modern production systems and the most prominent of which is the graceful production or manufacturing system and this is what necessitate searching for accounting techniques that are in line with these developments by producing high quality products.

The lean accounting technology is one of the most important modern techniques of managerial accounting that aims to improve the quality of the product by reducing its cost, producing products that meet the customer's requirements, and eliminating waste and loss. Of course, what the lean accounting technology achieves when it is applied is only by using the tools of this technology such as the value stream Points box, continuous improvement, etc. But among the problems that we faced was the decision-making behavior that affects lean accounting tools, despite providing accurate information in investment decision-making. The mutual behavioral effect between lean accounting tools and decision-making is directly influenced by the behavior and personality of the decision-maker, which is influenced by his internal psychological factors that are reflected in his performance. If the decision-maker suffers from anxiety, lack of focus and indifference, it will lead to an inability to fulfill the customer's requirements.

## 2. METHODOLOGY

### 2.1. Research Problem

The developments taking place in the modern business environment, the most prominent of which are technological advancement, increased competition intensity, globalization of markets, shortening the product life cycle, and others have made economic units facing a major challenge represented in the need to reconsider the applied cost systems if they want to continue in the conditions of this environment due to the lack of The ability of these systems to provide information that meets the above developments and helps eliminate waste of resources, time and performance related to product operations, especially in light of developments in production systems and the emergence of a graceful production system. Therefore, and in light of these developments, it is necessary for the economic units to think about applying modern techniques in the field of managerial accounting consistent with the developments above and in a manner that helps in improving the product quality as one of the main success factors. And work to choose executives who have stable behavior and personality in order to help them in making decisions without hesitation.

Accordingly, the research problem can be framed in this research with the following questions:

1. Is there a need for economic units to apply modern techniques in the field of management accounting that helps reduce waste and waste of resources, time and performance related to product operations?
2. Is the application of lean accounting works to abolish the traditional Caliphate systems in the Kufa Cement Factory, or is it complementary to these systems, and is it affected by the decision-making behavior?
3. Does the application of Iraqi economic units for lean accounting, including the tools and support for the lean production system or lean manufacturing, improve the product quality in the Kufa Cement Factory?

### 2.2. Research Objectives

In light of the research problem and the questions it poses, the research seeks to achieve the following goals:

1. Explain the importance of lean accounting tools by integrating them in improving product quality by reflecting on reducing its cost, reducing waste of resources, time and performance, and meeting customer requirements.
2. Determine the need of Kufa Cement Factory to modern techniques in the field of managerial accounting to help it achieve its goals, the most important of which is to reduce waste in resources, time and performance.
3. Explain the importance of applying some lean accounting tools in light of the methodological nature on which each tool is built and that helps in improving the quality of the product by applying it to the Kufa Cement Factory.

### 2.3. Significance of Research

The research acquires its importance from the following:

1. The importance of the product quality to the economic units and their continuous and continuous efforts to improve them in a manner that helps in their continuation and achievement of competitive advantage.
2. The importance of applying modern techniques of managerial accounting represented by lean accounting, including the various tools such as the value stream, points box, and continuous improvement.
3. The economic units need to apply modern technologies, the most important of which is lean accounting in light of the developments in the modern business environment.

### 2.4. Research Hypothesis

The research is based on the hypothesis that:

Lean accounting application with its important tools leads to improving product quality and as a result reducing its cost, eliminating waste, waste of resources, time and performance related to its production processes, and working according to the customer's requirements.

### 2.5. Search Limits

1. Time limits Reliance on data for 2018 as time limits for research, because it represents the most recent data that reflects the current reality of the performance of the research sample and can be adopted in order to achieve the goal of the research.
2. Spatial limits: Selecting the General Company for Southern Cement as a research community and the Kufa Cement Factory as a sample for research, due to the importance of this company in supporting the national economy and the intense competition it witnesses with imported cement and the cooperation the researcher found by its employees to solve the problems and obstacles that the company is exposed to by introducing technologies She is modern in her field of work.

## 3. LITERATURE REVIEW

### 3.1. Introduction to Lean Production

Before clarifying the concept of lean production, the meaning of lean or lean should be clarified, as it indicates (Debusk, 2012), That the term lean means a comprehensive philosophy or system

that focuses on the value of the customer, improving the quality of the product or service by eliminating waste and wasting, meaning that this term does not mean making efforts to reduce the size of the economic unit, but rather focusing on the exploitation of idle energy.

As for Celik, (2016) It expresses the term agility as a process of adopting lean methods that target wasting and wasting aspects and trying to eliminate them in that they do not add value to the product. He explains Celik, (2016) Lean production is a philosophy for managing the various processes of an economic unit that derives from the productive system that is adopted by a company Toyota Japanese and derived from the production system on time. (JIT) Generally, lean production is explained from two perspectives:

The first: A philosophical perspective regarding guidelines for overall principles and goals.

The second: A practical perspective that focuses on applicable management practices, tools, and methods.

These two: perspectives do not mean that there is a complete difference in terms of the interpretation of lean production, but it is a clarity of the concepts related to it.

### 3.2. Definition of Lean Production

Lean production was defined by several definitions in that the researchers did not agree on a specific definition of this concept. So he knew it Dombrowski and Zahn, (2010) One of the successful strategies to deal with changes and business challenges to produce products that meet the desires of customers in terms of price and quality.

As for Bakri et al. (2012) His philosophy that aims to reduce operating costs by eliminating loss and enhancing value to satisfy customers by producing high quality products. Notes Nasserredine and Wehbe, (2018) It is a comprehensive set of practices and technologies that help economic units get rid of lost production processes and reduce costs and thus improve quality.

It is noted that no specific definition of lean production has been agreed upon, and therefore, in light of the previous definitions, researchers can develop a definition of lean production as a philosophy and an organized approach to various principles, tools and techniques used by the economic unit to determine the loss and activities that do not add value in order to reduce them and in a manner that leads to improving the effectiveness of employment Reducing the cost of the product and, consequently, improving its quality.

### 3.3. The Concept of Lean Accounting

Lean accounting is one of the concepts launched by a group of researchers at the Massachusetts Institute of Technology in the United States of America as a result of developments in production systems and the emergence of concepts within these systems that fit with the meaning of agility such as (lean production or lean manufacturing, lean thinking, etc.) that required Economic units replace their traditional accounting systems with modern ones

that are appropriate to developments, as accounting systems or technologies play an important role within economic units in that they help in making critical decisions and as a result, they affect the profitability of these units (Al-Zubaidi, 2015). As for (Daferighe et al, 2018), mentions that lean accounting has two concepts:

#### 3.3.1. Value stream cost analysis

The value stream includes all the activities that host the value that contribute to providing specific products and services to the customers. As for the process of analyzing the value of the value stream, its goal is to identify the areas of loss, bottlenecks, idle energy, and areas of available opportunities.

#### 3.3.2. Income statement

According to this statement, the effect of the change in costs related to the product is explained due to the exclusion of idle energy, loss, waste, etc. which is a negative reflection on the profitability of the economic unit.

#### 3.3.3. Definition of lean accounting

Lean accounting was defined by several definitions, in that the researchers did not agree on a specific definition for it:

He knows her Haskin, (2010) It is a completely different method of collecting information for use in decision-making processes compared to traditional accounting, he notes Horngren, (2012) It is an accounting method for estimating costs that creates value for customers by analyzing the cost of the value stream, which is aimed at eliminating loss and waste. Daferighe et al. (2018) It defines it as one of the modern accounting methods that emerged as a result of adopting the principle of lean thinking in order to measure the critical impact of implementing lean improvement processes.

#### 3.3.4. Principles of lean accounting

Indicates Maskell and Baggaley, (2006); Monroy et al. (2012) lean accounting is governed by a set of principles that it adopts and which help in achieving the objectives of its application. They are summarized as follows:

1. Lean and simple accounting business.
2. Accounting operations that support transformation to grace Accounting processes that support the lean transformation.
3. Clear and timely communication of information.
4. Planning and budgeting from a lean perspective.
5. Strengthen internal accounting controls.

#### 3.3.5. Lean accounting need

Because of the increased interest of economic units in the principles of lean production or manufacturing, these economic units began looking for measurement and accounting systems that are compatible with lean principles, and lean accounting is a new way to manage business based on agility principles as it combines lean methods and accounting in a new context to measure, manage and monitor performance Economic unity and the development of this performance with the development of the business environment.

Notes Mokabel, (2016); Maskell et al. (2011) That the design of lean accounting has come to meet the following needs that necessitate the economic unit to shift towards agility:

1. Replacing the traditional measures with the few lean and focused performance measures to stimulate lean behavior at all levels of the economic unit and generate continuous lean improvement, as these measures reflect the lean economic unit strategy and the basis for achieving the operational and financial control of the economic unit by excluding loss, waste, and others.
2. Defining the financial impact of lean improvements and creating a strategy to maximize this impact.
3. Apply better methods to understand product costs and value stream costs and use relevant information to guide improvement processes and make better decisions while improving profitability.
4. Savings on costs by getting rid of lost aspects of accounting, control and measurement systems.
5. Providing time for workers in financial affairs to work on strategic issues and lean improvement, while identifying areas of idle energy and ways to invest them.
6. Focusing the work on the value created for customers.

### 3.4. Behavioral Entrance

By using the elements of the behavioral entrance of motivation, awareness, personality, shaping trends and groups, leadership and communication, high efficiency can be achieved in making the right decision after reviewing the lean accounting tools and achieving the organization's goals of increasing quality and reducing costs. Through awareness of the decision-maker, the competent departments can implement it.

The role of the behavioral entrance in explaining the stakeholders' response to the published financial reports information obtained from the factory or through the application of lean accounting tools is highlighted, and the decision maker's role comes to test the relationship between the adequacy of accounting information and the extent of the stakeholders' dependence on them in making decisions, and study the relationship between the volume of information Accounting and the decision-making ability to understand it, as the study derives its importance from the importance of the behavioral entrance role in interpreting lean accounting tools and knowing the extent of stakeholders response to the financial information that was reached, and the lack of studies that dealt with the tool Accounting elegans as an input behavioral behavioral entrance.

Be seen Hassan and Mudar, (2013) That the personal mood greatly affects the behavior of the individual, the way he thinks and the way he makes his decisions, and that emotions do not exist alone, but are subject to the control of brain processes to a large extent, by focusing on logical and scientific methods that have a great benefit in increasing the effectiveness and regularity of decisions. The main problem facing senior management at the present time is mainly the huge amount of information that it passes to, so the methods and methods of decision-making play an important role in studying the types of problems faced by institutions, the many influences in the decision, as well as the complexity of matters that are affected by the decision. The more complex the environment in which the administration operates, the more complicated the decision-making process and its importance, because the decision

relates to the future, and of course the future is uncertain, and the process becomes more difficult. Decision-making is one of the roles

The basic practice of the manager when performing his duties, he indicated De Bondt et al. (2013) The secret of the manager's success is the right decision." This requires him to prepare many solutions to the problem and choose the best ones in cooperation with others and their participation, because a good decision is the one that takes into account all the available information and gives attention to all possible alternatives. And there are multiple decision-making methods from the easiest to the most difficult in terms of effort, time and cost, as it comes at the forefront of these methods in terms of lack of effort, speed in time, and low cost; intuition, guesswork, and personal opinion are all part of the behavioral approach. The research focuses on the subject of behavioral entrance that affects the decision-making process by providing an enormous amount of information by lean accounting tools that affect the effectiveness and efficiency of decision-making in areas affected by feelings and emotions or the adoption of objectivity and rationality for its decision-maker.

Public and private organizations also attach great importance to behavioral input in decision-making, due to the fact that: "The wrong decision has a high cost." Therefore, this process is gaining increasing importance, due to the developments in the way information is collected, analyzed, classified and stored. To be used to find solutions to problems facing the organization.

### 3.5. Lean Accounting Tools

He mentions Muhammad, (2013); Arora, (2016) Lean accounting tools are as follows:

1. Value stream maps Value Stream Mapping.
2. Target cost Target Cost.
3. Performance measurement linking scheme Performance Measurement Linkage Chart.
4. Value stream Value Stream.
5. Points Box (value stream performance) Box Scores.
6. Kaizen (continuous improvement) Kaizen.
7. Value Stream Performance Boards (Including Stop and Continuous Improvement of Project) Value Stream Performance Boards.
8. English is clear and easy Simple and plain English.
9. Hoshin policy Hoshin policy.
10. Sales, operations and financial planning Sales, Operation and financial planning.
11. Inventory evaluation Value inventory.
12. Transaction elimination matrix Transaction elimination matrix.
13. Entrance 3P approaches 3P.
14. Plan, work, check and decide Plan - Do - Check - Act (PDCA).
15. Profit sharing profits sharing.
16. Staff satisfaction and training employee satisfaction and cross-training.
17. Dangers of Sarbanes-Oxley Sarbanes Oxley risks (sox).

Lean accounting application requires a set of tools that can be used for multiple purposes, and for the purposes of achieving

research objectives three of these tools will be used, namely the value stream, points box, and continuous improvement as follows:

#### 1. The value stream

Known Andersch, (2014) The value stream is a set of activities that work jointly to make the finished product from the stage of purchasing raw materials to the stage of delivering the product to customers, and in this regard it is possible to distinguish between two types of value streams:

- a. The value stream related to receiving customer requests: the product value is started from the process of purchasing materials and entering them into production processes, product manufacture, product delivery to the customer, and after-sales services.
  - b. The value stream related to the development and manufacture of a new product: The value generation process takes place from the stage of designing the product under development or to be manufactured again, through the rest of the value chain processes such as manufacturing to after-sales services.
- Aim the value stream Objectives of value stream  
Indicates Abdin and Abd al-Rahman, (2018) The objectives that the economic unit seeks to achieve from the application of the value stream lie in the following:
    - a. Measure the extent of implementation of the planned results.
    - b. Evaluating the factors necessary to accomplish what is being planned.
    - c. Developing plans and improvements related to critical success factors.
    - d. Achieving effective control for continuous improvement initiatives.
    - e. Amending the necessary plans related to continuous improvement operations as appropriate.
  - Value stream costing  
Indicates Chavez, (2016); Lopez et al. (2013) The economic units that apply agility should adopt a new method for managing costs based on value streams instead of the traditional cost methods that depend on the principle of cost allocation according to departments taking into account that the cost allocation method cannot be applied on the basis of value streams without the economic unit reaching the maturity stage in agility.
- #### 2. Points Box (value stream performance) Box Scores
- Explains Ogar, (2017) The points box displays the operational and financial performance and energies related to the value stream in three separate parts, which are the main driver for improving the value provided to customers by the following:
- a. Enabling management and employees to take effective decisions related to improving the future status of the value stream in order to create value for customers.
  - b. It is considered a link between the economic unit and the financial reports of the financial and accounting departments.
  - c. Motivating production units to move towards correct behavior.
- Point Box Metrics  
Indicates Bahadir, (2011); Maskell et al. (2011) There is a set of measures that are used in light of the application of the

point box tool to measure the value stream performance, which includes under each of the different levels of performance which include operational, financial, and energy as follows:

##### 3.5.1. First - Operational performance

In light of this level of performance, the measures that are applied are as follows

- a. From receipt to installation (from sidewalk to sidewalk) Dock - to - Dock Time.
- b. First time through First time through (FTT).
- c. Delivery on time On - Time Delivery.
- d. Sales per person Sales per person.
- e. Average value of the current value of each unit (average product cost) Average value stream cost per unit (Average product cost).

##### 3.5.2. Second: Financial performance

In light of this level of performance, the measures that are applied only reflect the effects of lean changes in the financial results, which derive their information from the financial performance of the value stream, and the following are the most prominent of those changes:

- a. Revenue.
- b. Cost of materials Material cost.
- c. The cost of the conversion Conversion cost.
- d. Win the value stream Value stream profit.
- e. Return on sales of value stream (ROS) Return of sales.

##### 3.5.3. Three - energy information

Energy information relates to all changes that result from the use of energy resources as a result of changes that result from the application of the principles of agility. The energy resource is the ability of the value stream to complete the work through the available resources, which are divided into human resources and machinery related resources.

As for the uses of energy resources, they are divided into three categories, as follows:

- a. Production Energy Resources.
- b. Non-productive energy resources.
- c. Available energy resources.
- d. Kaizen (continuous improvement) Kaizen (Continent improve).

Indicates Maarof and Mahmud, (2016) That continuous improvement is a Japanese philosophy that was successfully applied by the Japanese after World War II and is derived from two words) Kai (Means change and) Zen It means the best and its function is focused on encouraging the improvements that are made to product operations by reducing loss and improving productivity and with the participation of all levels of management in the economic unit, in other words, that its application is carried out in an environment dominated by lean production applications and therefore it is one of its important tools.

As for the steps to implement continuous improvement (Kaizen), they are concentrated in the following (Veres et al., 2017):

- a. Planning.
- b. Implementation Doing.
- c. Verification or evaluation Checking.
- d. Optimization Adjustment (Figure 1).

### 3.6. Quality and Improvement in Light of the Application of Lean Accounting Tools

Quality has become an important issue in the business environment due to the effects of globalization and alienating developments that have pushed economic units to work more seriously towards improving the quality that the customer is searching for in order to survive under strong competition. Therefore, in this topic the concept of quality will be addressed according to the following main paragraphs:

#### 3.6.1. The historical development of quality the development historical of quality

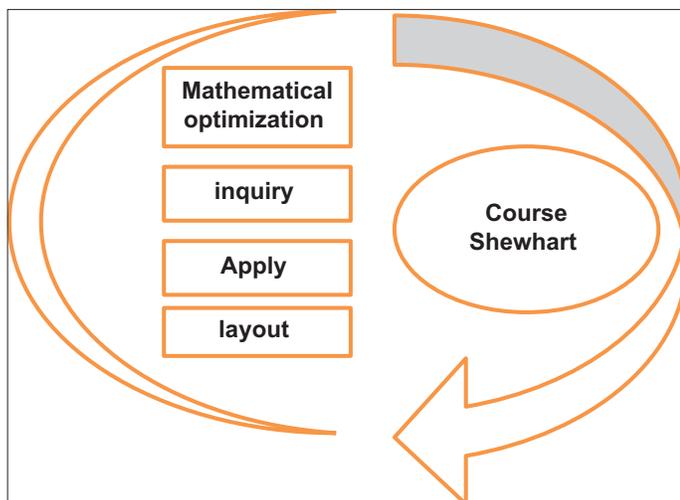
The historical roots are attributed to interest in quality since ancient times, and the areas of escalation have taken place in the events of development in it since the Second World War until now, as these areas were divided into four stages that formed the historical development of quality, as follows: Hoang, (2017); Tuomi, (2012); Weckenmann et al., (2015):

- a. Quality inspection phase (1900-1930).
- b. Quality Control Stage (1930-1950).
- c. Quality Assurance Phase (1950-1980).
- d. Total Quality Management Stage (1980-present).

#### 3.6.2. Definition of quality definition of quality

The definition of quality has taken a wide range in the literature dealing with this concept and has evolved with the development of management science So, find out Wan and Zeng, (2013) It is the degree that meets a set of characteristics found in customer requirements, either Hoe and Mansori, (2018) They know the product ability to meet or exceed customer expectations.

**Figure 1:** The steps for implementing continuous improvement. Steps to implement continuous improvement



Source: Veres, Cristina, Marian. Livin, Moica. Sorina, (2017). Case study concerning effects of Japanese management model application in Romania, *Procedia engineering*, 1015

#### 3.6.3. Quality dimensions

The product can be described and evaluated as quality if it includes the following eight dimensions of quality (Montgomery, 2009); (Hajjat, 2014); (Khoironi and other, 2018):

- a. The performance.
- b. Reliability.
- c. Durability
- d. Serviceability Service ability.
- e. Aesthetic Aesthetics.
- f. Appearance Features.
- g. Perceived Quality Perceived quality.
- h. Conformity Conformance.

#### 3.6.4. Quality improvement

Quality has become the main goal of economic units in general and industrial in particular, as no economic unit can enter the competition market unless it has an acceptable level of quality, which requires focusing on improving quality and searching for factors that contribute to its development, as most quality literature indicates, Simplifying the design, controlling the production process, participating in the decision and the work teams, and the interest of senior management in quality, are key keys to the process of continuous quality improvement (Abdul Kadhim, 2016).

Notes Kent, (2016) The process of quality improvement begins with an understanding that there is an opportunity to improve quality, and this requires a continuous measurement of processes to discover failures associated with all major operations of the economic unit and to identify activities that do not add value, i.e. in other words improving the quality of performance of activities means excluding or removing activities that are not adding value.

#### 3.6.5. Quality improvement measures quality improvement procedures

Marker and Morganstein, (2004) the process of improving quality requires focusing on the characteristics of the product required by customers, and this includes a set of procedures as follows:

- a. Determine the objective of quality improvement.
- b. Using the appropriate technologies.
- c. Identify the main activities of product formation.
- d. Eliminate unnecessary activities that increase costs related to the product.
- e. Drawing new plans and maps for these activities.
- f. Measuring the main variables resulting from the change.
- g. Document the best current methods resulting from the change.
- h. The commitment of management and workers to organize new work methods, work with one team spirit and make continuous improvements.

## 4. RESULTS

### 4.1. Introduction to Kufa Cement Factory (Research Sample)

The Kufa Cement Factory is one of the factories of the General Company for Southern Cement, which is affiliated with the Iraqi General Cement Company, one of the largest and largest companies of the Ministry of Industry and Minerals. F. L S Danish) in 1977, at a cost of (63233500.216) dinars, and the factory consists of four

production lines and a design capacity of (1781000) tons of cement annually, as the design capacity of each line is (1500) tons per day, and it works according to the wet method, which is characterized by low effects compared to the method Dry and the most important of its products is Portland cement, which is resistant to sulfur salts and a capacity of design kilns (1728000) tons of clinker per year. The cement is produced according to Iraqi specifications No. 5 of 1984 which made him get the Iraqi quality certificate according to administrative order No. (6001) on August 19, 2010 issued by Ministry of Planning and Development Cooperation Which mainly depends on the issuance of its specifications on the European specifications, and this is what made the demand for the factory rise continuously, whether by the governmental or private public sector represented by merchants and customers, this is despite the changes that Iraq witnessed during the events of 4/4/2003, the most important of which The openness of the Iraqi markets to the global market and the increase in the intensity of competition, which had a negative impact on most of the products of Iraq in terms of demand for them, the production of the Kufa Cement Factory has continued, but to varying degrees, has witnessed significant fluctuation so that it did not reach the planned level of production except in 2017, during which the factory witnessed Significant rise in margarine production So that it exceeded the level planned in that year as a result of the quality of the product.

## 4.2. The Application of Lean Accounting Tools

### 4.2.1. Stream value

The value stream tool is considered one of the important tools for lean accounting and its application is according to the steps below, noting that before commencing these steps the value stream must be determined in the laboratory of the research sample, as there is a single value stream in the laboratory, which is a Portland cement product resisting sulfur salts that is produced in The lab.

#### 4.2.1.1. Identify activities related to the cement product (value stream)

In the laboratory, the research sample reflects the activities related to the cement product, the stages during which the production of this product passes, and they are as follows, indicating that the first topic has dealt with the processes involved in each stage in detail:

- a. Extraction and cracking activity.
- b. Primary milling activity.
- c. Burning and cooling activity.
- d. Final grinding activity.
- e. Packaging activity.
- f. General administration activity.
- g. Financial Affairs Activity.
- h. Control activity.
- i. Examination activity.
- j. Electrical power generation activity.
- k. Electrical maintenance activity.
- l. Mechanical maintenance activity.

#### 4.2.1.2. Activities Analysis

After identifying activities that cause costs and that bear the cost of the product, in this step, those activities will be analyzed into activities that add value and others that do not add value from the customer's point of view as follows:

- Host activities of value  
It consists of a group of activities related to the formation of the product which are necessary to complete the product and cannot be excluded, but the efficiency needs to be increased, as follows:
  - a. Extraction and cracking activity.
  - b. Primary milling activity.
  - c. Burning and cooling activity.
  - d. Final grinding activity.
  - e. Packaging activity.
- Activities not adding value  
The results of the field study of the researcher and the results of the interviews with the officials in the laboratory indicate the research sample that there are two types of activities that are not adding to the value, the first of those activities is what cannot be excluded, and the second type is the one that requires exclusion as follows:
  - a. Management activity.
  - b. Financial affairs activity.
  - c. Control activity.
  - d. Examination activity.
  - e. Electrical power generation activity.
  - f. Electrical maintenance activity.
  - g. Mechanical maintenance activity.
- Determining the costs according to the value stream tool  
After clarifying the activities related to the cement product (value stream) and analyzing it in terms of adding or not adding value, in this step the costs are determined according to the value stream tool and in a form that is appropriate for lean accounting with the indication that the costs that are identified and are relevant in this regard include elements The costs shown in Tables 1 and 2:

#### 4.2.2. Point Box Tool (Value Stream Performance)

After applying the value stream tool, the points box tool is applied through the following three measures, which is a reflection of performance under the value stream:

##### 4.2.2.1. First: operational metrics

Operational measures consist of the following:

- a. Receipt to supply (time from platform to platform)

$$\begin{aligned} \text{Receiving to setup} = & \\ & \frac{\text{Raw material stock} + \text{In - progress production stock} \\ & + \text{Complete production stock}}{\frac{\text{The amount of production shipped}}{\text{Working hours}}} \\ & = 2.257 \text{ work hour} \end{aligned}$$

The result of applying a scale from the reception to the processing indicates that the time it takes for one ton of cement to become fully manufactured is 3,257 h, while the results of the interviews with production engineers in the laboratory indicate that the time needed to complete one ton is 2,250 h, and therefore there is a clear difference between the time The actual and planned time is 1,007 h (3,257-2,250), and this difference is a lost time as a result

**Table 1: The cost of the cement product by applying the value stream tool**

Activity	Materials Cost	Cost of wages	Costs related to machines and equipment	Costs Facilities and support	Other costs	External costs	Total
Extraction and cracking	342658789	632354060	1,396236328	720297965	93291398		3,184838540
Raw material transfer and grinding	856646973	867927600	4,528810003	1,080446949	111949678		7,445781203
Burning and cooling	1,370635156	983320128	7,494665149	1,296536339	149266237		11,294423609
Grinding cement	171329395	505316448	3,043837790	864357559	130607958		4,715449150
Packaging capacities	685317578	445236368	1,307414358	360148983	932913983	3,414349192	7,145380462
Administration		1,444243125	1,340986887	720297965	373165593		3,878693570
Test		307230352	318424109				625654461
Maintenance		80181615	7,707653030	1,440595932	74633118		9,303063695
Electricity		969391680	3,300350236	720297965			4,990039881
Total	3,426587891	6,235201376	30,438377890	7,202979659	1,865827965	3,414349192	52,583323971

Source: Prepared by the researchers

**Table 2: Prices of competing products**

Competitive products	Prices
1 Iranian cement	95000
2 Kuwaiti cement	105000
3 Cement bridge	112000
4 Bazian Sulaymaniyah Cement	97000
5 Falcon cement sky	UNTRANSLATED_CONTENT_START   90000   UNTRANSLATED_CONTENT_END

Source: preparation of researchers

of converting the raw materials needed for production from one stage to another using old vehicles designated for this purpose with an increase in maintenance work on them.

b. The first time through FIT

$$FIT = \frac{\text{Total production} - \text{faulty production}}{\text{Total production}} * 100\% = 81\%$$

The result of the application of this measure indicates that what percentage (81%) of cement is healthy or good and from the first time of production and it is of course a good result in that production does not require recycling, as a result of interviews with officials in the laboratory with emphasis on the need to reduce defective production in the future Which in itself is limited to the remains of production.

c. The delivery is right on time

$$\frac{\text{The percentage of orders shipped during the year} = \text{Amount of cement shipped} (\text{delivery date})}{\text{Total production}} * 100 = 96\% \text{ of cement}$$

The above ratio shows that (96%) of the cement produced during the year 2018 was shipped in the form of orders to customers, and this is a good percentage according to the interviews with factory officials and plans in this regard, as this measure is one of the

important control measures that makes all information related to production under control.

d. Sales per person

$$\text{Sales per person} = \frac{\text{Total sales}}{\text{Number of Workers}} = 23.484 IQ$$

But when applying the above equation to the data of the research sample in light of lean accounting and the resulting result in its application in reducing the number of employees to (575) workers, the application of the sales scale for each person is as follows:

$$\text{Sales per person} = \frac{46,992,405,535 \text{ dinars}}{575 \text{ workers}} = 81,992 \text{ dinars}$$

It is clear from the above results that the share of each worker in the factory's sales in the non-application of lean accounting is (23,484) dinars, but in light of the application of lean accounting, the share of each worker amounted to (81,992) dinars, and this indicates an increase in the share of each worker in sales under Lean Accounting This indicates a significant waste in human resources invested in the laboratory.

e. Average value of the current value of each unit (average product cost)

It is noted that with the application of lean accounting, the average cost of the product has reached (79,228) dinars per ton, which is less than the average cost of the product (in the case of non-application of lean accounting) of (111,916) dinars per ton. The low average cost of the product, and this in itself is a good indicator, as it reflects the ability of the factory to cover its costs and reach profit as quickly as possible.

#### 4.2.2.2. Second: Financial metrics

The financial metrics concerned with measuring the performance of the value stream by applying the point fund tool consist of the following:

- Revenues: The revenue stream value for the Kufa Cement Plant for the year 2018 amounted to (59,203,679,922) dinars.
- Cost of materials: The cost of the materials spent for production is represented, as the cost of the materials spent

for cement production through the application of lean accounting is (3,426,587,891) dinars, while the cost records for the factory indicate that the cost of the materials spent for production in (2018) is (5,526,754,663) dinars, and thus it is clear that there is a difference between The amount of the cost is (2,100,166,772) dinars, and the reason for this stems from the objectives of lean accounting that focuses on combating wasteful aspects in all aspects, including materials.

- c. Cost per conversion: It represents the total costs of the value stream minus the cost of materials, as the cost of conversion for the plant for the year 2018 amounted to (68,750,195,617) dinars, while the laboratory achieved conversion costs by adopting lean accounting of (49,156,736,080) dinars, and thus the application of this technology has resulted in a reduction in Transfer costs by (19,593,459,537) dinars.
- d. Stream value gain: The value stream profit represents the difference between the revenue and the cost of goods sold, as the value stream profit reached (6,647,627,666) dinars, calculated as follows:
  - Stream value gain: 6,647,627,666 dinars Noting that this realized profit is the result of the lean accounting application and what resulted in a decrease in the cost of the product, while it is noted that the factory has achieved a loss in 2018 of (12,291,814,618) dinars, calculated as follows:
  - Loss (12,291,814,618) dinars The reason for this loss is due to the high costs that are due to the presence of some activities that do not add value.
- e. Return on value stream sales (ROS): The return on value stream sales is calculated by dividing the profit of the value current by its revenue, so there is no return for the factory for the year (2018) due to the realized loss, but when applying lean accounting the return will be (0,11).

#### 4.2.2.3. Third: Energies

This scale shows the determination of plant capabilities and lost resources that have not been utilized. In this regard, energies are divided into three types as follows:

- a. Production capacity.
- b. Non-productive capacity 18%.
- c. 13% spare capacity.

It is noted from the above results from the reality of the application of the three energy measures that the plant did not take advantage of the available energy and did not reach the planned energy and this indicates a clear weakness in performance in that the plant has lost energy that was not utilized correctly due to the lack of proper planning of the course of work and production and this is what causes waste The loss in production and the impact on the quality of the product.

#### 4.2.3. Continuous improvement tool

Adopting the concept of continuous improvement in many industries is one of the important strategies that aim to provide high-quality products at a low cost and this is done through improving the performance of all activities related to the product while excluding all activities that do not add value, and in the laboratory the research sample should take operations Continuous improvement:

- a. Extraction and cracking activity: Work should be done in an appropriate manner for production by obtaining good materials with specifications that meet the requirements of manufacturing the product in terms of quality and time, and to avoid accumulation of inventory or shortages that cause work stoppages and failure to meet the requirements of customers in the specified time, and the researcher believes that the detonation process is done quickly from By purchasing the factory for a larger number of explosives, and examining the materials before transporting them to the factory to ensure that they conform to the specifications, it is also necessary to provide the appropriate environment in the quarry in order to ensure that the materials are not damaged and loss occurs, and also requires continuous maintenance of the crushers to ensure the continuity of its work It does well and does not stop suddenly, and requires choosing high-purity stone deposits.
- b. The activity of transporting raw materials to the factory: It is considered one of the important activities because it is through him that the raw materials are transported for production. The factory receives the materials from several places and then they are transported by rubber conveyors and cars. The cost of maintenance for it, which requires the purchase of modern cars and buses, to reduce the time related to transporting the raw materials and providing them in a timely manner without waiting and without any damage to these materials, and this of course damages the quality of the product.
- c. Preliminary grinding activity of materials: Grinding of the raw materials is done in the hanging mills, as these materials are mixed with water and the grinding continues until the required smoothness has been reached, and the results of interviews with laboratory engineers indicate that to achieve quality in the product in terms of the degree of smoothness of the materials that are grinded in the mills, the laboratory should apply the following steps that Reflects the technical path to be implemented in the initial milling activity of materials: Examine the materials before entering the mills and make sure that they conform to the specifications in terms of the composition and features that make the product of high quality, good grinding of materials to reach the required degree of smoothness, this is very important to match the product to quality, cleaning the mills continuously to avoid the accumulation of grinding residues, which affects the wall The mills and the materials entering for grinding, which affect the material specifications, taking samples periodically to ensure that its composition matches the required specifications and conforms to the customer requirements<sup>1</sup>. After completing the grinding and storing of the materials, it is necessary to ensure the safety of the storage silos to avoid damaging the stock while stressing that the storage is not delayed for long periods because it is considered a source of loss due to its damage and loss of specifications that affect its quality, as well as the high costs of its storage.
- d. Burning and cooling activity: It is considered one of the important activities in which the semisynthetic material is formed (clinker). After the initial grinding of the materials,

1. The customer's requirements to be met in the cement product are continuously extrapolated through market research carried out by the research and development department in the laboratory.

these materials are transported from the pans designated for them to the rotary feeding slot of the furnace. The results of the interviews with the engineers in the laboratory indicate the research sample that it is possible to make a structure for the work of the burning and cooling activity According to the steps below that the laboratory adopts regarding this activity and by applying it, the product conforms to the customer's requirements and the specifications required in the product: Examination of materials before entering the furnaces to ensure that they conform to the specifications, continuous maintenance of the furnaces to avoid sudden stoppages, as happened in 2018, in which the third furnace occurred, which affected the volume of production by decreasing and wasting a lot of resources and not using the available energy, making sure of electricity, fuel and oils for the furnaces Because the lack of any of them will lead to disruption of work and increase waiting times that are one of the main causes of loss, production of appropriate quantities of clinker and as specified to avoid stockpile accumulation, periodic inspection of materials by taking samples continuously to ensure their conformity with specifications. T and production requirements.

- e. Final grinding activity: When performing the final grinding activity, the laboratory is required to implement some important steps that fall within the scope of this activity, which laboratory engineers believe are necessary and affect the quality of the product, and these steps are the preliminary examination of the clinker material before it enters the mills, while preparing these mills and cleaning them well to avoid accumulation of waste That affect the grinding process and the product by affecting its quality, adding gypsum quantities according to the prescribed ratio, periodically checking the resulting particles to see their composition conforming to the specifications required in the product, and providing the appropriate silos to store and maintain the resulting cement Its influence in the composition.
- f. Packaging: Through the coexistence of the researcher in the laboratory, especially the packaging activity, it is clear that the packing bags of the laboratory are good, especially after opening the paper bags lab of the Kufa Cement Factory, the bags are of appropriate and good durability, and that one of the most important requirements of the customer<sup>2</sup> It is a good packaging to avoid rupture of the paper bags used for packing cement.
- g. Marketing activity: With regard to this activity, the results of the interviews with those responsible for performing this activity indicate that the lab should increase interest in this activity by paying attention to advertising and advertising to obtain more customers, as well as production according to the requirements of customers that must be provided and that fall within the scope of this activity, this would It leads to improving the quality of the product and as a result, the factory sales volume increases from this product, noting that the factory did not reach the planned sales that reached in 2018 (820,000) tons while the factory achieved actual sales for the same year of (663,352) tons and this indicates a clear

difference Between the scheme and the actual, and this It is indicated by the lack of attention to the requirements under which they work and the fundamental foundations to improve the quality of the product.

- h. Raising the competitive position: The developments that have occurred in the business environment, the opening of markets and the import of large quantities of cement have led to increased competition between foreign and domestic companies as well as between local companies themselves. Therefore, the laboratory must work to improve the quality of its product by matching its specifications to the wishes of customers, and field surveys of the researcher indicate for records The factory that the price of selling a ton of cement reached in the year 2018 (70,581) dinars, which is much lower than the selling prices of competing products, as shown in table (15-3), and this is due to a number of reasons, the most important of which is due to the failure to meet the customer requirements and try Publish these requirements On all activities that contribute to making the cement product ready for sale.
- i. Attention to environmental activities: It became clear to the researcher through the field coexistence that the laboratory, the research sample, did not give any attention to environmental activities and there are no environmental expenses despite the fact that cement production is the largest source of environmental pollution events due to the dust produced by the furnaces and the minutes resulting from grinding operations that contain nitrogen oxides, sulfur oxides and hydrocarbons Which leads to the injury of workers with many diseases of the respiratory system, therefore it requires the following laboratory:
  - Provide minute and particle removal equipment that works to book minutes before they are released into the air, and this equipment is represented by cyclones, electrostatic precipitators and bag filters.
  - Provide stable electrostatic precipitators to precipitate dust and prevent or reduce its emission to the outside. Thus, attention to environmental activities works to protect workers from risks.
- j. Attention to research and development activities: The preparation of an annual research plan of an applied and developmental nature in the areas of production and finding plans to improve production quality is very important, and according to the researcher's knowledge it was found that the laboratory did not care about this activity and did not spend any expenses that achieve the goals of the activity to be achieved, therefore the laboratory is required to give importance to this activity in order to Setting good and suitable plans and budgets for work to raise the level of production, improve it and reduce its costs, as well as research in developing the capabilities of workers and training them in terms of carrying out field surveys to study customer requirements that have a significant impact on product quality and as a result of increasing sales.
- k. Machinery and equipment: The results of the field study of the researcher in the laboratory indicate that most of his machines and equipment are old and need to be replaced as the maintenance process is intensified on an ongoing basis, while repairing what is out of them which is expected to achieve significant production if they are repaired and entered the field of work.

2. The results of the market research that the factory continuously conducts indicate that the necessity of providing good bags for cement packing is one of the basic requirements that must be fulfilled for the customer.

1. **Production Capacity:** The field surveys of the researcher indicate in the factory cost records that the planned production capacity for the year 2018 is (810000) tons, while the actual capacity amounted to (663690) tons, and this shows the amount of surplus energy and its waste in the laboratory resources, so this energy should be used for Increasing the volume of production, and this is done through proper planning of production and preparation of materials on time. This leads to a decrease in the volume of inventory and the costs associated with its storage and its exposure to the risk of damage that may affect the quality of the product.

It is noted from the above that applying the continuous improvement tool to the productive activities related to the cement product has affected the reduction of the costs of the product from (52,583,323,971) dinars to (49,227,993,243) dinars, in addition to setting many important steps and proposing improvements that have a significant impact on improving the quality of the product.

What is clear from the above is the importance of the role of lean accounting and its important tools such as (value stream, points fund, and continuous improvement) in improving the quality of the product by reducing costs related to production, excluding activities that are not adding to value and causing waste of resources, and improving the performance of all plant activities according to the steps That was proposed for the success of the application of the continuous improvement tool and thus the research hypothesis stating that (the application of lean accounting with its important tools leads to improving the quality of the product reduces its cost, eliminating waste in resources and time and performing operations related to its production processes), And work according to customer requirements).

## 5. CONCLUSIONS AND RECOMMENDATIONS

### 5.1. Conclusions

1. Lean production is a philosophy that focuses mainly on adding value to the customer, ease of flow of operations, eliminating waste and loss in production processes within economic units and as a result improving product quality.
2. Lean accounting is one of the modern technologies that have emerged as a result of the emergence of lean production, and the success of its application lies in the application of its important tools that it contains.
3. The application of lean accounting is based on the division of economic units on the basis of value streams and not on the functional basis, and the value stream represents the production line that consists of the set of activities necessary to form the product and create value for the customer.
4. The cement product is one of the important products that contribute to supporting the national economy, and it is the most affected by developments and intense competition due to the lack of demand for it compared to competing products.
5. Ignore the cost accounting system applied in the laboratory, the research sample for the relationship of cost to the product, and not to tabulate cost elements according to the known scientific tab when preparing cost statements by classifying them according to their components.
6. There is a great deal to reduce production costs and make improvements in the Kufa Cement Factory by excluding non-value-adding activities with the aim of improving the quality of the cement product.
7. The application of lean accounting technology with its important tools such as (value stream, points box, continuous improvement) in the laboratory, the research sample contributed to improving the quality of the product by reducing the costs related to it and suggesting important improvements related to it.
8. The application of lean accounting tools contributed to reducing the cost per ton of cement by (33,816) dinars, or (31%), as the cost per ton of cement was according to the traditional cost accounting system by (107,989) dinars, while it became according to the lean accounting technology, including It includes important tools at a rate of (74,173) dinars.
9. There is a weakness in relying on behavioral approach to decision making, as the results of lean accounting tools have not been relied upon.

### 5.2. Recommendations

1. In light of developments in the business environment, including the Kufa Cement Factory, the economic units should apply modern technologies in the field of management accounting that would contribute to reducing costs related to the product and suggesting its own improvements and thus improving its quality.
2. The research sample Kufa Cement Factory should develop the applied cost system and switch to modern systems and technologies that contribute to product development, improvement, and cost reduction.
3. The Kufa Cement Factory should develop the capabilities and skills of workers regarding the application of modern technologies, including lean accounting technology, and the important tools it contains for its role in achieving improvement in production processes.
4. The Kufa Cement Factory should pay attention to the research and development activity because of its role in developing the product in its direct relationship with the production department.
5. Kufa Cement Factory should considerably take care of customer requirements and meet their needs as soon as possible by dealing with competent workers to serve customers demands.
6. In light of the results achieved by the application of lean accounting tools, the economic units, including the Kufa Cement Factory, should use the research sample to exploit idle energy by finding solutions by investing them and thus improving the quality of the product by reducing its cost, reducing waste and waste in resources, time and performance, and meeting the requirements Customers.
7. We must rely on the rational and scientific method in making decisions and knowing the cause of the problem and its fragmentation in order to develop appropriate solutions.

## REFERENCES

- Abdin, H.A., Rashwan, A.R.M. (2018), The impact of using the value stream as a lean accounting tool for developing the accounting system and evaluating financial performance. *Al-Ijtihad Journal for Legal and Economic Studies*, 7(2), 558-584.
- Abdul Kadhim, A.M. (2016), The Impact of Using Agile Production Techniques on Product Quality. Master Thesis submitted to the Faculty of Administration and Economics, University of Karbala.
- Al-Zubaidi, K.I.I., Al-Bakri, R.H. (2015), The role of agile accounting in supporting corporate governance to achieve competitive advantage. *Journal of Accounting and Financial Studies*, 32(10), 1-35.
- Andersch, A. (2014), Lean Implementation and the role of Lean Accounting in the Transportation Equipment Manufacturing Industry (Doctoral Dissertation, Virginia Tech).
- Arora, V. (2016), Lean Accounting: A Case Study of Selected Enterprises in India, Master Thesis, Department of Accounting and Statistics, India University.
- Bahadir, A. (2011), The Role of Management Accounting Systems in Implementing Lean Business Strategies. Rotterdam: A Research Paper Presentation at Erasmus University.
- Bakri, A.H., Rahim, A.R.A., Yusof, N.M., Ahmad, R. (2012), Boosting lean production via TPM. *Procedia-Social and Behavioral Sciences*, 65, 485-491.
- Celik, İ.E. (2016), Mathematics and excel based statistical lean accounting implementation on a construction industry firm. *Beykent Üniversitesi Sosyal Bilimler Dergisi*, 9(1), 1-10.
- Chavez, Z., Mokudai, T. (2016), Mapping Tools Selection Towards Lean Transformation in Manufacturing Environments. Norway: Euroma 23<sup>rd</sup> Conference. p17-22.
- Daferighe, E.E., James, E.E., Offiong, P.E. (2018), Lean accounting and waste management in brewery industry in Nigeria. *Advances in Research*, 2018, 1-11.
- De Bondt, W., Mayoral, R.M., Vallelado, E. (2013), Behavioral decision-making in finance: An overview and assessment of selected research. *Spanish Journal of Finance and Accounting/Revista Española de Financiación y Contabilidad*, 42(157), 99-118.
- DeBusk, G.K. (2012), Use lean accounting to add value to the organization. *Journal of Corporate Accounting and Finance*, 23(3), 35-41.
- Dombrowski, U., Crespo, I., Zahn, T. (2010), Adaptive configuration of a lean production system in small and medium-sized enterprises. *Production Engineering* 4(4), 341-348.
- Hajjat, F., Hajjat, M.M. (2014), The effect of product quality on business performance in some Arab companies. *Journal of Emerging Trends in Economics and Management Sciences*, 5(5), 498-508.
- Haskin, D. (2010), Teaching special decisions in a lean accounting environment. *American Journal of Business Education*, 3(6), 91-96.
- Hassan, T., Mudar, A. (2013), The efficiency and effectiveness of the decision between the likelihood of using the emotional or rational style in decision making. *Damascus University Journal of Economic and Legal Sciences*, 29(1), 181-220.
- Hoang, Q., Hoang, V. (2017), Quality Management: The Importance of the Collaboration between Focal Firm and First Tier Supplier, School of Technology Degree Programme in Logistics Engineering.
- Hoe, L.C., Mansori, S. (2018), The effects of product quality on customer satisfaction and loyalty: Evidence from Malaysian engineering industry. *International Journal of Industrial Marketing*, 3(1), 20-35.
- Horngren, C., Harrison, W., Oliver, S., Best, P., Fraser, D., Tan, R., Willett, R. (2012), *Accounting*. London, United Kingdom: Pearson Higher Education AU.
- Kent, R. (2016), *Quality Management in Plastics Processing*. Amsterdam, Netherlands: Elsevier.
- Khoironi, T.A., Syah, H., Dongoran, P. (2018), Product quality, brand image and pricing to improve satisfaction impact on customer loyalty. *International Review of Management and Marketing*, 8(3), 51.
- Lopez, R.A.P., Fortuny-Santos, J., Cuatrecasas-Arbós, L. (2013), Lean manufacturing: Costing the value stream. *Industrial Management and Data Systems*,
- Maarof, M.G., Mahmud, F. (2016), A review of contributing factors and challenges in implementing kaizen in small and medium enterprises. *Procedia Economics and Finance*, 35, 522-531.
- Marker, D.A., Morganstein, D.R. (2004), Keys to successful implementation of continuous quality improvement in a statistical agency. *Journal of Official Statistics*, 20(1), 125.
- Maskell, B.H., Baggaley, B.L. (2006), Lean accounting: What's it all about? *Target*, 22(1), 35-43.
- Maskell, B.H., Baggaley, B., Grasso, L. (2011) *Practical Lean Accounting: A Proven System for Measuring and Managing the Lean Enterprise*. Boca Raton, Florida: CRC Press.
- Monroy, C.R., Nasiri, A., Peláez, M.Á. (2014), Activity based costing, time-driven activity based costing and lean accounting: Differences among three accounting systems' approach to manufacturing. In: *Annals of Industrial Engineering*. London: Springer. p11-17.
- Muhammad, R.M. (2013), The Role of Agile Accounting in Reducing Costs, Unpublished Doctoral Thesis, Submitted to the Higher Institute. Baghdad: University of Baghdad.
- Nassereddine, A., Wehbe, A. (2018), Competition and resilience: Lean manufacturing in the plastic industry in Lebanon. *Arab Economic and Business Journal*, 13(2), 179-189.
- Ogar, K. (2017), Value Creation with Lean Accounting, Thesis of Master Degree. Sweden: Lund University.
- Tuomi, V. (2012), Quality Management in Public Sector, Thesis of Master Degree. University Wasaensis.
- Veres, C., Marian, L., Moica, S. (2017), Case study concerning effects of Japanese management model application in Romania. *Procedia Engineering*, 181, 1013-1020.
- Wan, J., Zeng, M. (2013), Case study on improving quality management of W Company's new product development project. *Technology and Investment*, 4(3), 153-163.
- Weckenmann, A., Akkasoglu, G., Werner, T. (2015), Quality management-history and trends. *TQM Journal*, 27(3), 281.