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Original Paper

Do Industrial Companies in Lebanon Have the Requirements to Apply Lean Accounting? An Exploratory Study of a Sample of LCPAs

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Abstract

Significant changes have occurred in the industrial sector, including the adoption of Japanese management ideas such as waste reduction, quality manufacturing, employee participation, and continuous development. This change is a result of heightened competition among businesses, which makes it necessary to look for novel accounting ideas in order to adapt to changing client demands and obtain a competitive edge. The study at hand aimed to identify the availability of necessary requirements to apply lean accounting in industrial companies in Lebanon. The researchers identified two types of components, administrative and procedural. The researchers conducted a five-point Likert style questionnaire suitable to the subject and objectives of the study, and a random sample of 400 LCPA's was selected and the questionnaires were distributed among them. The sum of 389 questionnaires were retrieved, and all were valid for testing. The descriptive analytical approach was used to describe the variables of the study and analyze them. To test the hypotheses and analyze the data, the SPSS statistical program was used. The researchers hypothesize that industrial companies in Lebanon have the administrative capabilities to implement lean accounting. The study concluded that the industrial companies in Lebanon have the administrative and procedural requirements to apply lean accounting.

Keywords

lean accounting, value stream costing, continuous improvement, target costing, box scores

1. Introduction

Nowadays, the business environment has become more dynamic through advances in information and communications technology and globalization. This requires business sectors to be more flexible and able to adapt to changes, and to remain proactive in the ability to sense recurring changes and act accordingly. It must also distinguish one enterprise from another, and the enterprise must be able to respond to the power of supply and demand for its goods and services based on prevailing economic conditions. These conditions may cause significant differences in the level of economic activity, yet the business activities do not slow down. The industrial sector should also be sensitive to events that occur in order to harmonize globally (International Labor Organization, 2019).

The industrial sector has also witnessed many changes and developments, represented by an increased interest in developing production methods, as many industrial companies have shown great interest in production free of waste and loss of resources that enter the production process and move away from lean production. Many companies have focused their attention on introducing continuous improvements and adding value to customers and constantly striving to reduce costs and achieve a high level of quality for products (Rane, Achari, & Choudhary, 2023). This interest came to achieve a competitive advantage that distinguishes it from its competing companies, and on this basis, companies search for accounting tools that suit them in waste-free production, which include lean accounting tools that provide the company with the ability to adapt to the changes that surround it and reach advanced stages of stability and sustainability (Stronczek, 2023). In order for this to be achieved, companies work to appoint employees in different, multidisciplinary work teams to continuously improve products while reducing costs by eliminating activities that do not lead to adding value and by rearranging activities in a way that contributes to their flow and providing a quality product that meets customer desires and expectations, improving decision-making processes and raising the level of control and planning (Solís-Quinteros et al., 2021).

The industrial sector in many countries has witnessed many changes and developments, such as the rapid spread of Japanese management concepts of continuous improvement, collective employee participation, quality manufacturing, and waste reduction. The Japanese company, Toyota, has employed these concepts in all stages of manufacturing. The main reason behind these modern concepts was to increase competition between industrial companies that always seek to satisfy and meet the desires of customers despite their different requirements (Farida & Setiawan, 2022). Therefore, traditional accounting methods and concepts have become inappropriate and incompatible with these changes. Hence, there was a need to search for new concepts in accounting that help in meeting new needs and help companies achieve competitive advantage.

In order to achieve their goals, it was necessary for industrial companies to follow some methods that will help manage resources so as to reduce the amount of waste in those resources, which leads to reducing production costs and achieving competitive advantage; thus, loss-free accounting has been called lean accounting. Initially, the set of new concepts and methods was applied to the production stage

only, as it aimed to use modern production methods and modern management accounting systems to include target costing, on-time production, activity-based costing, total quality management, in addition to flexible production systems. The main goal behind applying modern production methods and administrative systems is the ability to compete and then continue (Cesaroni & Sentuti, 2014). To achieve this goal, the management must apply the concept of comprehensive quality to all aspects of the facility's activities, including financial accounting, which aims to produce appropriate and reliable information for decision-makers.

The goal of lean accounting is to eliminate waste in production and operation processes, reduce the flow time of production processes, provide accurate and rapid information, provide high-quality products, achieve greater flexibility, reduce the time required to provide products to customers, and other goals that all seek to reduce costs in general and thus achieve competitive advantage (Ditkaew, 2022). Lean accounting achieves such goals by using a set of tools such as value stream mapping, target costing, Kaizen continuous improvement, performance measurement linkage chart, value streams, box scores, value stream performance dashboards, Hoshin policy, financial planning, inventory reduction, profit-sharing, problem-solving strategies, training and employee satisfaction (Stronczek, 2023). Additionally, lean production depends on the optimal use of the organization's resources so that it can achieve its goals, through using workers with multiple skills capable of studying and understanding each activity and capable of solving its problems and developing it (Dachner et al., 2021). It is often used interchangeably with just-in-time (JIT) production, and the difference between them is that JIT emphasizes the need to solve problems, and its focus is on internal issues of the organization, while lean manufacturing emphasizes understanding customer requirements (Taghipour, et al., 2020). However, the philosophy in the lean system is to operate the system with the lowest levels of inventory, the lowest waste, the minimum space, as it is a system that does not include obstacles and is able to achieve flexibility (Tripathi, et al., 2021).

It is noted that the market in Lebanon is full of imported goods that can be produced locally due to their high quality and low costs. Therefore, imported products compete with local products; thus, industrial companies operating in Lebanon must follow some methods that help produce quality products. Given the importance of lean accounting in providing products with advantages related to quality and costs, light will be shed on some of the concepts of lean accounting, its principles and tools will be identified, and the extent to which the elements for applying lean accounting are available in industrial companies in Lebanon will be explored.

2. Literature Review

In light of the developments in modern technology and the rapid changes in the economic environment, traditional accounting is no longer able to meet the requirements of many production systems. This led to the emergence of lean accounting as an effective approach in response to the institutions' tendency to adopt lean thinking and manufacturing as modern accounting and cost management systems that create

value for work, raise the level of quality, and reduce costs. Therefore, they are considered a major reason for the emergence of lean accounting as a contemporary system created to overcome traditional accounting problems in order to make effective decisions using a set of effective and precise tools and methods (Stronczek, 2023).

A study conducted in Turkey (Kocamis, 2015) introduced the basics of lean accounting, its importance, and its impact on reducing production costs. The study explained how the organization moved from the old system of accounting to the modern one to provide better products to customers at lower prices. This methodology achieves lean manufacturing with the aim of removing processes that do not add value and thus reducing waste. This study focused on lean thinking and its elements as it focuses on five steps: defining value, determining the value stream, making the value stream flow, implementing the pull system, striving towards perfection. One of the most important findings of the study is that institutions that apply lean accounting work in accordance with the principles of lean thinking in all departments effectively and achieves the greatest number of benefits by reducing resources lost, which consequently reduces production costs.

Then there is the problem that the world is facing today, integration between sustainable business functions, and sustainability data is not sufficiently integrated (Rounaghi, et al., 2021). The researchers found that in order to solve this problem, organizations need information systems to facilitate their sustainability initiatives. Their study tested the hypothesis that costs are fixed and agreed that there is stability in the behavior of costs. The study found that most companies need to monitor, measure and control the characteristics of sustainable production in order to improve the efficiency and effectiveness of production sustainability. Therefore, the researchers concluded that measuring production sustainability has become an important issue in production and operations and designing a model to achieve the sustainable development index in order to integrate economic, social and environmental performance data of manufacturing industries by understanding resource constraints and shortages.

The study by Fullerton, et al. (2014) found a strong, positive correlation between implementing lean manufacturing strategy and strategies for success and achievement. It also concluded that implementing lean manufacturing strategy is positively related to the use of value stream costing. Moreover, implementing lean manufacturing strategy is positively related to measuring visual performance of information, where the use of value stream costing is positively associated with the use of visual performance metrics. The study finally found that the application of profound accounting principles has direct and indirect effects on operations and financial performance.

A study by Okpola (2013) aimed to apply loss-free, lean accounting as a strategy to achieve the waste-free philosophy in manufacturing companies in Nigeria. One of the most important findings reached is that lean accounting is positively linked to the waste-free business philosophy. It was concluded that the application of lean accounting will positively impact the economy in Nigeria.

The philosophy of lean manufacturing should utilize all human and material resources to maximize the wealth of the organization. The basis of the lean manufacturing philosophy is that the overall performance

of the organization must move towards standardization and follow a logical system that considers the customer or client as the focus of attention and aims to provide value to customers. The study aimed to explain the various aspects of lean, as it focused on providing an explanation of the principles of lean accounting tools and practices in Iran (Ramezani & Mahdloo, 2014). Their study reached the conclusion that lean is a management philosophy that originated from the automobile industry, and expanded until it is applied to non-production operations. Currently, it is applied to other domains such as information technology, customer services, and administrative processes. The main idea of lean is to provide more value to customers while using minimal resources. The study also showed that lean focuses on commitment to the process of continuous improvement, which can significantly affect the competitiveness of the organization. Finally, lean thinking helps eliminate waste and provide better value to the customer.

The purpose of a study by Ditkaew (2022) is to probe how spare account perpetration affects organizational performance through the interceding part of strategic decisions. The results of the analysis model's fit indicator of the abstract model, as determined by the structural equation model (SEM), are specified by the indicator examining the absolute quality of the fit measure. In addition, the results of path portions, thesis testing, and ordinary least places (OLS) retrogression analysis demonstrate that the perpetration of spare account plays a positive and significant part in determining and driving both strategic decisions and continuous improvement, which in turn appreciatively affects organizational performance.

In order to reduce production intervals and boost customer satisfaction and competitiveness in the furniture industry in Indonesia, Suhardi and Laksono (2019) studied the use of lean industrial strategies. By thorough examination of the related literature, the researchers revealed that lean manufacturing can potentially be implemented to analyze waste and address production problems. As a result, the effective use of lean manufacturing which raises customer value, decreases production costs, and increases productivity can help the company gain competitiveness in the marketplace.

Kafuku (2019) pointed out that lean methodology facilitates adapting to changing conditions. However, by only using production tools, success of the lean production system is not guaranteed. Rather, several aspects which include synchronized engineering, labor management, product development, equipment, procedure, factory planning and control, and relationships among suppliers and customers are necessary for the successful implementation of a lean manufacturing system (Kafuku, 2019). By concentrating on these aspects, the industrial sector can reduce production costs and get rid of non-value-added operations, making it more sustainable.

According to Arora and Soral (2017), lean accounting is a principle-based operating system which can be expressed in terms of customer value, value stream, flow and pull with minimum interruption, pursuit of perfection, and empowered people. It is a systematic approach to eliminate waste like overproduction, waiting, transportation, inventory, and over-processing through continuous improvement. The current cost accounting system earns profit by full utilization of resources, and is associated with large inventory,

long lead time and poor delivery, while lean system earns profit through ‘maximized flow’ on pull from customers and elimination of waste, resulting in superior customer value, good quality, good delivery and shorter lead time.

As such, there were many studies conducted as relative to the tools used to achieve lean accounting. Continuous improvement ways have evolved from systems that are primarily concentrated on product lines and reduce losses and enhance the quality of the finished product, to cold-blooded ways that concentrate on all paths in the association. Continuous improvement strategies target a variety of organizational factors and give a variety of benefits, the maturity of which can be measured in terms of quality, effectiveness, and speed (quality, cost, time) (Ghicajanu, 2018). Continuous improvement has also been developed and honored as making a significant donation to perfecting organizational products and processes, as well as adding effectiveness and profitable performance in an industry, particularly in the areas of product operation and quality operation. Agmoni (2016) presented a unique perspective into the consequences of using Kaizen in achieving dramatic performance earnings in a service organization and with its guests. The time spent in bringing Kaizen into a service organization greatly improves connections and the bottom line, both qualitatively and quantitatively, including customer and worker satisfaction and productivity.

However, according to the results of their study, Darabi, et al., (2023) assert that cultural, technical, organizational, and profitable factors are hindrances to the performance of spare accounts in manufacturing factories. The results also show that technical factors have the topmost position of chain to the performance of spare accounts in manufacturing companies and profitable factors has the lowest.

2.1 Gap in the Literature

The previous literature relative to the subject-matter of the current paper elaborates on the advantages of implementing lean accounting in industrial companies in various countries across the world. It also depicts the various tools and practices that are utilized in lean accounting. However, the current paper explores whether Lebanese industrial companies have the required aptitudes to implement lean accounting. As far as the researcher knows, this paper is the first of its kind to study this topic from this perspective.

3. Theoretical Framework

Lean accounting was developed to support lean manufacturing and production processes that originated from the automotive industry and has recently been applied in many other sectors and extended beyond that of production environments, showing remarkable gains as the advancement of manufacturing methodology is based on techniques that cost accounting methods and traditional management are not compatible with any longer (Nguyen & Ngo, 2023). This requires searching for accounting practices, tools and principles that will bridge the gap between traditional accounting practices and lean thinking. Thus, lean accounting was initially introduced to support lean manufacturing companies, but today it is

rapidly moving to the financial sector, health care services, government, and education (Almusawi, et al., 2019).

Lean accounting is a group of processes that seek to analyze the organization's systems and provide them with appropriate and accurate information to help the manager make the right decisions. Lean accounting aims to achieve optimal resource utilization at the lowest cost while maintaining the quality of products by following methods that work to eliminate processes that do not add value (Čečević & Djordjevic, 2020).

Because lean accounting has become increasingly significant and used in many companies around the world, the researchers are examining whether or not the Lebanese companies have the required potentials to implement lean accounting.

3.1 Principles of Lean Accounting

There are five principles that help guide to implementing lean accounting as follows:

a. Lean and Simple business accounting (kanbantool.com, 2023 & Gladysz et al., 2020):

The main practice relative to this principle is to continuously abolish waste from the transactions processes, reports, and other accounting methods. Tools that can be used to reach this principle, include value stream mapping, Kaizen (continuous improvement) and PDSA problem-solving (Plan, Do, Study, Act).

b. Accounting Processes That Support Lean transformation:

There are three main practices that lead to this principle (Batwara, et al., 2023, Pokuaa-Duah & Nadarajah, 2020, Salunke & Hebbar, 2014). The first practice is management control and continuous improvement, which includes tools such as performance measurement linkage chart, value stream performance boards, and box scores that show value stream performance. The second practice relative to this principle is cost management. The main tools used are value stream costing and value stream income statements. The third practice to reach this principle is customer and supplier value and cost management. One tool is utilized within this practice-target costing.

c. Clear and Timely Communication of Information:

Three practices are applied to reach this principle (McLean, 2023; Fenza et al., 2021; Brandalise et al., 2018). The first on is financial reporting, which is achieved using readily understood financial statements and simple, cash-based accounting. The second practice is visual reporting of financial and non-financial performance measurements. This practice is achieved through primary reporting using visual performance boards. The third practice is decision-making, which is accomplished through incremental cost and profitability analysis using value stream costing and box scores.

d. Planning from a Lean Perspective:

This principle can be attained using four main practices (Vaagen & Ballard, 2021; Halse, 2014; Emblemsvåg, 2014). Planning and budgeting are the first practice, and it can be attained using Hoshin policy deployment and SOFP (sales, operations and financial planning). The second practice relative to this principle is impact of lean improvement. Tools that can be used in this

practice include value stream cost and capacity analysis, current state and future state value stream maps, and box scores that show operational, financial and capacity changes from lean improvement. A third practice to attain this principle is capital planning, whose tools include incremental impact of capital expenditure on value stream box score. The fourth practice relative to this principle is investing in people. Tools that may be used in this practice include performance measurements tracking continuous improvement participation, employee satisfaction, and cross-training.

e. Strengthen Internal Accounting Control:

Two practices are utilized to achieve this principle, internal control and inventory valuation (Kaire, et al., 2023; Okpala, 2013). Tools that are used with internal control based on lean operational controls include transaction elimination matrix and process maps showing controls and SOX risks. Tools used with inventory valuation and usually simple methods to value the inventory without the requirement for perpetual inventory records and product costs.

3.2 Tools of Lean Accounting

Lean accounting utilizes various tools that were previously mentioned under the principles of lean accounting. Some of these tools follow:

a. Value Stream Mapping: It is a key tool in lean manufacturing and lean organizations. Its purpose is to view the flow of materials, information, and sometimes cash through the value stream. Value stream mapping is the starting point for lean manufacturing and the starting point for lean accounting (Dogan & Yagli, 2019). It is among the most important tools that achieve lean production, and it means all the economic activities required to achieve the production process, from beginning to end. Thus, the value is measured by the customer and is represented by a set of characteristics of the product that it has, which the customer is willing to pay for obtaining these characteristics. The value flow mapping refers to the map of the flow of information and materials throughout the product processing chain (Sasikumar, 2013). It is considered one of the most important tools used in lean planning, as it facilitates the task of lean production system practitioners to focus and plan their ideas on activities that add value and implement a set of rationalization techniques at the same time (Batra, et al., 2016).

b. Target costing: It is defined as a system for planning profits and cost management that relies on the selling price as a basic indicator, taking into account the requirements and desires of the customer (Pajrok, 2014). The target costing system requires that there be a team that includes all specializations and works to manage the cost in the first stages of production and continues throughout its life cycle (Callado et al., 2020). The value chain activities are considered part of the target costing system. Its approach is a modern one for determining cost. It is the process of determining the maximum permissible cost for the new product, or developing the original product in order to achieve growth in sales and generate a profit exceeding the maximum number of the target cost (OECD, 2015).

c. Box Score: The box score is a summary of the results of the value stream and is updated weekly with operational and financial information to obtain the results of the performance and profitability of the stream (López, et al., 2013). As for the power of the value stream, it occurs only when a significant change occurs in it. The point box is used within lean economic units and at all levels, as it gives everyone a common perspective and language to talk about lean performance (Maskell, 2007). Value stream managers use the fund to plan and segment improvements, and the continuous improvement team uses it to design improvement programs and make incremental improvements that will have a significant impact on financial and operational results. It is also used by plant and department managers to understand value stream improvement plans and evaluate performance (Khan et al., 2018). Finally, the box score is used by executives to simulate the potential effects of product market and capital investment plans. The main purpose of the weekly box score report is to focus the attention of the value stream team on areas that can benefit from continuous improvement efforts. Improvement in the results of the weekly value stream can be tracked as an influence on the effectiveness of continuous improvement efforts (Enaohow, 2021).

d. Hoshin Policy: It is a means of setting strategic goals for the future and developing the financial means to bring the goals into reality. The Hoshin policy includes the following six steps (Alic & Ideskog, 2016; Ahmed, 2016)

    1) Identifying the main issues facing the economic unit.
    2) Setting measurable goals and actions that address these issues.
    3) Determining the general vision and goals.
    4) Developing supportive strategies to achieve goals.
    5) Identifying methods and techniques that facilitate achieving goals.
    6) Implementing all necessary steps for each business process.

e. Inventory Valuation: The focus here is on providing low levels of inventory that are controllable. If a lean manufacturing system is used, inventory levels will be significantly low, and therefore, inventory evaluation will not require large costs and will not be of importance compared to if the inventory were large (Guzmán, et al., 2023; Wu, 2003). For example, if the value stream runs for three months for customer demand inventory, it is very necessary to evaluate this inventory in detail, such as using standard costs. However, if the inventory is planned for less than five days of customer demand, the relative importance of the inventory value for calculating the company's profits and financial position becomes very low. Benefits of reducing inventory include the following (Rossetti, et al., 2023):

    1) Reducing the amount of money invested in inventory.
    2) Reducing damage resulting from storage and thus reducing costs.
    3) Improving product quality through total quality management.
    4) Reducing costs resulting from remanufacturing or eliminating them completely.

To achieve these goals, a just-in-time production system must be used when the facility purchases the materials necessary to produce the units required by customers. This leads to eliminating the costs of activities that do not add value to the product, such as reducing the size of inventory, and thus reducing overall costs (Biswas & Sarker, 2020).

f. Kaizen (Continuous Improvement): Kaizen is a technique of continuous improvement that incorporates regular proposals for improvements from all staff members, including high management and the cleaning crew (Islam et al., 2019). The main goals of this system are to reduce waste and increase production, safety, and effectiveness. Japanese business practices including quality circles, automation, recommendation systems, just-in-time delivery, Kanban, and 5S are all incorporated within kaizen (Nakamori et al., 2019). It entails establishing and progressively raising standards as well as giving staff members the tools, resources, and guidance they need to meet them. Kaizen needs to start with the process owner, who actually bears accountability and duty, in order to be effective (Brunet & New, 2003). The person in command is always this person, regardless of whether they are the president, general manager, or plant manager. For kaizen to be successful, there needs to be strong leadership support and guidance (Flore, 2019).

g. PDSA problem-solving: Outlining the details of the cycle is the first thing to do before launching a PDSA cycle. What will be altered or tested, who will be involved, where data will be gathered, and what information will be required to assess whether or not objectives have been reached should all be clearly stated (NHS England, 2022). The next step is to carry out the plan, apply or test the modification, keeping in mind to collect information. After obtaining the necessary data from the modification, the assigned team should review and aggregate the findings and discuss as a team the lessons taken from the modification, testing, data, and cycle after the data has been examined. After making sure the results are documented, the team should begin planning the next cycle (McNicholas et al., 2019).

h. JIT (Just-in-Time): This type of production has a particular focus on waste reduction which is closely related to the concept of lean manufacturing. Manufacturing in response to customer needs for quantity, time, and location is known as “Just-in-Time” manufacturing. It avoids excess manufacturing, overstocking products in warehouses, unnecessary labor, storage and inventory costs (Kootanaee, 2013). Kanban is used as a scheduling approach in JIT inventory management which was developed by Taiichi Ohno, an industrial engineer at Toyota, to prevent work-in-process overcapacity. JIT inventory management implementation requires consistent output, excellent craftsmanship, no equipment failures, and dependable suppliers (Halton, 2022).

3.3 Advantages and Disadvantages of Lean Accounting

The main goal behind applying lean accounting is abolishing excess costs in production and operational processes. Although lean accounting has advantages, there are some shortcomings to applying it.

3.3.1 Advantages of Lean Accounting

Lean accounting provides accurate, understandable, and timely information to move the organization toward lean transformation, leading to decision-making regarding pricing, profitability, and cash flows (Rehamn et al., 2021). In addition, using lean accounting tools eliminates waste from accounting operations to carry out financial control on an ongoing basis Moreover, lean accounting motivates the use of lean manufacturing and improvement in the long term by following lean metrics as management's lean performance measure for control over production (Nguyen & Ngo, 2023). Lean accounting also supports the culture by motivating the human resources working in the enterprise, providing appropriate information, and encouraging continuous improvement at all levels of management in the enterprise (Assen, 2020). Lean accounting saves money and reduces costs as well, since most companies do not have plans to reduce costs or an efficient accounting system due to their preoccupation with various activities. Using lean accounting eliminates waste from transactions and reduces costs (Cescon & Grassetti, 2022). Furthermore, lean accounting clearly identifies the financial impact of improvements. Many companies use traditional systems to reduce costs, but using lean accounting eliminates loss and waste of enterprise resources and saves energy (Shehadeh & Al-Beshtawi, 2023). Besides, financial evaluation often depends on lean accounting to improve performance (Amahi, 2023).

3.3.2 Drawbacks of Lean Accounting

Transitioning from traditional accounting may be difficult since lean accounting calls for a lot of new processes that could be difficult and time-consuming to implement as everyone in the organization should be working in parallel (Chiarini, 2012). Additionally, maximization of profit is the primary objective of lean accounting; however, it comes at a high and difficult cost. Usually, transition to lean accounting has to be done in small phases, and thus, it requires a great deal of time to finish (Bakke & Johansen, 2019). It also requires that the company maintain low stock levels as one lean accounting strategy is to increase immediate profits. However, if orders increase significantly or abruptly, this could become an issue. Moreover, two sets of financial reports must be completed (Rehman, et al., 2021). Generally speaking, lean accounting reports cannot replace standard reports under the regulatory requirements of the country. Should lean accounting be implemented, the company's accounting team may have to run two separate sets of reports since most accounting software can only generate standard financial reports (Stronczek, 2023).

4. Research Questions and Hypotheses

This study took interest in searching for the availability of the required elements for applying lean accounting in industrial companies in Lebanon, where the research problem can be formulated in the two main questions as follows:

4.1 First Main question:

Do industrial companies in Lebanon have the administrative capabilities to implement lean accounting?

From this main question, five sub-questions arise as follows:

1) Do industrial companies in Lebanon have a sound management system that helps implement lean accounting?
2) Do industrial companies in Lebanon have an effective accounting information system that helps in implementing lean accounting?
3) Do industrial companies in Lebanon have an effective financial and production planning system that helps implement lean accounting?
4) Do industrial companies in Lebanon have an effective monitoring and performance measurement system that helps in applying lean accounting?
5) Do industrial companies in Lebanon have an effective system for continuous employee training that helps in implementing lean accounting?

4.2 Second Main Question:

Do industrial companies in Lebanon have the procedural components necessary to apply lean accounting, represented by the basic principles of lean thought?

From this main question, five sub-questions arise as follows:

1) Do industrial companies in Lebanon have a principle of determining value?
2) Do industrial companies in Lebanon have a value stream principle?
3) Do industrial companies in Lebanon have a value flow principle?
4) Do industrial companies in Lebanon have the principle of production on demand?
5) Do industrial companies in Lebanon have the principle of continuous improvement?

Based on the literature review and the fore-mentioned research questions, the researcher hypothesizes the following:

H_1: Industrial companies in Lebanon have the administrative capabilities to implement lean accounting.

Five sub-hypotheses emerge from this hypothesis as follows:

$H_{1.1}$: Industrial companies in Lebanon have a sound management system that helps implement lean accounting.

$H_{1.2}$: Industrial companies in Lebanon have an effective accounting information system that helps in implementing lean accounting.

$H_{1.3}$: Industrial companies in Lebanon have an effective financial and production planning system that helps implement lean accounting.

$H_{1.4}$: Industrial companies in Lebanon have an effective monitoring and performance measurement system that helps in applying lean accounting.

$H_{1.5}$: Industrial companies in Lebanon have an effective system for continuous employee training that helps in implementing lean accounting.

H_2: Industrial companies in Lebanon have the procedural components necessary to apply lean accounting, represented by the basic principles of lean thought.

Five sub-hypotheses emerge from this hypothesis as follows:

$H_{2.1}$: Industrial companies in Lebanon have a principle of determining value.

$H_{2.2}$: Industrial companies in Lebanon have a value stream principle.

$H_{2.3}$: Industrial companies in Lebanon have a value flow principle.

$H_{2.4}$: Industrial companies in Lebanon have the principle of production on demand.

$H_{2.5}$: Industrial companies in Lebanon have the principle of continuous improvement.

5. Research Importance

There is an urgent need for researches that positively tackle the potentials of applying lean accounting in Lebanon as this form of accounting can help save money and reduce costs for industries. It is also critical for users of financial information to assess the company's development.

6. Research Procedures and Methodology

The researchers used a descriptive-analytical approach in discussing subject-matter of the research. The researchers chose this approach because it is appropriate to attain the objectives of the research. It includes describing numerous actions, addressing the research questions, and providing relevant discussions and conclusions based on the data that the researchers have gathered. These attained results help respond to the research problem, including the sub-questions, so as to reach a comprehensive familiarity of the subject-matter of the study at hand. Thus, the researchers constructed a five-point Likert Style questionnaire of 60 items and distributed among a sample of 400 LCPAs, of which 389 were retrieved and all were valid for analysis.

6.1 Population and Sample Selection

The target population for this study is all certified public accountants in Lebanon. The insertion of certified public accountants (CPAs) in the study is because of their proven skills, as they were assessed by holding the required, relevant certificates. Hence, selecting LCPAs as the study population is appropriate to the research objectives. From the study population, the researcher randomly selected 389 individuals.

The demographic data of the sample is shown in Table 1:

Table 1. Demographic Data of the Sample

Variable	Frequency	Percentage
Education		
Bachelor	231	59.38%
Master	119	30.6%
PhD	39	10.02%
Major		

Accounting	212	54.5%
Economics	12	3.09%
Business administration	128	32.9%
Banking and Finance	37	9.51%
Years of experience		
0 – 5 years	18	4.63%
5 – 10 years	53	13.62%
10 – 15 years	204	52.44%
15 years and above	114	29.31%
Total		**100.0%**

It is quite clear from Table 1 that 59.38% of the participants have Bachelor's degrees. In addition, 30.6% have Masters' and 10.02% have PhDs. most of whom (54.5%) have majored Accounting which is the appropriate major to understand the items of the questionnaire and can give a professional and reliable response for the subject-matter of the study at hand. It is also evident that 81.75% of the sample has more than 10 years of experience in practicing the profession which adds to the reliability of the responses.

6.2 Instrumentation

Based on the previous literature, scientific discussions with university Professors and interviews made with some managers and owners of industrial companies in Lebanon, in addition to the researchers' personal experience, the researchers constructed a five-point Likert Style questionnaire with 60 items. The scale ranges as in Table 2:

Table 2. Correct Tool of the Study

Scale	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
Score	5	4	3	2	1

Table No. 3 provides the scale categories and the scope of each:

Table 3. The Five-point Likert Scale

	Approval Level				
	Very low	**Low**	**Moderate**	**High**	**Very high**
Mean	< 1.8	1.8 - 2.59	2.6 - 3.39	3.4 - 4.19	> 4.2
Relative Weight	< 36%	36% - 51.9%	52% - 67.9%	68% - 83.9%	> 84

6.3 Data Analysis and Discussion

Findings of the current study also show Cronbach's Alpha and Guttman Split-Half Coefficient as in Table 4:

Table 4. Reliability of the Questionnaire Using Cronbach's Alpha

Domain	Cronbach's Alpha		Split-Half	
	Number of Items	Cronbach's Alpha	Correlation between forms	Guttman Split-Half Coefficient
First Part	24	0.97	0.89	0.96
Second Part	36	0.97	0.87	0.97
Overall	**60**	**0.97**	**0.88**	**0.97**

It is evident from Table 4 that Cronbach's Alpha for the items of the questionnaire as a whole is **0.97** and the Guttman Split-Half Coefficient is **0.97**, which means that there is reliability in all items of the questionnaire

7. Testing the Hypotheses

7.1 The First Sub-hypothesis

$H_{1.1}$: Industrial companies in Lebanon have a sound management system that helps implement lean accounting.

Table 5. Testing the First Sub-hypothesis

Items related to the first sub-hypothesis	Mean	S. D	Relative weight	T	Level of Approval
1. The company has an accounting information system that helps it achieve its goals.	4.12	0.73	82.3%	15.55	High
2. The accounting information system used processes data quickly enough to provide the management with appropriate and timely information.	3.52	0.66	69.9%	19.23	High
3. Quantitative and functional information stored in databases can be retrieved quickly and accurately.	4.11	0.74	81.2%	21.84	High

4. The company's accounting information system is characterized by high flexibility to adapt to emergency changes in the facility.	3.61	0.83	70.9%	19.45	High
5. The company's accounting information system is suitable for users of this system.	3.63	0.992	71.3%	31.54	High
Total	**3.69**	**0.73**	**73.9%**	**24.63**	

Significant at (P) < 0.05

In general, the mean of the sample's responses to all items of the first domain of the questionnaire relative to the study is **3.69** and relative weight of **73.9%**. Also, the value of the calculated 'T' test is **24.63**, which is greater than the value of tabulated 'T' at the significance 0.05. This means that there is an increase of statistical significance to the neutral level in the average responses of the members of the sample; consequently, the first sub- hypothesis of the study which states **"Industrial companies in Lebanon have a sound management system that helps implement lean accounting"** is accepted.

7.2 The Second Sub-hypothesis

$H_{1.2}$: Industrial companies in Lebanon have an effective accounting information system that helps in implementing lean accounting.

Table 6. Testing the Second Sub-hypothesis

Items related to the second sub-hypothesis	Mean	S. D	Relative weight	T	Level of Approval
6. The company's management has sufficient experience to make appropriate decisions regarding determining the company's resource needs.	3.72	1.11	74.4%	22.31	High
7. The company's management has the ability to carry out its tasks of planning, organizing, coordinating and controlling without wasting time.	4.12	0.84	82.4%	13.59	High
8. The company's management has the ability to carefully study the internal and external environment.	3.91	0.78	77.8%	34.87	High
9. The company's management can properly utilize its available resources without any wasted resources.	3.61	0.89	70.9%	22.85	High
Total	**3.84**	**0.88**	**76.6%**	**9.64**	

Significant at (P) < 0.05

In general, the mean of the sample's responses to all items of the first domain of the questionnaire relative to the study is **3.84** and relative weight of **76.6%**. Also, the value of the calculated 'T' test is **9.64**, which is greater than the value of tabulated 'T' at the significance 0.05. This means that there is an increase of statistical significance to the neutral level in the average responses of the members of the sample; consequently, the second sub-hypothesis of the study which states **"Industrial companies in Lebanon have an effective accounting information system that helps in implementing lean accounting" is accepted.**

7.3 The Third Sub-hypothesis

$H_{1.3}$: Industrial companies in Lebanon have an effective financial and production planning system that helps implement lean accounting.

Table 7. Testing the Third Sub-hypothesis

Items related to the third sub-hypothesis	Mean	S. D	Relative weight	T	Level of Approval
10. The company has a strategic plan that can keep pace with internal and external changes.	4.23	0.87	84.6%	14.38	Very High
11. The company's management can determine the target market sectors and segments.	3.51	0.94	69.7%	43.51	High
12. The company has a financial and production plan through which it determines the sources of obtaining the necessary resources at the lowest costs.	3.95	0.89	79.2%	42.62	High
13. The company's management develops an appropriate plan to invest its available funds in a way that ensures the best possible returns.	3.93	1.11	78.1%	38.15	High
Total	**3.90**	**0.87**	**78%**	**10.66**	

Significant at (P) < 0.05

In general, the mean of the sample's responses to all items of the first domain of the questionnaire relative to the study is **3.90** and relative weight of **78%**. Also, the value of the calculated 'T' test is **10.66**, which is greater than the value of tabulated 'T' at the significance 0.05. This means that there is an increase of statistical significance to the neutral level in the average responses of the members of the sample; consequently, the third sub-hypothesis of the study which states **"Industrial companies in Lebanon have an effective financial and production planning system that helps implement lean accounting"** is accepted.

7.4 The Fourth Sub-hypothesis

$H_{1.4}$: Industrial companies in Lebanon have an effective monitoring and performance measurement system that helps in applying lean accounting.

Table 8. Testing the Fourth Sub-hypothesis

Items related to the fourth sub-hypothesis	Mean	S. D	Relative weight	T	Level of Approval
14. The time for implementing activities within the company is monitored and studied.	3.89	0.91	77.5%	33.16	High
15. The company continuously monitors workers to determine the extent to which they complete their duties within the specified time.	3.81	0.89	73.6%	33.14	High
16. A control system that includes preventive and corrective measures is implemented.	3.92	0.82	77.8%	32.12	High
17. There is continuous monitoring by the company's management of the quality level of the products provided to customers.	3.51	1.01	69.7%	21.21	High
18. The company has an internal control system capable of operating with complete independence.	3.73	0.94	72.4%	22.11	High
19. There is continuous monitoring by the company's management of the quality level of the products provided to customers.	3.72	1.01	72.3%	56.16	High
Total	**3.76**	**0.95**	**72.5%**	**22.12**	

Significant at (P) < 0.05

In general, the mean of the sample's responses to all items of the first domain of the questionnaire relative to the study is **3.76** and relative weight of **72.5%**. Also, the value of the calculated 'T' test is **22.12**, which is greater than the value of tabulated 'T' at the significance 0.05. This means that there is an increase of statistical significance to the neutral level in the average responses of the members of the sample; consequently, the fourth sub-hypothesis of the study which states**: "Industrial companies in Lebanon have an effective monitoring and performance measurement system that helps in applying lean accounting."** is accepted.

7.5 The Fifth Sub-hypothesis

$H_{1.5}$: Industrial companies in Lebanon have an effective system for continuous employee training that helps in implementing lean accounting.

Table 9. Testing the Fifth Sub-hypothesis

Items related to the fifth sub-hypothesis	Mean	S. D	Relative weight	T	Level of Approval
20. The company's management participates with employees in drawing up plans and setting goals that suit each department of the company.	3.81	1.12	73.6%	45.21	High
21. The company provides the necessary training programs for its employees to develop their capabilities according to their needs.	3.83	1.16	74.5%	44.63	High
22. The company contributes to training employees to increase their ability to detect errors.	4.18	0.61	83.5%	19.77	High
23. The company's management pays attention to the human element by recruiting, motivating and training qualified individuals.	3.93	1.02	78.1%	36.84	High
24. The company allocates an annual budget to train its employees.	4.13	0.75	82.6%	15.40	High
Total	**3.97**	**0.73**	**79.4%**	**13.56**	

Significant at (P) < 0.05

In general, the mean of the sample's responses to all items of the first domain of the questionnaire relative to the study is **3.97** and relative weight of **79.4%**. Also, the value of the calculated 'T' test is **13.56**, which is greater than the value of tabulated 'T' at the significance 0.05. This means that there is an increase of statistical significance to the neutral level in the average responses of the members of the sample; consequently, the fifth sub-hypothesis of the study which states **"Industrial companies in Lebanon have an effective system for continuous employee training that helps in implementing lean accounting"** is accepted.

7.6 The Sixth Sub-hypothesis

$H_{2.1}$: Industrial companies in Lebanon have a principle of determining value.

Table 10. Testing the Sixth Sub-hypothesis

Items related to the sixth sub-hypothesis	Mean	S. D	Relative weight	T	Level of Approval
25. The customer is the focus of the organization.	3.89	0.69	76.7%	36.25	High
26. The company's management communicates with customers continually to see their needs.	2.79	1.02	54.2%	38.47	Moderate
27. The company offers its products to customers at prices that suit them.	3.91	0.77	77.6%	26.31	High
28. The products are designed according to the customers' desires and according to the specifications they require.	3.99	0.84	78.4%	22.85	High
29. The products are delivered to the customers timely and without any delay.	3.72	0.82	74.4%	19.66	High
30. A distinction can be made between activities that add value and activities that do not add value for the customer.	3.69	0.73	73.9%	24.63	High
31. The value of activities is determined according to the customers' point of view.	3.72	0.88	74.4%	20.66	High
32. A distinction can be made between activities that add value and activities that do not add value to the customer.	4.00	0.99	78.9%	34.25	High
Total	**3.71**	**1.01**	**74.2%**	**7.18**	

Significant at (P) < 0.05

In general, the mean of the sample's responses to all items of the first domain of the questionnaire relative to the study is **3.71** and relative weight of **74.2%**. Also, the value of the calculated 'T' test is **7.18**, which is greater than the value of tabulated 'T' at the significance 0.05. This means that there is an increase of statistical significance to the neutral level in the average responses of the members of the sample; consequently, the sixth sub-hypothesis of the study which states **"Industrial companies in Lebanon have a principle of determining value"** is accepted.

7.7 The Seventh Sub-hypothesis

$H_{2.2}$: Industrial companies in Lebanon have a value stream principle.

Table 11. Testing the Seventh Sub-hypothesis

Items related to the seventh sub-hypothesis	Mean	S. D	Relative weight	T	Level of Approval
33. Work is divided according to value streams (the series of operations needed to reach a specific product or group of products).	3.71	0.89	74.2%	41.82	High
34. The number of value streams to be created is specified.	4.20	1.11	84.0%	19.88	Very High
35. The processes involved in each value stream are identified.	3.99	1.02	74.4%	26.35	High
36. Each value stream is charged with its own costs.	4.43	0.60	88.6%	24.21	Very High
37. Available resources (workers, machines, etc.) are distributed among the value streams to ensure the independence of each stream.	4.10	0.78	82%	14.29	High
38. The authority and responsibilities of the value stream team are defined precisely and clearly.	4.10	0.85	82%	13.10	High
Total	**4.08**	**0.77**	**81.6%**	**14.23**	

Significant at (P) < 0.05

In general, the mean of the sample's responses to all items of the first domain of the questionnaire relative to the study is **4.08** and relative weight of **81.6%**. Also, the value of the calculated 'T' test is **14.23**, which is greater than the value of tabulated 'T' at the significance 0.05. This means that there is an increase of statistical significance to the neutral level in the average responses of the members of the sample; consequently, the seventh sub-hypothesis of the study which states **"Industrial companies in Lebanon have a value stream principle"** is accepted.

7.8 The Eighth Sub-hypothesis

$H_{2.3}$: Industrial companies in Lebanon have a value flow principle.

Table 12. Testing the Eighth Sub-hypothesis

Items related to the eighth sub-hypothesis	Mean	S. D	Relative weight	T	Level of Approval
39. Production units to be manufactured flow from one process to another simultaneously.	4.07	0.80	81.4%	13.54	High
40. Activities and operations within the company flow smoothly and easily without any obstacles.	4.08	0.76	81.6%	14.46	High
41. Working methods and tools are used to help eliminate the production of defective products.	4.10	0.85	82%	13.10	High
42. The machines inside the factory are arranged sequentially to ensure production flow with no waiting periods.	3.60	0.93	70.4%	52.87	High
43. Process flow maps are drawn and used for the value stream (maps that show the flow of the production process).	4.29	0.77	85.8%	17.03	Very High
44. Areas of loss and waste in resources and time can be identified.	3.81	0.97	73.6%	39.48	High
45. Just-in-time production is used instead of mass production.	4.10	0.87	82%	12.93	High
Total	**4.00**	**0.87**	**80%**	**11.72**	

Significant at (P) < 0.05

In general, the mean of the sample's responses to all items of the first domain of the questionnaire relative to the study is **4.00** and relative weight of **80%**. Also, the value of the calculated 'T' test is **11.72**, which is greater than the value of tabulated 'T' at the significance 0.05. This means that there is an increase of statistical significance to the neutral level in the average responses of the members of the sample; consequently, the eighth sub-hypothesis of the study which states **"Industrial companies in Lebanon have a value flow principle"** is accepted.

7.9 The Ninth Sub-hypothesis

$H_{2.4}$: Industrial companies in Lebanon have the principle of production on demand.

Table 13. Testing the Ninth Sub-hypothesis

Items related to the eighth sub-hypothesis	Mean	S. D	Relative weight	T	Level of Approval
46. Operations are scheduled to fulfill customer orders that arrive at the company.	3.83	0.78	74.5%	26.66	High
47. Production is carried out according to customer orders and not according to market demand forecasts.	4.13	0.76	82.6%	15.11	High
48. The company builds a strong partnership with suppliers to ensure prompt supply without delay.	4.00	0.88	80%	11.57	High
49. The company relies on well-trained and equipped workers.	3.41	1.02	68.1%	44.78	High
50. Modern machinery and equipment are used to meet customers' changing needs and requirements.	4.08	0.69	81.6%	15.86	High
51. The company seeks to reduce the storage of finished products, which is considered a non-value adding activity.	4.05	0.76	81%	14.15	High
52. A system for immediate maintenance and periodic inspection of machines is available.	4.13	0.83	82.6%	13.78	High
Total	**3.94**	**0.84**	**79%**	**11.55**	

Significant at (P) < 0.05

In general, the mean of the sample's responses to all items of the first domain of the questionnaire relative to the study is **3.94** and relative weight of **79%**. Also, the value of the calculated 'T' test is **11.55**, which is greater than the value of tabulated 'T' at the significance 0.05. This means that there is an increase of statistical significance to the neutral level in the average responses of the members of the sample; consequently, the ninth sub-hypothesis of the study which states **"Industrial companies in Lebanon have the principle of production on demand"** is accepted.

7.10 The Tenth Sub-hypothesis

$H_{2.5}$: Industrial companies in Lebanon have the principle of continuous improvement.

Table 14. Testing the Tenth Sub-hypothesis

Items related to the tenth sub-hypothesis	Mean	S. D	Relative weight	T	Level of Approval
53. The company's management cooperates with teams of operators and technicians to make continuous improvements.	4.38	0.66	87.6%	21.36	Very High
54. The products provided to customers are monitored continuously to ensure their quality.	4.32	0.75	86.4%	17.82	Very High
55. The company uses new technology and techniques in production processes.	4.09	0.77	81.8%	14.49	High
56. The company's management communicates with international companies to find out everything new in the world of industry.	4.06	0.58	81.1%	15.53	High
57. The company's senior management supports the improvement programs on an ongoing basis.	4.10	0.92	82%	12.16	High
58. The company's management seeks to satisfy its customers by improving the quality of the products provided to them.	4.18	0.64	83.7%	18.70	High
59. The company's management seeks to spread a culture of eliminating waste (activities that don't add value) among employees.	4.09	0.83	81.8%	13.42	High
60. The company's management works on correcting and addressing errors instead of focusing on the people who err.	4.07	0.87	81.3%	12.47	High
Total	**4.16**	**0.85**	**83.2%**	**13.98**	

Significant at (P) < 0.05

In general, the mean of the sample's responses to all items of the first domain of the questionnaire relative to the study is **4.16** and relative weight of **83.2%**. Also, the value of the calculated 'T' test is **13.98**, which is greater than the value of tabulated 'T' at the significance 0.05. This means that there is an increase of statistical significance to the neutral level in the average responses of the members of the sample; consequently, the tenth sub-hypothesis tenth sub-hypothesis tenth sub-hypothesis of the study which states "**Industrial companies in Lebanon have the principle of continuous improvement"** is accepted.

8. Findings and Discussion

In this paper, the researchers examine whether industrial companies in Lebanon have the necessary administrative and procedural requirements to apply lean accounting. Thus, they went through the related literature and prepared a questionnaire which LCPA's replied to the 60 items in it. Based on the results of the empirical study, the researchers conclude that industrial companies in Lebanon have an effective accounting information system which can help the management provide enhanced analysis and reporting of finances. It also provides the management with improved decision-making through quick and precise financial data access. The results showed also that industrial companies in Lebanon have sound management systems that can assist the management to minimize downtime, extend the life of equipment, and provide the workers with a safe working environment. It can genuinely ease operations, provide reliability, and maximize profit. Further, the results showed that industrial companies in Lebanon have an effective financial and production planning system which can help reduce cost, improve efficiency, and manage resources in a much-improved manner. Additionally, the results of the study assert that industrial companies in Lebanon have an effective monitoring and performance measurement system, which improves the management's decision-making process and improve accountability to a great extent. It also helps the management set up the company's goals and decide on continuous improvement programs. The results of the study assure that industrial companies in Lebanon have an effective system for continuous employee training which may increase employee performance and build a stronger working force in the company. With adequate training, accidents and injuries will be reduced. This will lead to a safer workplace for the workers who become less likely to make mistakes, which in turn leads to saving costs for the company. Moreover, the study found that industrial companies in Lebanon have a principle of determining value, which is important in more than a way. It helps the company increase competitiveness, reach enhanced financial performance, and assess and manage risks more efficiently. The results of the current study also showed that industrial companies in Lebanon have a value stream principle which helps reduce waste and enhance efficiency. It also helps the management to improve the quality of the company's products leading to achieving customer satisfaction. The researchers further found that industrial companies in Lebanon have a value flow principle which is critical for industrial companies since optimizing the value flow from raw materials to the final product during the production process is the main goal of the value flow principle in industrial organizations. This idea seeks to reduce waste, boost effectiveness, and raise total productivity. Value flow concepts can help businesses cut expenses, shorten lead times, and enhance quality of their products, and thus, achieve customer satisfaction. The results of the study at hand additionally showed that industrial companies in Lebanon apply the principle of production on demand, which helps the company in many ways. It reduces inventory costs as the industrial company would produce goods only when there is demand. The company would also have a faster response to market changes as it allows the company to adjust levels of their production which enables the company to meet the needs of their customers in a better way. The final result the study rendered is that industrial companies in Lebanon apply the principle of continuous

improvement which pertains to the constant endeavor to enhance internal processes, services, or products. This strategy helps industrial companies in maintaining their competitiveness, adjusting to shifting market dynamics, and satisfying client requests more successfully.

Suggestions for future research

Further research about the application of lean accounting can include: adoption of lean accounting in small and medium-sized businesses, global supply chain management, and the application of lean accounting in the service industries. All these are all possible topics for future research related to lean accounting.

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