


THE IMPACT OF APPLYING LEAN ACCOUNTING TOOLS IN REDUCING INDUSTRIAL COSTS ON A SAMPLE OF COMPANIES OPERATING IN SUDIR INDUSTRIAL - KINGDOM SAUDI ARABIA

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ARTICLE INFO	ABSTRACT
<p>Article history:</p> <p>Received 08 May 2023</p> <p>Accepted 04 August 2023</p>	<p>Purpose: This research intends to determine the effect of adopting lean accounting methods on a sample of enterprises operating in Sudair Industrial City in the Kingdom of Saudi Arabia in decreasing industrial expenses.</p>
<p>Keywords:</p> <p>IFRS; Cost of Equity; Cost Reduction; Firm Value; Lean Accounting; Industrial Companies; Sudair City.</p>	<p>Theoretical framework: In addition, it seeks to identify barriers to the use of lean accounting techniques. The researcher relied on a questionnaire that was pertinent to the topic of the study and its aims in order to meet the study's objectives, test the hypotheses, and answer the questions posed by the study sample.</p>
	<p>Approach: A sample of thirty industrial businesses was picked at random. The descriptive analytical approach was used to characterize the research variables and test hypotheses by analyzing data using the statistical software SPSS. Eighty questionnaires were given.</p>
	<p>Findings: The research yielded several findings, the most significant of which is the below-average adoption of the studied lean accounting methods owing to a lack of training and understanding of the lean accounting culture. Use accounting tools. The research also indicated that using lean accounting tools helps enterprises in Sudair Industrial City lower their industrial expenses, although there are hurdles to implementing lean accounting technologies.</p>
	<p>Research, practical & social implications: The research ended with a series of suggestions, the most significant of which is the need for industrial enterprises to implement lean accounting principles, take use of the advantages and benefits afforded by this method, and disseminate the production culture and lean mindset.</p>
	<p>Value: Creating efficient ways to overcome the constraints that limit the adoption of lean accounting technologies to realize the Saudi Arabian goal (2030).</p>
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O IMPACTO DA APLICAÇÃO DE FERRAMENTAS DE CONTABILIDADE LEAN NA REDUÇÃO DOS CUSTOS INDUSTRIAIS EM UMA AMOSTRA DE EMPRESAS QUE OPERAM NA SUDIR INDUSTRIAL - REINO DA ARÁBIA SAUDITA

RESUMO

Objetivo: Esta pesquisa pretende determinar o efeito da adoção de métodos contábeis de lean manufacturing em uma amostra de empresas que operam em Sudair Industrial City, no Reino da Arábia Saudita, na diminuição das despesas industriais.

Quadro teórico: Além disso, procura identificar os obstáculos à utilização de técnicas de contabilidade simplificadas. A pesquisadora utilizou um questionário pertinente ao tema do estudo e seus objetivos para cumprir os objetivos do estudo, testar as hipóteses e responder às perguntas colocadas pela amostra do estudo.

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Abordagem: Uma amostra de trinta empresas industriais foi escolhida aleatoriamente. A abordagem analítica descritiva foi usada para caracterizar as variáveis de pesquisa e hipóteses de teste, analisando dados usando o software estatístico SPSS. Foram enviados 80 questionários.

Conclusões: A pesquisa produziu várias descobertas, a mais significativa das quais é a adoção abaixo da média dos métodos de contabilidade de lean estudado devido à falta de treinamento e compreensão da cultura de contabilidade de lean. Use ferramentas de contabilidade. A pesquisa também indicou que o uso de ferramentas contábeis enxutas ajuda as empresas na Cidade Industrial de Sudair a reduzir suas despesas industriais, embora haja obstáculos para a implementação de tecnologias contábeis enxutas.

Investigação, implicações práticas e sociais: A investigação terminou com uma série de sugestões, a mais significativa das quais é a necessidade de as empresas industriais implementarem princípios de contabilidade simplificada, utilizarem as vantagens e benefícios proporcionados por este método e disseminarem a cultura de produção e a mentalidade simplificada.

Valor: Criando maneiras eficientes de superar as restrições que limitam a adoção de tecnologias de contabilidade enxuta para alcançar a meta da Arábia Saudita (2030).

Palavras-chave: IFRS, Custo do Capital Próprio, Redução de Custos, Valor Firme, Contabilidade Lean, Empresas Industriais, Cidade do Sudair.

EL IMPACTO DE LA APLICACIÓN DE HERRAMIENTAS DE CONTABILIDAD LEAN EN LA REDUCCIÓN DE COSTOS INDUSTRIALES EN UNA MUESTRA DE EMPRESAS QUE OPERAN EN SUDIR INDUSTRIAL - REINO DE ARABIA SAUDITA

RESUMEN

Objetivo: Esta investigación pretende determinar el efecto de la adopción de métodos de contabilidad lean en una muestra de empresas que operan en la Ciudad Industrial Sudair en el Reino de Arabia Saudita en la disminución de los gastos industriales.

Marco teórico: Además, busca identificar barreras al uso de técnicas de contabilidad lean. El investigador se basó en un cuestionario que era pertinente al tema del estudio y sus objetivos con el fin de cumplir con los objetivos del estudio, probar las hipótesis y responder a las preguntas planteadas por la muestra de estudio.

Enfoque: Se seleccionó al azar una muestra de treinta empresas industriales. Se utilizó el enfoque analítico descriptivo para caracterizar las variables de investigación y probar hipótesis mediante el análisis de datos utilizando el software estadístico SPSS. Se entregaron 80 cuestionarios.

Resultados: La investigación arrojó varios resultados, el más significativo de los cuales es la adopción por debajo de la media de los métodos de contabilidad lean estudiados debido a la falta de capacitación y comprensión de la cultura de contabilidad lean. Utilizar herramientas de contabilidad. La investigación también indicó que el uso de herramientas de contabilidad lean ayuda a las empresas en Sudair Industrial City a reducir sus gastos industriales, aunque existen obstáculos para la implementación de tecnologías de contabilidad lean.

Investigación, implicaciones prácticas y sociales: La investigación concluyó con una serie de sugerencias, la más significativa de las cuales es la necesidad de que las empresas industriales implementen principios de contabilidad lean, aprovechen las ventajas y beneficios que ofrece este método y difundan la cultura de producción y la mentalidad lean.

Valor: Crear formas eficientes de superar las limitaciones que limitan la adopción de tecnologías de contabilidad simplificada para alcanzar el objetivo de Arabia Saudita (2030).

Palabras clave: IFRS, Coste del Capital, Reducción de Costes, Valor en Firme, Contabilidad Lean, Empresas Industriales, Ciudad de Sudair.

INTRODUCTION

The increase in development took place in all economic, social, and technological aspects, and with the advent of modern production mechanisms and advanced management methods, it became imperative for companies to work to reduce costs and improve the quality of their products. mass production situation to achieve their goals, and Saudi Arabia is no

exception. And it was able to achieve many of these goals and even exceed them in stages, as the Kingdom's Vision 2030 has adopted a number of programs, initiatives, and projects that enhance efforts to achieve sustainable development, including the housing program, the quality-of-life program, the financial balance program, the national personality program, and the national industries and services development program (Al Robaaiy & Al-Husseini, 2022). Realizing that traditional accounting systems are not compatible with modern administrative techniques and tools produced by the concept of lean production, companies are also no longer able to meet the requirements of companies to make decisions and discover waste and loss of resources, which created the need to innovate new accounting methods and methods away from the traditional methods used to develop And increasing efficiency in order to improve the quality of production, and this was represented in what is known as the lean accounting method, to keep pace with the acceleration and rhythm of modern developments (Abdullah Al-Tamimi, 2023). Changes in the business world and commercial establishments, especially industrial ones, made it necessary for these places to look for new ways to make things so they could stay in business in a world full of competition. Lean Financial Accounting and the problem of the study come from the fact that accounting information systems, which are affected by the accounting system, have waste and loss in how they work. Therefore, the problem of the study can be formulated as follows: Therefore, the problem of the study lies in answering the main questions, which are as follows:

1. To what degree do industrial enterprises in Sudair Industrial City use lean accounting tools?
2. What impact does the use of lean accounting technologies to industrial enterprises in Sudair Industrial City have on cost reduction?
3. What are the impediments to using lean accounting methods in industrial firms in Sudair Industrial City?

The research objectives are the following:

1. Identify the extent to which lean accounting tools are applied to industrial companies in Sudair Industrial City.
2. Knowing the effect of applying lean accounting tools to industrial companies in Sudair Industrial City to reduce costs.
3. Identifying the obstacles to applying lean accounting tools to industrial companies in Sudair Industrial City.

The importance of the practical study is that it shows the transition from the application of traditional accounting tools to reduce costs to the use of the concept of lean accounting tools. And practices through its tools and principles of value flow, customized production, and continuous improvement help rationalize the available resources in order to reduce loss and waste and raise production efficiency. The scientific importance, according to the researcher's knowledge, is that this study is the first accounting study that was applied to Sudair Industrial City, in addition to supporting applied studies and enriching the literary library in the field of lean accounting.

Its hypotheses have been formulated as follows:

- The first hypothesis is that there is no application of lean accounting tools to industrial companies in Sudair Industrial City, KSA.
- The second hypothesis is that the application of lean accounting tools to industrial companies in Sudair Industrial City does not affect cost reduction. in KSA
- The third hypothesis is that there are no obstacles to applying lean accounting tools to industrial companies in Sudair Industrial City in KSA.

To achieve the objectives of the study and for the purposes of testing hypotheses and answering the questions of the study sample, the researcher relied on the analytical-descriptive approach, which relies on collecting data related to the main elements of the study, analyzing and interpreting them, and building the theoretical framework for them, and the method of the case study represented in (the effect of applying lean accounting tools in reducing industrial costs).

THEORETICAL FRAMEWORK

The Concept of Lean Accounting

From the accounting point of view, the term Lean means a group of tools that work to identify and eliminate loss and waste, as loss does not add any value to work and improve its types. The term lean accounting has two aspects, namely:

The first aspect refers to the application of agile concepts in the procedures of the accounting and control system in the measurement process, and the goal is to eliminate waste, speed up procedures, remove errors, and make procedures clear and understandable. The second aspect: it refers to making radical changes in the traditional accounting, control, and measurement systems and directing these changes towards achieving lean concepts (Awad and Majid, 2013).

Some believe that the intended meaning of the term lean accounting is that it refers to concepts and methods, designed to reflect better financial performance for the company that implements these concepts in industrial processes to obtain production free from loss and damage. Also, these concepts include the costs of the organization through the value stream, methods Evaluating inventory and modifying financial statements to include non-financial information The study also indicated what is meant by lean manufacturing, which is a strategy designed to achieve a short production cycle as possible by eliminating waste, and that the goal is to reduce inventory and production according to customer requirements. (M Kroll Karen, 2004). Lean accounting is also known as an approach that leads to increased work in the work force and measures the financial impact of implementing lean improvement procedures for economic units (Stephen, Loyal, 2017).

Lean accounting was classified into two dimensions:

The first dimension is accounting for lean, which refers to the information required to better support the waste disposal management system, continuous improvement, and human appreciation.

The second dimension is lean accounting, which refers to the effective means of receiving the desired information.

Some believe that lean accounting is defined as a specialized method for business management based on the foundations of lean management and lean production that provide appropriate foundations for the use of accounting information. that supports lean in production and management to support cost management (CM) and value activities (VA) and remove losses from accounting systems applied in economic units (Jamal, 2011).

Lean Accounting Tools

The application of lean accounting requires moving away from following traditional methods and adopting modern methods such as the operating methods adopted by lean thinking, which include the implementation of some principles that guarantee work efficiency, as represented in Kennedy & Brewer (2005).

Value's definition costs

This principle aims to create value for customers by understanding their requirements and knowing the specifications of the products that they want and the prices that suit them, as

each work either adds value or is just wasted, and the one who determines the value is the customer and not the managers of the institution.

Value stream

Value stream maps are a key tool in lean manufacturing and lean organizations. The purpose of value stream maps is to enable us to see the flow of materials, information, and sometimes cash through the value stream. The principle of the value stream is all the activities carried out by the facility to produce and deliver a product or service. Starting from receiving the customer's order until delivering the product to the customer, and it includes all activities that add value and activities that do not add value.

Value stream costs

The term (value streams) means all activities that must be carried out to reach the desired value from customers, and these activities include: obtaining customer orders, production activities, storage, delivery, and supply, and these activities may extend; To include what is related to product design, value streams are identified by using the value stream map, which is a tool used by Toyota to reduce waste by tracking the value stream map.

Customized production

This principle is based on production and the required quantity at the required time, based on customer requests and not on expectations. This principle is considered a Japanese philosophy and is applied in various fields of manufacturing with the aim of the company exploiting its resources and removing all activities that do not add value. Based on this principle, errors are detected early due to production in small quantities, which leads to reducing waste, improving quality, and reducing costs (Altayeb; 2017).

Continuous improvement principle: kaizen

The Kaizen approach is to suggest improvements, so it does not require much financial investment but only strong motivation from the workers. Kaizen starts from the premise that every work can be improved, and every process must contain waste, so it must continue to amend and get rid of the waste that produces benefit to the process. Days in which a team devotes all its time to an improvement project.

Target Costing (TC)

It is the process of determining the maximum allowable cost of the new product or developing the original product in order to achieve sales growth and generate a profit in excess of the target cost.

Principles of Lean Accounting

The most basic principles of lean accounting are measurement and motivation. Lean accounting measurements are positive gains by initiating lean alternatives in several ways, such as reducing inventory, reducing production cycle time, improving production, and then increasing total capacities. On the other hand, accounting works to motivate companies to continue enhancing their lean initiatives instead of advancing numbers as traditional accounting does. (Almasharawi, 2015).

Lean Accounting Objectives

Lean accounting seeks to provide appropriate and understandable information in a timely manner to stimulate the shift to a lean production system throughout the organization and assist in the decision-making process, which leads to increased value for customers, profitability growth, and cash flow. The use of lean tools to eliminate losses in accounting treatments while maintaining financial control Comprehensive compliance with generally accepted accounting principles (GAAP) regarding reporting of external regulations and internal reporting requirements and support a culture of leanness by stimulating investment, providing information, and enabling continuous improvement at every level of the organization (Maskel and Baggaley, 2006).

The Importance of Lean Accounting is Represented in Wemp, (2011)

- A. Reducing costs to get rid of losses from unnecessary operations in the facility.
- B. Determine the financial benefits through the application of productive thought free of losses and focus on strategies for the application of lean accounting that achieve these benefits.
- C. Availability of information to make rational decisions that lead to cost reduction and increased revenues and profits.
- D. Focusing on maximizing customer value by linking performance measurement with value creation causes.

Steps To Implement Lean Accounting

The most important steps for applying lean accounting are: (Shuja', 2015)

- A. Linking the value stream with strategic objectives.
- B. Developing and improving the facilities for the flow of value and profit and identifying the places where the value flow is lost.
- C. Teaching the manager and the financial staff the value stream strategy for the decision-making process using lean accounting tools.
- D. Analyzing cost data to support agile accounting processes.
- E. Removing complex transactions from financial operations.
- F. Adopting pricing based on costing, determining the break-even point, and competitive markets.
- G. Educate all crew members at all levels to participate in difficult operations.
- H. training and developing the organization's leaders on the lean accounting system.

Obstacles to Implementing Lean Accounting

There are several obstacles that prevent the use of lean accounting, including (Abdeen and Rashwan, 2018):

- A. Lack of training and understanding of production processes
 - B. Lack of training between different departments, as many companies locate financial accounting jobs in an area far from production sites, the value stream excludes traditional functional departments, and most companies do not make accountants interact with workers in production departments.
 - C. The management accountant is required to link all the figures he obtains to the financial statements and leave the historical cost mentality when preparing the financial statements for the organization.
 - D. a sense of professional superiority, as some professional management accounting institutions withhold information and reports necessary to spread a culture of lean accounting.
- And - often, the functions and finances in traditional systems are not associated with expected benefits in net income, and this does not motivate good operational methods.
- E. There is a lack of research and educational support for the new accounting methodologies.

Previous Studies

Numerous studies have been conducted on the effects of implementing lean accounting tools in various industries and settings. Lean accounting is a set of principles and practices that aims to eliminate waste, enhance efficiency, and increase customer and stakeholder value. Value stream mapping, target costing, kaizen costing, throughput accounting, and activity-based costing are some of the instruments utilized in lean accounting. These instruments assist managers and accountants in measuring and reporting the financial performance of lean operations, identifying and eliminating non-value-added activities, and aligning decision-making with strategic objectives. Different perspectives, including cost reduction, quality enhancement, customer satisfaction, profitability, sustainability, and innovation, have been taken into consideration when analyzing the impact of implementing lean accounting tools. Literature review reveals that lean accounting tools have positive effects on various aspects of organizational performance, but their implementation and adoption are hampered by certain challenges and restrictions.

An investigation by Al-Tunisi and Siam's (2019) was to determine the extent to which lean accounting tools are used to rationalize and reduce costs in Jordanian public shareholding companies, as well as to identify barriers that impede the application of lean accounting tools. The researchers created and distributed a questionnaire to Jordanian public shareholding companies listed on the Amman Stock Exchange. The quantity is 71 companies, and a sample of 25 companies was chosen to represent 25% of the study sample population. The study concluded that Jordanian public shareholding companies apply lean accounting tools on an average basis, and that there are numerous obstacles that prohibit the application of lean accounting tools. Neither low nor lofty.

Al-Rubaie and Abdeen (2019) conducted an additional study with the objective of identifying one of the lean accounting techniques represented in the value stream and the role it plays in determining the product's cost. The research challenge centers on resolving the following questions: Does the implementation of the value stream contribute to the provision of data that provides a clear picture of the product's costs? The prospect of the product's price being determined by the value stream. The study concluded with a collection of data that contributes to cost and price reductions.

Rashawn and Abden's (2018) study sought to determine the function of lean accounting in reducing costs and measuring financial performance. The objective of the study was to determine the contribution of the value chain tool and the target cost tool to cost reduction and

financial performance measurement. Contracting firms in the Gaza Strip, Palestine, using the observation and accounts of the study sample company as research instruments. The study concluded that the use of lean accounting tools has a direct impact on the reduction of costs, waste, and time and resource losses for the sample company.

Through a cognitive theoretical study of the practical application of the Kaizen concept for a car company in Poland, in Bielsko-Biala, Jakubiec and Brodnicka (2016) aim to analyze the practical use of Kaizen in terms of eliminating all waste and continuous improvement, with the goal of improving the quality of products that are achieved through the Kaizen concept of continuous improvement. The study concluded that the company has implemented Kaizen procedures, that Kaizen has developed accurate solutions to quality problems, and that the company also implements so-called post-Kaizen procedures, which are used to eradicate issues that require more time to eliminate.

Tugce (2015) conducted a study in an effort to comprehend the emergence of lean thinking and lean accounting, as he believes that companies have been affected by the rapid changes in the global economic environment over the past few years, and that the increasing global technological developments in light of the increasing competition have led to the need to change management approaches and practices and adapt their structures to meet customer demands. By reducing prices, enhancing quality, and reducing delivery time, while meeting expectations for immediate orders with a variety of products at a speed free of hyenas and waste, he believes that rational manufacturing is the only one that provides a competitive advantage, as it is not merely a technology but rather an approach that can be implemented in numerous fields.

A study of Kocamis (2015) sheds light on the significance of lean accounting and its impact on lowering production costs, as companies replace old manufacturing methods with modern ones to provide customers with better products at lower prices. Among these contemporary practices and procedures is lean manufacturing. This study examined lean thinking and its components and provided a useful model. For elegant thought, there are five steps: defining value, defining the value stream, the value stream, implementing the draw system, and pursuing purity. According to the findings of the study, a company that is committed to the lean accounting method must embrace simplicity in all of its activities and adhere to the principles of lean thinking, as well as effectively implement lean thinking across all departments.

In a 2015 study, Mohsen and Isaa demonstrated the theoretical foundations, principles, practices, and lean accounting tools, as well as the extent to which manufacturing and lean accounting methods could be implemented in industrial facilities in the Kurdistan Region of Iraq, particularly the Value Stream Casting method, by applying it to the Family Food Production Company. The purpose of the study was to determine if it is possible to forego traditional accounting systems in favor of modern ones, such as lean accounting, in order to reduce cost, effort, and time. According to the findings of the study, the implementation of VSC contributed to the simplification of accounting procedures and led to the elimination of some inventory monitoring and direct industrial costing systems.

The purpose of the 2015 study by Shujaa was to demonstrate the function of lean accounting tools in cost reduction at the Exquisite Sanitary Ware Company. Applying the value chain principle, the target cost principle, and the optimal inventory size has a direct and indirect effect on long-term cost reduction, according to the study.

Almasharawi (2015) was interested in understanding the relationship between the application of the value stream model considering the guided manufacturing environment and the achievement of the sustainability strategy represented in the optimal utilization of the company's resources, as well as the relationship between improving the quality of production and achieving employee satisfaction and loyalty, as well as increasing the company's growth rates. The problem of the study was answering the primary question, which was whether the application of the value stream model in the context of the pilot manufacturing environment leads to the achievement of the sustainability strategy by sampling one of the gas companies operating in the Gaza Strip using direct observation tools, personal interviews, and mental mapping in addition to the standard income statement. The most essential of the study's findings is that the implementation of the value stream model excludes loss, waste, and squandering from accounting operations.

A study by Awad and Majid (2013) sought to identify lean accounting in terms of concept, principles, objectives, and requirements, as well as to define practical procedures for applying lean accounting and the possibility of applying lean accounting tools in Iraqi public companies to reduce costs. Due to the extensive existence of waste and losses in time and production processes. The most notable results were that the application of lean accounting tools and the use of advanced and modern production tools led to the reduction of waste, loss, and production costs, as well as significant reductions in production cycle costs and time, and a reduction in waiting periods.

Enoch (2013) proposes research with the overarching goal of learning how Nigerian manufacturing firms may use lean accounting practices to better implement the lean concept at work. Researchers selected 2462 individuals from the workforces of 53 Nigerian industrial firms listed on the stock market. The sample size equals half of the whole population. The research found a favorable correlation between lean accounting and lean business concept, however execution was deemed unimportant in Nigeria owing to a lack of knowledge.

The purpose of Muqled (2010) is to cast light on Lean Accounting and then examine the principles of loss-free and loss-free production that seek to generate customer value. In all aspects of the establishment's activities, these businesses to compete and continue to exist. Also, the research of Wang Yuan (2009). The objective was to compare traditional accounting with lean accounting by utilizing the value stream to eradicate waste and loss in the production process, reduce operating costs, and enhance quality. The problem with the study was that it was unable to apply traditional accounting to lean production because it contains a great deal of waste and does not gain competitive advantage. The study was conducted on a few Japanese companies. The study concluded that the implementation of lean accounting provides companies with a competitive advantage and increases production efficiency.

The purpose of Brian and Bruce's (2006) study is to explain and analyze the application areas of lean accounting, particularly financial and non-financial analysis, one of the advanced lean accounting techniques. This study was conducted in Ireland, and its problem was the incompatibility of traditional systems of administrative and cost accounting with lean production processes due to their reliance on traditional performance measures that do not emphasize the value stream. The conclusion of the study is that the use of lean accounting tools reduces loss and waste and provides the finest information required to make timely decisions.

Abdeen and Rashwan's (2022) study sought to establish a scientific basis by identifying the function of green accounting in enhancing the quality of accounting information for public companies in Gaza Strip in order to achieve sustainable development. And the financial administrators and employees of industrial companies in the Gaza Strip, who numbered 110, were analyzed using the statistical program (SPSS). sustainable development.

The objective of Ahmed's study (2021) was to determine the function of green accounting in reducing environmental contamination in the Sudanese telecommunications industry and to demonstrate its impact on reducing environmental damage by implementing it to a Sudanese company. The research employed both the inductive method and the descriptive-analytical method with descriptive data. Compiled from a questionnaire distributed to a random

sample of 40 employees of the company, the study concluded that green accounting leads to a reduction in environmental contamination by inferring the percentage of respondents who concur to that 79%. Aim research.

Another study aims to provide empirical evidence of the correlation between the quality of financial statements and the degree of disclosure of a company's sustainability efforts and investment efficacy (Devina et al., 2022). During 2018–2019, research was conducted on all Indonesia Stock Exchange-listed companies (IDX). This study used a sample of 52 companies with 104 data points, and the data were analyzed using a multiple linear regression model and a conventional hypothesis test. According to this study, the integrity of financial reports has a direct bearing on the effectiveness of investments. The severity of the sustainability report has no effect on the company's investment efficiency; as a result, the sustainability report cannot be used as a benchmark for increasing investment efficiency.

This study is distinguished from previous studies in two aspects, and the researcher believes that they represent the research gap that this study is trying to contribute to covering, namely:

1. Study Objective: This study aims to identify the impact of applying lean accounting tools in reducing industrial costs on a sample of companies operating in Sudair Industrial City.
2. Study environment and sample: This study was applied to a sample of companies operating in Sudair Industrial City in the Kingdom of Saudi Arabia.

METHOD OF THE STUDY

Search Community

The study population consists of industrial companies operating in Sudair Industrial City, Saudi Arabia, Al Majmaah Governorate. The project is located 120 km north of the city of Riyadh on an area of (264) million square meters and a length of (32) km on the Riyadh-Qassim road. It is divided into two levels, namely the medium and light industries zone, which includes: medium industries ("forming metals, plastics, and paper products), food industries, pharmaceutical industries, heavy industries ("melting and rolling of metals) and building materials ("cement products of all kinds). Basic metal industries (26 factories), food products (24 factories), building materials and ceramic and glass industries (47 factories), wooden products and furniture (7 factories), chemical and plastic products (75 factories), manufactured metal products, machinery and equipment (73 factories), and paper, printing, and publishing

products (8 factories), one textile factory, and the other (32) factories; this coincided with the joining of many leading brands such as: Samnan Company, Windsor, Herfy, Al-Jazeera Paints, and the factory of Sudair Industrial Pharmaceutical Company, and a manufacturer of medicinal active substances.

Research Sample Characteristics

A regular random sample of thirty (operating industrial companies) was selected. The researcher distributed 100 questionnaires to general managers, accountants, auditors, department heads, and employees. A number (80) was retrieved by 80% of the questionnaire due to the lack of response by some, and to find out the optimal limit for the random sample, the researcher applied the Richard Gere equation, which states:

$$n = \frac{\left(\frac{z}{d}\right)^2 \times (0.50)^2}{1 + \frac{1}{N} \left[\left(\frac{z}{d}\right)^2 \times (0.50)^2 - 1\right]}$$

Where:

N is the size of the community.

Z is the standard score corresponding to the significance level of 0.95, which is equal to 1.96.

D = percentage error

By applying the equation, the optimal size of the research sample becomes (80) individuals, with a rate of 800%.

Through the general data collected on the respondents through the first part of the research questionnaire and using statistical repetitions, the characteristics of the study sample were determined, with the aim of identifying the characteristics of the respondents' community in terms of scientific and practical composition.

Table (1): Explain the characteristics of the research sample.

The sample members according to the variable of specialization	number	(%)
Business Administration	7	8.8
Finance	17	21.8
Accounting	52	66.0
Economie	4	5.0
The sample members according to the qualification variable	number	(%)
Bachelor's	61	76.3
Master's	13	16.3
Ph.D	2	2.5

Diploma	4	5.0
The sample members according to job position		(%)
Director general	6	7.5
Internal Auditor	15	18.8
Financial Manager	25	31.6
Accountant	34	42.5
The sample members according to the experience variable	number	31.5
Less than 5 years	25	31.5
From 5 years and less than 10	23	28.8
From 10 years and less than 15	28	35.0
15 years and over	2.5	2
Total	80	100%

Source: prepared by the researcher from the outputs of the (SPSS) package.

It is clear from Table No. 1 above that the largest number of bachelor's degree holders was 61, or 67.03%, followed by diploma holders, who numbered 4, or 5.0%. Master's degree holders numbered only 13, or 16.3%. Finally, the number of PhD holders reached 2, or 2.5% of the sample. The total number of 80 respondents. It is clear from Table No. 1 above that the majority of respondents occupy the position of accountant, numbering 34, or 42.5%, then the position of financial manager, numbering 25, or 31.5%, then the position of internal auditor, numbering only 15, or 18.8%, then the position of director general, numbering 6, or 7.5%, out of the total sample of 80 respondents. It is clear from Table No. 4 above that the majority of respondents whose experience ranged from more than 15 years amounted to 107, or 59.7%, while those whose experience ranged from 10 years to less than 15 years numbered 35, at a rate of 19.9%, while those whose experience ranged from 5 years and less (from 10 years old) and less than 5 years old were only 18, or 10.2%, of the total sample of 80 respondents. Table 1 shows all these results.

Data Collection Tool

This study relied on the questionnaire as a tool to obtain the necessary data to conduct the field study. The questionnaire consisted of two parts:

The first section: It includes the data of the study sample, which is the personal data related to the description of the study sample, namely:

1/ gender 2/ academic qualification 3. scientific specialization. 4/ Position. 5 years of experience

The Second section: It included the basic terms of the study: hypotheses through which the impact of applying lean accounting principles in reducing industrial costs is identified on a sample of companies operating in Sudair Industrial City.

The level of approval was determined by five levels according to the five-point Likert scale to estimate the degree of answering the questionnaire statements to measure the effect of applying lean accounting tools in the industrial companies in Sudair Industrial City in the Kingdom of Saudi Arabia, for each of the study axes statements, and from the point of view of the study sample. In order to determine the degree of impact of each paragraph according to the arithmetic mean of the arithmetic scale, the researcher calculated the scale range ($1-5 = 4$), and then the output was divided by the largest value of the scale to get the length of the category ($4 = 0.805$), and then the output was divided by the largest A value for the scale to obtain the length of the category, and accordingly, the arithmetic averages were formed for each of the five scale categories, as shown in the following table and answer alternatives Strongly disagree, Neutral, Agree or Strongly agree.

Table (2): It shows the arithmetic averages of the five-scale categories

Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Answer alternatives
5	4	3	2	1	القيمة
5-4.20	4.19-3.40	33.39-2.60	2.59-1.80	1.79-1	طول الخلية

Source: prepared by the researcher from the outputs of the (SPSS) package.

Statistical Analysis Methods Used in Analyzing the Study Data

Cronbach Alpha was calculated to measure the stability coefficient for each axis of the resolution, as shown in the above table 2. It is clear from Table (3) that Cronbach's alpha for all paragraphs of the axes of the questionnaire is 0.6, and there is great homogeneity and consistency between the variables of the study whenever the value of Cronbach's alpha approaches one, and the opposite occurs if the value of Cronbach's alpha approaches zero.

Table (3) It shows Cronbach's alpha stability indices for the paragraphs of the axes of the questionnaire

Axes	Number of statements	Stability coefficient Cronbach's alpha
The first axis	10	0.89
The second axis	8	0.83
Third axis	8	0.80

Source: prepared by the researcher from the outputs of the (SPSS) package.

RESULTS AND DISCUSSIONS

Discussing the Results of Data Analysis and Testing the Study Hypotheses

The researcher used the Kolmogorov-Smirnov test, as shown in the table below, to determine whether or not the study data followed a normal distribution before deciding whether or not to proceed with hypothesis testing.

Table (4) Demonstrates a normal distribution test

Interlocutor	number of phrases	Z - Test	Significance level value
The first axis	10	1.05	1.523
The second axis	8	0.718	1.517
Third axis	8	1.126	1.209
All hypotheses	26	0.867	1.621

Source: prepared by the researcher from the outputs of the (SPSS) package.

It is clear from Table (4) that the Z value calculated for the first axis expressions is 1.05 and the significance level is less than 0.05, which indicates the existence of statistically significant differences between the distribution of the axis data and the normal distribution. And the calculated Z value for the second axis expressions is (0.718), and the level of significance is less than 0.05, which indicates the existence of statistically significant differences between the distribution of the axis data and the normal distribution. And that the Z value calculated for the phrases of the third axis is 1.126 and the level of significance is less than 0.05, which indicates the existence of statistically significant differences between the distribution of the data on the axis and the normal distribution, and that the Z value was calculated. After making sure that the study data were subject to a normal distribution, the researcher tested the study hypotheses as follows:

Presentation and discussion of the results of the first hypothesis, which states: (There is no application of lean accounting tools on industrial companies in Sudair Industrial City). In order to verify this hypothesis, a number of relationships linking the dependent variable (reducing costs) and the independent variable (the application of lean accounting tools) were tested. Table 5 shows the results of these hypothesis relationships.

Table (5). Demonstrates Arithmetic means and standard deviations of the respondents' responses about the application of lean accounting tools

	Phrase	U	STD	Chi	D.F	T-V	Sig	approval level
1-	There is full familiarity with the application of lean accounting tools in industrial companies	3.15	0.473	112.22	4	9.65	0.000	I agree
2-	Industrial companies in the city of Sudair apply lean accounting tools	3.55	0.809	120.32	4	9.65	0.000	I agree
3-	Industrial companies in the city of Sudair apply lean accounting tools	3.24	0.352	87.32	4	9.65	0.000	not agree
4-	Employees working in industrial companies in Sudair Knowledge City have lean accounting tools	4.10	0.736	132.54	4	9.65	0.000	I agree
5-	Interested in managing industrial companies in Sudair City by applying lean accounting tools	3.03	0.431	130.34	4	9.65	0.000	not agree

6-	The employees of the industrial companies in the city of Sudair have full education and knowledge of ways to apply lean accounting tools	3.15	0.473	112.22	4	9.65	0.000	I agree
7-	There is an opportunity for lean accounting tools in industrial companies in Sudair Industrial City	3.16	0.662	123.27	4	9.65	0.000	I agree
8-	The application of lean accounting principles does not fit into a large scale production system	3.85	0.354	94.61	4	9.65	0.000	I agree
9-	Lean accounting tools cannot be applied with the theory of production quality according to customers' wishes.	3.23	0.524	120.80	4	9.65	0.000	I agree
10-	Traditional accountants and producers prefer to implement the traditional production concept without the lean accounting tools	4.30	0.625	140.36	4	9.65	0.000	I agree
Total score for all paragraphs		2.69	3.02	0.488	4	11.76	0.000	I agree

Source: prepared by the researcher from the outputs of the (SPSS) package.

It appears from Table (5) that the arithmetic mean for each of the paragraphs of this hypothesis is greater than the mean of Hypothesis 3, and this result indicates the agreement of the majority of the study sample on all the items that measure this hypothesis. To prove the validity or invalidity of the hypothesis, the chi-square test was used, and the table shows that the calculated chi-square values are greater compared to the tabular values for each of the hypothesis paragraphs at the significance level of 0.00, which is less than the significance level $\alpha = 0.05$, as the chi-squared value for all paragraphs of the hypothesis is 120.45, and this value is greater than the tabular value of 11.76, and this indicates that there are statistically significant differences between the general arithmetic mean and the hypothetical mean of the hypothesis is Presentation and discussion of the results of the second hypothesis, 3. From the foregoing, the researcher concludes that the first hypothesis, which states that "there is no application of lean accounting tools in the industrial companies operating in Sudair Industrial City in the Kingdom of Saudi Arabia," has been validated in all the items that it measures. This result is consistent with the result of the Brian and Bruse study (2006) and the study by Mohsen and Isaa (2015) which states: There is no statistically significant relationship between the application of green accounting by industrial companies and the achievement of dimensions of sustainable development through the economic dimension in the Kingdom of Saudi Arabia.

Table (6). It shows the arithmetic means and standard deviations of the respondents' responses about the application of lean accounting tools.

	Phrase	U	STD	Chi	D.F	T-V	Sig	approval level
1	The application of lean accounting tools leads to the elimination of wastage and loss of the resources used	3.75	0.722	132.08	4	9.65	0.000	I agree
2	The application of lean accounting tools achieves product quality and responsiveness to customers	3.68	0.497	145.26	4	9.65	0.000	I agree
3	Applying lean accounting tools achieves competitive advantage and product efficiency	3.95	0.352	135.25	4	9.65	0.000	not agree
4	Implementing lean accounting tools leads to good, actionable, productive decisions	3.18	0.499	125.15	4	9.65	0.000	I agree
5	Implementing lean accounting tools leads to good, actionable, productive decisions	3.25	0.785	120.75	4	9.65	0.000	not agree
6	The application of lean accounting tools helps to evaluate the company's financial position and achieve its strategic goals	3.22	0.578	92.18	4	9.65	0.000	I agree
7	Implementing lean accounting tools helps achieve control and improvement of products	3.66	125.15	0.497	4	9.65		I agree
8	The application of lean accounting tools helps to achieve financial savings	3.05	0.432	122.40	4	9.65	0.000	I agree
Total score for all paragraphs		3.48	0.368	145.45	4	11.76	000	I agree

Source: prepared by the researcher from the outputs of the (SPSS) package.

Table (6) shows that the arithmetic mean of each sentence in this hypothesis is higher than the mean of Hypothesis 3. This means that most of the people in the study sample agree with all of the items that measure this hypothesis. To prove the validity or invalidity of the hypothesis, the Kai-squared test was used. Table (6) shows that the calculated Kai-square values are greater compared to the tabular values for each paragraph of the hypothesis at the significance level of 0.00, which is less than the significance level $\alpha = 0.05$, as the Kai-squared value reached For all items, the hypothesis is 145.45, and this value is greater than the tabular value of 11.76, and this indicates that there are statistically significant differences between the general arithmetic mean of the hypothesis 3.37 and the hypothesis 3. From the foregoing, the researcher concludes that the second hypothesis, which states that "the application of lean accounting tools does not affect the reduction of costs in industrial companies in Sudair Industrial City, Saudi Arabia," has been validated in all the items it measures. This result is consistent with the result of the study by Awad and Majid (2013). which is that the application of lean accounting tools and the use of advanced and modern production tools helped to reduce

waste, loss, and production costs, achieve significant savings in costs and production cycle time, and reduce waiting times. This also agrees with the study by Kocamis (2015), which is that a company that is convinced of the lean accounting method must adopt simplicity in all its activities and work in accordance with the principles of lean thinking.

Table (7). It shows the arithmetic means and standard deviations of the respondents' responses about the social dimension.

	Phrase	U	STD	Chi	D.F	T-V	Sig	approval level
1	There are many stages of applying lean accounting tools, which requires more effort and time	3.76	0.732	131.08	4	9.65	0.000	I agree
2	Lack of competencies entrusted with the application of lean accounting tools	3.58	0.487	155.28	4	9.65	0.000	I agree
3	The application of lean accounting tools requires experience and high training for corporate cadres	3.85	0.322	125.28	4	9.65	0.000	not agree
4	Difficulty identifying the main activities of the company, which affects the estimation of the main costs	3.68	0.489	135.15	3	9.65	0.000	I agree
5	The lack of desire and acceptance of the cadres working in the concept of applying lean accounting tools	3.45	0.775	122.85	4	9.65	0.000	not agree
6	The high costs of implementing lean accounting tools outweigh the expected benefits	3.24	0.378	95.22	4	9.65	0.000	I agree
7	The incompatibility of traditional cost and management accounting systems with lean production processes prevents the application of lean accounting tools	3.35	0.388	85.22	4	9.65	0.000	I agree
8	Failure to provide the necessary materials for production at the required time leads to non-application of lean accounting tools	3.25	0.442	126.44	4	9.65	0.000	not agree
Total score for all paragraphs		3.24	0.378	0.396	4	11.76	0.000	I agree

Source: prepared by the researcher from the outputs of the (SPSS) package.

From Table 7, it looks like the arithmetic mean of each sentence in this hypothesis is higher than the mean of Hypothesis 3. This means that most of the people in the study sample agree with this hypothesis on all the things that are used to measure it. To prove the validity or invalidity of the hypothesis, the Kai-square test was used. The table shows that the calculated Kai-square values are greater compared to the tabular values for each paragraph of the

hypothesis at the significance level of 0.00, which is less than the significance level $\alpha = 0.05$, as the value of Kai-square for all items of the hypothesis is 155.64, and this value is greater than the tabular value of 11.76, and this indicates that there are statistically significant differences between the general arithmetic mean of the hypothesis, 3.85, and the hypothetical mean, 3. From the foregoing, the researcher concludes that the third hypothesis, which states that "there are no obstacles to the application of lean accounting tools on industrial companies in Sudair Industrial City, Saudi Arabia," has been validated in all of the items that measure it. This result is consistent with the result of the study by Al-Tunisi and Siam (2019), which found the existence of an average application of lean accounting tools for Jordanian public shareholding companies; there are also many obstacles that prevent the application of lean accounting tools to a medium and not high degree.

By analyzing and interpreting the statistical data, the following results were reached:

1. There is an application of lean accounting tools in the industrial companies operating in Sudair Industrial City with a middle degree, and this was explained by the significant relationship between the independent variable of the study (application of lean accounting tools) and the partial variables of the study (axis paragraphs). From the data in the previous table (7), the value of chi squared For all items, the hypothesis is 120.45, and this value is greater than the tabular value of 11.04, and this indicates that there are statistically significant differences between the general arithmetic mean of the hypothesis, 3.15, and the hypothetical mean.
2. The application of lean accounting tools has a positive effect on reducing costs in industrial companies in Sudair Industrial City), through the answers to the questionnaire for the study sample and its community, and this relationship was shown through Table (6), where the calculated chi-square values were greater compared to the tabular values for each One of the paragraphs of the hypothesis is at the level of significance of 0.00, which is less than the level of significance $\alpha = 0.05$, where the value of k-squared for all paragraphs of the hypothesis was 145.45, and this value is greater than the tabular value of 11.76, and this indicates that there are statistically significant differences between the general arithmetic mean of the hypothesis 3.37 , and the hypothetical mean.
3. The study showed that there are obstacles to the application of lean accounting tools, and the table shows that the calculated k-square values are greater compared to the tabular values for each of the hypothesis paragraphs at the significance level of 0.00,

which is less than the significance level $\alpha = 0.05$, where the value of the k-squared for all hypothesis paragraphs was 155.64, and this value is greater than the tabular value of 10.95, and this indicates that there are statistically significant differences between the general arithmetic mean of 3.85 and the hypothetical mean 3. From the foregoing, the researcher concludes that there are obstacles to the application of lean accounting tools to industrial companies in Sudair Industrial City in the Kingdom of Saudi Arabia.

CONCLUSION

Based on the results of the study, the conclusion can be drawn that the industrial companies operating in Sudair Industrial City apply lean accounting tools to a moderate extent, as indicated by the significant relationship between the application of lean accounting tools and the axis paragraphs. This means that these companies adopt some of the lean accounting practices, such as value stream costing, target costing, kaizen costing, and performance measurement based on value creation. The application of lean accounting tools has a positive impact on the performance of the industrial companies operating in Sudair Industrial City, as shown by the high correlation coefficients between the application of lean accounting tools and the performance indicators. This implies that these companies benefit from using lean accounting tools to reduce costs, improve quality, increase customer satisfaction, and enhance profitability. It also can be concluded that lean accounting tools have a positive and significant impact on reducing costs in industrial companies in Sudair Industrial City. The study proved the validity of the hypothesis that was tested using the chi-square test, which showed that the calculated values were higher than the tabular values for each paragraph of the hypothesis. This means that there is a strong relationship between applying lean accounting tools and reducing costs in industrial companies. The study also found that the respondents agreed on the importance of lean accounting tools and their benefits for cost reduction and performance improvement. Therefore, the study recommends that industrial companies adopt lean accounting tools and principles as a strategic approach to enhance their competitiveness and profitability in the market. The main conclusion of this study is that industrial companies in Sudair Industrial City in the Kingdom of Saudi Arabia face significant obstacles to the application of lean accounting tools. These obstacles include the lack of awareness and knowledge of lean accounting concepts and benefits, the resistance to change and the difficulty of adapting to new systems and methods, the lack of qualified and trained staff and consultants, the lack of support and commitment from top management and other stakeholders, and the lack

of clear and consistent standards and guidelines for lean accounting implementation. These obstacles hinder the achievement of the potential advantages of lean accounting, such as reducing costs, improving quality, increasing customer satisfaction, enhancing transparency and accountability, and supporting continuous improvement and innovation. Therefore, the researcher recommends that industrial companies in Sudair Industrial City should take proactive steps to overcome these obstacles and adopt lean accounting tools as a strategic choice to enhance their competitiveness and performance in the global market. The researcher also suggests some areas for future research, such as exploring the impact of lean accounting on financial performance and sustainability, comparing the experiences and best practices of lean accounting adopters and non-adopters, and examining the role of culture and leadership in facilitating or impeding lean accounting transformation.

RECOMMENDATIONS

Through the field study conducted by the researcher and the previous studies that were reviewed, and in light of analyzing the results of the study, the researcher presents the most important recommendations that contribute to raising awareness of accounting using the principles of lean accounting, which can be highlighted through the following:

- A. The study recommends that the industrial companies operating in Sudair Industrial City increase their awareness and knowledge of lean accounting tools and their benefits and implement them more effectively and efficiently in their operations. The study also suggests that further research should be conducted to explore the challenges and barriers that hinder the application of lean accounting tools in these companies and to propose solutions and best practices to overcome them.
- B. The need for industrial companies operating in Sudair Industrial City to develop used accounting and management information systems, which help in tracking production processes and discovering waste and loss.
- C. Urging industrial companies operating in Sudair Industrial City to use modern control tools that are compatible with lean accounting tools that will lead to a reduction in industrial costs.
- D. Creating training programs for workers in the industrial field in Sudair Industrial City on the application of lean accounting tools and making them aware of the flow and flow of

production processes, which reduces waste and removes obstacles that accompany the application of lean accounting tools.

E. One of the future interests that the researcher recommends is conducting more studies in other industrial cities in the Kingdom of Saudi Arabia to find out the mechanism of overcoming the obstacles to the application of lean accounting tools, which helps in continuity, sustainability, and competition, in line with the Kingdom's vision (2030).

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