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# The Impact of Cost Management Techniques on Production Costs' Measurement in Industrial Companies (Field Study on Some Sudanese Industrial Companies in Khartoum State)

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**Abstract:- The study basically aimed to investigate the impact of using cost management techniques on production costs' measurement in industrial companies. To achieve this objective, (65) questionnaires used to collect data from the sample of the study's community which represented in the employees of some Sudanese industrial companies in Khartoum state and it was (100%) collected and analyzed. The study adopted the descriptive analytical approach and the historical approach. And the study found several results, among which is that, the use of cost management techniques impacts the measurement of direct industrial materials costs, the use of cost management techniques impacts the measurement of direct industrial wages costs and the use of cost management techniques impacts the measurement of direct industrial expenses. The study recommended that, The Sudanese industrial companies should pay attention to the accuracy of the accounting measurement of the various industrial costs, which helps the management in rationalizing its decisions.**

***Keywords:-*** *Cost management techniques, industrial costs.*

## I. INTRODUCTION

### *A. Methodological Framework*

In light of the intense competition witnessed by the product markets, many industrial companies seek to search for mechanisms and means to maximize their competitive capabilities in a way that secures their continuity and achieve their goals. Which are in line with the various activities of the industrial facilities and have become widely used. And because the Sudanese industry suffers from shortcomings in its compliance with production specifications due to the adoption of many Sudanese industrial companies of the traditional production costs systems that depend on the storage of raw materials and complete production, which leads to the emergence of damaged production, defective units and high capital costs, this study came to address the impact of cost management techniques on the measurement of production costs.

### *B. The study's Problem*

The problem of the study is that Sudanese industrial companies do not apply modern cost management techniques, which are concerned with measuring the costs of products in Sudanese industrial companies and their inability to compete with global products. Therefore, the problem can be formulated in the following questions:

- Q1. Is there a statistically significant relationship between cost management techniques and the measurement of materials costs in industrial companies?
- Q2. Is there a statistically significant relationship between cost management techniques and the measurement of wage costs in industrial companies?
- Q3. Is there a statistically significant relationship between cost management techniques and expenditure measurement in industrial companies?

### *C. The importance of studying*

The scientific importance of the study is that it is one of the few studies that dealt with the impact of cost management techniques on industrial costs in the Sudanese business environment (according to the researcher's knowledge), and the study is a valuable addition to the scientific and academic library, as it provides information on its topics to students and researchers. The practical importance of the study was to show how to use cost management techniques in measuring costs in industrial companies and controlling them.

### *D. Objectives of the study*

This study aimed to achieve the following:

- Demonstrate the impact of cost management techniques on improving quality, eliminating waste and wastage of materials and reducing costs.
- Knowing the possibility of applying cost management techniques in the Sudanese industrial environment.
- A statement of the difference between the traditional and modern costing systems used in the Sudanese industrial environment.

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*E. Study hypotheses*

To achieve the objectives of the study, the following hypotheses were tested:

- H1. There is a statistically significant relationship between cost management techniques and the measurement of materials costs in industrial companies.
- H2. There is a statistically significant relationship between cost management techniques and the measurement of wage costs in industrial companies.
- H3. There is a statistically significant relationship between cost management techniques and expenditure measurement in industrial companies.

*F. Methodology of the study*

The study adopted the descriptive analytical approach and the historical approach. The questionnaire was used to collect data from some Sudanese industrial companies in Khartoum state.

*G. Sources of data collection*

The primary sources are the questionnaire form, while the secondary sources are the references, scientific periodicals, theses related to the subject of the study, and the Internet.

*H. The limits of the study*

The spatial limits represented in Some Sudanese industrial companies in Khartoum state, while the time limit is the year 2022.

## II. PREVIOUS STUDIES

Hereafter, and for the purposes of this study, the researchers reviewed some prior studies related to the study's variables.

The study of **(Marcinekova, et. al., 2017, 290-297)** aimed to show partial results of the primary quantitative research focusing on the change management integrated to the area of cost calculation, change effects and process optimization. The study found several results, the most important of which is that, it exist significant difference between indicator Return on Equity (ROE) in Wood-processing Industry and Machinery Industry, and it exist significant dependence between indicator Return on Equity (ROE) and cost analysis execution in the machinery industry. The study of (**Abdulgader, 2018, 1-146)** aimed to achieve the following: knowledge of the role of the cost system based on the activity and the target cost system and the balanced performance card system in the process of rationalizing strategic decisions in the industrial establishments. The study found results that confirm the validity of the hypotheses, including: Cost-based method of activity provides more accurate cost-effective and objective information enabling the management to make the best decisions. The target cost method helped provide detailed information for decision makers to choose manufacturing alternatives and price requirements better. The study of **(Ali, 2019, 139-162)** aimed to discuss the inability of traditional cost methods to provide appropriate information about production environment in Sudan, one of the paper goals is to show the limitation of traditional cost accounting system in meeting the production needs in such environment. The most important findings are; the success of activity based costing (ABC) in measuring production costs accurately, depends on cost caused activities, using descriptive methods may not measure accurately the production costs and there is statistical relationship between ABC system, and accurate production costs measurement. The study of **(Saheli and Zigha, 2020, 1-132)** aimed to present the traditional cost accounting and the activity based cost accounting method, to highlight the possibility of applying the activities-based costing system and comparing it to the traditional costing system within the organization. The study found several results, the most important of which is that there is possibility of applying the activity cost system and determining the real cost of products, whether under the traditional system or the activity-based costing system in Algeria Telecom. The study of **(Mohammed and Mohammed, 2020, 59-88)**aimed to identify the effect of running application of cost mode in terms of activity as well as mode of the targeted cost, and balance scorecard to have control over costs in industrial companies operating in Sudan along with recognizing obstacles and difficulties that hinder the application of cost mode. A number of results were found out by the study; the most important one: the application of costs mode based on the activity resulted in estimating the cost accurately.

Referring to previous studies, the researcher note that the studies of (Marcinekova, et. al., 2017), (Ali, 2019), and ( Easa and Mohsin, 2020), concentrated on investigating the role of modern techniques of cost accounting in improving the processes of measurement, while the study (Abdulgader, 2018, 1-146), dealt with the effectiveness of modern methods of cost management in evaluating strategic decisions in industrial establishment, also the study of (Saheli and Zigha, 2020) compared between traditional cost methods and Activity-based system in Algerian institutions, and the study of (Mohammed and Mohammed, 2020) analyzed the extent of applying modern cost techniques in achieving control on cost components, while the current study differ from those studies by addressing the impact of cost management techniques on production costs' measurement in industrial companies, also there a different in spatial limits and time limits.

## III. COST MANAGEMENT TECHNIQUES

*A. Concept of cost management*

Cost management has emerged to go beyond the goal of the traditional cost accounting system to respond to the successive economic developments and the requirements of the modern business environment characterized by intense competition by strengthening the relationship with customers and suppliers and reducing costs in the long and short term, cost management is also defined as a set of actions taken by managers in pursuit of customer satisfaction in addition to reducing costs and monitoring them on an ongoing basis. (Basili, 2001, 316)

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The researcher can define cost management as all administrative practices that aim to reduce costs by focusing on resources, whether internal or external, how they are distributed and exploited, and identifying activities, evaluating their costs and controlling them.

*B. Importance of cost management*

The importance of cost management lies in the following: (Kandori, 2006, 28)

- Providing the information that managers need to manage the organization efficiently, whether that information is financial about costs and revenues, or non-financial information about productivity and quality.
- Measuring the cost of the resources consumed in accomplishing the organization's basic activities, determining the effectiveness and efficiency of existing activities, and determining and evaluating new activities with which the organization's strategy and improving its future performance can be conceived.

The researcher believes that the importance of cost management is that it helps to accurately show the cost of products and their control and measure performance by following up on costs through the use of causal relationships between costs and activities, which leads to a better understanding of activities, which helps to continue organizational strategies.

*C. Objectives cost management*

Cost management aims to achieve the following: (Basili, 2001, 320)

- Designing an effective cost management system to match the internal environment of the organization and the cost structures specified therein.
- Prioritizing resource consumption.
- Determining the cost of important activities, to determine the efficiency and effectiveness of performance of activities.
- Identifying and evaluating new activities that can improve future performance.

The researcher believes that cost management aims primarily at controlling production costs at all levels and maximizing the profits of the establishment.

*D. Cost management techniques*

The most important cost management techniques are as follows: ( Morse,2003, 341)

a) Just-in-time:
On-time production is a revolution in inventory and cost management through the philosophy behind this technology of getting raw materials exactly on time from suppliers according to schedules of production programs.

It becomes clear to the researcher that production on time theoretically excludes the need for a commodity stock, because production does not occur unless it is confirmed in advance that it will be sold, and this requires reliable suppliers who will provide raw materials with the required quality and at the exact time.

Bounce back: This technique is defined as a cost measurement system in which the recording of what happens to the condition of the product is postponed until it becomes a complete product or until the products are sold, that is, the change of raw materials is not recorded and converted into production in operation. (El-Gamal, 2000, 70)

It is clear to the researcher from this that the reverse recording system for the cost is a response from the cost accounting to the technique of inventory management and inventory cost management, which is represented by the production technique on time.

b) Total quality management:
The Total Quality Management technique is defined as a process of continuous improvement that looks for opportunities to increase consumer satisfaction by identifying and solving problems that limit current performance.

The researcher believes that achieving comprehensive quality at all levels by which customer satisfaction is achieved and then obtaining a competitive path through which more sales are achieved and then costs are reduced in order to reach a greater return.

c) Activity-based costing:
It is defined as a system that assumes cash outflows are to obtain supplies of resources, which are subsequently consumed by activities, meaning that activities cause costs and that products or services meet the demand for activities. (Drury, 2002, 296)

It becomes clear to the researcher that the activity-based costing technique is based on focusing on activities as they are important and have a specific purpose.

d) Activity-based management:
It is defined as management decisions that use activity-based cost information to achieve customer satisfaction and improve profitability. These decisions include pricing, product assortment, cost reduction, product design decisions and production process improvement.

The researcher believes that activities-based management seeks to manage activities and manage the costs of those activities by integrating with the information of financial and non-financial activities.

e) Activity-based budgeting
Activity-based budgeting is also defined as a method that focuses on the costs of activities necessary to produce and sell products and services.( William, 2002,486)

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From the above, it is clear to the researcher that there is an integration and interrelationship between activity-based cost, activities-based management, and activity-based budget, as activity-based budgeting is based on all activity-based cost information.

f) Target cost:
Target cost is defined as one of the cost management tools in the competitive environment because it targets three main competitive elements: "price, quality and cost" as well as creativity.

It becomes clear to the researcher that the target cost is a strategic technique for cost management and reduction, and then profit management, which leads us to identify the justifications for adopting this technique.

g) Value engineering:
Value engineering is defined as the systematic evaluation of all aspects and activities of research and development, product design, production processes, marketing and distribution, and customer service in order to reduce costs while meeting customer needs.

It becomes clear to the researcher that value engineering makes changes in the specifications of materials or modifications in the product, which leads to improving the value of the product and reducing costs to reach the target cost.

h) Kaizen:
Continuous improvement technology is defined as gradual improvement through small improvement activities instead of large activities, and those improvements are made through innovation or significant investment in technologies.

It becomes clear to the researcher that continuous improvement is based on the available technological means and aims to meet the needs of customers by constantly improving specifications according to their needs with continuous cost reduction.

i) Benchmarking:
It is defined as the method that enables the organization to determine whether the specific goals are commensurate with the needs of the market that are affected by competitors, as it is not enough to set goals by a certain percentage more than the goals of the last year and consider this an indicator of progress and improvement. (Basili, 2001, 36)

It becomes clear to the researcher that the role of accounting comes effectively with the first type because measuring and evaluating performance falls within the concepts of cost and management through budgets and standard costs and their analysis.

j) Theory of constraints:
The theory of constraints is defined as a continuous process of identifying and removing system constraints to ensure optimum utilization of resources and increase the output of finished products as large as possible to ensure increased profitability for the organization.

It becomes clear to the researcher that the constraints are planned and placed before starting the production process. It may be the scarcity of resources or skilled workers that do not have a specific location for their emergence or occurrence.

k) Balancedscorecard:
It is defined as measuring the efficiency of the organization's management performance and its ability to perform in a good manner that achieves the interests and concerns of those parties with common interests.

The researcher sees the possibility of evaluating performance and achieving total quality through financial and non-financial data, through the relationship of the balanced scorecard and total quality management.

## IV. PRODUCTION COSTS MEASUREMENT

### *A. The concept of production costs*

The cost was defined as the value of sacrifice to ensure the benefit or the amount measured in cash paid in exchange for a good or service, while production costs are a group of expenditures of materials, labor and industrial services spent on the good or service during the production stage (Khalil, and Abdulaal, 1982, 31).

It becomes clear to the researcher that costs in general mean the amounts paid by the establishment in exchange for obtaining the services of the production elements, such as wages and salaries for workers, the costs of the purchase price of raw materials, maintenance costs, electricity, water, transportation, and advertising fees.

### *B. Elements of production costs*

The most important elements of production costs in industrial companies are as follows: (Zahir and Abunassar, 2008, 41)

a) Direct material cost:I
t means the costs related to the materials that were actually used in the production process and directly to the product, such as the cost of direct raw materials, as well as the value of packaging materials that belong to the product.

The researcher believes that the direct material cost is the cost of the materials used in the manufacturing process of the commodity, and it constitutes the basic structure of the commodity and appears clearly in the final product.

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b) Direct wage cost:
It is the costs of all labor that can be considered as part of the cost object and that can be traced, such as wages for labor based on operating machinery.

The researcher believes that what is meant by direct wages is the cost directly borne by the establishment for the workers in the production department in exchange for human effort in order to achieve production.

c) Indirect industrial cost:
It includes all industrial costs that can be considered as part of the cost object but cannot be traced back to that purpose. (Al-Farra, 2012, 259)

The researcher believes that the indirect industrial costs are the costs incurred by the facility to carry out its activity, but they cannot be attributed to a specific cost center, but rather are distributed to the finished products that were produced using the basis of loading and distribution used in the facility.

*C. Methods of measuring production costs*

Several costing methods are used to measure the cost of production, namely: (Ajami, 2006, 4)

a) The total costs method:
It is based on the total loading, that is, the activity units bear their share of all the direct and indirect components of production and marketing costs, variable and fixed. As for the administrative costs, they are considered time costs that are charged to the income statement.

b) Direct costs method:
The theory is based on the theory that production units bear their share of direct costs only, while indirect costs of all kinds, whether production, marketing or administrative, are charged to the income statement as time expenditures.

c) Variable costs method:
It is based on partial loading, that is, loading the activity units with their share of the elements of variable costs only, and considering fixed costs as periodic or time costs that are charged to the list of business results. (Neuner, 1973, 41)

d) Standard Costing Method:
Standard costs are production costs and depend on determining the quantitative and quantitative standard for raw material, labor, and indirect expenses, as they do not care about distribution expenses.

e) Exploited energy method:
According to this method, production is charged with variable costs and part of the fixed costs by the ratio of the utilization of the production capacity in the facility (the ratio of the actual production capacity to the maximum production capacity).

The researcher concludes that, the existence of a good system for costs in industrial companies works to achieve control over production costs, to find an appropriate and sound basis for evaluating and measuring production costs, and to provide data and information on cost centers to help formulate production policies and take decisions that ultimately help achieve the objectives of the facility.

## V. FIELD STUDY

*A. Field study procedures*

The statistical program (SPSS) was used to analyze the data and reach the objectives set within the framework of this study, and it was based on the significance level (5%) corresponding to confidence (95%) to interpret the results of the tests that were conducted. Several statistical methods have been used, the most important of which are the reliability test (Cronbach alpha), descriptive and analytical statistical methods, percentages and the t-test.

*A. Study's community and sample:*

The study community consists of the employees of the Some Sudanese industrial companies in Khartoum state. As for the study sample, it was chosen randomly, where the questionnaire was distributed randomly to a number of the company's employees, and the sample size was determined with the help of expert arbitrators to include various job titles and administrative levels in the Some Sudanese industrial companies in Khartoum state. (60) Questionnaires were distributed. All of them were retrieved at a percentage of 100%, and this percentage is considered very large from a statistical point of view, which leads to the acceptance of the results of the study and its circulation to the study community, and to come up with accurate results as much as possible, the researchers were keen on the diversity of the study sample members, and this diversity in the characteristics of the respondents is related to their opinions about the impact of cost management techniques on production costs' measurement in industrial companies.

*B. Stability and validity of the study tool:*

To ensure the apparent honesty of the questionnaire and the validity of its statements in terms of wording and clarity, the questionnaire was presented to a number of academic arbitrators and specialists in the field of study, and after the questionnaire was returned from the arbitrators, the amendments that were suggested to it were made. The stability test of the questionnaire statements was conducted using Cronbach-alpha and the result was (0.794), which means that there is stability in the data as shown in table (1) below:

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| No | Axis | Number of ferries | Stability(constancy) |
|---|---|---|---|
| 1 | First hypothesis | 5 | 0.714 |
| 2 | Second hypothesis | 5 | 0.591 |
| 3 | Third hypothesis | 5 | 0660 |
| 5 | Total statements | 15 | 0.794 |

Table 1: Alpha Cronbach coefficient of the questionnaire

Source: Information obtained from the output of SPSS program, 2022

The above table shows that the Cronbach coefficient for all the terms of the questionnaire is (0.794), which is high and the reference to the terms of the questionnaire is that the increase in the value of the Cronbach coefficient means increasing the credibility of the data. This means that the measure measures what is measured.

*B. Data analysis and hypothesis testing*

The hypotheses were tested by finding the weighted arithmetic means (answer power) and standard deviations for each of the questionnaire statements. All of these hypotheses are descriptive questions, according to the five-point Likert scale, as the variable that expresses the options (Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree) ordinal scale, and weighted averages are calculated according to Likert scale through a number of steps, namely: Firstly, assign each value in the Likert scale a specific weight (Strongly Agree 5, Agree 4, Neutral3, Disagree 2, Strongly Disagree 1), secondly find the result by multiplying the number of the sample by the weight, and in the third step find the sum of the totals of multiplication results, then find the arithmetic mean by dividing the sum of the totals of multiplication results in the previous step / the number of the sample, to get the arithmetic mean. For the purpose of analyzing the sample, there is a so-called hypothetical average, which is equal to the sum of the weights divided by their number (the scale items), that is, the hypothetical mean = (5 + 4 + 3 + 2 + 1) /5 = 3. Accordingly, the averages were distributed according to their positive or negative deviation from the hypothetical mean, and the distribution of the averages becomes as follows (1 to 1.79 strongly disagree, from 1.80 to 2,59 disagree, from 2.60 to 3.39 neutral, from 3.40 to 4.19 agree, and from 4.20 to 5 strongly agree).

*C. The first hypothesis testing*

**H1. There is a statistically significant relationship between cost management techniques and the measurement of materials costs in industrial establishments.**

| No | Sentences | Frequency and percentage% | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Strongly Disagree | | disagree | | Neutral | | Agree | | Strongly agree | |
| | | f | P | f | p | f | P | f | P | F | p |
| 1 | The use of cost management techniques impacts the measurement of direct industrial materials costs | 2 | 3.3% | 8 | 13.3% | 7 | 11.7% | 23 | 38% | 20 | 33.3% |
| 2 | The use of cost management techniques impacts the measurement of variable indirect industrial material costs | 1 | 1.7% | 5 | 8.3% | 13 | 21.7% | 34 | 56.7% | 7 | 11.7% |
| 3 | The use of cost management techniques impacts the measurement of fixed indirect industrial material costs | 3 | 5% | 8 | 13.3% | 12 | 20% | 25 | 41.7% | 12 | 20% |
| 4 | The use of cost management techniques impacts the measurement of costs of marketing materials | 3 | 5% | 7 | 11.7% | 16 | 26.7% | 21 | 35% | 13 | 21.7% |
| 5 | The use of cost management techniques impacts the measurement of administrative materials costs | 1 | 1.7% | 4 | 6.7% | 16 | 26.7% | 25 | 41.7% | 14 | 23.3% |

Table 2: The frequency distribution of the responses of the sample members of the study for the first hypothesis terms

Source: Preparation of the researcher, based on field study data, 2022.

It is clear to the researchers from Table (2) regarding the recurring distribution of the answers of the study sample members to the statements of the first hypothesis which states that (there is a statistically significant relationship between cost management techniques and the measurement of materials costs in industrial establishments), that the majority of the answers were at the levels of “agree” and “strongly agree” .

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| No | Sentences | Standard deviation | Mode | Arithmetical Mean | Interpretation |
|---|---|---|---|---|---|
| 1 | The use of cost management techniques impacts the measurement of direct industrial materials costs | 1.13 | 4 | 3.85 | Agree |
| 2 | The use of cost management techniques impacts the measurement of variable indirect industrial material costs | 0.85 | 4 | 3.68 | Agree |
| 3 | The use of cost management techniques impacts the measurement of fixed indirect industrial material costs | 1.10 | 4 | 3.58 | Agree |
| 4 | The use of cost management techniques impacts the measurement of costs of marketing materials | 1.11 | 4 | 3.56 | Agree |
| 5 | The use of cost management techniques impacts the measurement of administrative materials costs | 0.94 | 4 | 3.73 | Agree |

Table 3: The mean and the mode of the responses of the sample members of the study for the terms of the first hypothesis

Source: Preparation of the researcher, based on field study data, 2022

In Table (3) we note that the descriptive statistics of the first hypothesis terms, which states (there is a statistically significant relationship between cost management techniques and the measurement of materials costs in industrial establishments), the Arithmetic mean is in the range between (3.56-3.85), the mode is in the range of (4) and the standard deviation is in the range between (0.85-1.13). According to the five-digit Likert scale, the individuals' answers are agreed.

| No | Sentences | Chi-square | Degree of freedom | Statistical significance |
|---|---|---|---|---|
| 1 | The use of cost management techniques impacts the measurement of direct industrial materials costs | 99.134 | 1 | .000 |
| 2 | The use of cost management techniques impacts the measurement of variable indirect industrial material costs | 104.686 | 2 | .000 |
| 3 | The use of cost management techniques impacts the measurement of fixed indirect industrial material costs | 85.611 | 2 | .000 |
| 4 | The use of cost management techniques impacts the measurement of costs of marketing materials | 104.849 | 2 | .000 |
| 5 | The use of cost management techniques impacts the measurement of administrative materials costs | 78.393 | 1 | .000 |

Table 4: Test Chi – square for first hypothesis

Source: Preparation of the researcher, based on field study data, 2022

In order to test the validity of the hypothesis, which states "there is a statistically significant relationship between cost management techniques and the measurement of materials costs in industrial establishments ", the Chi-square test was used for the axis expressions. The values of the Chi-square calculated as follows (99.134,104.686 ,85.611 , 104.849,and 78.393). With degrees of freedom (1-2), and with the statistical significance for all terms (0.00), When comparing the level of statistical significance with the permissible level of significance (0.05) we find that the level of statistical significance is less than the level of morale, this means that there are differences of statistical significance of the terms of the hypothesis and the hypothesis achieved.

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*D. Second hypothesis Testing*

**H2. There is a statistically significant relationship between cost management techniques and the measurement of wages costs in industrial establishments.**

| No | Sentences | Frequency and percentage% | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Strongly Disagree | | disagree | | Neutral | | Agree | | Strongly agree | |
| | | f | P | f | p | f | P | f | P | F | p |
| 1 | The use of cost management techniques impacts the measurement of direct industrial wages costs | 2 | 3.3% | 7 | 11.7% | 8 | 13.3% | 23 | 38.3% | 20 | 33.35% |
| 2 | The use of cost management techniques impacts the measurement of variable indirect industrial wages costs | 2 | 3.3% | 8 | 13.3% | 15 | 25% | 27 | 45% | 8 | 13.35% |
| 3 | The use of cost management techniques impacts the measurement of fixed indirect industrial wages costs | 3 | 5% | 8 | 13.3% | 14 | 23.3% | 28 | 46.7% | 7 | 11.7% |
| 4 | The use of cost management techniques impacts the measurement of marketing wages costs | 0 | 0% | 9 | 15% | 13 | 21.75% | 28 | 46.75% | 10 | 16.75% |
| 5 | The use of cost management techniques impacts the measurement of administrative wages costs | 5 | 8.3% | 10 | 16.75 | 13 | 21.7% | 22 | 36.7% | 10 | 16.7% |

Table 5: The frequency distribution of the responses of the sample members of the study for the second hypothesis

Source: Preparation of the researcher, based on field study data, 2022

It is clear to the researchers from Table (5) regarding the recurring distribution of the answers of the study sample members to the statements of the first hypothesis which states that (there is a statistically significant relationship between cost management techniques and the measurement of materials costs in industrial establishments), that the majority of the answers were at the levels of “agree” and “strongly agree” .

| No | Sentences | Standard deviation | Mode | Arithmetical Mean | Interpretation |
|---|---|---|---|---|---|
| 1 | The use of cost management techniques impacts the measurement of direct industrial wages costs | 1.11 | 4 | 3.86 | Agree |
| 2 | The use of cost management techniques impacts the measurement of variable indirect industrial wages costs | 0.99 | 4 | 3.51 | Agree |
| 3 | The use of cost management techniques impacts the measurement of fixed indirect industrial wages costs | 1.03 | 4 | 3.46 | Agree |
| 4 | The use of cost management techniques impacts the measurement of marketing wages costs | 0.93 | 4 | 3.65 | Agree |
| 5 | The use of cost management techniques impacts the measurement of administrative wages costs | 1.19 | 4 | 3.36 | Agree |

Table 6: The mean and the mode of the responses of the sample members of the study for the terms of the second hypothesis

Source: Preparation of the researcher, based on field study data, 2022

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In Table (6) we note that the descriptive statistics of the first hypothesis terms, which states (there is a statistically significant relationship between cost management techniques and the measurement of wages costs in industrial establishments), the Arithmetic mean is in the range between (3.36 – 3.86), the mode is in the range of (4) and the standards deviation is in the range between (0.93-1.19). According to the five-digit Likert scale, the individuals' answers are agreed.

| No | Sentences | Chi-square | Degree of freedom | Statistical significance |
|---|---|---|---|---|
| 1 | The use of cost management techniques impacts the measurement of direct industrial wages costs | 89.128 | 1 | .000 |
| 2 | The use of cost management techniques impacts the measurement of variable indirect industrial wages costs | 74.776 | 1 | .000 |
| 3 | The use of cost management techniques impacts the measurement of fixed indirect industrial wages costs | 86.503 | 3 | .000 |
| 4 | The use of cost management techniques impacts the measurement of marketing wages costs | 55.686 | 3 | .000 |
| 5 | The use of cost management techniques impacts the measurement of administrative wages costs | 83.731 | 1 | .000 |

Table 7: Test Chi – square for first hypothesis

Source: Preparation of the researcher, based on field study data, 2022

In order to test the validity of the hypothesis, which states "there is a statistically significant relationship between cost management techniques and the measurement of wages costs in industrial establishments", the Chi-square test was used for the axis expressions. The values of the Chi-square calculated as follows (89.128,74.776 , 86.503, 55.68,and83.731). With degrees of freedom (1-3), and with the statistical significance for all terms (0.00), When comparing the level of statistical significance with the permissible level of significance (0.05) we find that the level of statistical significance is less than the level of morale, this means that there are differences of statistical significance of the terms of the hypothesis and the hypothesis achieved.

*E. Third hypothesis Testing*

**H3. There is a statistically significant relationship between cost management techniques and expenditures measurement in industrial establishments.**

| No | Sentences | Frequency and percentage% | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Strongly Disagree | | disagree | | Neutral | | Agree | | Strongly agree | |
| | | f | P | f | p | f | P | f | P | F | p |
| 1 | The use of cost management techniques impacts the measurement of direct industrial expenses | 2 | 3.3% | 4 | 6.7% | 5 | 8.3% | 36 | 60% | 13 | 21.7% |
| 2 | The use of cost management techniques impacts the measurement of variable indirect industrial overheads | 2 | 3.3% | 5 | 8.3% | 10 | 16.7% | 31 | 51.7% | 12 | 20% |
| 3 | The use of cost management techniques impacts the measurement of fixed industrial overheads | 3 | 5% | 6 | 10% | 12 | 20% | 27 | 45% | 12 | 20% |
| 4 | The use of cost management techniques impacts the measurement of marketing expenses | 3 | 5% | 7 | 11.7% | 11 | 18.3% | 27 | 45% | 12 | 20% |
| 5 | The use of cost management techniques impacts the measurement of administrative expenses | 3 | 5% | 3 | 5% | 17 | 28.3% | 21 | 35% | 16 | 26.7% |

Table 8: The frequency distribution of the responses of the sample members of the study for the third hypothesis

Source: Preparation of the researcher, based on field study data, 2022

It is clear to the researchers from Table (8) regarding the recurring distribution of the answers of the study sample members to the statements of the first hypothesis which states that (there is a statistically significant relationship between cost management techniques and expenditures measurement in industrial establishments), that the majority of the answers were at the levels of "agree" and "strongly agree" .

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| No | Sentences | Standard deviation | Mode | Arithmetical Mean | Interpretation |
|---|---|---|---|---|---|
| 1 | The use of cost management techniques impacts the measurement of direct industrial expenses | 0.93 | 4 | 3.90 | Agree |
| 2 | The use of cost management techniques impacts the measurement of variable indirect industrial overheads | 0.98 | 4 | 3.76 | Agree |
| 3 | The use of cost management techniques impacts the measurement of fixed industrial overheads | 1.07 | 4 | 3.65 | Agree |
| 4 | The use of cost management techniques impacts the measurement of marketing expenses | 1.08 | 4 | 3.63 | Agree |
| 5 | The use of cost management techniques impacts the measurement of administrative expenses | 1.07 | 4 | 3.73 | Agree |

Table 9: The mean and the mode of the responses of the sample members of the study for the terms of the first hypothesis

Source: Preparation of the researcher, based on field study data, 2022

In Table (9) we note that the descriptive statistics of the first hypothesis terms, which states (There is a statistically significant relationship between cost management techniques and expenditures measurement in industrial establishments), the Arithmetic mean is in the range between (3.63 – 3.90), the mode is in the range of (4) and the standard deviation in the range between (0.93-1.08). According to the five-digit Likert scale, the individuals' answers are agreed.

| No | Sentences | Chi-square | Degree of freedom | Statistical significance |
|---|---|---|---|---|
| 1 | The use of cost management techniques impacts the measurement of direct industrial expenses | 121.495 | 3 | .000 |
| 2 | The use of cost management techniques impacts the measurement of variable indirect industrial overheads | 101.098 | 3 | .000 |
| 3 | The use of cost management techniques impacts the measurement of fixed industrial overheads | 120.619 | 3 | .000 |
| 4 | The use of cost management techniques impacts the measurement of marketing expenses | 99.444 | 2 | .000 |
| 5 | The use of cost management techniques impacts the measurement of administrative expenses | 120.006 | 3 | .000 |

Table 10: Test Chi – square for first hypothesis

Source: Preparation of the researcher, based on field study data, 2022

In order to test the validity of the hypothesis, which states "There is a statistically significant relationship between cost management techniques and expenditures measurement in industrial establishments ", the Chi-square test was used for the axis expressions. The values of the Chi-square calculated as follows (121.495, 101.098, 120.619, 99.444,120.006 ) With degrees of freedom (2-3), and with the statistical significance for all terms (0.00), When comparing the level of statistical significance with the permissible level of significance (0.05) we find that the level of statistical significance is less than the level of morale, this means that there are differences of statistical significance of the terms of the hypothesis and the hypothesis achieved.

## VI. CONCLUSION

This study basically aimed to investigate the impact of cost management techniques on production costs' measurement in industrial companies. Its findings concluded that using of cost management techniques impacts materials measurement in industrial companies. The results of the study also revealed that there is a kind of interdependence between a number of cost management techniques, which means that the use of any of them affects the measurement of direct and indirect industrial labour costs in addition to overheads.

Because this study was applied on Sudanese industrial companies which operates under conditions of hyperinflationary economic, the researchers suggest the possibility of applying the study in an environment with better economic conditions to know the other effects of cost management techniques, and the researchers also suggest conducting further studies on the role of cost management

techniques in achieving competitive advantage and the continuity of industrial enterprises.

## VII. RESULTS OF THE STUDY

After completing the theoretical frame work of the study and the filed study, the researcher found the following results:

- The use of cost management techniques impacts the measurement of direct industrial materials costs.
- The use of cost management techniques impacts the measurement of variable indirect industrial material costs.
- The use of cost management techniques impacts the measurement of direct industrial wages costs.
- The use of cost management techniques impacts the measurement of marketing wages costs.
- The use of cost management techniques impacts the measurement of direct industrial expenses.
- The use of cost management techniques impacts the measurement of variable indirect industrial overheads.

## VIII. RECOMMENDATIONS OF THE STUDY

Based on the results of the field study, the researchers recommend the following:

- The Sudanese industrial companies should pay attention to the accuracy of the accounting measurement of the various industrial costs, which helps the management in rationalizing its decisions.
- The necessity of the industrial companies' commitment to consistency in the selection and use of the accounting measurement bases for industrial costs in order to enable comparison between the costs of different periods.
- Increasing the awareness of the employees in Sudanese industrial companies of strategic cost management techniques and their multiple advantages to enable them to choose the techniques that suits the nature of the company's activity and objectives.
- The necessity of employing cost accountants in industrial companies to get advantages of their knowledge of cost management techniques in accurately measuring various industrial costs.

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