INVENTORY ANALYSIS USING THE ABC-VED MATRIX - APPLIED RESEARCH IN AL-ZAWRAA STATE COMPANY

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ABSTRACT

Purpose: The aim of this study is to examine or analyze the inventory by integrating the analyzes of ABC and VED and take advantage of their advantages together by forming an ABC-VED matrix to classify the inventory according to the cost criteria and the functional importance of the inventory items.

Theoretical framework: The ABC-VED matrix consists of ABC analysis, VED analysis, and then the ABC-VED matrix.

Design / Methodology / Approach: The researcher relied on the case study approach in this research, due to the multiplicity of features and benefits of this approach by using more than one research method at the same time to obtain the maximum benefit related to the case under study. In addition to the fact that this approach helps in a comprehensive and in-depth analysis of the researched problem by obtaining a large amount of information for all events related to the researched case, Where the researcher seeks through this research to analyze the inventory according to the ABC-VED matrix to classify the inventory into three categories according to the criteria of cost and the functional importance of the inventory.

Finding: The results show that the use of the ABC-VED matrix helped Al-Zawra State Company to control, organize and manage its inventory of raw materials and spare parts in more efficient ways, by classifying it into three categories according to the criteria of cost and critical importance, by focusing on the first category and giving it great attention and care because of its high cost, and its great importance.

Research, practical & social implications: The study is expected to help control inventory because of its classification into three categories according to the criteria of cost and the functional importance of raw materials and spare parts for the company in the field of research or other companies wishing to control their inventory.

Originality / Value: The value of the study focuses on the analysis of inventory in Al-Zawraa State Company, and this research responds to addressing the problems of inventory in the company in the field of research by classifying it into three master categories for the purpose of controlling and managing it better.

Doi: https://doi.org/10.26668/businessreview/2023.v8i5.1508

ARTICLE INFO

Article history:
Received 31 January 2023
Accepted 26 April 2023

Keywords:
Inventory; ABC Analysis; VED Analysis; ABC-VED Matrix.

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ANÁLISE DE INVENTÁRIO UTILIZANDO A MATRIZ ABC-VED - PESQUISA APLICADA NA AL-ZAWRAA STATE COMPANY

RESUMO
Objetivo: O objetivo deste estudo é examinar ou analisar o estoque integrando as análises de ABC e VED e aproveitar suas vantagens juntas formando uma matriz ABC-VED para classificar o estoque de acordo com os critérios de custo e importância funcional de os itens de inventário.
Referencial teórico: A matriz ABC-VED consiste na análise ABC, na análise VED e, em seguida, na matriz ABC-VED.
Desenho / Metodologia / Abordagem: O pesquisador contou com a abordagem de estudo de caso nesta pesquisa, devido à multiplicidade de recursos e benefícios desta abordagem ao usar mais de um método de pesquisa ao mesmo tempo para obter o máximo benefício relacionado ao caso em questão estudo, além do fato desta abordagem auxiliar em uma análise abrangente e aprofundada do problema pesquisado obtendo uma grande quantidade de informações para todos os eventos relacionados ao caso pesquisado, onde o pesquisador busca através desta pesquisa analisar o inventário de acordo com a matriz ABC-VED para classificar o estoque em três categorias de acordo com os critérios de custo e importância funcional do estoque.
Constatação: Os resultados mostram que a utilização da matriz ABC-VED auxiliou a Al-Zawraa State Company a controlar, organizar e gerenciar seu estoque de matéria-prima e peças de reposição de forma mais eficiente, classificando-o em três categorias de acordo com os critérios de custo e importância crítica, concentrando-se na primeira categoria e dando-lhe grande atenção e cuidado devido ao seu alto custo e sua grande importância.
Pesquisa, implicações práticas e sociais: Espera-se que o estudo auxilie no controle de estoque devido a sua classificação em três categorias de acordo com os critérios de custo e importância funcional das matérias-primas e peças de reposição para a empresa na área de pesquisa ou outras empresas que desejam para controlar seu estoque.
Originalidade/Valor: O valor do estudo centra-se na análise do inventário na Al-Zawraa State Company, e esta pesquisa responde a abordar os problemas de inventário na empresa no campo da pesquisa, classificando-o em três categorias principais para o efeito de controlá-lo e gerenciá-lo melhor.

Palavras-chave: Inventário, Análise ABC, Análise VED, Matriz ABC-VED.

ANÁLISIS DE INVENTARIO UTILIZANDO LA MATRIZ ABC-VED: INVESTIGACIÓN APLICADA EN LA EMPRESA ESTATAL AL-ZAWRAA

RESUMEN
Propósito: El objetivo de este estudio es examinar o analizar el inventario integrando los análisis de ABC y VED y aprovechar sus ventajas juntos formando una matriz ABC-VED para clasificar el inventario de acuerdo con los criterios de costo y la importancia funcional de los elementos del inventario.
Marco teórico: La matriz ABC-VED consta del análisis ABC, el análisis VED y luego la matriz ABC-VED.
Diseño / Metodología / Enfoque: El investigador se basó en el enfoque de estudio de caso en esta investigación, debido a la multiplicidad de características y beneficios de este enfoque al utilizar más de un método de investigación al mismo tiempo para obtener el máximo beneficio relacionado con el caso en cuestión. estudio, además de que este enfoque ayuda en un análisis integral y profundo del problema investigado al obtener una gran cantidad de información para todos los eventos relacionados con el caso investigado, donde el investigador busca a través de esta investigación analizar el inventario de acuerdo a la matriz ABC-VED para clasificar el inventario en tres categorías según el criterio de costo y la importancia funcional del inventario.
Hallazgo: Los resultados muestran que el uso de la matriz ABC-VED ayudó a la Empresa Estatal Al-Zawra a controlar, organizar y administrar su inventario de materias primas y repuestos de manera más eficiente, al clasificarlo en tres categorías de acuerdo con los criterios de costo e importancia crítica, centrándose en la primera categoría y dándole gran atención y cuidado debido a su alto costo y su gran importancia.
Implicaciones de investigación, prácticas y sociales: Se espera que el estudio ayude a controlar el inventario debido a su clasificación en tres categorías según los criterios de costo y la importancia funcional de las materias primas y repuestos para la empresa en el campo de la investigación u otras empresas que deseen para controlar su inventario.
Originalidad/Valor: El valor del estudio se centra en el análisis del inventario en la Empresa Estatal Al-Zawraa, y esta investigación responde al abordaje de la problemática del inventario en la empresa en el campo de la investigación clasificándolo en tres categorías maestras para el efecto de controlarlo y gestionarlo mejor.

Palabras clave: Inventario, Análisis ABC, Análisis VED, Matriz ABC-VED.
INTRODUCTION

During the industrial revolution, the world witnessed great developments on the technical level and the accompanying development in machinery, machinery and equipment, and the emergence of modern methods of production, which was directly reflected in the manufacturing processes, and there is no doubt that the industrial sector is one of the necessary sectors for the economic development of any country, The manufacturing sector is considered a particularly important sector, which helps to diversify the sources of national income as well as its contribution to meeting the needs of society for necessary products without resorting to importing them from other countries (Al-Msary et al., 2022). The tremendous development in production methods and means and the emergence of automation led to an improvement in the quality of products, and this matter contributed to an increase in the level of demand and sales, and this has stimulated towards a wide and varied production of products and their spread in the markets in a large way, accordingly, many organizations, especially industrial ones, have purchased large quantities of materials, spare parts, and other production requirements to meet the growing needs of production and the market, and to meet the desires of customers. As the production inputs are the raw materials or services needed to achieve the production process, and the outputs are the goods and services that were produced from the process of processing the inputs in the production process (Rahman et al., 2022).

The importance of the research and its justification is that the ABC-VED matrix achieves great benefit for the company in the field of research in controlling its inventory by classifying inventory items into three master categories according to the criteria of cost and functional importance of inventory, and this research helps in expanding or increasing our understanding of inventory analysis and control methods in the researched company and adopting inventory strategies that lead to improving inventory management and reducing its costs in the company. The aim of the research is to improve inventory management by classifying inventory into specific categories by applying the ABC-VED matrix to classify inventory into three categories according to the criteria of cost and critical importance. The need for research is to provide a scientific and systematic analysis of the inventory to control it.

The problem of this research was the existence of a weakness in the management of the company's inventory in the field of research through the presence of stagnant and accumulated quantities of inventory for a long time for many materials, while dealing with all inventory items with the same importance.
LITERATURE REVIEW

The problem was represented in the study (Ayat, 2017) with the high amount of damaged inventory as a result of the presence of large balances of some low-consumption inventory items, some of which were exposed to damage. As the accumulation of a large volume of these inventorys for a long time and in a manner that is not compatible with the needs of these elements leads to the exposure of some of them to damage. While the aim of this study was to apply the ABC-VED matrix to spare parts inventory in order to reduce and better manage idle inventory items, ensuring that vital and essential parts and other desirable items are available in optimal quantities. This study was applied in the printer industry company, while the research sample was the inventory of spare parts and spare materials for this company, which includes a total of 331 items. This study concluded that the application of the ABC-VED matrix for the inventory items helped in determining the appropriate quantities that are supposed to be kept in the inventory, and in reducing the accumulation and spoilage of the inventory. This study concluded that the process of applying the ABC-VED matrix to the inventory items helped in determining the appropriate quantities that are supposed to be kept in the inventory, and to reduce the accumulation and spoilage of the inventory.

In the study (Yigit & Vahit, 2019) the research problem was that hospitals used a large part of their resources to purchase medical supplies in increasingly large amounts every year. Thousands of different types and sizes of medical materials are stored in hospitals, and these stored materials constitute an important and significant component of the hospital budget. If not managed effectively, it will be a huge waste of resources in hospitals. While the aim of the research was to analyze the inventory of medicines using ABC analysis, VED analysis, and the ABC-VED matrix to classify the inventory according to the cost and functional importance of the inventory for the purpose of providing uninterrupted health service, and Providing medicines in the required place, time, quantity and quality. This study was applied in the medical supplies of the hospital group of (KHGM) company, while the research sample was 100 items from the drug inventory at this distributor, Inventory of medicines for these hospitals. The study concluded that saving in the inventory of medicines in hospitals increases the efficiency, profitability and financial sustainability of the hospital, and on the other hand, it plays a major role in providing cost-effective health services. In the absence of effective management of inventories of medical supplies in hospitals.

In a study (Al-Najjar et al., 2020), the research problem was that the management of pharmacies’ inventory was not well researched in Iraq. As the failure to direct the allocation of
financial resources efficiently and effectively led to an increase in health care provision expenditures in a way that is disproportionate to the volume of financial resources allocated by the central government for the health care provision system. While the objective of the research was to conduct a systematic classification according to the ABC-VED matrix of the drugs in the pharmacy's inventory in order to direct resources efficiently and effectively and optimal financial allocation in purchasing medicines according to their importance, cost and level of use, and thus reduce the costs of drug inventory and improve the level of service. This study was applied in a general hospital, and the study sample consisted of 138 types of medicines. The study concluded that inventory analysis according to the ABC-VED matrix has a significant role in controlling drug inventorys in pharmacies, The better use of inventory models according to this analysis leads to the improvement of both the health service delivery system in the hospital, the relationship between the patient and the hospital, and the allocation of appropriate financial resources to the hospital.

In the study (Mor et al., 2021), the research problem was that inventory management practices were not well exploited in various manufacturing industries so far, As the master problem of inventory management is to reduce the actual conflict and conflict between operating efficiency, investment cost, and miscellaneous costs associated with inventory and make them as low as possible. While the objective of the research was to formulate ABC and VED measures for selected items in the industry, thus reducing the actual discrepancy between operating efficiency, investment cost and other costs of inventory to a minimum, while improving the levels of inventory retention in the required quantities. This study was applied in some manufacturing industries in India, and the study was a set of 146 raw materials. The study concluded that managing the appropriate levels of inventory in the organization leads to better management of resources and management of costs, as the research concluded that planning and analyzing inventory helps reduce waste time, which reduces processing costs and damages to improve product quality and speed of data storage.

MATERIAL AND METHODOLOGY

Population and Sample

Al-Zawraa State Company, which is located in the city of Baghdad in Iraq, was chosen as a field for conducting the research, as it is one of the companies that enjoy great weight and importance in the manufacturing sector in Iraq. It includes a number of factories that contribute to the production of various types of products that are supplied by a group of public and private
sector companies, In light of this, a group of raw materials and spare parts was selected from the company's stores, which numbered 353 raw materials out of 2500 materials, which were extracted from the company's commercial affairs department - warehouse division.

The choice of this company is due to several reasons, including Al-Zawraa Company was selected as a research field due to its distinction in the industrial sector in Iraq, the company has a large inventory of raw materials, spare parts and maintenance materials, In addition, she suffers from major problems in managing its inventory due to its large size and the traditional policies and systems used in the company.

Inventory Concept

Inventory includes all tangible assets that include goods held for sale, those currently used in the process of producing these goods, and those actually used in the production of products and services (Ab dolazimi et al., 2021). Accordingly, the inventory includes all of the raw materials to finished goods, semi-manufactured materials, and even production aids (Al-Shammari, 2015). (Al-Ham dani et al., 2015) defined inventory as goods (materials) or services that have a future benefit for the organization, which is used in the production process, retention, or for the purpose of selling as a commercial activity for the organization. The inventory cost includes (workers’ salaries, fuel, building maintenance, electricity, etc.) (Fadel & Mohammed, 2021). While inventory management includes a planned approach to determine what will be ordered, when, and the quantity of materials to be stored for the purpose of reducing purchase costs to the lowest possible extent without affecting the progress of the production and sales process (Al-Dulaimi, 2013). Inventory management is the nerve center in any organization, as without implementing an effective inventory management system, no company can be successful in its business, and a model for inventory management is developed on the basis of reducing variable cost (Kumar et al., 2018). Inventory management is very necessary because inventory represents an important asset of the organization, which may negatively affect the performance of companies if they are not managed efficiently because it absorbs financial resources that could have been used in other business activities (Kumari, 2020).

ABC Analysis

Simple classification of the materials that make up the product according to frequency of use and cost. This analysis classifies each item of inventory into one of A, B, and C categories
so that it is easy to apply strict control to specific categories in light of their value and level of consumption (Pandya & Thakkar, 2016). Category A represents 10% of inventory items, Category B represents 20%, and Category C represents 70% (Al-Najjar et al., 2020).

**VED Analysis**

VED analysis is a qualitative approach to the classification of inventory materials and parts (Fedriani, 2017). A VED analysis is conducted to determine the importance of an item and its impact on production and other services. This analysis is used to classify materials and spare parts into three categories – Vital, Essential and Desirable. If the part is vital, it is given the classification “VED”. V”, and if it is necessary or essential it is given the rating "E" and if it is not absolutely necessary but desirable the part is given the rating "D". For "V" items a large inventory of inventory is generally kept, while for "D", minimum inventory is sufficient (Kumari & Jagadeeswaran, 2018) (Onanuga & Adekunle, 2014). This analysis requires the warehouse manager to classify the item based on its importance. One of the simple ways to assign and determine the importance of the item is by estimating the extent to which this item affects the performance of the product and the impact of its lack of availability on production loss. The greater the production loss due to this item, the higher the rating of the vital importance of the item (Shenoy & Rosas, 2018).

**ABC-VED Matrix**

Inventory of materials is very expensive in companies, especially in industrial companies, so any increase in inventory items over the need leads to an increase in costs, and any shortage of inventory items leads to stopping production processes and delaying delivery to the customer, so it requires companies to pay increased attention and focus Great on inventory, searching for techniques and approaches that help in managing it and improving the efficiency of inventory management. There are two important factors in inventory management, which are the cost and the functional importance of the inventory, and both the ABC and VED analyzes helped classify the inventory into multiple categories according to these two factors, which are cost and critical importance (Prommarat, 2021). The difference between the ABC and VED analyzes includes that the first depends on a database from which we extract the value and cost of inventory, while the second depends on a database from which we extract the importance and criticality of inventory items (Phuong, 2017). VED analysis is often used along with ABC analysis because the two complement each other, by creating an ABC-VED matrix.
(Machado & Barroso, 2014). The ABC-VED matrix is formed by cross-tabulation of the ABC-VED analysis and three groups of master categories are formed. It should be noted that the first letter in this category indicates the place of the item in the categories of the ABC analysis, and the second letter indicates the place of the item within the categories of the VED analysis (Durmus & Dugral, 2021). Experiments show that the use of ABC analysis and VED analysis independently does not lead to effective control in inventory management (Al-Najjar et al., 2018).

**Categories of the ABC-VED Matrix**

Combining the ABC and VED analyses together and applying the ABC-VED matrix results in three distinct master groups with different characteristics that classify inventory items as follows: (Bulkan & Ceylan, 2017)(GunerGoren & Dagdeviren, 2017)(Karim& Andawaningtyas, 2020)

**The first group:** This group includes very expensive and vital items, as these items need to be closely monitored and controlled continuously, and the inventory items for this group include a number of sub-categories, which are AV, AE, AD, BV, and CV.

**The second group:** This group includes the least expensive and least criticality Items of the group (A). It can be said that they are of medium value and of medium functional importance, and these Items need to be controlled periodically. Items in this group include sub-categories, which are BE, CE, BD.

**The third group:** This group includes the least valuable, costly, and functionally least important elements, so these elements do not need to be controlled periodically, and the elements of this group include the CD category.

**Benefits of Using the ABC-VED Matrix**

Using and applying the ABC-VED matrix helps companies in general and inventory management in particular to achieve a set of benefits as follows: (Bulkan & Ceyln, 2017)(Fedriani, 2017)(Pholpipattanaphong & Ramingwong, 2021) (Prommarat, 2021)

a. Research and studies show that the combination of ABC classification principles and VED classification can improve the efficiency of inventory management and help management estimate the quantity of material inventory according to demand and importance.
b. The use of this matrix helps increase the ability to control inventory by covering the problem and its solution in inventory management.

c. The ABC-VED Matrix provides more efficient control over the supply of materials, parts and components.

d. VED analysis is usually combined with ABC analysis to increase accuracy in purchasing and inventorying.

e. The appropriate selection of inventory control techniques and methods such as ABC, VED and linking them together helps in improving efficiency in inventory management.

RESULTS AND DISCUSSION

About Al-Zawraa General Company

Al-Zawraa State Company was established in 1988 and is affiliated to the Iraqi Ministry of Industry and Minerals. It is considered one of the engineering companies or those with engineering specialization in Iraq. The company seeks to establish strong and long-term relationships with its customers from the public or private sectors alike to gain their trust and satisfaction by manufacturing products that conform to international standards, in addition to providing maintenance services, on-site rehabilitation and after-sales services.

An Introduction to Inventory Classification According to the ABC and VED Methods

The researcher relied on diagnosing the most important problems that Al-Zawaa General Company suffers from by going to the company several times, And conducting a series of interviews with the company’s employees, engineers and managers, and it became clear that it complains of inventory problems in terms of the accumulation and stagnation of some materials, shortages and scarcity of other materials, and the change in adherence to inventory systems and their poor application, Therefore, here, this research presents a modest attempt to the company (the field of research) and by following the modern and multiple scientific methods and approaches to solve this problem and control or control the inventory, And after reviewing the mechanism of purchase and storage of materials, their nature and types, whether they are primary or secondary materials or even semi-manufactured materials that may be used in other operations. ABC-VED analysis and the ABC-VED matrix can be done in the next steps in this topic.
ABC Analysis

The ABC analysis methodology includes classifying inventory items (research sample) into three categories according to cost and level of consumption, as data for these materials (research sample), amounting to 353 items, were randomly obtained from the company's records in the Commercial Affairs Department - Warehouse Division for the year (2020). These materials were arranged in descending order according to their total cost for each material from the highest to the lowest, then they were classified into three categories according to the percentages shown in Table (1), which were adopted as a scientific and academic reference followed in many scientific researches, on which companies base their inventory classification at use this analysis. The ABC analysis classifies the inventory of raw materials into three categories, which are the high-cost materials category, the medium-cost materials category, and the low-cost materials category, as well as knowing the most consumed materials from the least consumed materials. Table (1) shows the ABC analysis procedure.

<table>
<thead>
<tr>
<th>Category</th>
<th>The number of items in the group</th>
<th>The percentage of items is approx</th>
<th>The monetary value in dinars</th>
<th>The percentage of the monetary value</th>
<th>The cumulative percentage of monetary value</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>35</td>
<td>%9.9</td>
<td>892731000</td>
<td>88.2%</td>
<td>%88.2</td>
</tr>
<tr>
<td>B</td>
<td>71</td>
<td>%20.1</td>
<td>104821700</td>
<td>10.4%</td>
<td>%98.6</td>
</tr>
<tr>
<td>C</td>
<td>247</td>
<td>%70</td>
<td>14155400</td>
<td>1.4%</td>
<td>%100</td>
</tr>
<tr>
<td>Total</td>
<td>353</td>
<td>%100.0</td>
<td>1011708100</td>
<td>%100</td>
<td></td>
</tr>
</tbody>
</table>

Source: Prepared by the authors (2022).

It is clear from the foregoing that the number of category A items is the least in quantity, but it has the highest monetary value, while the number of category C items is the most quantity, but it has the lowest monetary value, and here requires the management of the company and the management of stores to focus attention on the items of category (A) being It includes most inventory costs and represents the largest percentage of the total costs of inventory, While it reduces its focus on category (C) because it represents the lowest percentage of inventory costs to save effort and time.

VED Analysis

The VED analysis approach includes classifying the inventory items (research sample) into three categories according to the vital and functional importance of these materials. The three categories are as follows:
1. **Vital Category (V):** It is the category of very necessary and most important materials in the company, which is characterized by a number of characteristics that distinguish it from the rest of the other categories, as the unavailability or absence of these materials in the company’s stores leads to the cessation of production. It directly affects the performance of the product, and it can be involved in the production and manufacture of more than one product in the company. These materials may be global and unique, and their availability and import require a long period of time compared to the materials of other categories.

2. **Basic materials (E):** It is the category of necessary materials, but it is less important than the materials of the vital category (V). The materials of this category are characterized by their impact on production and product performance indirectly, but to a lesser degree than the effect of materials of category (A). These materials can be imported regionally or globally, but they are not unique, and it may take a long period of time to provide them.

3. **Desirable materials (D):** They are the materials that are not necessary in the company and are the least critical and less important than their counterparts in categories (A) and (B). At most, it can be provided locally and takes a short period of time to process.

In order to classify inventory items (research sample) into three categories according to the VED method, the researcher conducted a series of interviews with experts and specialists from the engineers and managers of the company to identify and classify inventory items (research sample) into three categories according to their functional importance. As the importance and criticality of these materials were classified based on a set of characteristics and criteria, which were the master focus in this classification, then the researcher distributed the results with percentages as shown in Table (2).

<table>
<thead>
<tr>
<th>Inventory categories</th>
<th>Quantity</th>
<th>percentage</th>
<th>Monetary value in Iraqi dinars</th>
<th>Percentage of cash value</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>168</td>
<td>47.6%</td>
<td>4125455750</td>
<td>40.8</td>
</tr>
<tr>
<td>B</td>
<td>87</td>
<td>24.6%</td>
<td>234743650</td>
<td>23.2</td>
</tr>
<tr>
<td>C</td>
<td>98</td>
<td>27.8%</td>
<td>364418700</td>
<td>36</td>
</tr>
<tr>
<td>Total</td>
<td>353</td>
<td>100%</td>
<td>1011708100</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: Prepared by the authors (2022).

It is clear from the foregoing that the elements of the vital category V are the most quantitative, and they are the highest monetary value in addition to being the most functionally...
important and must be given high priority and increased attention, while the elements of category D are the least vital and of functional importance are the least among the three categories so they do not require great interest in saving time and effort and investing it in taking care of other most important inventory categories.

ABC-VED Matrix

After conducting both the ABC and VED analyzes, we can now perform and apply the ABC-VED matrix by merging the ABC and VED analyzes together in one table and forming a matrix that includes each of the aforementioned analyzes for the purpose of integration and maximizing the benefit of merging the two analyzes together, as shown in Table (3) Then, we show the ratios for each of the categories within the ABC-VED matrix, as shown in Table (4).

<table>
<thead>
<tr>
<th>Category</th>
<th>V</th>
<th>E</th>
<th>D</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>12</td>
<td>11</td>
<td>12</td>
<td>35</td>
</tr>
<tr>
<td>B</td>
<td>35</td>
<td>17</td>
<td>19</td>
<td>71</td>
</tr>
<tr>
<td>C</td>
<td>121</td>
<td>59</td>
<td>67</td>
<td>247</td>
</tr>
<tr>
<td>Total</td>
<td>168</td>
<td>87</td>
<td>98</td>
<td>353</td>
</tr>
</tbody>
</table>

Source: Prepared by the authors (2022).

Table 4: Results of the analysis of the raw materials inventory categories for the ABC-VED matrix

<table>
<thead>
<tr>
<th>Category</th>
<th>Inventory subcategories</th>
<th>percentage</th>
<th>Monetary value in Iraqi dinars</th>
<th>Percentage of the monetary value</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>(AV,AE,AD,BV,CV)</td>
<td>54.11</td>
<td>947816750</td>
<td>93.7</td>
</tr>
<tr>
<td>II</td>
<td>(BE,BD,CE)</td>
<td>26.91</td>
<td>59919650</td>
<td>5.9</td>
</tr>
<tr>
<td>III</td>
<td>(CD)</td>
<td>18.98</td>
<td>3971700</td>
<td>0.4</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>100</td>
<td>1011708100</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Source: Prepared by the authors (2022).

Detailed Results of the ABC-VED Matrix

The inventory analysis according to the ABC-VED matrix shown in Table (4) and based on the criteria of cost and the functional importance of the inventory leads to the classification of the inventory items of the research sample into nine sub-categories. We can then put these categories into three master categories, where the first category includes five sub-categories, which are (AV,AE,AD,BV,CV), The second category includes three subcategories, which are (BE, BD, CE), while the third category includes one category, which is (CD). Each category includes details specifying the quantity of each category, the percentage of this quantity out of
the total number of items in the total inventory, and the monetary value in Iraqi dinars, and the percentage of this cash value of the total costs, as shown in Table (4).

Interpretation of Inventory Analysis Results According to the ABC-VED Matrix

Based on the results of this matrix, it requires a strong concentration of attention and care for the inventory of the first category of the ABC-VED (I) matrix, and giving more effort and time to adjust and control it by providing it continuously and preventing its depletion or shortage, and also taking into account that it is very expensive, so it requires achieving balance without excess big and no decrease, On the other hand, it is required to give medium importance to the second category of the ABC-VED (II) matrix, due to its cost and medium functional importance, while giving less focus and attention to the third category of the ABC-VED (III) matrix because it is low in vitality and low cost, in order to save effort and time to control the inventory of the two categories. The first in particular and the second to a lesser extent.

CONCLUSION

The use of the ABC-VED matrix helps Al-Zawraa General Company to control its inventory of raw materials and spare parts, organize it, and manage it in more efficient ways, by classifying it into three categories according to the criteria of cost and critical importance. The ABC-VED matrix also helped the management to focus on the first category. And giving it more attention and care because it has a high cost and great functional importance, while reducing attention, effort and time in the third category.

This research suggests the need to focus and pay attention to the first category of the ABC-VED matrix, as it is the most important category and the highest cost, and to reduce attention to the third category because it is cheap and non-critical.

The research also recommends linking the ABC-VED matrix with other approaches and methods to maximize the benefit in inventory management, such as linking the matrix to the AHP hierarchical analysis process to help decide on Selection the inventory system to control each of the three categories of the ABC-VED matrix.

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