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Inventory management practices applied by stores officers in public tertiary educational institutions in south-east Nigeria

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ABSTRACT

This study determined the inventory management practices applied by Stores Officers in public tertiary educational institutions in South-East Nigeria. Two research questions guided the study and two null hypotheses were tested. The study adopted a descriptive survey research design using a population of 747 Stores Officers in all the public tertiary educational institutions. Taro Yamani formula was used to select a sample size of 261 Stores Officers. A structured questionnaire developed by the researcher was used for data collection. Cronbach Alpha method was used to establish the reliability which yielded coefficient values of 0.85 and 0.87 for the two clusters. Out of the 261 copies of the questionnaire distributed, 208 (representing 79.69 %) were duly completed, retrieved and used for data analysis. Mean, standard deviation and ANOVA were used to analyze the data. The results showed that barcode inventory management practices were moderately applied by Stores Officers in public tertiary educational institutions in South-East Nigeria, while activity based costing inventory management practices were lowly applied. The results showed that type of institution do not significantly influenced the mean ratings of the respondents on the extent they applied barcode and activity based costing inventory management practices in universities, polytechnics and colleges of education. Therefore, it was recommended among others that tertiary educational institutions should sponsor their stores personnel to training in the area of inventory control management that will empower them to adequately apply different inventory management practices for smooth running of the institutions.

Keywords: Inventory management practices, stores officers and tertiary educational institutions.

1. INTRODUCTION

Nigerian educational system is made up of primary, secondary and tertiary levels. Tertiary educational institutions purchase different materials and equipment known as inventory. Inventory is an asset in the form of materials and equipment in the production and service delivery processes. These materials and equipment are often properly stored in order to avoid discrepancies or loss and

hence, the need for inventory control system for effective and efficient management. Inventory has helped in the growth and survival of an institution by ensuring regular supply of materials and equipment as at when required. Daniel (2017) defined inventory management simply as the management of inventory or stock. In educational institutions, inventory includes equipment and materials used in instructional delivery such as books, magazines, among others. Supply of these materials is affected by funding such that where funding is insufficient as in the Nigerian situation, inventory supply is inadequate or grossly inadequate in some cases for effective teaching and learning. This calls for prudent management of inventory; hence Fedena (2019) averred that it is important to safeguard school equipment and materials in order to ensure efficiency of use.

Inventory management in schools is the management of educational equipment and materials to ensure that they are cared for properly and utilized in the ideal fashion to achieve high returns on the expenditure and labour on them. Inventory management thus affects multiple concerns an institution would have from ensuring that their investment has good returns but also ensuring that all their stakeholders benefit from everything the institution has to offer. Tertiary education institutions have a duty to utilize their inventory and assets appropriately, because there are so many stakeholders involved. This is why Pontius (2020) explained that educational institutions receive funding, tuition, and other endowments that make them especially accountable to these stakeholders.

More importantly, these institutions fall under the governance of the Governmental Accounting Standards Board (GASB) or the Financial Accounting Standards Board (FASB) this makes their compliance with the standards critical to their continued operations. Standards in financial reporting activities of tertiary institutions in the South-East would facilitate inventory management. Store officers must follow the standards and practices involved in order to control corrupt practices in these institutions. In view of the fact that inventory management is very important to educational institutions, both the administration and employees are expected to be mindful of the best practices required to be followed in the management of inventory. The objective of inventory management is to know the status of inventory at any given time in order to manage the levels correctly (Walts, 2020).

Inventory management is very important because every organization strives to maintain adequate level of inventory in order to avoid stock outs. Daniel (2017) observed that high levels of inventory held in stock will adversely affects cash flow and leads to inefficiency in maintaining stock level. To achieve the objectives of minimizing stock related costs, firms should maintain adequate levels of stock so as to enable smooth business operations. Good inventory management is equal to good financial management. Most organizations are forced out of business due to poor inventory management because determination of many economic trends and making various forecasts are based on amount invested in inventories. Obiri-Yeboah, David and Makafui (2015) asserted that good inventory management practices help by adding value in terms of having control over and maintaining lean inventory. Inventories often constitute a major element of the total working capital. In public sector organizations a large portion of working capital is locked up in inventories resulting in various visible and invisible effects on performance. Thus, it is very essential to reduce the amount of capital locked up in inventories.

Inventory management helps to set policies and establishes guidelines to ensure efficient and scientific inventory control. Inventory forms an important part of current assets of any organization. The return on investment depends on the utilization of inventories. Inventories are also the subject of reduction efforts because they are a critical variable in a firm's return on investment. The inventory management policy of the public sector enterprises has direct influence on their profitability and risk. The liquidity can be strengthened by increasing the level of investment in inventory but increased liquidity through increased levels of inventory decreases its returns because more funds will be tied up in current assets than are absolutely necessary. To increase the rate of return, the liquidity will have to be sacrificed by reducing the level of investment in inventories to the minimum. This is in line with the position of Haruna and Salome (2019) that inventory management is based on the need to demonstrate accountability for public funds, improve transparency and credibility of information used for policy making as well as efficiency. Poor inventory management can present a serious challenge in the validity of an organization and can sometimes have disastrous effect on the solvency.

There are various perspectives to the problem of inventory control in developing economies like Nigeria currently facing challenges of maintaining socio-economic progress amidst unprecedented plunge in crude oil prices and tightened global financial conditions which resulted in reduction of government revenues (Aro-Gordon & Gupte, 2016). In the Nigerian context, the key challenge of inventory control has been attributed to failure in recruiting well qualified stores officers to take charge of inventory supervision and management. There is a misconception that inventory operation is not a strategic function and also the dearth of storage facilities as well as the habit of stores procedure violation by various cadre personnel in many organizations. Gitau (2016) opined that management of inventories has an important bearing on the financial strength and competitiveness of organizations because it directly affects working capital, production and service delivery. This is why Akindipe (2014) averred that the practice of

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inventory management in tertiary institutions in South East Nigeria today requires significant improvement, in view of the poor level of computerization and non-determination of stock level.

Managing inventories by stores officers at public tertiary institutions is one of the major challenges for higher educational institutions in Nigeria especially South-East. Stores officers ensures adequate and complete keeping of appropriate store accounting records for all procurements and rendering relevant reports to management for decision making. Achieving these expectations in the every growing public tertiary institution calls for inventory management practices. Many practices are available for effectively managing inventories. According to Daniel (2017), the inventory management practices that are universally adopted by firms include Economic Order Quantity (EOQ) model, ABC model, Vendor Managed Inventory (VMI), Just-In-Time model, Bar-coding, Periodic review, Perpetual Review, Simulation, among others. This study focused on barcode and activity based costing inventory management practices in tertiary institutions.

Barcoding is an easy and versatile approach to cataloguing and monitoring supplies in educational institutions. Barcodes allow educational equipment and materials to be tracked efficiently from the time to time. This allows store officers to gather important information about institutions equipment and materials used by department or discipline (Sohail, 2018). With the help of barcodes, school inventory management can be automated so that receiving, storing and shipping processes are streamlined. Barcode is assigned to a particular inventory item to show its identity during storage, retrieval and dispatch. According to Daniel (2017), barcodes facilitate the tracking of specific items in the warehouse during inventory audit or material pick up. They also help in tracking consignments during transportation/ inspection at the customer end. The information that may be required generally relates to the country code, manufacturer's name, product details, date of manufacture, material content, and so on. Barcodes systems are great tools for inventory management and control.

Activity Based Costing (ABC) analysis is an inventory method that divides items into three categories, A, B and C. ABC analysis is a sound and recognized categorization technique whose main purpose is to establish items that should be prioritized in the management of an inventory (Daniel, 2017). ABC analysis categorizes products based on importance. The ultimate purpose of ABC system is to assign every activity cost incurred to product or service. As in the university case the cost is assigned to student as each activity center incurred cost as a result of service rendered to the students. The ABC cost activity analysis shows clearly to the department head how much cost is incurred by the division in performing services for each student and to know whether this cost is justifiable to provide the service (Yunis, 2019). This system also eliminates non added value activities to show the true cost incurred. ABC system help tertiary institutions to understand where costs are and what drive it to occur. Therefore, the big opportunities of ABC system predicting planning, cost estimation and elimination of non-added value activities are useful for operational strategic decision.

Respondent variable that can influence the inventory management practices applied by store officers in tertiary educational institutions in South-East Nigeria could be type of institution. Type of institution in this research study means all conventional federal universities and colleges of education. Federal tertiary educational institutions are likely to apply inventory management practices before the State follows. Odimmega (2015) reported that a significant difference exists in the views of accounting officers in the universities, polytechnics and colleges of education on the use of accounting techniques and standards. Stores Officers in this study are among the account officers. It is on the basis of this background that this study was conceived to determine the inventory management practices applied by Stores Officers in public tertiary educational institutions in South-east Nigeria.

Statement of the Problem

Inventory in organizations today is a key area that has attracted scholars from the business world. Inventory management is the technique of controlling the purchases, use and transformation of materials in an optimal manner. The objective of effective inventory management is to maintain inventory at suitable levels and at low cost. Poor inventory management provides negative impact on the provision of quality education which has resulted into theft of educational materials and equipment, over or under-stock of inventory and the attendant interruption of operations and increased costs. Lack of good inventory management had adversely affected organizations both internationally and locally such as the inability of the management to recruit well qualified Stores Officers; the issue of lack storage facilities and the habit of stores procedure violation by the top, the middle, and junior cadre personnel in the organization. These result in improper verification and valuation of inventory in institutions' financial reporting. For better functions of tertiary educational institutions, materials and equipment should be stored properly so as to avoid discrepancies or losses. This makes the study on the inventory management practices applied by Stores Officers in public tertiary educational institutions in South-East Nigeria imperative.

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Purpose of the Study

The aim of this study was to determine the inventory management practices applied by Stores Officers in public tertiary educational institutions in South-East Nigeria. Specifically, the study determined the extent stores officers apply:

1. barcode inventory management practices.
2. activity based costing (ABC) inventory management practices.

Research Questions

The following research questions guided the study:

1. To what extent do Stores Officers apply barcode inventory management practices in public tertiary educational institutions in South East Nigeria?
2. What is the extent to which Stores Officers apply Activity Based Costing (ABC) inventory management practices in public tertiary educational institutions in South East Nigeria?

Hypotheses

The following null hypotheses were tested at 0.05 level of significance:

1. Store Officers in universities, polytechnics and colleges of education do not differ significantly in their mean ratings on the extent they apply barcode inventory management practices in tertiary educational institutions in South-East Nigeria.
2. Store Officers in universities, polytechnics and colleges of education do not differ significantly in their mean ratings on the extent they apply activity based costing (ABC) inventory management practices in tertiary educational institutions in South-East Nigeria.

2. METHOD

Descriptive survey research design was adopted for the study. The study was conducted in South-East Nigeria. The population consisted of 747 Stores Officers in all the public tertiary educational institutions (five federal universities, three polytechnics and four federal colleges of education) in South-East Nigeria. A sample size of 261 stores officers was used which was derived using Taro Yamani formula. Data for this study was collected using a questionnaire titled "Extent of Application of Inventory Management Practices in Public Tertiary Educational Institutions (EAIMPPTEI)". The respondents were requested to rate the items on a 5-point rating scale of Very Highly Applied (VHA), Highly Applied (HA), Moderately Applied (MA), Lowly Applied (LA) and Very Lowly Applied (VLA) with values 5, 4, 3, 2 and 1 respectively. Three experts in business education validated the instrument. Cronbach Alpha method was used to test reliability of the instrument which yielded coefficient values of 0.85 and 0.87 for the two clusters. Out of the 261 copies of the questionnaire distributed, 208 (representing 79.69 %) were duly completed, retrieved and used for data analysis. Data were analyzed using mean, standard deviation and ANOVA. The application of SPSS version 23 was used for data analysis. For the hypotheses, p-value was used for decision making. Where the calculated p-value was less than the stipulated level of significance 0.05 ($p < 0.05$), it implies that there was a significant difference between respondents' mean scores and the null hypothesis is rejected. On the other hand, if the p-value is greater than or equal to the alpha level of 0.05 ($p \geq 0.05$), it means that there was no significant difference in the respondents mean scores and is not rejected.

3. RESULTS

Research Question 1

To what extent do Stores Officers apply barcode inventory management practices in public tertiary educational institutions in South East Nigeria?.

Table 1 Mean ratings of Stores Officers on their extent of application of barcode inventory management practices (N = 208)

S/No	Barcode Inventory	Mean	SD	Decision
1.	Using barcode for document tracking	2.09	0.73	Lowly applied
2.	Using barcode for stock-taking	2.14	0.69	Lowly applied
3.	Using barcode to prepare statistical report	2.71	0.53	Moderately applied
4.	Making of use of barcode as security detector	2.60	0.61	Moderately applied
5.	Making use of barcode to prevent pilferage	3.03	0.49	Moderately applied
6.	Use of barcode to charge and discharge materials	2.84	0.37	Moderately applied

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7.	Recording transaction histories	2.88	0.33	Moderately applied
8.	Streamlining documentation and reporting	2.86	0.36	Moderately applied
9.	Using barcode for identification and handling of materials in stores	1.95	0.66	Lowly applied
Cluster Mean		**2.57**		**Moderately applied**

As displayed in Table 1, the cluster mean of 2.57 shows that barcode inventory management practices are moderately applied by Stores Officers in public tertiary educational institutions in South-East Nigeria. The item-by-item analysis shows that items 1, 2 and 9 with mean scores of 2.09, 2.14 and 1.95 are barcode inventory management practices lowly applied by Stores Officers, while items 3, 4, 5, 6, 7 and 8 with the mean scores of 2.71, 2.60, 3.03, 2.84, 2.88 and 2.86 respectively are barcode inventory management practices moderately applied by Stores Officers. The standard deviations of 0.33 to 0.73 are within the same range, showing homogeneity in responses.

Research Question 2

What is the extent to which Stores Officers apply activity based costing inventory management practices in public tertiary educational institutions in South East Nigeria?

Table 2 Mean ratings of Stores Officers on their extent of application of activity based costing inventory management practices (N = 208)

S/No	Activity Based Costing Inventory	Mean	SD	Decision
10.	Allocating time and money in inventory by use of ABC	2.08	0.71	Lowly applied
11.	Using ABC in determining the control level placed on the items	2.08	0.76	Lowly applied
12.	Making use of ABC to reduce cost holding costs	2.08	0.70	Lowly applied
13.	Using ABC helps the institution concentrate on the most cost effective areas	2.43	0.61	Lowly applied
14.	Breaking down data into segments	2.04	0.74	Lowly applied
15.	Using ABC analysis to identify the activities within each department	2.06	0.76	Lowly applied
16.	Using ABC to reduce overhead costs	2.39	0.64	Lowly applied
17.	Assigning every activity cost incurred to service rendered	2.07	0.73	Lowly applied
18.	Making use of ABC to evaluate the division performances	2.03	0.75	Lowly applied
Cluster Mean		**2.14**		**Lowly applied**

Table 2 shows that the mean scores of all the nine items on activity based costing inventory management practices range between 2.03 and 2.43 which indicate that each of them is lowly applied. The cluster means score of 2.14 shows that, and whole activity based costing inventory management practices are lowly applied by Stores Officers in public tertiary educational institutions in South-East Nigeria. The standard deviations of 0.61 to 0.76 are within the same range, showing that the respondents are not wide apart in their responses.

Test of Hypotheses

Hypothesis 1

Stores Officers in universities, polytechnics and colleges of education do not differ significantly in their mean ratings on the extent they apply barcode inventory management practices in public tertiary educational institutions in South-East Nigeria.

Table 3 Summary of ANOVA on the barcode inventory management practices applied by Stores Officers

Source of Variance	Sum of Square	df	Mean Square	F	P-value	Decision
Between Groups	4.807	2	2.403	.878	.417	Not Sig
Within Groups	560.866	205	2.736			
Total	565.673	207				

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Table 3 shows that at 205 degree of freedom, type of institution do not significantly influenced the mean ratings of the respondents on the extent of their application of barcode inventory management practices. F-ratio is .878 and *P-value* (.417) is greater than the stipulated 0.05 level of significance (P-value > alpha level). Therefore, the null hypothesis is not rejected.

Hypothesis 2

Stores Officers in universities, polytechnics and colleges of education do not differ significantly in their mean ratings on the extent they apply activity based costing inventory management practices in public tertiary educational institutions in South-East Nigeria.

Table 4 Summary of ANOVA on the activity based costing inventory management practices applied by Stores Officers

Source of Variance	Sum of Square	df	Mean Square	F	P-value	Decision
Between Groups	19.677	2	9.838	1.698	.186	Not Sig
Within Groups	1187.818	205	5.794			
Total	1207.495	207				

Table 4 shows that at 205 degree of freedom, type of institution do not significantly influenced the mean ratings of the respondents on the extent of their application of activity based costing inventory management practices. F-ratio is 1.698 and *P-value* (.186) is greater than the stipulated 0.05 level of significance (P-value > alpha level). Therefore, the null hypothesis is not rejected.

4. DISCUSSION

Results of the study revealed that barcode inventory management practices were moderately applied by Stores Officers in public tertiary educational institutions in South-East Nigeria. This could lead to low physical control and security of materials and equipment which may result in failure of the tertiary educational institutions in achieving their objectives. This finding agrees with that of Akanbi, Bashorun, Salihu, Babafemi, Sulaiman and Kolajo (2018) who found that the utilization of barcode was low which leads to loss of materials and equipments in various institutions. Orga and Mbah (2017) also found that the utilization of barcode helps in proper monitoring of branch inventory operations and also in maintaining the right quantity of inventory for optimal productivity. Barcode helps to track a particular item at any specific time. Stores Officers in public tertiary educational institutions can use bar-coding systems to ensure that work orders are linked; purchase orders are thoroughly linked to the level of stock which is replenished and that all auxiliary parts in addition to equipment are tracked. This allows Stores Officers to gather information in recording transaction histories which will be used in the preparation of institutions financial statements at the end of accounting period. In line with this, a study carried out by Fatima and Ansari (2017) revealed that the utilization of barcode technology in educational institutions has greatly changed the way of performing different functions and brought efficiency, accuracy and accountability. Findings also indicated that Stores Officers in universities, polytechnics and colleges of education do not differ significantly in their mean ratings on the extent they apply barcode inventory management practices in public tertiary educational institutions in South-East Nigeria.

The results of the study indicated that activity based costing inventory management practices were lowly applied by Stores Officers. This implies that Stores Officers lowly applied activity based costing inventory management practices in allocating time and money in inventory, determining the control level placed on the items, identifying each department activities and in assigning every activity cost incurred to service rendered. This could lead to mishandling of institution materials and equipment due to weak inventory control system. This finding shows that the benefits of activity based costing as reported by Yunis (2019), as clearly showing to the departmental head the total cost incurred and whether this cost is justifiable to provide the service are lost in public tertiary educational institutions in the area of the study. This cost is a performance evaluation tool which helps in the preparation of financial statements. In line with this, Arasa and Achuora (2020) found that the utilization of ABC influences performance of organizations. Activity based costing could help Stores Officers in public tertiary educational institutions in South East to analyze costs and work activities. Findings further revealed that Stores Officers in universities, polytechnics and colleges of education do not differ significantly in their mean ratings on the extent they apply activity based costing inventory management practices in public tertiary educational institutions in South-East Nigeria. It follows therefore, that the null hypothesis of no significant difference was not rejected. This agrees with the findings of Arasa and Achuora (2020) who reported that there is no significant influence on the application of activity based costing in organization.

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5. CONCLUSION

It is clear from the study that barcode and activity based costing inventory management practices have not been fully applied by Stores Officers. Therefore, it is concluded that the management of public tertiary educational institutions should design and develop inventory systems that could enable adequate turnover and ensure a constant review of various inventory system in the institutions to enable them maintain productivity. It will also help to ensure efficiency in the output of the institutions.

RECOMMENDATIONS

The following recommendations are made:

1. Tertiary educational institutions should sponsor their stores personnel to training in the area of inventory control management that will empower them to adequately apply different inventory management practices for smooth running of the institutions.
2. Regulatory bodies in tertiary institutions should lay emphasis on proper inventory management techniques and measuring of efficiency deviations to identify weaknesses in the process of managing inventories.

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This study has not received any external funding.

Conflicts of interests

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are present in the paper.

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