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Keywords: inventory management, inventory control, COVID-19, health institutions, and challenges.

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I. Introduction

a) Background to the study

Inventory management and control which revolve around coordination of materials availability, control, utilization and procurement of materials helps firms to maintain the optimum level of inventory at any given time. Issues concerning inventory management generally involve the overall success of an enterprise (Iliemena, Ijeoma & John-Akamelu, 2019). This is because, the revenue and profit capacities of any business depend on its inventory level which also indirectly makes it an issue of concern when the sustainability of a business institution is in discussion. Inventory management is however, not a new concept in itself as there have been past studies in this regard (Bawa, Asamoah & Kissi, 2018; Prempeh, 2016; Mensah, 2016; Mwanzi 2016). Due to the nature of inventory in health institutions, health implication of poor inventory management system and the need to ensure the sustainability of health institutions being one of the basic needs of an economy, we considered it a very necessity to evaluate how effective the old systems of inventory management and control work given the present COVID-19 pandemic emergencies. Owing to this, a lot of developed countries have adopted the use of advanced technologies in inventory management but the case is reverse for developing countries like Nigeria whose poor technological infrastructure and general economic condition may not support the advanced systems (Dedunu & Weerasinghae, 2018). As effective inventory management system is basic to corporate success, the inventory management objective of health institutions in the corona virus era is expected to constantly strike a balance between demand, inventory level (considering availability, perishability and high/low patient turn-up as the case maybe), supply and adequate return on investment. Onikoyi, Babafemi, Ojo and Aje, (2017) did not find it necessary for continuous study on inventory management especially as excess inventory were indications of wealth accumulation but recent events in terms price level changes, current health trend, general economic and health implications

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of COVID-19. There are varied options which an institution can utilize in managing its inventory as a way of achieving improved product and service delivery and efficiency (Wanyoike & Tundura, 2016). Prempeh (2016) opine that the current assets constitute one of the fundamental assets in health institutions, it makes it very vital that the right quantity of inventory is maintained at any given time to avoid stock out, expirations and excess holdings. This could be the challenge with some health institutions that have been found with stock-out situation that they had to refer patients to external sources when prescriptions are made.

b) Statement of Problem

The system of inventory management being used in some hospitals could have their number of challenges presently due to corona virus (COVID-19) pandemic and its implication on health institutions. Some hospitals, thus, find it hard to balance the supply of inventory with current demand though every hospital would want to have enough inventories in medical supplies to satisfy the demands of its patients. Ideally, no hospital would want to hold too much inventory to due to the associated inventory holding cost (Agu, Obi-Anike & Eke, 2016). Previous authors such as Onuorah (2019), Bawa, Asamoah and Kissi (2018), Sporta (2018), Dedunu and Weerasinghae (2018), Atnafu and Assefa (2018), Musau, Namusonge, Makokha and Ngeno (2017), Onikoyi, Babafemi, Ojo and Aje (2017), Mwangi (2016), Etale and Bingilar (2016), Wanyoike and Tundura (2016), Agu, Obi-Anike and Eke (2016), Edwin and Florence (2015), Ogbo and Ukpere (2014), Koin, Cheruiyot and Mwangangi (2014), Anichebe and Agu (2013), and others have all examined the extent to which inventory management affect corporate performance of enterprises. There are abundant local researches in Nigeria that determined the relationship between inventory management techniques and firm profitability before the onset of corona virus disruptions in Nigeria. However, the studies always assumed that the presence of adequate inventory management techniques already presupposes that there is also an appreciable inventory control measure but the COVID-19 pandemic has faulted this assumption. To fill this gap, this study was conducted to explore the inventory management system (proxies by re-order level system, periodic review system and economic order quantity model) and inventory control (proxy by optimal stock level) using selected registered health institutions in Anambra state as cases of reference.

c) Objective of the Study

The broad objective of this study is to explore the inventory management and control systems being used by selected health institutions, and its suitability and challenges in the Covid-19 era using the case of Anambra state, Nigeria. To achieve this, this study specifically sought to:

1. Ascertain the inventory management systems currently being used in health institutions and its level of effectiveness.
2. Determine the extent to which the inventory management systems pose challenges to health institutions in the COVID-19 era.
3. Examine the degree to which inventory management influence optimal stock levels in the COVID-19 era.

d) Research Questions

The following research questions were addressed in this study:

1. What inventory management systems are currently being used in health institutions and how effective are they?
2. To what extent do the inventory management systems pose challenges to health institution in the COVID-19 pandemic period?
3. To what degree do the inventory management systems influence optimal stock levels in selected health institutions in the COVID-19 era?

e) Hypotheses Development

H_{O1}: The inventory management systems currently being used in the COVID-19 pandemic era are not significantly effective.

H_{O2}: The inventory management systems pose no significant challenges to health institutions in the COVID-19 pandemic era.

H_{O3}: Inventory management systems (proxies by re-order level system, periodic review system and economic order quantity model) do not significantly influence optimal stock levels in selected health institutions in the COVID-19 era.

II. Literature Review

a) Conceptual Review

i. Inventory Management and control systems

Inventory management (IM) simply refers to a process that consists of planning, organizing and controlling the flow of stock of materials from their initial purchase unit through internal operations to the service point through distribution to clients or customers. Agu, Obi-Anike and Eke (2016) defined inventory management as the sum total act of coordinating the purchase, manufacturing and distribution functions with a view to meeting the marketing demands and organizational needs of availing the product to its clients or customers. It equally refers to the collection of activities that are put in place in order to ensure that customers have the demanded product or service. Inventory management encompasses the development and management of inventory levels such as raw materials, semi-finished materials and finished goods. The only way of making adequate supplies of goods is

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when the inventory is properly managed. With this, they are made available to meet up with customers' demand and the costs of over or under stocks are lowered in the process. IM refers to all the policies and firm managerial processes of planning, organizing and controlling that relate to how the firm's stock level will be kept or maintained at a level whereby the least cost will be incurred by the firm (Kwadwo, 2016). It is primarily about how best to guarantee the availability of all input materials of production to the firm so that the quantity of the stock in question is at a level where production is not interrupted with the barest operational cost of holding the inventory without prejudice to operation efficiency (Eneje, Nweze, and Udeh, 2012). Onikoyi, Babafemi, Ojo and Aje (2017) averred that IM, which they preferably called stock management, refers to the business activity aspect that comprises the planning for purchase, receiving, handling, storing, and releasing of inventory for use in production or distribution to customers. It is the science-based art of making sure that just sufficient inventory stock is held by a firm for meeting with demand for them. Through IM, hospitals are able to identify items of stock. In the management of inventory, the primary involvements range from being able to specify the size and placement of stocked goods. The goal of IM therefore is to reach a balance in the above requirements which will then result in an effective inventory control process that brings about optimal inventory level. This is often a continuous process that is subject to constant change and therefore requires the organization to respond to market changes on time. IM is used to create inventory purchase plan, and track the existing inventories and their utilization (Muhayimana, 2015). It is impossible to talk of the effectiveness of management in organizations without making reference to how effective the IM of the organization is since inventory control is remains a central part of core management functions in organizations. The critical place of inventory in a firm is so because inventory are resources which in addition to having an economic value have some idle resources tied to it. This is why corporate managers in hospitals try to implement policies and plans that will help them strike a balance between the benefits accruing from holding stock against the cost incurred from holding same (Musau, Namusonge, Makokha and Ngeno, 2017). Atnafu and Assefa (2018) simply defined IM as the act and process that are undergone to record and observe stock level, estimate future request, and settle on when and how to arrange for new order. It is this sort of process and procedures that enables firms to effectively know how to go about the storage and replacement of stock and also how to keep a sufficient amount of stock even as they minimize the cost. Inventory can be managed via re-order level system, periodic review system, economic order quantity model, perpetual inventory system, etc. However, this study focuses on the systems discussed below:

1. Re-Order Level System

According to Onuorah (2019), re-order level system is a way of managing inventory in such a way that a level at which another order is made for inventory is set ahead of time and systematically complied with for every item of inventory. Re-order level system often involves the operational use of two bins for inventory management whereby re-order is made when inventory is exhausted from the first bin. The merits of the re-order level system is that it allows the firm to respond to changes in demand and also enables the organization to generate replenishment order automatically at the designated time simply by a comparison of inventory levels against re-order level. However, the re-order system may be over-loaded if different types of inventories that are jointly used to produce different items reach their re-order at the same time.

2. Periodic Review System

Periodic review system is a method of inventory management whereby stock levels are subjected to some fixed interval reviews usually once every week, month or year, as the case may be. It can be seen as physical counting method of IM where-in inventories are cross-checked and also updated at a fixed interval of time (Onuorah, 2019). This system ensures that all inventory items are reviewed periodically which often provides more possibility of eliminating outdated items or obsolete inventories. Orders for replenishment in periodic review system are follow the same sequence. This singularly facilitates order of different items (of medical use for instance) and attracts large quantity of discounts to the purchasing firm. However, the periodic review system does not fully enable firms to respond to changes in consumption and so stock-out is more likely to occur especially when the usage rate changes shortly after the review. Demand for the inventory item has to be constant before the appropriate periodic review can be determined and this is often taxing.

3. The system of Economic Order Quantity

The economic order quantity theory suggests that the quantity of inventory that ought to be maintained by corporate organizations is the stock level that provides the lowest total holding cost and acquiring cost (Mwangi, 2016). Economic Order Quantity Model is undeniably the most fundamental and also the best-known inventory decision model f which its origin is often dated back to the early 1900s. It is the ordering quantity that minimizes the balance of inventory cost that exists between inventories re-orders costs and inventory holding costs (Ogbo & Ukpere, 2014). The calculation of the EOQ Model is calculated using some assumptions as enlisted below, that; Holding stock is certain and known, Ordering costs is constant, known and certain, rate of demand is known, unit price is

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constant, and that there is no stock-outs . However, the assumptions seem not to be realistic in practice and this system may not be suitable in health sector due to the unpredictable pattern of demand. However, demand for medical supplies seem to be on the increase as more and more persons get sick due to covid-19 and other related diseases. One notable weakness of this system is its failure to consider buffer stocks that should be maintained to accommodate for variations in lead-time and demand for inventory.

ii. *Inventory Control system (ICS) using optimal stock level*

According to the views of Wanyoike and Tundura (2016), inventory control (IC) refers to a set of procedures and techniques that are used to oversee and control ordering, storage and use of inventory resources. Onikoyi, Babafemi, Ojo and Aje (2017) defined inventory control as the process of supervising the storage, the supply and the accessibility of items to ensure an adequate supply of inventory without over or under supply. Inventory control is carried out to make sure that only the adequate amount of inventory are available whenever and wherever required by customers. The distinction between IC and IM is that whilst IM refers to all the activities that are done in the process of procuring, storing, selling, disposing or using inventory while IC is a subset i.e a part of inventory management. However, managers assume that once they are good with inventory management then the firm is safe in terms of the possibility of having under or excess stock level. This is where IC comes in to control the flow of inventory so that only the optimal stock level would be maintained in the firm. The necessity for inventory control is that sufficient and appropriate quantity of inventory is required each time in order to minimize the rate of stock-outs in the firm, and thereby unnecessarily increasing the stock-out cost of the firm which is the cost incurred when the firm is not able to meet current external and internal demand for inventory. IC often reveals the continuity chances of a hospital because a hospital requires some level of stock that will keep the firm running which extant literature have enlisted as cycle inventory, safety inventory, speculative demand inventory and dead inventory (Okerulu, 2019).

Onikoyi, Babafemi, Ojo and Aje (2017) was of the opinion that corporate managers require both reliable and effective control of inventory resources so that the operating cost of the firm will be maximized for the sake of remaining viably competitive. Inventory control practically enhances firm profitability since it can bring about reduction in corporate operating costs that are associated with handling and storage of inventory. This sis further justified by Iliemena and Amedu (2019) which opine that cost reduction strategies should be the focal point of management if sustainable profit is aimed. Thus, it is against the undesirable reality of having excessive inventory or having insufficient inventory that IC has become a very highly placed strategic management technique. Excessive inventory ties down the funds of the organization, increases the possibility of inventory deterioration, obsolescence and theft and also increases holding cost. Still, inappropriateness of insufficient stock is such that it can interrupt the process of production and distribution of goods and services, especially for hospitals and pharmaceuticals firms, proper inventory management and control cannot be over-looked. Thus, hospitals are at all times expected to have an optimal stock level that both caters for customers' demand and minimizes the cost of holding the inventory. Operational efficiency is therefore guaranteed by optimal stock level which eliminates the possibility of stock-out, especially in emergency cases.

iii. *Leveraging inventory Management and Control in Health Institutions in the COVID-19 pandemic period*

Health institutions often make managerial efforts to reach corporate decisions while providing strategies that are required for the effective management of the firm's resources and this has not changed in the period of covid-19 pandemic. Certainly, the stock of medical supplies is one of the institution's resources that critically need to be effectively managed and monitored especially considering the economic times of corona virus and its health implications. Opinion exists that the COVID-19 era is associated with global increase in demand for medical supplies which could possibly lead to stock-out while opinion also exist that even though the pandemic has come with a lot health challenges but due to the poverty induced by the virus and the fear of being compelled to isolation centers, sick persons would want to explore other means like off-the-shelf drugs, herbal treatment and home therapies in managing their health issues, thus culminates into low demand for medical supplies. Low demand for medical supplies put a lot of health institutions at risk of incurring losses if not properly managed. This is due to the expiry nature of their products and services. On the other hand, increase in demand for medical supplies in the COVID -19 pandemic periods if not properly managed could lead to stock-out which has damaging effect on the sustainability and overall corporate performance. However, Dedunu and Weerasinghae (2018), and, Iliemena, Goodluck, and Amedu (2020) are of the opinion that large inventory bunch generates extra costs and this lends credence to the ever growing importance of inventory management through which proper managerial attention could be paid to procedures, techniques or processes. This makes inventory management a very crucial decision area for corporate success of health institutions in the pandemic period. According to Bawa, Asamoah and Kissi (2018), IM is necessary mainly because it is one of the ways for health institutions to minimize operating costs and funds

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invested. This is by reducing the cost of holding stock of inventory so as increase both profit and operating cash flow that simultaneously leads to an improved corporate performance (Iliemena & Amedu, 2019). But the contributions of IM would equal to nothing if proper ICS is not installed to help minimize the very inventory cost for the purpose of maximizing profit margins. Additionally, IM is stronger and more effective when the inventory control procedures have been properly implemented to facilitate an optimal stock level that allows for the best utilization of inventory resource.

No firm will ever be as efficient as it would want when the firm has not implemented sound IM and ICS that would guarantee optimal level of medical supplies (Mwangi, 2016). It is through proper inventory management of stock of drugs that hospitals or pharmaceutical firms can ensure that patient service level is considerably adequate since insufficiency of stock is detrimental and excessive stock is wasteful. There could be reasons for a hospital to hold excessive stock of materials more because of uncertainty in demand by patients for drugs and related products and medical services. The sorts of things that are put into consideration during inventory management and control processes are the modalities for the purchase of stocks that are commensurate with both internal and external demands, changing usage patterns, seasonal variation, and monitoring for expiration and pilferage. This therefore make it necessary that health institutions review their inventory management and control systems periodically especially when there is massive global change like the changes currently induced by the covid-19 pandemic, to ascertain the continuous suitability of the old system in the new structure of events.

b) Theoretical Framework

i. *Theory of Economic Order Quantity Model*

According to Mwangi (2016), the major and first proponent of the economic order quantity (EOQ) model was Haris in 1913 that used the model to determine the optimal level of inventory. In line with the propositions of the first proponent, economic order quantity entails the level of inventory that can both minimize inventory ordering cost and also inventory holding cost. Ziukov (2015) put this in another way when the researcher submitted that economic order quantity as a model is primarily meant to be used when determining an optimal ordering size that will not only minimize ordering but will also minimise the sum of both carrying costs and ordering costs of inventory. There are some assumptions that guide the application of this model to business realities. One of the assumptions is that demand is certain, i.e. demand must equal annual total quantity that is ordered by the firm at any point in time (Ziukov, 2015). Of essence, economic order quantity model puts into consideration a tradeoff between ordering cost and storage cost while making policies and decisions on the quantity to order and use as regards replenishing inventory items. Ordering a larger quantity of inventory practically reduces ordering frequency and by implication reduces total ordering costs but would require a more spacious storage capacity and increases holding or storage cost. There are holding costs that reduce ordering costs increase and vice versa until there is a minimum point on the cost curve where the sum of ordering costs and holding costs will be barest with the best optimal stock level. The costs that are incurred when an additional unit of inventory is procured is called ordering costs carrying costs are the inventory costs that are incurred for storing or holding stock. According to Mwangi (2016), economic order quantity is therefore determined by the intersection of carrying cost line and ordering cost curve, where the total ordering cost equals the total carrying cost (Kumar, 2016).

The relevance of the theory to the study is that economic order quantity model is expected to be useful to health institution in the Covid-19 pandemic era by providing an optimal order quantity of medical supplies that minimizes total inventory cost in stock-out or expiration. This model is applied in inventory management and control that is applicable to the management of not only raw materials but also work-in-progress and finished goods. As a model for inventory control, EOQ model proposes that the purchase and storage of inventory, using either periodic review system and re-order level system, should be carried out in such a way as to make sure that there is no excess or under stocking at a given point in time. To this end, this theory makes a good argument that supports the relationship between inventory control and management and this informed the need to anchor the study upon the theory.

ii. *Lean Theory*

Lean theory proposes that inventory systems should be designed in a way that optimizes costs of inventory. According to Atnafu and Assefa (2018), the lean theory augments the thoughts of Just-in-Time model and puts buffer stock into consideration while it advocates for the minimization of wastages in production procedure. On the note that inventory leanness significantly influences the productivity of health institutions (Iliemena, Goodluck & Amedu, 2020), lean theory is of the view that optimal inventory level should be maintained. Through this theory, the shortcomings of the economic order quantity model are considerably addressed because the lean theory also borrows foundation from the EOQ model that solely seeks to optimize the quantity of any batch of inventory ordered (Musau, Namusonge, Makokha & Ngeno, 2017). Lean theory just like JIT emphasizes that a pull-based system should be put in place to help the organisation align the production and business processes throughout the supply chain and inventory

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planning. Musau, Namusonge, Makokha and Ngeno (2017) submitted that, based on the lean theory, firms can more successfully find ways of optimizing inventory by way of lean supply chain systems and practices in order to achieve a better level of both asset utilization and customer satisfaction that ultimately result in enhancement of organizational profitability, growth, and operational performance.

The relevance of lean theory to this study is because it presented inventory management practices as a vital part of any supply chain regardless of whether the firm operates a product or service supply chain. In the present study, hospitals majorly although not entirely operate a service supply chain but need to match demand and supply in the supply chain while considering uncertainties in the market environment. Analyzing lean theory vis-à-vis the inventory management of hospitals will reveal that most hospitals are beleaguered by ineffective inventory control and the majority of the hospital do not utilize nor implement the basic inventory control concepts and principles for various reasons (Atnafu & Assefa, 2018). Most hospitals rely on imported medical substances or drugs coupled with unnecessary delays and communication problems which all jointly make the calculations of lead time inaccurate. This is the reason lean theory is mostly advocated for as an inventory management tool that best controls the flow of stock for optimal stock levels especially in the corona virus pandemic era.

c) Extant Literature and gaps in studies

A study carried out by Onuorah (2019) ascertained the effect of inventory management system on corporate performance of a pharmaceutical company (Juhel Nigeria Limited) using descriptive research design. The study sample was 41 full time staff of the company while data were gathered using a structured questionnaire. Data gathered for the purpose of their study were tested using Pearson Product Moment Correlation Coefficient and findings showed IMS significantly affects a firm's performance. The study only examined one firm, which makes the finding less generalizable. (Iliemena and Amedu, 2019), studied the effect of inventory turnover period on equity of 22 manufacturing companies quoted on the Nigerian stock exchange from the period 2012 to 2018 using ex-post facto research design. Data from the financial statements of the companies were tested using multiple regression analyses and evidence indicated that inventory turnover period has significant positive effect on equity component. The implication of this to our present study is that health institutions are expected to turn over their inventory of medical suppliers soon enough so it would not culminate to loss of equity capital investment. Sequel to the evidence emanating from the manufacturing sector, this outcome may be said to be debatable. Anichebe and Agu (2013) investigated the effect of inventory management on organizational effectiveness using three companies (Yemenite, Hardis and Dromedas, and Nigerian bottling company) in Enugu State using descriptive research method on a a sample of 248. The data gathered using questionnaires and interviews were tested using Pearson product moment correlation co-efficient and regression method. Evidence emanating from the study showed good inventory management is significantly related to organizational effectiveness. By way of limitation, the study failed to gather evidence relating to challenges in their inventory management system. Ogbo and Ukpere (2014) also using a descriptive research design, evaluated the relationship between effective IM and organizational performance as a case study of 7-up bottling company Nigeria. The study sample was made up of 83 respondents while data gathered were tested using Chi-square method. Findings from this study revealed a relationship between operational feasibility and IM and that flexibility in inventory management is key to good corporate performance. Critically, only one organisation was studied by the researchers which made the findings less generalizable. Furthermore, Koin, Cheruiyot and Mwangangi (2014) invstigated the effect of IM on performance of manufacturing sector using 56 out of 459 business process owners. The descriptive study gathered its data using questionnaires. The outcome of the study revealed that IM and supplier relation both has significant effect performance even though order management was found to have just a mild effect. The study however, failed to consider the effect of inventory management system on optimal stock levels of the selected firms. Edwin and Florence (2015) in their study assessed the effect of IM on profitability of the 6 cement manufacturing firms listed on Nairobi stock exchange in Kenya from 1999- 2014 using secondary data from annual reports. The ordinary least square regression results in multiple analyses revealed a negative relationship existing between inventory turnovers, storage cost and conversion period with profitability as measured using return on asset. Thus, since the system of inventory control in manufacturing firms differs from that of hospitals, there is need to carry-out a similar study using evidence from hospitals. Also in Kenya, Mwangi (2016) further investigated IM, profitability and operating cash flow 6 beer distribution companies in Nairobi for a ten years period ranging from 2006 to 2015. The secondary data gathered for the study was analyzed using ordinary least squares regression analyses and findings revealed a significant relationship between IM, profitability and operating cash flows. By way of criticism, the study focused on inventory management practices such as just in time and material requirement planning and did not consider re-order level system, periodic review system and economic order quantity model. In a related study carried out in Nigeria, Etale and Bingilar (2016) focused

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on examination of IM and profitability of three listed breweries on Nigerian stock exchange from 2005 to 2014. The data for the study were obtained from the annual reports of the companies while analyses were carried out using multiple regression methodology. Evidence revealed in line with most other studies that IM has significant positive effect on profitability. However, the study derived its evidence further emanated from brewery companies and outcome may differ from the health sector. The findings do not fit the realities and peculiarities in the health sector. Agu, Obi-Anike and Eke (2016) in their own study evaluated the effect of ICS on the productivity of Nigerian manufacturing firms using a sample of 285 respondents. The descriptive study generated data using the questionnaire method and statistical analysis were carried out on the data using linear regression coefficients. Findings showed ICS have significant positive relationship with productivity. Also, demand management was found to have a positive relationship with customer satisfaction. Aligning this with our present study, the finding implies that when changes in demands for medical supplies in the COVID-19 pandemic era, are properly managed, patients issues will be well addresses and thus image of the hospital boosted while ensuring continuous patronage. As a limitation however, the evidence emanating from manufacturing firms may need to be re-examined before it can be said to also apply to the health sector. Onikoyi, Babafemi, Ojo and Aje (2017) evaluated the IM practices of a Nigerian cement producing company, Lafarge Africa (WAPCO) plc using the survey design on annual reports from 2005 to 2015. Regression analyses on the gathered data indicated that significant relationship exists between costs of goods sold and value of inventory in stock. This study was however, conducted before the inception of the COVID-19 pandemic in 2019 and it may have affected the current position. Also, the researchers adopted a case study design where only one firm was studied. This reduced the generalizability of the findings.

Still emphasizing on how relevant IM is to corporate success, Bawa, Asamoah and Kissi (2018) conducted an evaluation of IM and performance of 14 companies listed on the stock exchange of Ghana from 2007 to 2016. Regression and correlation co-efficient were used on relevant financial statement information and findings showed no significant effect of IM on selected profitability measures over the period. This evidence even though contradicted earlier views, failed to cover the aspect of IC using optimal stock levels. As a remedy, Sporta (2018) in his study evaluated the IC techniques of medical supply agencies in Ghana using descriptive research design on a population of 100 employees. The result of the correlations and the multiple regression analysis carried out on the qualitative and quantitative data revealed IC techniques significantly affect performance. Thus, the findings are not fittingly applicable to health institutions in Nigeria given the peculiarities.

III. Methodological Steps

This study adopted a descriptive research design to enable the researchers have a comprehensive picture of the phenomenon of interest by surveying the opinions of a sample that is derived from our target population. The full time staff of procurement, stores, emergency, accounting and finance departments (PSEAFD) of seven health institutions formed the study population as shown in table 3.1 below:

Table 3.1: Population of the Study

SN/	Name of Health Institution	No of Staff in PSEAFD
1.	Izunna Hospital, Amansea Junction, Awka	12
2.	Amen Specialist & Diagnostic Clinic, Amaenyi, Awka	11
3.	Crest Specialist Hospital, Enweana, Awka	9
4.	First Hospital and Maternity, Umuokpu Awka	10
5.	Graceland Specialist Hospital & Maternity, Old INEC Road, Awka	12
6.	Okoye Specialist Hospital, Emma Nnaemeka Street, Awka	9
7.	Eldorado hospital, Awka	11
	Total	74

Source: Field Survey, 2022.

The study deployed Taro-Yamane (1964) formula for determination of sample size of finite population. The formula is mathematically represented as $n = \frac{N}{1+N(e)^2}$, Where: n = Sample size, N = Population size, *e* = Sampling error (5%), 1 = Constant. From the calculation after approximation, n = 66. For the determination of the stratum size, the formula expressed underneath was applied and calculated in Table 3.2 below. Stratum size = $\frac{number\ of\ target\ staff\ in\ each\ hospital}{total\ population\ target} \times study\ sample\ size$

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Table 3.2: Stratification of the Sample Participants by specific health institution

SN/Name of Health Institution	Stratum Calculation	Stratum Sample Size
1. Izunna Hospital, Amansea Junction, Awka	$\frac{12}{74} \times 66$	11
2. Amen Specialist & Diagnostic Clinic, Amaenyi, Awka	$\frac{11}{74} \times 66$	10
3. Crest Specialist Hospital, Enweana, Awka	$\frac{9}{74} \times 66$	8
4. First Hospital and Maternity, Umuokpu Awka	$\frac{10}{74} \times 66$	9
5. Graceland Specialist Hospital & Maternity, Old INEC Road, Awka	$\frac{12}{74} \times 66$	11
6. Okoye Specialist Hospital, Ema Emeka Street, Awka	$\frac{9}{74} \times 66$	7
7. Eldorado hospital, Awka	$\frac{11}{74} \times 66$	10
Total	-	66

Source: Field Survey, April, 2022

We obtained primary data for the study using structured and unstructured questionnaires administered to 66 staff as comprised above in table 3.2. The structured questionnaire was designed in using five-point-likert scale as strongly agree, agree, neutral, disagree and strongly disagree. To rightly make sense of the research constructs, the responses were ordered and numbered accordingly as 5,4,3,2 and 1. The internal consistency of the questionnaire was determined by Cronbach alpha that produced a Cronbach co-efficient of 0.81 which made the constructs reliable since the coefficient of reliability exceeded the threshold of 0.7. The test of first and second hypotheses was conducted with the use of Chi-square while the third hypothesis was tested using Spearman Ranked Order Correlation Coefficient which is calculated with the aid of Statistical Package for Social Sciences (SPSS). The choice for this particular statistic for test of hypothesis three was because the collected data were ranked and required a non-parametric tool to produce a more reliable result.

IV. Analyses and Discussion of Results

a) Analysis of Responses Rate of the Questionnaire

Table 4.1: Analysis of Questionnaire

Response	Frequency	Percentage (%)
Well Filled in Questionnaires	63	95.45
Unreturned in Questionnaires	3	4.55
Total	66	100

Source: Field Survey 202

The questionnaire was administered to sixty-six (66) respondents during the field survey by the researcher. However 63(95.45%) were well filled and returned while 3 (4.55%) were not returned.

b) Analysis of Respondents' level of management

Table 4.2: Respondents' Level of Management

Level	Frequency	Percentage (%)
Low	14	22.2
Middle	26	41.3
Top	23	36.5
Total	63	100.0

Source: Field Survey 2022

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Table 4.2 above shows that among the respondents, 14 (representing 22.2%) are low level managers. 26 respondents (representing 41.3%) are middle level managers while 23 (representing 36.5%) are top level managers.

c) Analyses of Research Questions

Table 4.3: Analysis of Responses to Research Question 1

Response	Frequency	Percentage (%)
Re-order level system	11	17.5
Periodic review system	25	39.7
Economic order quantity model	21	33.3
Others	6	9.5
Total	63	100.0

Source: Field survey, 2022

Table 4.3 above summarized the responses to the research question of what inventory management systems are currently being used in health institutions and its efficiency rates. The above table shows that 11 respondents (17.5%) pointed that they use Re-order-level system most frequently in the COVID-19 pandemic period. 25 of the respondents representing (39.7%) opted for Periodic Review System; 21 (33.3%) use Economic Order Quantity; while 6 (9.5%) use other inventory management systems which are currently not of concern to the researchers.

Table 4.4: Analysis of Responses to Research Question 2

Response	Frequency	Percentage (%)
Very Little Extent	15	23.8
Little Extent	11	17.5
Neutral	7	11.1
Great Extent	12	19.0
Very Great Extent	18	28.6
Total	63	100.0

Source: Field survey, 2022

Table 4.4 presented responses to the question of the extent inventory management systems pose a challenge to health institution in the covid-19 pandemic period. The summary table above shows that 15 (23.8%) of the respondents were of the opinion that their inventory management system poses very little challenge to their hospital in the pandemic era. 11 representing 17.5% were of the view that the extent of challenge is little. 7 respondents (11.1%) were undecided on the extent of challenge currently being posed by their inventory management . 12 (19%) opined that the extent of such challenge is great while the rest of the 18 respondents (28.6%) claim that the extent of challenge is very great.

Table 4.5: Analysis of Responses to Research Question 3

Response	Frequency	Percentage (%)
Very Little Degree	10	15.9
Little Degree	3	4.8
Neutral	12	19.0
Great Degree	11	17.5
Very Great Degree	27	42.9
Total	63	100.0

Source: Field survey 2022

Table 4.5 provided a summary of the responses to the research question of the degree to which inventory management systems influence optimal stock levels in the COVID-19 era. The table above shows that 10 (15.9%) of the respondents believe that the degree to which inventory management system enhances optimal stock level is very little. 3 respondents (4.8%) opted for little degree; 12 (19%) were undecided; 11 respondents (17.5%) opined that there is a great degree of influence of inventory management on optimal stock level. Finally, 27 respondents (42.9%) indicated that the degree of such influence is very great.

d) Test of hypotheses

i. *Hypothesis I*

H_{O1}: The inventory management systems currently being used in the COVID-19 pandemic era are not significantly effective.

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Table 4.6: Effectiveness of IMS in COVID-19 pandemic era

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	15.336[a]	16	.060
Likelihood Ratio	9.443	16	.071
Linear-by-Linear Association	1.911	1	.167
N of Valid Cases	63		

Source: Field survey 2022

Table 4.6 above shows the test of hypothesis of the degree of effectiveness of re-order level, period-review and EOQ in the COVID-19 pandemic era. The result above shows that the Pearson's Chi-Squared Statistical Test result is insignificant (X^2 = 15.336, *p-value* =0.060). To further support the statistical position of the above result, the Likelihood Ratio of the test is 9.44 with a *p*-value of 0.071. Since the p-value of the test (0.060) is greater than 0.05, the null hypothesis was accepted. As a result, the researchers concluded that the inventory management systems being used in selected health institutions in Anambra state are not effective in the COVID-19 pandemic period at 5% level of significance.

ii. *Hypothesis II*

H_{O2}: the inventory management systems pose no significant challenge to health institutions in the COVID-19 pandemic era. Below is the output of the test:

Table 4.7: Challenges of IMS in COVID-19 pandemic era

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	0.6377[a]	8	.001
Likelihood Ratio	0.6132	8	.003
Linear-by-Linear Association	0.8332	1	.074
N of Valid Cases	63		

a. 10 cells (66.7%) have expected count less than 5. The minimum expected count is .44.

Source: Field Survey 2022

The result above shows that the Pearson's Chi-Squared Statistical Test result is significant (X^2 = 0.6377, *p-value* =0.001). To further support the statistical position of the above result, the Likelihood Ratio of the test is 0.6132 with a *p*-value of 0.003. Since the p-value of the test (0.001) is less than 0.05, the null hypothesis was rejected. Consequently, the researchers concluded that IMS pose significant challenges to health institutions in the COVID-19 pandemic era at 5% level of significance. The findings of the study are in tandem with the outcome of the studies earlier carried out by Onuorah (2019); Okerulu (2019);Agu, Obi-Anike & Eke (2016)

iii. *Hypothesis III*

H_{O3}: Inventory management systems (proxies by re-order level system, periodic review system and economic order quantity model) do not significantly influence optimal stock levels in selected health institutions in the COVID-19 era.

The output of the test is given below:

Table 4.8: Correlation Result of Test of Hypothesis III

Spearman's rho		Re-Order Level System	Periodic Review System	Economic Order Quantity Model	Optimal Stock Level
Re-Order Level System	Correlation Coefficient	1.000			
	Sig. (2-tailed)	.			
	N	63			
Periodic Review System	Correlation Coefficient	-.011	1.000		
	Sig. (2-tailed)	.931	.		
	N	63	63		
Economic Order Quantity Model	Correlation Coefficient	.895**	.029	1.000	
	Sig. (2-tailed)	.000	.822	.	
	N	63	63	63	

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Optimal Stock Level	Correlation Coefficient	.267*	.368**	.342**	1.000
	Sig. (2-tailed)	.034	.003	.006	.
	N	63	63	63	63

Source: Field survey 2022

Table 4.8 above shows the test of hypothesis of the influence of Re-Order Level System, Periodic Review System, and Economic Order Quantity Model on optimal stock level of selected health institutions at 5% level of significance. The result above shows that the influence of Reorder Level, Periodic Review System and Economic Order Quantity Model on optimal stock level is positive and significant. 1 unit change in Reorder Level System, Periodic Review System and Economic Order Quantity Model increases optimal stock level by 0.267, 0.368 and 0.342, respectively. Since the p-value of the test (0.001) is less than 0.05, the null hypothesis was therefore rejected. This led to the conclusion that inventory management systems (proxies by re-order level system, periodic review system and economic order quantity model) significantly influence optimal stock levels in selected health institutions. This result is in agreement with the findings of Iliemena, Ijeoma and John-Akamelu (2019). Also in line with the findings of this study is the works of Edwin and Florence (2015), Ogbo and Ukpere (2014), and Anichebe and Agu (2013).

e) Theoretical contribution of Findings and application to wider research

Generally, the outcome of this study re-emphasized the Lean Theory and lean practice for health institutions as in proposed by earlier researches. The theoretical application of the lean theory in medical supplies management was earlier highlighted by Iliemena, Goodluck and Amedu (2020) which viewed inventory management practices as a vital part of any supply chain regardless of whether the firm operates a product or service supply chain. In the present study, hospitals majorly although not entirely operate a service supply chain but need to match demand and supply in the supply chain while considering uncertainties in the market environment like the COVID-19 pandemic.

V. Conclusion, Implications and Recommendations

The overall objective of inventory management is to maintain stock level in a way that reduces cost of inventory. The optimum level of stock depends on some factors which arise from the interest of the management to establish an overall policy for stock taking. An effective inventory management strategy enhances optimal stock level and ensures that the right quantity and quality of the relevant stock is available at the right time and at the right place. Thus, the results of the study provided empirical evidence for managers of health institutions and thus the conclusion that inventory management, proxy by Re-order Level system, Periodic review system and Economic Order Quantity Model, positively influence optimal stock level of medical supplies in health institutions using the case of selected hospitals in Anambra state but currently pose significant challenges in cost minimization due to COVID-19 pandemic. This implies that inventory management systems of health institution urgently need to be modified to properly fit the unpredictable changes in demand and supply of medical supplies in the pandemic era. In other words, there is need for hospitals to adopt flexible systems of inventory management as it suits the economic and medical situation of the time. Consequent to the above, this study recommends that;

1. Management of health institutions should strive to ensure that the right stock is kept in their warehouses to hedge against excessive holding cost of medical supply inventories and stock-outs which could lead to loss of life/ patronage.
2. Given that the utilization of Re-order Level System, Periodic Review System and Economic Order Quantity Model positively influences optimal stock level, management of hospitals should diversify their inventory management system to suit specific needs of considering movements in demand and supply.
3. Management of hospitals and other health institutions should closely monitor and regulate their inventory system as a way of ensuring corporate sustainability due to its influence on performance.

a) Suggestions for Further Studies

Given the limitation of our study based on the scope and area, future research may attempt same topic in such a way that other methods of inventory management and control are subjected to similar tests. Flowing from our research outcome, the following topics of research are suggested for further studies:

1. Inventory Management and Corporate Profitability of health institutions in Nigeria.
2. Inventory Management Techniques and Cost Minimization in the COVID-19 pandemic period as a comparative study of different sectors or comparative study of countries.
3. Inventory Control systems and Financial Performance of listed health institutions.

References Références Referencias

1. Agu, O., Obi-Anike, H. & Eke, C. (2016). Effect of Inventory Management on the Organizational

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Performance of the Selected Manufacturing Firms. *Singaporean Journal of Business Economics, And Management Studies, 5*(4), 56-69.
2. Anichebe, N. A. & Agu, O. A. (2013). Effect of Inventory Management on Organizational Effectiveness. *Information and Knowledge Management*, 3(8), 92– 100.
3. Atnafu, D. & Assefa, B. I. (2018). The impact of inventory management practice on firms' competitiveness and organizational performance: Empirical evidence from micro and small enterprises in Ethiopia. *Cogent Business & Management, 5*(1), 1-16.
4. Bawa, S., Asamoah, G. & Kissi, E. (2018). Impact of Inventory Management on Firm Performance: A Case Study of Listed Manufacturing Firms in Ghana. *International Journal of Finance and Accounting, 7*(4), 83-96.
5. Dedunu, H. H. & Weerasinghae, I. M. (2018).The Effect of Inventory Management on Company Performance Reference to Listed Manufacturing Companies in Sri Lanka. *International Journal of Management Sciences and Business Research, 7*(7), 49-54.
6. Edwin S. & Florence, M. (2015). The Effect of Inventory Management on Profitability of Cement Manufacturing Companies in Kenya: A Case Study of Listed Cement Manufacturing Companies in Kenya, *International Journal of Management and Commerce Innovations 3*(2) 111-119.
7. Eneje, C., Nweze, A. & Udeh, A. (2012). Effect of efficient inventory management on profitability: Evidence from selected brewery firms in Nigeria. *International Journal of current Research,* 4(1), 350-354.
8. Etale, L. M. & Bingilar, P. F. (2016). The Effect of Inventory Cost Management on Profitability: A Study of Listed Brewery Companies in Nigeria. *International Journal of Economics, Commerce and Management*. 4(6), 446-455.
9. Iliemena, R. O., & Amedu, J. M. A. (2019). Effect of standard costing on profitability of manufacturing companies: study of Edo state Nigeria. Journal of Resources Development and Management, 53(3) 28-34. doi:10.7176/JRDM/5303
10. Iliemena, R.O., Ijeoma, N.B., & John-Akamelu, C.R. (2019). Effect of cash conversion cycle on capital structure: empirical evidence from quoted manufacturing firms in Nigeria. Journal of Global Accounting, 6(1), 59 – 74.
11. Iliemena, R., Goodluck, & Amedu (2020). An Assessment of the Practicability of Lean Accounting in Healthcare Sector: Evidence from Anambra State, Nigeria. Test Engineering and Management, 81(1), 6190-6207.
12. Koin, V. R, Cheruiyot, G. K & Mwangangi P. (2014). Effect of Inventory Management on the Supply Chain Effectiveness in the Manufacturing Industry in Kenya: A Case Study of Tata Chemicals Magadi, *International Journal of Social Sciences Management and Entrepreneurship 1*(2), 189-202,
13. Kumar, P. & Bahl, R. N. (2014). The Effect of Inventory Management on Organizational Performance. *International Journal of Innovative Science, Engineering &Technology,* 1(4), 453-459.
14. Kumar, R. (2016). Economic Order Quantity (EOQ) Model. *Global Journal of Finance and Economic Management,* 5(1), 1-5.
15. Kwadwo, B. P. (2016). The Impact of Efficient Inventory Management on Profitability: Evidence from Selected Manufacturing Firms in Ghana. *International Journal of Finance and Accounting,* 5(1), 22-26.
16. Mensah, J. M. K. (2015). Working Capital Management and Profitability of Firms: A Study of Listed Manufacturing Firms in Ghana. *International Journal of Economics, Business and Finance,* 1(2), 07-25.
17. Muhayimana V. (2015). Inventory Management Techniques and Its Contribution on Better Management of Manufacturing Companies in Rwanda: Case Study: Sulfo Rwanda Ltd. *European Journal of Academic Essays,* 2(6), 49-58.
18. Musau, E. G., Namusonge, G., Makokha, E. N. & Ngeno, J. (2017). The Effect of Inventory Management on Organizational Performance among Textile Manufacturing Firms in Kenya. *International Journal of Academic Research in Business and Social Sciences, 7*(11), 1032-1046.
19. Mwangi, L. (2016).Effect of Inventory Management on Firm Profitability and Operating Cash Flows of Kenya Breweries Limited, Beer Distribution Firms in Nairobi County. Unpublished MSc. Project Submitted to School of Business, University of Nairobi.
20. Ogbo, A. & Ukpere, W. (2014). The Impact of Effective Inventory Control Management on Organisational Performance: A Study of 7up Bottling Company Nile Mile Enugu, Nigeria. *Mediterranean Journal of Social Sciences, 5*(10), 109-118.
21. Okerulu, S. O. (2019). Inventory control system on the logistics cycle of selected retail outlet in Anambra State. An Unpublished Research Project Submitted to Department of Accountancy, Nnamdi Azikiwe University, Awka.
22. Onikoyi, I., Babafemi, E., Ojo, S. & Aje, C. (2017). Effect of Inventory Management Practices on Financial Performance of Larfage Wapco Plc. Nigeria. *European Journal of Business and Management, 9*(8), 113-122.
23. Onuorah, N. (2019). Effect of Inventory Management on the Performance of Manufacturing Firms: A Study of Juhel Pharmaceuticals Nigeria Ltd. Unpublished Research Project Submitted to

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Department of Accounting, Nnamdi Azikiwe University, Awka.

24. Prempeh, K. B. (2016). The impact of efficient inventory management on profitability: evidence from selected manufacturing firms in Ghana. *International Journal of Finance and Accounting*, 5(1), 22-26.
25. Sporta, F. O. (2018). Effect of Inventory Control Techniques on Organization's Performance at Kenya Medical Supplies Agencies. *International Journal of Business & Management, 6*(3), 62-76.
26. Wanyoike, D. & Tundura, L. (2016).Effect of Inventory Control Strategies on Inventory Record Accuracy in Kenya Power Company, Nakuru. *Journal of Investment and Management,* 5(5) 82-92.
27. Ziukov, S. (2015). A literature review on models of inventory management under uncertainty. *Verslo Sistemos irEkonomika*, 5(1), 113-121.

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