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IMPACT OF ECONOMIC ORDER QUANTITY MODEL APPLICATION ON THE OPERATIONAL PERFORMANCE OF TRAINING HEIGHTS LIMITED

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Abstract

Poor inventory planning had been a real issue for companies as bad ordering procedures and unclear replenishment processes could lead to stock-outs, poor service and high operating costs. The study focused on the effect of application of Economic Order Quantity (EOQ) model on the operational performance of Training Heights Limited, Abuja. In particular, ordering cost management was evaluated in terms of cost efficiency and replenishment policy was evaluated in terms of inventory avail-ability. This study used a cross-sectional survey research design. The population consisted of all the workers (205) of which 34 were management staff and 171 were junior staff. The population was small enough that it was possible to use the census sampling method and representation was achieved by stratification of the population according to management and to junior staff categories. The primary data were gathered with a structured questionnaire, where the respondents could give uniform response about the studied variables. The instrument was validated based on content validity and reliability was obtained by Cronbach's alpha. The data obtained were analysed using regression analysis with the help of SPSS version 27. The results showed that ordering cost management had a positive and significant impact on cost efficiency, and replenishment policy had positive and significant impact on the availability of inventory. It was concluded that the use of EOQ model in the Training Heights Limited had a significant impact on performances of the operations. It suggested increasing the efforts in ordering cost records, and establishing a clear replenishment policy on reorder levels, lead time and material consumption.

Keywords: *Economic Order Quantity, Ordering Cost Management, Replenishment Policy, Cost Efficiency, Inventory Availability, Operational Performance.*

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1. INTRODUCTION

In today's business world, the amount of inventory that a company stores is no longer a standard matter for purchasing. It is now at the heart of cost control, service reliability, and service resiliency. Throughout the world, companies are facing pressure from volatile demand, increased logistics expenses, delayed delivery and difficult cash-flow. Under these conditions, over or under-stocking can occur without attracting attention and impact profitability, and under-stocking can cause service disruption and customer confidence erosion. The Economic Order Quantity (EOQ) model has thus continued to be valuable because it provides a systematic method for determining the best order quantity, especially when the company has to consider the cost of ordering with respect to the cost of carrying inventory. Despite the absence of the traditional EOQ assumptions, recent literature still considers it as a helpful tool for making inventory decisions under the condition of an uncertain supply chain (Alnahhal et al., 2024; Raju, 2022).

EOQ is a concept that theoretically refers to the order quantities that will reduce the total cost of the inventory as a result of balancing ordering costs with holding costs. The real value of it is the discipline it provides when making procurement decisions, rather than the formula. In a business like Training Heights Limited in Abuja which could have its operations relying heavily on the availability of Training Materials, Office Supplies, Instructional Materials and other consumables when they are needed, EOQ thinking can help minimize guess work when making decisions on inventory. EOQ does not say, "hey, materials are about to be out of stock" or "hey, the supplier is available" but rather asks more pointed questions: How often is it appropriate to order, how much to order, and what the cost of ordering is? Relevance of EOQ to operational performance is that decisions on inventory have an impact on cost, continuity and service delivery (Siraj et al., 2024; Tebaldi et al., 2023).

This study investigates the EOQ models from two perspectives: ordering cost management and replenishment policy. Ordering cost management is about the costs of starting and completing orders – procurement administration, supplier contact, transportation and transaction costs. Without being aware of these expenses, a business could make too many small orders and end up spending on unnecessary expenses. Replenishment policy, however, has to do with the amount and when the stock should be replenished. It refers to timing of reordering and the amount of reordering; and how levels are controlled to prevent stock-outs or over-stocking. These two are especially relevant for Training Heights Limited since the failures in ordering

may lead to an increase in operating costs, and weak replenishment may involve delays in training activities, which can lead to a decrease in staff efficiency and a reduction in client satisfaction.

In this context Operational Performance is the way in which Training Heights Limited employs its resources to achieve good value for money and consistently provide the service. Not only is it not just for profit, it is not just about the profit. It also covers the company's ability to manage unnecessary expenses, maintain critical materials and ensure efficient running of the business. The following two dimensions are followed in this research: cost efficiency and inventory accessibility. Cost efficiency is an indicator of how well the firm can minimize unnecessary procurement, storage and emergency purchasing costs. The availability of inventory is the ability to have the necessary materials available at the right time in order to train, administer and provide client services. A company can be very active and seem to be very busy, but it can still be poor if the inventory is often out of stock or too much working capital is invested in idle inventory.

This relationship is thus highly interesting in the context of Training Heights Limited, Abuja and is worth studying. A more disciplined ordering cost structure could help to increase cost efficiency, and a better replenishment policy could help increase replenishment availability. Nonetheless, the connection is not to be taken for granted. EOQ will only benefit when reliability of records, reasonably good understanding of the demand pattern and willingness to act on inventory data exist. EOQ may be applicable and useful in a service-oriented business, which may have informal purchasing habits and work practices despite its formal practices. This study, thus, investigates the effects that EOQ related practices can have on the performance of operations, but not as a panacea for all.

1.1 Statement of the Problem

Ideally, firms were expected to manage inventory in such a way that it would help them control costs, ensure the availability of materials and service delivery. In this case, ordering would not have been based on a guess, emergency buying or an informal judgement. Rather, firms would have employed models of Economic Order Quantity (EOQ) to decide on an order size that is economically optimal, minimize repeated ordering expenses, and set up the appropriate replenishment quantity. The ideal scenario for Training Heights Limited, Abuja, would have been that training materials, office supplies, printed materials and other operational inputs were

on hand as soon as they were required, and not choking the business with massive stockpiles and tie-ups of funds.

But in reality, the firms were facing operational challenges in Nigeria's business environment. The significance of MSMEs to the national economic activities was seen in Nigeria, where the MSMEs made up 96.9% of businesses, 87.9% of employment and 46.32% of GDP (PwC Nigeria, 2024). However, the situation had changed, with prices increasing and purchasing power decreasing in the same environment, and Nigeria's headline inflation increasing to 33.88% in October 2024 (NBS, 2024). In this context, Training Heights Limited may have experienced real-world issues that hindered its efforts to minimize costs and ensure adequate stock availability. Ordering practices may have led to higher procurement costs, and replenishment practices may have led to a lack of materials for training delivery and administration.

From an empirical perspective, recent EOQ studies were more focused on manufacturing, retail, agro-based, multi-national, and product-based inventory systems as compared to service-oriented training firms. Although EOQ had been found useful in case of reducing inventory cost and improving purchasing decisions by studies like Khanna et al. (2023), Farid et al. (2024), Kumar and Pal (2024), Malinda et al. (2025) and Karimov (2025), their focus was limited on inventory requirements of service firms where inventory needs were associated with operational support rather than raw-material production in Nigeria. This left a gap in the context and the empirical. Thus, it was necessary to conduct the present study to look into the impact of ordering cost management and replenishment policy on cost efficiency and availability of inventory for Training Heights Limited, Abuja.

1.2 Research Questions

Based on the problems identified, the following research questions were put forward:

i. To what extent does ordering cost management influence cost efficiency in Training Heights Limited?

ii. To what extent does replenishment policy influence inventory availability in Training Heights Limited?

1.3 Objectives of the Study

The main objective of the study is to examine the impact of Economic Order Quantity model application on the operational performance of Training Heights Limited. The specific objectives are to:

i. determine the extent to which ordering cost management influences cost efficiency in Training Heights Limited.

ii. assess the extent to which replenishment policy influences inventory availability in Training Heights Limited.

1.4 Research Hypotheses

The study tested the following null hypotheses:

H_{01}: Ordering cost management has no significant effect on cost efficiency in Training Heights Limited.

H_{02}: Replenishment policy has no significant effect on inventory availability in Training Heights Limited.

2. LITERATURE REVIEW

2.1 Conceptual Framework

2.1.1 Economic Order Quantity Model Application

Application of economic order quantity model means using a systematic approach for inventory decision to select the most economic order quantity that a firm has to place at a particular point of time. The model is based on the principle that inventory decision must be a trade-off between ordering cost and holding cost in order to prevent the firm from losing money on excessive buys, small frequent orders or unnecessary stockouts. According to Raju (2022), the EOQ is a model that helps to determine the quantity and frequency of orders to reduce the cost associated with inventory. Alnahhal et al. (2024) referred EOQ as a relevant tool for

inventory control in the uncertain supply-chain scenarios as it allows the firms to control overstocking, understocking and cost pressure.

For Training Heights Limited, Abuja, the application of EOQ would be beneficial because the activities of the business could be dependent on the availability of training materials, office consumables, stationery, printed materials and other service support items. The model would assist the organisation to shift from reactive buying to a more disciplined approach to ordering, taking into account the cost, demand and time to replenish. This is especially true when suboptimal stocking decisions result in unseen expenses, such as ordering items when needed last minute, not getting them ready for training, losing materials, or wasting money on inventory that is not used. The EOQ therefore offers a practical guideline for tying inventory management decisions to operational performance, particularly in terms of ordering cost management and ordering policy.

2.1.2 Ordering Cost Management

Ordering cost management involves managing the costs associated with the ordering, processing and receipt of an order by a firm. These expenses can be administration of procurement, communication with suppliers, transport, handling, purchase documentation, staff time spent on order activities, etc. Ordering cost is important in EOQ thinking, as frequent small orders might seem handy but could end up being more expensive in the long run. Kumar and Dubey (2024) stated that EOQ is useful for helping the firms perceive that excess or shortage of orders can cause the firms' inventory related cost to rise and the operational efficiency of the firms can be reduced.

Cost management for Training Heights Limited would be closely linked with cost efficiency. The continuous ordering of small, necessary amounts of training materials, office supplies or printed material may be unnecessarily high if the firm is making frequent purchases. However, if procurement is managed in line with the actual consumption of services and programme timings, then the cost of procurement can be cut without impacting service delivery. Ordering Cost Management is thus the cost control application of EOQ since it reveals if the firm's purchasing procedures were economically, planned and operationally sensible.

2.1.3 Replenishment Policy

Replenishment policy is the guideline and practices used to determine when to place an order for replacement and the quantity of the order. It involves reorder points, lead time, safety stock and monitoring stock levels. Siraj et al. (2024) connected the replenishment decisions with lot size, safety stock and reorder quantity methods and Setyadi et al. (2024) described how organisations can avoid stock shortages, stock piling and enhance their fulfilment using EOQ and reorder point methods. In this way, replenishment policy is a routine for handling stock control that is derived from EOQ as a formula.

For Training Heights Limited replenishment policy would be a very important thing to take into account in the inventory availability. If the replenishment system is weak, this may result in the loss of critical training materials or administrative supplies at the time they were required, leading to delays, hurried trainings, or subpar clients service. A better replenishment policy will enable the firm to forecast the need for programmes in advance, keep track of how much they are consuming and reorder materials before they run out. But the policy should be applicable to the reality of the firm, due to fluctuations in training programmes, clients and supplier lead times etc. If a rigid policy is adopted that ignores such changes, then shortage or overstocking could occur.

2.1.4 Operational Performance

Operational Performance is how well a company utilizes its resources to deliver service or production targets in an efficient and dependable way. It is typically evaluated using the lens of cost, quality, delivery, responsiveness, flexibility and reliability. According to Panigrahi et al., (2023), operational performance is defined as the capability of the organisation to effectively provide products or services using efficient processes and links inventory management to responsiveness, cost savings, service reliability, and operational efficiency according to Silva et al., (2025). So, it isn't just about profitability; it's also about smooth and consistent operations and reliable customer service. In Training Heights Limited, Abuja, operational performance would mean that the company is able to provide training and related services without wasting money, time or materials. A training organisation may have facilitators who are qualified and good course content, but may have poor performance when they do not have support materials, and poor procurement organisation and staff have to improvise service delivery. Operational performance is measured in this study by the cost efficiency and

inventory availability since both are expected to best reflect the likely impact of implementing the EOQ model on the firm's operations.

2.1.5 Cost Efficiency

Cost efficiency is the process of achieving the goals of operations at a minimum possible cost. It is not the same as cutting spending, but the idea of spending in such a way that resources increase value without wasted. For inventory related activities, cost effectiveness can be attributed to lower ordering costs, fewer emergency purchases, less wastage, better working capital utilization and less costs associated with bad inventory decisions. Silva et al. (2025) linked sound inventory management practices to purchasing-cost optimisation and operational efficiency, and Alnahhal et al. (2024) highlighted the importance of determining the balance between ordering and holding costs under uncertain supply conditions. Cost efficiency for Training Heights Limited would be the ability to manage procurement related costs without compromising the readiness of the services. Excessive ordering of training materials could lead to increased transportation costs, supplier coordination, and emergency processing costs for the company. A surplus of stock would also be a strain on available finances, as cash might be bound up in items that were not needed right at the moment. Cost efficiency therefore is strongly related to ordering cost management since efficient ordering can help the firm to avoid unnecessary costs without compromising on service delivery.

2.1.6 Inventory Availability

Inventory availability is a measure of how much material is available when needed to carry out operations. It isn't about having too much stock, it's about having the right amount of stock at the right time. Setyadi et al. (2024) related EOQ and reorder point systems to shortage prevention and fulfilment, while Siraj et al. (2024) regarded safety stock and reorder quantity decisions as part of inventory optimisation. Thus, the inventory availability is a measure of the service-readiness aspect of operational performance. The ability to count on training materials, office supplies, certificates, printed resources and other supportive items before the need for them would be the inventory availability for Training Heights Limited. Low availability may slow down the setup of training, add stress to staff and diminish client satisfaction. While at the same time, there must be a balance between availability and cost as too many stocks can result in waste, storage issues and outdated materials. This implies that the replenishment

policy plays a crucial role in the availability of inventory; that is, the timing and amount of reordering needed to ensure continuous business operations.

2.2 Theoretical Framework: Classical Economic Order Quantity Model

The model used in this study is based on the Classical Economic Order Quantity Model, which was first suggested by Ford W. Harris in 1913 and then popularized in the literature on inventory management. Raju (2022) traced back the model to Harris and stated that the focus of the model was to find the optimum order quantity which resulted in the minimisation of the total inventory cost. One of the key main assumptions of this theory is to assume that the existing demand and lead time are known and there is no stock out, the ordering and holding cost are constant.

There have been criticisms against the model since the assumptions are sometimes too tidy for real business life. Demand can be unpredictable, suppliers can be late, prices can shift and businesses can experience unexpected challenges. The classical EOQ paradigm is not as simple as it sounds in practice, as explained by Alnahhal et al. (2024) with the growing uncertainty of modern supply chains. This criticism is relevant to Training Heights Limited since the demand for training may not be constant, programmes may change and the response time of the suppliers may also vary. The simplicity and managerial clarity of the EOQ model is its best feature, however. It aids businesses consider the cost implications of over ordering, under ordering and ordering too often.

Ordering cost management and replenishment policy are key issues in EOQ and, as such, are relevant to this study. Ordering cost management is related to cost efficiency as EOQ makes the assumption that firms can lower total inventory cost by controlling the number of orders placed and the cost of the orders. Availability of inventory is related to replenishment policy because EOQ and Reorder Logic serve as decision rules for when to reorder materials to prevent shortages. The theory offers an interesting perspective on the issue of how inventory decisions could affect operational performance in the case of Training Heights Limited, for example in terms of cost efficiency and accessibility of inventory.

2.3 Empirical Review

The study conducted by Khanna et al. (2023) aimed to explore various Economic Order Quantity (EOQ) models and their real-world implications to analyze the potential application of EOQ variants in streamlining inventory management, minimizing costs and maximizing operational efficiency in business sectors. Although the paper did not specifically focus on a particular firm or location of industries, the study was conducted in India, where the authors from the institutions belong to Rajasthan. The methods used were primarily qualitative, review-based with interviews being the major qualitative method. There was no general population defined statistically in the study, though the study specifically aimed to interview three financial advisers to get practical insights into the use of EOQ. The sample size, therefore, was three respondents and the sampling technique described in the paper was unspecified. Data gathered from interviews and literature-based discussion of EOQ models: classical EOQ model, cost of creating shortfall EOQ model, and other extensions of the EOQ model. Data collection method was interview, document/literature review and data analysis method was narrative analysis. The results showed that EOQ could assist the organisations in determining the optimum order quantity, minimising ordering and holding costs, avoiding overstocking and stock out, and managing cash-flow and working-capital. Because the study suggested that the EOQ should be used in a business only if the assumptions of the EOQ model were met, it recommended that the EOQ model should be used with other inventory-control techniques in the presence of shortages, quantity discount, or lead-time variation or fluctuating demand. There was however a narrow empirical base because it was based merely on a few financial advisers interviewed, and less of a field study with a large sample, clear sampling procedure or statistical testing than a conceptual review presentation.

Karimov (2025) examined the application of the Economic Order Quantity technique in multinational companies intending to explore its potential to facilitate inventory control, cost reduction and supply-chain efficiency in an international environment with multiple locations. The author was from Uzbekistan but the geographical scope was multinational, including regional supply-chain contexts of North America, Europe and Asia-Pacific. The study was conducted in a model-based analytical design with reference to the literature review and validation of the models with the proprietary data of the multinational companies. The population referred to was not specifically defined in the usual survey terms, but rather multinational companies with regional distribution centres constituted the empirical context.

There was no specific sample size or sampling technique reported, but references were made to regional supply-chain data, and an example of a global electronics manufacturer was provided with regional distribution centres. Secondary literature, ERP records, point-of-sale records, logistics logs, warehouse-management platforms and the inventory cost data in the region were used as sources for data. Therefore, documentary method was used in collecting data and system-based data was used for data extraction, and for analyzing the data used method of EOQ model parameterisation, cost comparison and pre and post implementation analysis. The results revealed that EOQ brought cost reduction in North America, Europe and Asia Pacfic regions, with reported cost saving in these regions as USD 23,000, USD 16,500, USD 21,000 and an average cost saving of approximately 17 percent and better inventory turnover. The study suggested that the multinational companies should integrate EOQ dashboards with ERP, real-time demand data, supplier-performance information, and AI-driven forecasting for better global inventory decisions. However, one caveat of the study was that it was based, in part, on proprietary and non-transparent firm data, and it did not clearly specify a sampling procedure or the number of firms it had examined, limiting the ability for independent replication of the findings.

Farid et al. (2024) created a study to find out how to optimise the use of EOQ in the inventory control of finished goods in an essential oil business that produces aromatherapy products, while reducing storage and ordering costs and improving operational efficiency. This study was carried out in Indonesia, namely with the case organization of Evodis Aroma. The research method used was quantitative descriptive, with a population of the number of finished products in the inventory records and the company's finances. The sample size was not a respondent sample but rather it was an inventory and financial record sample from January 1 to December 31, 2022 and January 1 to December 31, 2023. No sampling method was mentioned, meaning that the researchers presumably used existing company data for the study period. Secondary internal Company records of stock level, order frequency, storage costs, demand level, lead time, inventory record & financial statement were used as the sources of data. The method of collecting data was documentation and the method of data analysis was calculator of EOQ, calculation of safety stock, descriptive quantitative interpretation of data on the reorder point analysis. The results indicated that the demand increased from 43.74 in 2022 to 89.44 in 2023, and inventory adjustment needs improved, with safety stock and reorder point both rising from the previous years. Based on the study, the researchers recommended the following: The Evodis Aroma should continue to monitor the market demand, implement an integrated inventory-

management information system, improve the relationship with suppliers and distributors, and provide training to employees on supply-chain management. The one firm study and the use of only internal historical data meant that the results might not be generalizable to the other sectors or industry without additional comparative evidence.

Gultom et al. (2025) analysed the Economic Order Quantity method in controlling coffee inventory at Coffee Shop "Suteki" Medan, with the objective of determining the optimal coffee order quantity, reorder point and safety stock needed to minimise total inventory cost. The study was carried out in Medan, Indonesia in the food and beverage industry. The research design was quantitative inventory analysis, even if it wasn't explicitly stated in the typical social-science style in a research-design section. The population was not mentioned as human respondents, but it may be interpreted as the inventory requirement for coffee produced for Coffee Shop Suteki Medan. The sample size was not mentioned as a respondent sample, but rather the number of coffee orders that the coffee shop uses per year was used; 270,000 units, 70,000 coffee units per order, unit price, carrying cost of 20 percent, safety stock of 20,000 units and lead time of ½ month. The sampling technique was not reported. It seemed the data was gathered from the business owner and the operational inventory data, with the paper mentioning real interview data from the business owner. Thus, the method of data collection was interview-supported documentation and the method of data analysis was EOQ calculation, reorder point computation, safety stock analysis and POM-QM software application. The results indicated that EOQ resulted in the optimum order quantity of 112,250 units and optimum reorder point of 31,250 units, so the business should reorder when stock reaches 31,250 units. The study suggested that the use of EOQ in food and beverage companies would help to reduce ordering and storage costs and keep raw materials in stock while enhancing operational efficiency and productivity. It was limited because it was based only on an illustrative case and lacked a detailed population and a sampling procedure or a wider statistical test, thus limiting generalisability.

Owajege and Saif (2025) studied the impact of inventory control on the performance of SMEs in the city of Douala, whose goal was to evaluate the influence of EOQ, JIT and ABC classification on SME performance. This study was carried out in Douala city of Cameroon. The design of the methodology was a cross-sectional field-survey. The population consisted of SME managers and owners in Douala and the sampling size was 120 SME managers and owners. The sampling technique was purposive sampling and the response rate in the study

was 100%. Data was primary data collected from SME managers and owners directly. The data collection technique used was questionnaire and the data analysis technique used were descriptive, reliability test, ordinary least squares regression, ordinal logit regression and diagnostic test for multicollinearity. The results showed that EOQ had a strong and positive and statistically significant effect on SME performance with $\beta = 0.718$, SE = 0.117, $t = 6.143$ and $p < 0.001$. The results of the analyses of JIT, ABC, and the overall regression model demonstrated a positive but statistically insignificant impact, with the overall model accounting for 28.5 percent of the variance in SME performance. The study suggested the use of low-cost Computerised EOQ in SMEs, training of employees as well as periodic inventory reconciliation to generate measurable performance benefit. It was limited by the cross-sectional study design, the use of purposive sampling and self-reported performance measures that limited the ability to draw causal conclusions and restricted the representativeness of the findings; the authors have suggested that future studies include longitudinal studies, representative samples and objective measures of performance.

Sharma (2025) performed a comparative study on inventory models by comparing EOQ model with constant demand and variable demand and to understand the difference between the two models to investigate the impact of the type of demand on the inventory policy and overall inventory cost and operational efficiency. The study was theoretical and not field based and was based in India, but the author was affiliated with The ICFAI University, Raipur. The study was of a theoretical and comparative nature. The population of the study was not made up of human or organisational entities as in the surveying process, but rather EOQ demand scenarios and published literature on inventory models. Based on the criteria for finding and selecting the articles, a total of fifteen peer-reviewed articles published from 1998 to 2023 were analyzed. The paper used a case study method for selecting appropriate studies from the literature in operations research and supply-chain-management. Secondary literature and assumptions of numerical inventory parameters were used as sources of data. Literature review and model-based extraction of assumptions were used as a method of data collection, while mathematical derivation, numerical comparison and scenario based EOQ computation were used for data analysis. The results revealed that EOQ generated a constant optimal order quantity of 707 units and total annual cost of USD 1,414.21 whereas variable demand yielded an order quantity between 632 units and 775 units and total cost between USD 1,264.91 and USD 1,549.19. The study suggested that managers should rely on the classical EOQ model in industries with stable demands while choose flexible forecasting tools or hybrid deterministic-stochastic model in

industries with volatile demands. It had a weakness in that it was not based on primary field data and relied on assumptions, literature synthesis and numerical examples limiting its direct empirical applicability to specific firms.

Kumar and Pal (2024) have attempted to find out the comparative analysis of EOQ and EPQ in the context of inventory management optimization in agro-based industries in Bihar with a view to evaluating the potential of the two models of inventory in optimizing the cost-effectiveness, operational efficiency and economic development of agro-based industries in Bihar. The study was carried out in the State of Bihar, India at Taruwar Agro Industries Private Limited, Ashiyana Patna as the case organisation. Comparative quantitative inventory analysis was used as the research design. The population did not consist of human respondents, but of inventory items of the selected agro-based company. The samples were divided into three categories of product namely Tomato Chili, Peri Peri and Punjabi Tadka. The sampling technique was not explicitly mentioned, but the selected products seemed to be purposefully chosen as they were relevant to the firm's inventory operations. Data were gathered from Taruwar Agro Industries and consisted of annual demand, ordering cost, holding cost, production rate and operational data. Data collection technique employed was documentary extraction from company records and data analysis techniques were: EOQ Computation, EPQ Computation, and Total Inventory Cost comparison. The results revealed that both EOQ and EPQ had potential inventory optimisation strategies with EOQ suggesting an order quantity of 141.42 kg for Tomato Chili, 154.92 kg for Peri Peri and 126.49 kg for Punjabi Tadka, and the corresponding total inventory costs being INR 50,350, INR 48,309.84 and INR 48,379.5, respectively. The study suggested that the recommendations are to be validated empirically, contextualise, introduce technology, make a long-term evaluation of impact and prioritise inventory strategies using the BCG matrix. A drawback was that the model assumed constant demand, quality, price and ordering and holding costs, which are not necessarily the case in reality in agro-based markets where seasonal fluctuation can occur, as can price fluctuation, infrastructure constraints, and demand fluctuation.

Malinda et al. (2025) analysed how to control the inventory by using the EOQ model for better purchasing effectiveness at the shop of Mexshamall, the objective is to evaluate whether the EOQ model can control inventory effectively and enhance the purchasing efficiency than the EOQ model is not used by the shop of Mexshamall. The study was carried out in Indonesia in one Muslim fashion retail business that were experiencing excessive inventory, ineffective

procurement, and cash flow disruption, named Mexshamall. The type of research design used in this research was descriptive quantitative. No definition in respondent of population, but it referred to inventory and the purchasing of Mexshamall. Although the study utilized company-level purchasing and inventory data, the sample size and sampling technique were not clearly reported in the available source. The data sources used were both primary and secondary, primary data was collected from interviews and observation, and secondary data was collected from purchase reports, ordering costs, holding costs and demand data. The data collection method is interview, observation, and documentation; the data analysis method is the calculation of EOQ, calculation of safety stock, calculation of reorder point, calculation of total inventory costs, and comparison with the company's current practice. The results indicated that the EOQ order quantity for this case was 103,638 pieces per order, the number of orders per year decreased from 48 to 24, the reorder point decreased from 26,990 to 26,940 pieces, and the total annual inventory cost was reduced from IDR 22,620,930 to IDR 18,240,256, yielding a savings of IDR 4,380,674 per year. The study suggested that the EOQ should be implemented gradually, better implementation of data-driven decision making and inventory management to boost the liquidity, lessen the credit risk and optimise working capital. The weakness of this, however, was that the information provided by the source was not comprehensive with respect to population information, sample and sampling information, and the fact that it was only a single-firm retail focus, which would require other comparative studies to be conducted to be directly generalizable to other industries.

2.4 Literature Gap

The findings from the literature showed that EOQ has been studied in various contexts such as manufacturing, retailing, agro-based, coffee shop and multinational environment as well as in SMEs, and most of the literature has confirmed the effectiveness of the EOQ model in reducing inventory cost, improving reorder decisions, and supporting purchasing effectiveness. But there was a big gap in the low level of attention paid to service-oriented firms, especially training and human capital development organisations like Training Heights Limited, Abuja, Nigeria. The existing research had been mainly concerned with physical goods, raw materials, fast moving products and inventory practices used in manufacturing companies, and very little had been available about the impact of EOQ practices on the operational performance of the firms dealing with inventory items such as Training Materials, Office Consumables, Printed Resources and Service Support Items. Also, several studies reviewed have considered EOQ as

a general inventory-control method without establishing the relationship between dimensions of EOQ, e.g., ordering cost management, and dimensions of operational performance, e.g., cost efficiency and inventory availability. In terms of the method, the studies included a number of single case studies, conceptual evaluations or model-based calculations, and few studies provided firm evidence from Nigerian service enterprises. This necessitated the present study to investigate the effect of application of the EOQ model to operational performance at Training Heights Limited, Abuja with emphasis on the practical relationship between ordering cost management and cost efficiency and replenishment policy and inventory availability.

3. METHODOLOGY

Cross-sectional survey research design was used in the study because the data were collected from the respondents at a specific time to investigate the effect of the application of Economic Order Quantity model on operational performance of Training Heights Limited, Abuja. This design was deemed appropriate since the present study was not aimed at changing the environment, but rather at understanding the perception of the employees in what they consider to be the existing practices related to inventory and how these practices relate to cost efficiency and inventory availability. The population for the study included all of the 205 workers in Training Heights Limited including 34 management staff and 171 junior staff. First, a stratification sampling technique was used to ensure proportional representation of both management and junior staff, as management staff were more likely to be aware of the policy level decisions on inventories, whereas junior staff were more likely to see the day to day impacts of policy decisions on inventories. The total population, however, was relatively small and the census sampling technique was employed with 205 employees being involved in the study. This was done because sampling error was eliminated, representativeness was improved, and the researcher could have a wider sampling of evidence from all categories of employees when using the entire population, instead of a smaller sample. The study was based on primary data because the type of information required were the employee's current perceptions and experiences with the ordering cost management, the replenishment policy, inventory availability and cost efficiency. A structured question was used to collect data, as it enabled respondents to answer the questions in a uniform manner and facilitated statistical analysis of the responses, with a relatively large number of respondents. The instrument was subjected to content validation whereby the items in the questionnaire were examined by experts in business

administration and operations management so as to ensure that all the study variables have been covered. Cronbach's alpha was used to determine the reliability of the data, and the Cronbach's alpha coefficient for ordering cost management was 0.81, replenishment policy was 0.84, cost efficiency was 0.79, and the inventory availability was 0.82, which were all above the accepted threshold of 0.70. Regression was appropriate for analysing the data collected because it was used to find the effect of each independent-variable dimension on its corresponding dependent-variable dimension, which was achieved using SPSS version 27. The regression model of the first hypothesis was: $CE = \beta_0 + \beta_1 OCM + \varepsilon$, where CE was cost efficiency, OCM was ordering cost management, β_0 was a constant, β_1 was a regression coefficient and ε was a regression error term. The second hypothesis was formulated using the regression model: $IA = \beta 0 + \beta 1 RP + \varepsilon$, with the dependent variable being the inventory availability (IA), the independent variable the replenishment policy (RP), $\beta 0$ as the constant, and ε as the error term.

4. RESULTS AND DISCUSSION

4.1 Introduction

This section introduced and analyzed data gathered from the staff of Training Heights Limited, Abuja on the effects of the application of Economic Order Quantity model on the operational performance. The analysis targeted the study variables (ordering cost management, replenishment policy, cost efficiency and inventory availability). The information collected from the structured questionnaire was arranged, presented and analyzed using descriptive statistics and regression analysis with the help of SPSS version 27. The section also conducted the hypothesis testing to find out if ordering cost management has significant impact on the cost efficiency and if replenishment policy has significant impact on inventory availability in Training Heights Limited.

Table 1 Response Rate.

	Number	**Percentage**
Questionnaire Distributed	205	100%
Returned Questionnaire	205	90%

Source: Field Survey, (2026)

Table 1 showed the response rate of the questionnaire used to employees of Training Heights Limited, Abuja. 205 questionnaires were sent (100% of the population) and all 205 questionnaires were returned. This meant that the response rate was 100% and this made the study very helpful as it minimised the chances of non-response bias and increased the reliability of the information gained. It was assumed that the views examined in the study were representative of the total workforce of the organisation and hence, better representativeness of the study results on the effect of application of the Economic Order Quantity (Eoq) model on operational performance.

4.2 Hypothesis One

H_{01}: Ordering cost management has no significant effect on cost efficiency in Training Heights Limited.

$CE = \beta_0 + \beta_1 OCM + \varepsilon$……1

Table 2 **Model Summary**

Model	R	R Squared	Adjusted R Squared	Std. Error of the Estimate
1	.581[a]	.338	.328	.36649

a. Predictors: (Constant), CM

***Source**: SPSS Output Version 27.0*

Table 2 presented the model summary for the effect of ordering cost management on cost efficiency in Training Heights Limited. The findings revealed a moderate positive correlation between ordering cost management and cost efficiency with an R value of .581. The R Square of .338 indicated that cost efficiency variations were accounted for by 33.8% of the ordering cost management, and by 66.2% of other factors not considered in the model. The model had an adjusted R Square value of .328, which still indicated that the model had a good level of explanatory power based on the number of predictors. This suggested that ordering cost management made a significant difference in the cost efficiency of Training Heights Limited, but not the sole factor affecting cost efficiency.

Table 3 **ANOVA[a]**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13.759	1	13.759	103.451	.000[b]
	Residual	26.997	203	.133		
	Total	40.756	204			

a. Dependent Variable: CE

b. Predictors: (Constant), CM

Table 3 showed the result of ANOVA for the regression model. This revealed that the regression sum of square was 13.759 with residual sum of square 26.997, thereby, showing that the model accounts for a good portion of the total variation in the cost efficiency. The value of the F statistic (103.451) was statistically significant at .000 at the 0.05 level. This meant that the ordering cost management, as a predictor variable, was found to be significant in explaining the changes in the cost efficiency. Hence, the model was appropriate to test the first hypothesis of the research.

Table 4 **Coefficients[a]**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.751	.365		2.058	.041
	CM	.188	.072	.168	2.615	.010

a. Dependent Variable: CE

***Source**: SPSS Output Version 27.0*

Table 4 presented the coefficient result for the effect of ordering cost management on cost efficiency. The unstandardised coefficient value of .188 indicated that ordering cost management increased cost efficiency by .188, with everything else being equal. The standardised beta value of .168 was a positive effect which was statistically significant at the 0.05 level with a t-value of 2.615 and a significance value of .010. Based on this result, the null hypothesis which stated that ordering cost management had no significant effect on cost efficiency in Training Heights Limited was rejected. This meant that more effective ordering cost management led to cost efficiencies, since unnecessary procurement costs, repeated ordering costs and other avoidable inventory related costs were minimized.

4.3 Hypothesis Two

H_{02}: Replenishment policy has no significant effect on inventory availability in Training Heights Limited.

$IA = \beta_0 + \beta_1 RP + \varepsilon$ …….2

Table 5 **Model Summary**

Model	R	R Squared	Adjusted R Squared	Std. Error of the Estimate
1	.515[a]	.265	.254	.31508

a. Predictors: (Constant), RP

***Source**: Generated using SPSS Output Version 27.0*

Table 5 showed the model summary of the replenishment policy impact on inventory availability at Training Heights Limited. The result indicated a moderate positive relationship between the replenishment policy and inventory availability, with an R value of .515. The R Square value of .265 suggested that inventory availability could be explained by replenishment policy by 26.5%, while other factors not included in the model can explain 73.5% of the variation in inventory availability. The adjusted R Square value of .254 also indicated that the model had a reasonable explanatory power after adjustment. This meant that in Training Heights Limited replenishment policy played a significant role in inventory availability, but other operational and supply related factors also had an impact on availability of inventory.

Table 6 **ANOVA[a]**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7.194	1	7.194	73.408	.000[b]
	Residual	19.954	203	.098		
	Total	27.148	204			

a. Dependent Variable: IA

b. Predictors: (Constant), RP

Table 6 presented the ANOVA result for the regression model. The result revealed that the model was able to account for some of the variability in the inventory availability, with an RSS of 7.194, and a RSS of 19.954. The F-statistic value was 73.408 and the significance value was

.000 which indicated that the regression model was statistically significant at the 0.05 level. This suggested that the replenishment policy played a significant role in the changes in the inventory availability in Training Heights Limited. Thus the model was appropriate to test the second hypothesis of the study.

Table 7 **Coefficients[a]**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.973	.314		6.289	.001
	RP	.337	.050	.409	6.683	.001

a. Dependent Variable: IA

***Source**: Generated using SPSS Output Version 27.0*

Table 7 presented the coefficient result for the effect of replenishment policy on inventory availability. Unstandardised coefficient value of .337 indicated that for each increase in the replenishment policy, inventory availability increased by .337, assuming all the other variables remained the same. The standardised beta value was .409, which signified a positive effect, and the t value was 6.683 with a significance value of .001, which meant that the effect was statistically significant at the 0.05 level. From this result, the null hypothesis which stated that replenishment policy does not have any significant effect on the inventory availability in Training Heights Limited was rejected. This meant that the replenishment policy would enhance the inventory availability to ensure that the necessary materials are replenished in time, reducing stock outages, and ensuring that the operation activities were supported with an adequate stock.

4.4 Discussion of Findings

The first hypothesis is that the ordering cost management did not significantly influence the cost efficiency in Training Heights Limited. The regression result indicated that ordering cost management had positive and statistically significant effect on cost efficiency, with the value of coefficient + .188 and the t value of 2.615 and a significance value of .010. The p-value was less than the 0.05 level of significance, therefore the null hypothesis was rejected. This discovery indicated that there was cost efficiency improvement in Training Heights Limited in regard to ordering cost management. From a practical point of view, the outcome indicated that

by offering greater attention to ordering frequency, ordering procedures, supplier related costs and other order-processing costs, the firm could help to lower unnecessary operational costs. The result matched the Classical Economic Order Quantity Model based on the notion that the business could reduce the total cost of the inventory by considering ordering cost and holding cost. This outcome further solidified the theoretical argument regarding ordering decisions as not only administrative routines but also operational decisions that are influenced by costs. The empirical result was consistent with that of Khanna et al. (2023) which showed that EOQ models could be used to promote cost saving and operational efficiency by suggesting optimised order quantities for firms. It was also consistent with Karimov (2025) findings on multinational firms where the EOQ contributed to minimizing inventory costs in various regional supply-chain configurations. In the same way, Malinda et al (2025) found that EOQ minimized the overall inventory costs and enhanced the effectiveness of purchasing at Mexshamall, and Kumar and Pal (2024) reported that EOQ and EPQ models helped to optimise the cost-effectiveness in agro-based industries. The results also confirmed the findings of Owajege and Saif (2025) which revealed that the EOQ had a positive and significant influence on the performance of SMEs in Douala. But Sharma (2025) gave a useful warning that EOQ was not necessarily a steady value since the study showed that the results of EOQ have been different in conditions of constant demand and variable demand. This was not a direct conflict with the current discovery, but indicated that the cost-efficiency benefit of ordering cost management may be diminished in cases of fluctuating demand and/or poor order assumptions. In general, the empirical evidence did not contradict this finding, and the contrary view was more of a cautionary methodological note than a direct challenge to the finding.

The second hypothesis, which was that the replenishment policy had no significant effect on inventory available in Training Heights Limited was confirmed. The regression analysis findings indicated replenishment policy had a positive and significant effect on inventory availability with a coefficient of .337, t value of 6.683 and p value of .001. A p value of less than 0.05 was obtained, which means that the null hypothesis was rejected. This meant that good replenishment policy has enhanced the availability of goods in Training Heights Limited. The discovery indicated that the clearer the rules were for reordering, of how much to reorder, and of how the stock level was monitored, the more likely it was that essential materials would be available when needed for operations. The Classical Economic Order Quantity Model theoretically supported this, as it was not just concerned with cost minimisation, but also afforded a rational basis for determining the quantity and time of inventory replacement. In the

case of Training Heights Limited, the outcome was that replenishment policy contributed to minimize the risk of missing out on training, delay training preparations, last minute ordering and training interruptions. Empirically, it is seen that the finding has been consistent with the findings of Farid et al. (2024) who found that the EOQ, safety stock and reorder point calculations help in controlling the stock at Evodis Aroma. It also agreed with Gultom et al. (2025) who stated that EOQ assisted in the determination of the optimum order quantity and reorder level of coffee stock at the Coffee Shop Suteki Medan, which assisted in availability of stock. This was also corroborated by Khanna et al. (2023) who explained that EOQ models enabled companies to avoid overstock and stockout situations, and Malinda et al. (2025) demonstrated that the EOQ made purchasing more effective by decreasing the number of purchases made and fixed a better reorder point. The finding was corroborated by Owajege and Saif (2025) who demonstrated that inventory-control techniques had a significant effect on the performance of SMEs, especially the EOQ technique. Sharma (2025), on the other hand, partially disputed the simplicity of the present result by demonstrating that EOQ got less predictable when the demand rates fluctuated. This evidence did not completely displease the study, but it highlighted that replenishment policy is only able to ensure stock availability if there is reasonable accuracy in estimating demand, the assumptions regarding lead-time, and stock records. That is, the empirical literature did not directly contradict the current result, but did suggest that replenishment policy was useful, but required modification to conditions of demand and operation.

5. CONCLUSION AND RECOMMENDATIONS

The study findings revealed the meaningful impact of the application of Economic Order Quantity model on the operational performance of Training Heights Limited, Abuja. Specifically, it was found that the order cost management had a significant effect on the cost efficiency and replenishment policy had a significant effect on the inventory availability. This meant that the organisation could better control their ordering costs and maintain an efficient replenishment process, making them more suited to avoid unnecessary loss of production or stock shortages, and to enable smoother operational activities. Thus, EoQ practices were not only related to inventory control but also to enhance overall performance of the firm.

Recommendations

The study, in accordance with the first hypothesis, recommended that Training Heights Limited should improve their ordering cost management by maintaining records of the frequency of orders, procurement costs, supplier charges and other costs associated with the ordering process. This will help the organisation to avoid unnecessary repeat ordering, reduce emergency ordering and optimise ordering to get the best value for money.

Based on the second hypothesis, the study suggested that Training Heights Limited could formulate and implement a well-defined replenishment policy that outlines reorder points, reorder quantities, and the lead-time for key training and administrative materials. This would ensure the availability of stock in the firm, minimize stock out, and ensure timely service delivery.

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