Effect of Economic Order Quantity (EOQ) Inventory Measurement on Profitability of Top 100 Medium Enterprises in Kenya

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Abstract- ***International Accounting standard 2 regulates how inventories can be accounted for at Lower of Cost (LOC) and Net Realizable Value (NRV) with an outline of acceptable methods of cost determination. This study examined effects of EOQ inventory measurement on Profitability of Top 100 Medium Enterprises in Kenya. Descriptive research design was adopted targeting 300 accountants and chief executive officers of the selected top 100 medium enterprises. Simple stratified random sampling was used to select 171 respondents. Questionnaires were used as data collection instruments and data analyzed using quantitative and qualitative methods. Reliability, normality and homoscedasticity tests were carried out to test the goodness of fit of the Pearson Product Moment Correlation Coefficient model. The findings of the study revealed that there is no significant effect of Economic Order Quantity (EOQ) inventory measurement on profitability of top 100 medium enterprises in Kenya. The study recommends adoption of international accounting standards by the medium enterprises in order to realize sustainable profits.***

Index Terms— ***Economic order, Inventory measurement, Lower of Cost, Net Realizable Value, Profitability.***

I. INTRODUCTION

International Accounting Standards (IAS) is an integrated global accounting regulatory system that includes standards and their interpretation, litigation and enforcement [1]. Reporting should characterize financial, property and prospective market profiles including the risks [2]. This is founded on the fact that financial statements are management tools that can enhance the efficiency of enterprise decision making [2]. The whole concept of International Accounting as a regulatory control basis includes oversight and policy developed by professional entities including the International Accounting Standards (IAS) Organization that has developed a framework of control and quality management [3]. The outcomes of financial disclosures are used by owners and staff; counterparties including buyers, suppliers and sellers; investors; statutory control bodies; scholars; quality control agencies among others [2].

International accounting standards are sets of integrated quality management procedures that reflects the standards, their interpretation, enforcement and litigation[4]. Firms that have embraced IAS tools have been identified with timely detection of losses [4]. Quality International Accounting has been linked to household accumulation of wealth [5]. Since the development of micro finance institutions is an outreach initiative to the vulnerable, International Accounting therefore accelerates socio-economic development [5]. International Accounting standard 2 regulates how inventories can be accounted for at Lower of Cost (LOC) and Net Realizable Value (NRV) with an outline of acceptable methods of cost determination including First in First Out (FIFO) and Weighted Average Cost [6].Migration by countries including Kenya from local accounting standards to IAS has been successful but with notable challenges including requirements to shift away from the Last In Last Out (LIFO) method of accounting for inventories [7]; a widely applied local inventory accounting method in many countries.

International Accounting is therefore guided by the ability of organizations to adopt to best practices that conform to standards set by regulatory organizations including the IAS; International Accounting Standards Board (IASB), ICPAK among others. The extent of conformity to inventory reporting International Accounting guidelines as stipulated by IAS by the top 100 Medium Sized Companies in Kenya raises fundamental research questions that this study will make attempts to address.

Economic order quantity costing approaches have been applied in managing under conditions of delay in payments [8], and preferred method for costing items with imperfect quality [9]; or those items that are defective [10]. The costing method is therefore widely applied in firms that capitalize on economies of scale and permissive delays [11].

A study was carried out to examine the application of an EOQ model on imperfect items with options for buy and repair. The results arrived at a threshold in which a decision had to be done for firms to either repair defective orders or buy [12].

The approach is observed to be highly realistic on the fact that items from distant suppliers could most have a percentage that is defective and because of distance and cost, may not be replaced by another order. The method is therefore ideal in environments of large economies of scale and associated with cost minimization which increases return on purchases in form of profits. However, the assumption of large economies and distant purchases may be not practical to many small and medium enterprises that enjoy small to medium annual turnover. It also has an inherent disadvantage of not taking care of the hidden or exegetic costs in inventory systems [13].

An investigation in India examined the EOQ model that capitalizes on managing the number of orders per year to minimize ordering costs[14]. The EOQ is seen to be preferred in striking a balance between the optimal quantity that can be purchased with minimum costs and the volume of purchase orders. Purchases are demand driven and controlled by externalities in markets. Consequently, moderating purchases could practically be a challenge that calls for more investigations.

Attempts have been undertaken in Malaysia to integrate EOQ model for items with imperfect quality on differing holding costs and learning considerations [15].

The investigation combined EOQ with learning concepts and fuzzy logic in an engineering set up. The idea's applicability to medium enterprises that are not identifiable with learning is a question for further investigation.

A study investigated the EOQ model for imperfect items that undergo emissions[16]. This is largely viewed as an environmentally sustainable Inventory Management system that moderates emissions as part of inventory management process. The approach is more suited to an environmental or waste management firms and need to be looked at further, for possibilities of integrating in all firms' activities as an initiative to curb global warming. According to a study in China, there is need to accelerate efforts to fill the gap between an EOQ model and reality [17].

In Africa, a study adopted survey research design to investigate inventory costing in SMEs carried in Nigeria observed that majority of SMEs preferred EOQ for inventory costing [18]. The EOQ model developed in Ghana was found to be widely applied in changing from one order to another [19]. The results from this study was more applicable in firms that make multiple orders and requires more interrogation on SMEs with minimum orders of up a single order in a year.

In Kenya, a study was carried out to interrogate the performance of manufacturing firms identified with efficient Inventory Management practices [20]. The study employed a descriptive research design with census sampling technique targeting 15 large scale consumer manufacturing companies in Kenya. The study established increase in operational performance corresponding to implementation of standard inventory practices.

Size of Kenyan firms, profitability and liquidity impacted on international standards guided disclosure; where firms with a strong corporate culture and capital base were more likely to embrace IFSR [21]. Adoptability of Kenyan listed Companies

to IFSR for transparency, cost efficiency and accounting quality [22]. The study observes insignificant improvement of accounting quality under different circumstances which can be generalized in developing countries. Voluntary disclosures in International Accounting in the Kenyan banking sector are actions that can build investor confidence and are affected by board representations [23]; and are influenced by corporate culture, size, ownership and sector [23].

International Accounting in Kenya is built on an active legal framework as enshrined in the Kenya 2010 Constitution [24], CAP 486 of the laws of Kenya and professionally regulated by the Institute of Certified Public Accountants of Kenya (ICPAK). The law stipulates disclosure as a duty to heads of companies in section 199 emphasizing on matters that should be depicted in an auditor's report detailed in section 162. Satisfactory information for the sake of the audit must be availed; evidence of proper books of accounts by the company; and harmony between the balance sheet and the books of accounts and in the opinion of auditors', true representation of the company's financial practices in the records of accounts.

The unavailability of acceptable practices conforming to International Accounting Standards (IAS) and impact on profitability is a problem that can limit capital investment options and moderate returns on equity and assets of many organizations [25]. Economic development of medium enterprises and adoptability of firms to IAS in Kenya is affected by many converging factors and hence calling for investigations on effect of Economic Order Quantity (EOQ) inventory measurement on profitability. Poor quality inventory reporting practices and inability of Kenyan MEs to implement IAS has led to weak corporate culture, subjective disclosure, longer periods of loss detection and hence low profitability. This study therefore sought to investigate the effect of EOQ Inventory Measurement on Profitability of the top 100 medium enterprises in Kenya.

II. METHODS

Diagnostic test were carried out to test the goodness of fit of the Pearson Product Moment Correlation Coefficient model in order to determine the effect of Economic Order Quantity (EOQ) inventory measurement on profitability of top 100 medium enterprises in Kenya. Here, the reliability test, normality test and homoscedasticity tests were carried out.

2.1. Reliability Test

Cronbach's alpha coefficient which is a measure of internal consistency was used to assess reliability. Although there is no set interpretation as to what is an acceptable alpha value, Park (2021) assert that, an alpha coefficient above 0.80 is exemplary, in the range between 0.70 and 0.79 is extensive, whereas coefficients in the range between 0.60 and 0.69 indicate a moderate level of internal consistency. However, Cronbach's alpha values are quite sensitive to the number of items in the scale. In particular, it is common to find quite low Cronbach's values when the number of items is less than ten [26]. Despite this, this study had reliability index of 0.67 and so it suggested acceptable levels of internal consistency.

Table 1: Reliability Test

Cronbach's Alpha	No of Items
0.67	4

2.2.Normality Test

One of the assumption for Pearson Product Moment Correlation Coefficient model, is that the data should be normally distributed. This assumption was tested using Kolmogorov-Smirnov test where the null hypothesis was; *H0*: The sample data are not significantly different than a normal population. This was tested at **0.05** alpha level where the null hypothesis was accepted since all the p-values were greater than **0.05.** As shown in the table 2.

Table 2: Kolmogorov-Smirnov test for normality

	Statistic	df	Sig.
EOQ factors	.136	102	.103

2.3. Homoscedasticity Test

Homoscedasticity means that the variance along the line of best fit remain similar as you move along the line. It is required that the data should show

homoscedasticity for one to run a Pearson Product Moment Correlation. Failure for homoscedasticity test can have a very large effect on Pearson Product Moment Correlation Coefficient, which can lead to very different conclusions regarding the data. The results revealed that data points were homogeneous around linearity and therefore was not associated with any issues of homoscedasticity.

2.4. Pearson Product Moment Correlation Coefficient Test.

Pearson Product Moment Correlation Coefficient was run to determine the relationship between Economic Order Quantity (EOQ) and Profitability. The results are displayed in table 3. From the table, it was revealed that there was a very weak positive correlation of 0.138, between Economic Order Quantity (EOQ) factors and Profitability factors, which was not statistically significant with a p-value of 0.508 testing at 0.05 alpha level. Therefore, the null hypothesis which stated that, there is no significant effect of Economic Order Quantity (EOQ) inventory measurement on profitability of top 100 medium enterprises in Kenya, was not rejected.

Table 3: Pearson Product Moment Correlation Test on Economic Order Quantity (EOQ) and Profitability

		EOQ factors	Profitability factors
(EOQ) factors	Pearson Correlation	1	. 138**
	Sig. (2-tailed)	-	.508
	N	103	103
Profitability factors	Pearson Correlation	.138**	1
	Sig. (2-tailed)	.508	-
	N	103	103

** Correlation is significant at the 0.05 level

III. DISCUSSION OF RESULTS

The findings of the study upheld this hypothesis and confirmed that there is no statistically significant correlation between the availability of inventory information for accounting (that is, EOQ information) and firms' profitability (that is, the observation that a firm's expenses are less than its revenue). Although majority of respondents in the survey generally indicated that their firms availed pertinent inventory information for accounting purposes, the correlational analysis failed to confirm that such disclosures were tied to profitability. Hence, the hypothesis was accepted based on the evidence from the study.

The results of this research concurred with the research done by [12]. They examined the application of an EOQ model on imperfect items with options for buy and repair. They arrived at a conclusion that there is weak relationship between EOQ and business profit. Though the approach was observed to be highly realistic on small scale business, it did not yield a strong positive association in yielding business profit. They concluded that EOQ method was therefore ideal in environments of large economies of scale and associated with cost minimization which increases return on purchases in form of profits. However, the assumption of large economies and distant purchases may be not practical to many small and medium enterprises that enjoy small to medium annual turnover. This method also has an inherent disadvantage of not taking care of the hidden or exegetic costs in inventory systems [12].

The findings of this study contradicted the research in India who examined the EOQ model that capitalizes on managing the number of orders per year to minimize ordering costs [14]. According the results of his research EOQ was seen to be striking a balance between the optimal quantity that can be purchased with minimum costs and the volume of purchase orders. This implied that there was a very strong correlation between EOQ and Profitability. According to Kumar, purchases are demand driven and controlled by externalities in markets.

IV. CONCLUSION AND RECOMMENDATION

The study concluded that EOQ method was ideal in environments of large economies of scale and associated with cost minimization which increases return on purchases in form of profits and that EOQ

has non-significant effect on profitability for medium enterprises.

The study recommends that medium enterprises utilize IAS for timely loss detection. The study also encourages further studies on all Medium enterprises in Kenya and other profit determining factors of ME profitability.

REFERENCES

(Periodicalstyle)

[1] Ball, Ray. "IFRS–10 years later." Accounting and business research.,Vol.46, no. 5,pp.545-571,2016

[2] Pelekh, U., N. Khocha, and H. Holovchak. "Financial statements as a management tool." Management Science Letters.,Vol.10, no. 1,pp. 197-208, 2020

[3] IAS." International Accounting Standards". Available at: https://www.ifrs.org/news-and-events/calendar/2020/october/international-accounting-standards-board/.

[4] Barth, Mary E., et al. "Are IFRS-based and US GAAP-based accounting amounts comparable?." Journal of accounting and economics., Vol.54 No.1,pp.68-93, 2012

[5] Bassem, Ben Soltane. "Social and financial performance of microfinance institutions: Is there a trade-off?." Journal of Economics and International finance.,Vol.4, no. 4,pp. 92,2012

[6] Ali, Muhammad Jahangir, and Kamran Ahmed. "Determinants of accounting policy choices under international accounting standards: Evidence from South Asia." Accounting Research Journal., Vol.30, no. 4,pp.430-446, 2017

[7] Hughen, Linda, Jane R. Livingstone, and David Upton. "Switching from LIFO." The CPA Journal 81, no. 4 (20 Teng, Bing-Sheng, and Jeffrey L. Cummings. "Trade-offs in managing resources and capabilities." Academy of Management Perspectives., Vol.16, no. 2,pp. 81-91, 2002

[8] Teng, J. T. "On the economic order quantity under conditions of permissible delay in payments." Journal of the operational research society.,Vol. 53,pp.915-918,2002.

[9] Maddah, Bacel, and Mohamad Y. Jaber. "Economic order quantity for items with imperfect quality: revisited." International journal of production economics.,Vol.112, no. 2,pp. 808-815, 2008

[10] Eroglu, Abdullah, and Gultekin Ozdemir. "An economic order quantity model with defective items and shortages." International journal of production economics.,Vol. 106, no. 2,pp. 544-549, 2007

[11] Schwarz, Leroy B. "The economic order-quantity (EOQ) model." Building Intuition: Insights from Basic Operations Management Models and Principles.,pp.135-154,2008.

[12] Jaber, Mohamad Y., Simone Zanoni, and Lucio E. Zavanella. "Economic order quantity models for imperfect items with buy and repair options." International Journal of Production Economics.Vol. 15,No.5,pp. 126-131. 2014.

[13] Jawad, Hussam, Mohamad Y. Jaber, and Maurice Bonney. "The economic order quantity model revisited: an extended exergy accounting approach." Journal of Cleaner Production.,Vol.105,pp.64-73, 2015 thesis,Dept.Electron.Eng.,OsakaUniv., Osaka,Japan, 1993.

[14] Kumar, Rakesh. "Economic order quantity (EOQ) model." Global Journal of finance and economic management., Vol.5, no.1, pp. 1-5, 2016

[15] *Shekarian, Ehsan, Ezutah Udoncy Olugu, Salwa Hanim Abdul-Rashid, and Nima Kazemi. "An economic order quantity model considering different holding costs for imperfect quality items subject to fuzziness and learning." Journal of Intelligent & Fuzzy Systems.,Vol. 30, no. 5,pp. 2985-2997, 2016*

[16] *Kazemi, Nima, Salwa Hanim Abdul-Rashid, Raja Ariffin Raja Ghazilla, Ehsan Shekarian, and Simone Zanoni. "Economic order quantity models for items with imperfect quality and emission considerations." International Journal of Systems Science: Operations & Logistics.,Vol.5, no. 2,pp.99-115, 2018*

[17] *Zhou, Yongwu, Chuanying Chen, Changwen Li, and Yuanguang Zhong. "A synergic economic order quantity model with trade credit, shortages, imperfect quality and inspection errors." Applied Mathematical Modelling.,Vol. 40, no. 2,pp. 1012-*

[18] Karim, Norazira Abd, Anuar Nawawi, and Ahmad Saiful Azlin Puteh Salin. "Inventory control weaknesses–a case study of lubricant manufacturing company." Journal of Financial Crime.,Vol. 25, no. 2,pp. 436-449, 2018

[19] Otchere, Alexander Fianko, Emelia Darko Adzimah, and Ireen Aikens. "Assessing the inventory management practices in a selected company in Ghana." International Journal of Development and Sustainability.,Vol. 5, no. 3,pp.105-119,2016

[20] Kinyua, Derrick. "Inventory management practices and performance of consumer goods.,2016.

[21] Andrew, Kipchoge Kiprop. "Effect of corporate attributes on international financial reporting standards disclosure level. Evidence from Kenya listed firms." Research Journal of Finance and Accounting., Vol.6, no. 1,pp.97-107, 2015

[22] Outa, Erick Rading. "The impact of international financial reporting standards (IFRS) adoption on the accounting quality of listed companies in Kenya." Available at SSRN 1976146 (2011).

[23] Barako, Dulacha G. "Determinants of voluntary disclosures in Kenyan companies annual reports." African Journal of Business Management.,Vol.1, no. 5,pp.10-16,2007

[24] Hope, Kempe Ronald. "Devolved government and local governance in Kenya: Implementing decentralization underpinned by the 2010 constitution." African and Asian Studies.,Vol.13, no. 3,pp. 338-358, 2014

[25] Park, Hyeonah. "Reliability using Cronbach alpha in sample survey." The Korean Journal of Applied Statistics.,Vol.34, no.1,pp. 1-8,2021

[26] Cronbach, L. J. “Coefficient alpha and the internal structure of tests”. psychometrika,Vol.16,No.3,pp. 297-334,1951