The Effect of Inventory Management Practices on Operational Performance: A case study of mineral water factories in Dire Dawa Administration.

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Abstract

Inventory management is defined as keeping or maintaining the firm's stock at a level that firms will incur the least cost consistent with other management for the set objectives and targets. The purpose of this study was to examine the effect of inventory management practices on operational performance in case of mineral water factories in Dire Dawa City Administration. The researchers were used explanatory research design, both primary, and secondary sources of data were used to achieve the objective of the study. In this study, close-ended questionnaire was used to collect the data from selected respondents. The total population of the mineral water factories in Dire Dawa City Administration was 2225 and the researchers took 290 employees as a sample. Both descriptive statistics (mean and standard deviation), and inferential statistics (Pearson correlation and ordinal logistic regression) were used. The findings of the study implies that activity-based cost, just-in-time, and inventory control practices have a positive and significant effect on operational performance, whereas economic order quantity has a positive and insignificant effect on operational performance. Therefore, the researchers would like to recommend that the companies should give priority to inventory control because inventory control practice may affect the companies' performance more than the rest of the inventory management practices in the company.

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1.1. Introduction

Many firms in the world have been facing several challenges particularly related to inventory management, and control that affect their operational performance (OP). Overstocking materials that are expired or outdated, under stocking, lack of stock-taking, theft of materials by the workers, and delays in the delivery of materials are some of the challenges that firms faced in the organizations. More than 50 percent of total assets are invested in the working capital of manufacturing firms inventory contain accounts receivable and accounts payable (Beheshti, 2010 Darun et al., 2015, and Gill et al., 2010).

In the contemporary, the success of any company requires it to improve the production to consider minimize costs in their supply chains and provide efficient customer service in terms of customer satisfaction of the competitive business environment. This activity could be achieved through the efficiency of inventory management. The efficiency of inventory management ensures large profit and retention of the available customer base and the achievement of better customer service drives of companies are to structure their inventory management. In manufacturing firms, at every stage or phase of production, there must be a trade-off or balance of the inventory level which is to make not too high, not too low, and to reduce the cost of operating the firm and losses (Hugo et al., 2016).

Different management practices have been recognized in the easing process of effective and efficient service delivery to both customers and to its stakeholders with the consistent increase in the demand for products and services in various facets of the economy. One way of such management practices is the utilization of an inventory management system in maintaining adequate stock in an organization. Inventory management is also the tool for an optimal resource with increasingly regarded in achieving across industries overall organizational efficiency (Akindipe, 2014).

Many authors define the term inventory management in different ways. For example, according to (Stevenson, 2010) inventory management is defined as the framework that is employed in firms related to controlling their inventory, and inventory management also includes the recording and observing of stock level, estimating future requests, and settling on when and how to arrange. This idea is supported by (Deveshwar, and Dhawal, 2013) described that inventory management is a method that is used to organize, store, replace inventory, to keep an adequate supply of goods at the same time minimizing costs in the companies. Inventory

management is defined as keeping or maintaining the firm's stock at the level that a firm will incur the least cost consistent with other managements for setting objectives and targets (Kwadwo, 2016).

Some studies showed that the inventory management system is practiced or applied in different organizations specifically in manufacturing firms concerning global and local context. From a global perspective, (Lewin, 2012) study focused on American firms in the manufacturing sector of inventories revolutions policies in the 1970s and 1980s. He observed that, the extent of emphasis on inventories among American a firm reached the financial market where their rule that would reward firms that controlled inventories and punish those that did not do so. This is because, during the 1970s, Japanese manufacturing Companies were made substantial market share gains in the United States markets in a range of industries including most notably the automobile industry. From African perspective, (Ondiek, and Odera, 2012) stated that the manufacturing organizations in Kenya have ignored the potential saving from the strategic inventory management systems, treating inventory as a necessary evil and not an asset requiring management.

From Ethiopian perspective, only a few studies stated the problems of inventory management practices in manufacturing industries. The study conducted by (Alie et al, 2017) on the performance analysis on the demand and supply of basic metal products focused on Ethiopian basic metal industries indicated that unbalanced demand and supply of basic metal industries, poor information technology, insufficient and faulty practices, absence of materials manager, poor delivery time, poor customer satisfaction, product unavailability, material cost, and material warehouse are the common problems that have seen in Ethiopia basic metal industries.

Several scholars have researched in the field of inventory management practices on operational performance. For instance, Msheila, (2015) studied the effect of inventory management practices on performance of small and medium-scale enterprises (SMEs) in Ghana. He took 211 samples from small and medium-sized enterprises in Kaduna north and south of the local government area in the period of 2008-2012 by using inventory management as independent and the performance of SMEs as the dependent variable. The study concludes that, IM has a positive and significant effect on performance of small and medium enterprises in Kaduna.

Tse, and Gong, (2009) conducted their study on the effect of inventory control management on operational performance of sugar manufacturing industries in Kenya a case of Nzoia sugar

company by using variables inventory management techniques (economic order quantity, just-in-time, periodic review technique, and action level method), inventory cost, and computerized inventory management. This study concludes that variables inventory management techniques, inventory cost, and computerized inventory management have a positive effect on operational performance.

Babatunde, (2017) examined inventory management practices and operational performance of selected flour mills companies in Nigeria by using six (6) construct variables such as inventory shrinkage, inventory investment, inventory turnover, inventory record accuracy, inventory control, and automated inventory system. The study concludes that, inventory management practices influenced the operational performance of selected flour mills companies are positively and significantly in Nigeria.

Furthermore, Mbah et al., (2017) investigated inventory management and operational performance of manufacturing firms in south-east Nigeria by using variables like inventory cost, just-in-time approach, material requirement planning, and strategic supplier partnership. A sample size of 538 was mathematically determined from 5223 target population using Godden's (2004) formula and a simple random sampling technique was employed to select the staff from the various departments for the study. The find of this study indicated that, inventory cost, just-in-time approach, material requirement planning, and strategic supplier partnership have a significant relationship with operational performance.

Opoku et al., (2017) study conducted on inventory management practices and operational performance of manufacturing firms in Ghana by using variables of activity-based costing, economic order quantity, just-in-time, strategic supplier partnership, vendor-managed inventory, and material resource planning. The study found that, all inventory management practices including activity-based costing, economic order quantity, just-in-time, strategic supplier partnership, vendor-managed inventory, and material resource planning to be significantly associated with promoting operational performance levels of manufacturing firms, and IMPs play tremendous roles in improving the operational performance levels of manufacturing firms in a developing economy notably Ghana.

As the knowledge of the researchers, in Ethiopia, the inventory management related to the aspects of water factories has not yet attracted the attention of researchers and policymakers. Mineral water factories are contributing significantly to the economic development in several

ways and are very important for generating employment next to agriculture. Yet, mineral water factories are facing challenges like insufficient materials (highlands and plastics which is an import from the foreign market), the traditional method of inventory management tools and techniques in mineral water factories, lack of banking and finance sectors, lack of communication infrastructure, high cost of inputs for manufacturing, lack of access to international information and technology. These challenges are often led mineral water factories to stop production schedules, generating a low profit and low-capacity utilization of the company's performance. Some studies show that a large number of manufacturing firms are failing their operational performance due to limited efficiency, capacity utilization, as well as the limited skill of workers, and the quality of raw materials discrepancy in the production costs (CBI, 2015, and H, and H, 2016). The other studies shows that poor inventory management could potentially lock up to 70 percent of a firm's total current assets which could affect their operational and overall performance (Jingyao, and Guoqing, 2015, and Abd et al., 2018). Therefore, These problems are creating huge gaps in internal control leading to financial risks such as theft, and fraud while exposing manufacturing firms to production or deliveries delay, countless faulty products, unnecessary product shortages, improper storage practices, frequent material wastages, product shortages, high customer dissatisfaction, low-quality products, lack of flexibility, employee dissatisfaction, and lack of competitive advantages (Koumanakos, 2008, Michael, and Patrick, 2018, and Zakaria et al., 2016).Additionally, the study conducted by (Aktas et al, 2015 and Bagchi et al., 2012) states that the excessive level of working capital invested in inventory is one of the general business problems that negatively affect the company's operational performance, and lack of strategies for efficient inventory management is another basic business problem (Bagchi et al., 2012).

Generally, manufacturing industries like mineral water factories have strategic importance in developing countries like Ethiopia that contributing to source or national income, source of employment, and exports. The developments of manufacturing industries are the central focus of the Ethiopian government industrial development strategy is stated in the growth and transformation plan. As it is observed from different review literature, inventory management practices are one of the ways to achieving the overall organization operational performance. However, to the researchers' best knowledge, very few works has been done in Ethiopia specifically in mineral water factories are the main reason that is necessary for researching on the effect of inventory management practices on operational performance by identifying gaps such as place or study area gap, methodologically gap, lack of empirical evidence from

inventory management concepts and performance association with mineral water factories, and low performance of mineral water factories in terms of efficiency, competitiveness, and productivity in the manufacturing firms. Therefore, due to these research gap, the researchers was initiated to examine the effect of inventory management practices on operational performance by considering variables of activity-based cost (ABC), economic order quantity (EOQ), just-in-time (JIT), and inventory control (IC) to fill theoretical and empirical gaps of inventory management practices on operational performance in the case of mineral water factories in Dire Dawa city administration (DDCA).

2.   Materials and Methods

In this study, the researcher has used an explanatory research design that was used to estimate the causal effect between variables. Causal research design can be carried out to identify the extent or nature of the cause-and-effect relationship between variables to examine the effect of specific changes on existing norms and processes, while offering a great level of validity due to the systematic selection of subjects. For the study achievement, the data was obtained from primary and secondary sources. A self-administered questionnaire was distributed to the target respondents' of the company based on the response of close-ended items questions were elicited on a 5-point Likert scale with 1=Strongly Disagree, 2= Disagree, 3=Moderate, 4=Agree, and 5= Strongly Agree.

Currently, there are eight (8) mineral water factors in the DDCA. Those mineral water factors are Vita water, Ayaan water, Aqua Dire water, Eftein water, Libaan water, Aqua Uno water, Free water, and Daal- Salon water. Those companies have 2225 employees. From 2225 employees, the researcher selected 290 respondents by using (Getu, and Tegbar. 2006) formula from respective departments. In this regard, the sample size was calculated as follows.

$$sample\ size\ n = \frac{Z^2 p(1-p)}{W^2 \left(1 + \frac{\frac{Z^2 p(1-p)}{W^2}}{N} \right)}$$

$$n= \frac{1.96^2 \times 0.5 \times 0.5}{\left(\dfrac{0.05^2 \dfrac{1.96^2 \times 0.5 \times 0.5}{1+0.05^2}}{2225} \right)}$$

$$= 290.$$

In this study, data was analyzed through both descriptive (mean and standard deviation), and inferential statistics (Pearson correlation, and ordinal logistic regression) statistics. The data collected was processed through the use of a statistical package for social science software (SPSS).

3. Analysis and discussion
3.1. Descriptive Analysis

In descriptive statistics, the analysis for all variables mean and the standard deviation was used. The mean value was used to show the typical response among respondents to the extent of company inventory management practices on each item, while the standard deviation was used to show the degree of consistency with which the response was made. Responses were elicited on a 5-point Likert scale with the following options are strongly disagree (1), disagree (2), moderate (3), agree (4), and strongly agree (5). As it was mentioned by (Johns, 2010) the scale of approach agree-disagree was used to the simple way of measuring specific opinions. The approach enables the construction of multiple items that constituted Likert scales. Analysis of the response scores was conducted on a continuous scale. In this context, if the mean value is $0.5 < R < 1.5$ strongly disagree, if the mean value is $1.5 < R < 2.5$ disagree, if the mean value is $2.5 < R < 3.5$ moderately agree, if the mean value is $3.5 < R < 4.5$ agree and if the mean value is $4.5 < R < 5$ strongly agree.

"Table1". Descriptive Statistics of Inventory management Practices and Operational Performance

Variables	Descriptive Statistics	
	Mean	Std. Deviation
ABC	3.18	.696
JIT	3.38	.586
EOQ	3.37	.524
IC	3.39	.648
OP	3.28	.606

Source: (Researchers survey, 2021)

The first objective the current study pursued that investigate the effect of activity-based cost on operational performance. Mean and standard deviations were used to explore responses from the respondent questionnaire. A total of six items were used to measure the respondents' view on activity-based cost in mineral water factories. The result presented in the above table1, the overall mean response score among respondents concerning the activity-based cost used in mineral water factories in Dire Dawa City Administration was 3.18. This value is found in the interval 2.5<R<3.5 which implies that respondents seemed to show agreement of the activity-based cost being used in the mineral water factories, and the overall the standard deviations (SD= .696) which is an indication of consistency in agreements among the respondents. The implications of this result that respondents moderately agree that mineral water factories of Dire Dawa City Administration have taken cognizance of the crucial role activity-based cost play towards increasing operational performance. This finding is related to previous studies that have concluded that activity-based cost results in better firm performance in the area of operational flexibility, dependability, customer satisfaction, and product quality (Albalaki et al., 2018, Dong et al., 2014 and Tse, and Gong, 2009).

The second objective sought to examine the effect of just-in-time on operational performance of mineral water factories. A total of six items were used to measure the respondents view on JIT in mineral water factories. As shown in the above table1, the overall mean response score among respondents about just-in-time used in mineral water factories in Dire Dawa City Administration was 3.38. This value is found in the interval 2.5<R<3.5 which implies that respondents seemed to show agreement of just-in-time being used in the mineral water factories. The overall the standard deviations (SD= .586) are an indication of consistency in agreements among the respondents. This result implies that mineral water factories operating in Dire Dawa City Administration recognize the importance of effective just-in-time play towards to increasing operational performance. Many previous review literatures related suggested that just-in-time used for continuous improvement, waste elimination, and involvement of people (Hugo et al., 2016), just-in-time is helped to produce high quality of items at the required time, improve strategies, and fixing setbacks (Yeboah, 2015), and just-in-time also used to lead to waste reduction, value maximization and lead to productivity (Kootanaee et al., 2013).

The third objective of the current study pursued to examine the effect of economic order quantity on operational performance. Mean and standard deviations were used to explore responses from the respondent questionnaire. A total of six items were used to explore

respondents from respective department unit awareness of the nature of economic order quantity used in inventory management in mineral water factories in Dire Dawa city administration. The result presented in the above table 1, the overall mean response score among respondents concerning the economic order quantity used in mineral water factories in Dire Dawa city administration was 3.37. This value is found in the interval $2.5 < R < 3.5$ which implies that respondents seemed to show agreement of economic order quantity being used in the mineral water factories. The overall the standard deviations (SD= .524) are an indication of consistency in agreements among the respondents. The implications of this result that respondents moderately agree that mineral water factories of Dire Dawa city administration have taken cognizance of the crucial economic order quantity play towards increasing operational performance. In inventory management, economic order quantity is very important is order of quantity that minimizes the total holding costs and ordering costs. This finding is evidenced from review literature related that economic order quantity is the optimal order quantity to order that minimizes the total variable costs required to order and holding inventory (Lewin, 2012).

The fourth objective of the current study pursued to establish the effect of inventory control on operational performance. Mean and standard deviations were used to explore responses from the respondent questionnaire. A total of six items were used to explore respondents from respective department unit awareness the nature of the inventory control used in inventory management in mineral water factories in Dire Dawa city administration. As shown in the above table 1, the overall mean response score among respondents about the inventory control used in mineral water factories in Dire Dawa city administration 3.39. This value is found in the interval $2.5 < R < 3.5$ which implies that respondents seemed to show agreement of inventory control being used in the mineral water factories, and the overall the standard deviations (SD= .648) are an indication of consistency in agreements among the respondents. This result implies that the respondents moderately agree that mineral water factories Dire Dawa city administration have taken cognizance of the crucial role inventory control play towards increasing operational performance. Many previous studies have given evidence showing that the use of inventory control in the organization is an integrated functioning that dealing with supplies of materials, and allied activities to achieve maximum coordination and optimum expenditure on materials(Adeyeye,2016).

On the other hand, operational performance was conceptualized as a dependent variable in the study. Fifteen questionnaire items reflecting quality, customer satisfaction, and flexibility were

used to measure the mineral water factories operational performance. As shown in the above table 1, the overall mean score was 3.28 which indicate that the respondents moderately agree with operational performance. The standard deviation value of .606 is an indication of consistency in agreements among the respondents. This finding is consistent with (Gitau, 2016) conducted on the effect of inventory management practices on the operational performance of warehousing firms in Mombasa County. In his study, seven (7) parameters of the operational performance questions were developed that show the relationship between inventory management practices and OP which had an average mean (3.60) which is a moderate extent to apply in warehousing firms in Mombasa County.

3.2. Correlation Analysis

Correlation is measuring the linear relationship between two variables. A coefficient of correlation has a value starting from -1 to 1. The values that are closer to the absolute of 1 indicate that there is a strong relationship between the variables being correlated whereas the values that are closer to 0 indicate that there's little or no linear relationship. In correlation analysis when the value coefficient ± 0.1 represents a small effect, ± 0.3 represents a medium effect and ± 0.5 represents a large effect is an important commonly used to measure the size of an effect that happens within the study (Pallant, 2010).

"Table2". Correlation matrix for Inventory Management Practice and Operational Performance

Variables	Pearson Correlation	ABC	JIT	EOQ	IC	OP
ABC	Pearson Correlation	1				
	Sig. (2-tailed)					
	N	245				
JIT	Pearson Correlation	.267**	1			
	Sig. (2-tailed)	.000	245			
	N	245	245			
EOQ	Pearson Correlation	.182**	.496**	1		
	Sig. (2-tailed)	.004	.000			
	N	245	245	245		
IC	Pearson Correlation	.411**	.710**	.600**	1	
	Sig. (2-tailed)	.000	.000	.000		
	N	245	245	245	245	
OP	Pearson Correlation	.503**	.562**	.417**	.636**	1
	Sig. (2-tailed)	.001	.000	.000	.000	
	N	245	245	245	245	245
**. Correlation is significant at the 0.01 level (2-tailed).						

Source: (Researchers Survey, 2021)

The above table 2, indicates that there is a positive relationship between activity- based cost and operational performance with Pearson correlation (r= 0.503) and at significance p-value

(p=.000) which is less than 0.01. This implies that activity- based cost and operational performance are strongly correlated. This finding is supported by Efiok et al, (2015) correlation analysis shows that there is a positive correlation between activity- based cost and operational performance with Pearson correlation (r=0.664, p<0.01).

On the other hand, the above table 2, demonstrates that there is a positive relationship between just-in-time and operational performance with Pearson correlation (r=0.562) and at significance p-value (.000) which is less than 0.01. This implies that just-in-time and operational performance are strongly correlated. This finding is supported by (Michael, and Patrick, 2018) results further revealed that the correlation between just-in-time and performance at 0.575 with a corresponding p-value of 0.000. There is a significant and positive correlation coefficient which implied that if an increase in just-in-time techniques increases the performance of soft drinks manufacturing firms.

Similarly, the result presented in the above table 2, shows that there is a positive relationship between the economic order quantity and operational performance with Pearson correlation (r=0.417) and at significance p-value (p=.000) which is less than 0.01. This implies that economic order quantity and operational performance are medium correlated. This finding is consistent with (Auma, 2017) the value of correlation analysis indicates that there is a moderate positive relationship between economic order quantity and the performance of procurement function with the Pearson correlation (r= 0.453) and inferred at significance p-value (p=0.005) which is less than 0.01 and the correlation was significant at 99% confidence level.

Additionally, from the above table 2, it can be understood that there is a positive relationship between inventory control and operational performance with Pearson correlation (r=0.636) and at significance p-value (p=.000) which is less than 0.01. This implies that inventory control and operational performance are strongly correlated. This finding is consistent with (Mulei, and Were, 2017) that concluded the findings further reveal that there exists a very strong positive relationship between the performance of the education sector and inventory control as presented at (n=92, r = 0.708, p < 0.01).

3.3. Model Diagnostics

In estimating the logistic regression model parameters using the maximum likelihood estimator, there is a need to assess the significance of the variables with regard to predicting

the response variable. Several statistics can be used to carry out the assessment and these include Model Fitting Information, Goodness-of-Fit, and Cox and Snell R^2 test.

3.3.1. Model Fitting Information

In this study, the researchers compare the final model against the base line to see whether it has significantly improved the fit to the data. The model fitting information gives the -2log likelihood values for the baseline and the final model, and SPSS performs a chi-square to test the difference between the -2Log likelihood for the two models given in the following tale.

"Table3". Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	Df	Sig.
Intercept-Only	437.795			
Final	266.091	171.704	4	.000

Link function: Logit.
Source: (Researchers survey, 2021)

The Model Fitting information in the above table 3 contains the -2Log Likelihood for an Intercept- Only (null) model and Final model (containing the full set of predictors). The likelihood ratio Chi-square test to test whether there is a significant improvement in Fit of the Final model relative to the Intercept-Only model. In this case, it is possible to conclude that, there is a significant improvement in Fit of the Final model over the null model (Intercept-Only) model [x^2 (4) =171.704 that means 437.795-266.091, p< .000].

3.3.2. Goodness-of-Fit

The Goodness-of-Fit table contains Pearson's chi-square statistic that is intended to test whether the observed data are consistent with the fitted model. When the p-value is large, it is concluded that the data and the model predictions are similar and that the model fits the data well and becoming a good model. However, if the assumption of a good fit is violated, conventionally if p<.05, then the model does not fit the data well.

"Table4". Goodness-of-Fit

	Chi-Square	Df	Sig.
Pearson	303.334	474	1.000
Deviance	263.318	474	1.000

Link function: Logit.

Source: (Researchers survey, 2021)

The Goodness of fit in the above table 4 contains both the Deviance and Pearson Chi-Square tests, which are useful for determining whether a model exhibits a good fit to the data. Non-significant test results are indicators that the models fit the data. In this analysis, it is possible to understand both the Pearson Chi-square test [x^2 (474) = 303.334, p= 1.000] and the deviance [x^2(474) =263.318, p= 1.000] were both non-significant. Therefore, these results suggest a good model fit.

3.3.3. Pseudo R-Square

Unlike when using linear regression where the R-square measures the amount of variation in the dependent variable that is explained by the independent variables, in logistic regression, there is controversy regarding the relevance of r-square measures in assessing the predictive power of a model. The R^2 for Logistic regression is estimated by the Cox and Snell R^2. Unlike in linear regression, logistic regression is only used to compare competing models that are used for the same data. A value of 1 is an indication of a perfect fit while a value of zero is an indication that there is no relationship. The higher the value the better fit the model.

"Table5". Pseudo R-Square

Cox and Snell	.504
Nagelkerke	.604
McFadden	.390
Link function: Logit.	

Source: (Researchers survey, 2021)

The Cox and Snell R Square and Nagelkerke R Square values are indicating the amount of variation in the dependent variable explained by the model (from the minimum level 0 to a maximum of approximately 1). In this case, the result presented in the above table 5, shows that the two values are 0.504, and 0.604 respectively. The model as a whole explained 50.4% (Cox and Snell R Square) and 60.4% (Nagelkerke R Square) of the variance of operational performance (Dependent Variable).

3.3.4. Test of Parallel Lines

For our ordinal regression model to hold, its needs to ensure that the assumption of parallel lines
of all levels of the categorical data is satisfied since the model does not assume normality and constant variance. This assumption states that the dependent variable's categories are parallel

to each other. When the assumption does not hold, it means that there is no parallelity between categories (Fullerton, and Xu, 2012).

"Table6". Test of Parallel Lines

Model	-2 Log Likelihood	Chi-Square	Df	Sig.
Null Hypothesis	266.091			
General	261.217	4.484	4	.301
The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.				
a. Link function: Logit.				

Source: (Researchers survey, 2021)

As mentioned, in the ordinal logistic regression assume that the relationship between the independent variables is the same across all possible comparisons involving in dependent variable assumption referred to as Proportional Odds. When the result of the test parallel lines (assumption of proportional odds) indicates non-significance, then, it interprets to mean that the assumption is satisfied. On other hand, the statistical significance is taken as an indicator that the assumption is not satisfied. Therefore, in the result analysis of table 5, the assumption test of proportional odds is satisfied as (p=.301 which is greater than 0.05) and the main assumption of the ordinal regression is checked.

3.3.5. Parameter Estimates of Ordinal Logistic Regression

Parameter estimates tell that how much each independent variable contributes to the dependent variable which is operational performance.

"Table7". Parameter Estimates

Parameter		Estimate (B)	Std. Error	Hypothesis Test			Exp(B)	95% Wald Confidence Interval for Exp(B)	
				Wald Chi-Square	Df	Sig.		Lower	Upper
Threshold	[OP=2.00]	12.297	1.5877	59.988	1	.000	219074.124	9752.581	4921104.744
	[OP=3.00]	18.308	2.0531	79.519	1	.000	89323755.128	1597365.794	4994931817.869
ABC		1.562	.2809	30.926	1	.000	4.769	2.750	8.270
JIT		1.273	.3939	10.440	1	.001	3.570	1.650	7.726
EOQ		.529	.3105	2.898	1	.089	1.696	.923	3.118
IC		1.737	.4287	16.411	1	.000	5.680	2.451	13.160

Dependent Variable: OP
Model: (Threshold): ABC, JIT, EOQ, and IC
a. Fixed at the displayed value
Source: (Researchers survey, 2021)

From the above table 6, shows that the regression coefficients and significance tests for each of the independent variables like ABC, JIT, EOQ, and IC in the model. The regression coefficients are exactly interpreted as the predicted changes in the Log odds of being in a higher (as opposed to a lower) group or category on the dependent variable (controlling for the remaining independent variables) as per unit increase on the independent variable.

H1: Activity-based cost has a positive and significant effect on operational performance.

As activity-based cost practice is increase by one unit, all other variables are constant at their value; there is a predicted increase of 1. 562 in the Log odds of being in a higher (as opposed to a lower) category on OP at (B= 1.562 and p= 000). This indicates that ABC practice has a positive and significant effect on operational performance. Therefore, an alternative hypothesis was accepted. This finding is supported by (Auma et al., 2017) summary of the coefficients of the model of the interpretations of the results indicates that a p-value of 0.001 which is less than 0.05, and r= 0.456 indicates that the activity-based cost has a positive effect on the procurement function performance in sugar manufacturing firms in western Kenya. On the other hand, this finding well goes with the evidence from the literature review related to ABC is the well-accepted techniques that are used for large manufacturing for efficient control of the greater amount of stock (Hatefi et al., 2014, and Adeyemi, and Salami, 2010).

H2: **Just-in-time has a positive and significant effect on operational performance.**

As just-in-time practice is increase by one unit, all other variables are constant at their value; there is a predicted increase of 1.273 in the log odds of being in the higher category on OP. This implies that just-in-time practice has a positive and significant effect on OP at (B= 1.273 and p= .001). Therefore, the alternative hypothesis was accepted. This finding is supported by (Mulandi, and Ismail, 2019) the findings of the beta coefficient and the significance of analysis indicate that JIT (p<0.05) has a positive and significant effect on the performance of commercial state corporations, and most organizations today have embraced the JIT system in the management of their inventories possibly because of its ability to eliminate waste. Similarly, the result of the study is evidenced from a literature review and supported by (Farzaneh, 2012) concludes that JIT from a mathematic model view that JIT can eliminate the storage, capital, insurance, ordering, and transportation costs that depend on a certain condition. Additionally, other studies similarly found that JIT is positively influence

operational performance in terms timely deliveries, waste elimination, increased productivity, and improved demand management (Panwar et al., 2017, Yadav et al., 2019, and Sharma, and Modgil, 2019).

H3: Economic order quantity has a positive and significant effect on operational performance.

As economic order quantity is increase by one unit, keeping all other variables are constant at their value, there is a predicted increase of .529 in the Log odds of being in a higher category on operational performance. This implies that economic order quantity practice has a positive and insignificant effect on OP at (B= .529 and p= .089). Therefore, the alternative hypothesis was rejected. The finding is consistent with (Auma et al., 2017) the summary of the coefficient of regression model indicates that economic order quantity of coefficient of (b= -0.054, t= -.512 and p= 0.612) which is greater than 0.05 denoting an insignificant contribution to procurement function performance and was dropped from the model. Similarly, in the study conducted by (Efiok et al., 2015) the determination of the multiple regression equation of hypothesis coefficient indicated that the economic order quantity with 0.141 beta coefficient contributes 14.1% towards predicting operational performance and at insignificance p-value (p= .077) which is greater than 0.05. Therefore, researchers observed that from the regression model that other inventory management practices made positive contributions to predicting operational performance but insignificant. Therefore, in this study, the beta value of economic order quantity contributes by positive value (b= .529) towards operational performance with insignificant value (.089), and (Efiok et al., 2015) the economic order quantity contributes by positive value (0.141) towards to operational performance with insignificant value (.077).

H4: Inventory control has a positive and significant effect on operational performance.

As inventory control increase by one unit, all other variables are constant at their value; there is a predicted increase of 1.737 in the Log odds of being in a higher category on operational performance. This implies that, inventory control practice has a positive and significant effect on OP at (B= 1.737 and p= .000). Therefore, the alternative hypothesis was accepted. This finding is supported by (Hussein et al., 2018) the coefficients result indicates that (performance of commercial state corporations 12.908 + 0.882 inventory control. Therefore, the authors conclude that the t-value for Inventory Control (6.667 > 1.96) has a significant level of 0.000 thus the value is less than 0.05. Therefore, the research question was concluded that inventory

control has a significant positive impact on the performance of the commercial state corporations in Kenya. This finding is evidenced from review literature related to the supervision of storage, supply, and accessibility of items to ensure an adequate supply without excessive oversupply is an important activity of inventory control (Miller, 2010).

4. Discussion

From descriptive statistics shows that IC has the highest the mean value with the standard deviation (M=3.39, SD= 648) followed by JIT (M=3.38, SD= 586), EOQ (M= 3.37, SD= 687), and ABC (M=3.18, SD= 696) respectively. All these inventory management practices such as IC, JIT, EOQ, and ABC can affect the OP of mineral water factories in DDCA.

The study established that IC has the highest correlation coefficient value (r= 0.636) followed by JIT with the correlation coefficient (r= 0.562), ABC with the correlation coefficient (r= 0.503), and EOQ with the correlation coefficient (r= 0.471). This implies that there is a positive relationship between inventory management practices and the operational performance of mineral water factories of DDCA.

From regression, analysis result indicates that IC with the beta value (1.737) followed by ABC with the beta value (1.562), JIT has the highest effect on operation performance with the beta value (1.273), and EOQ with beta value with the beta value (.529).

From hypotheses tests show that ABC, JIT, and IC have a positive and significant effect on operational performance but, the EOQ has a positive and insignificant effect on the operational performance. The general objective of the study was to examine the effect of inventory management practices on operational performance a case study of mineral water factories in DDCA by using variables ABC, JIT, EOQ, and IC. The researcher has formulated basic research questions based on the specific objectives that were to be answered through the investigation of the study. Therefore, the summary of the discussion was presented as follows.

The result of the study shows that ABC has a positive and significant effect on OP. This finding is supported by (Ranjan et al., 2019) that stated that the IMP is close to 0.113 or 11.3%, which implies that ABC has a positive and significant participation in determining dependent variables that mean production performance. This finding well goes with the evidence from the literature review related to ABC is the well-accepted techniques that are used for large

manufacturing for efficient control of the greater amount of stock (Hatefi et al., 2014, and Adeyemi, and Salami, 2010).

Additionally, the result of the study shows that JIT has a positive and significant effect on OP. The result of the study similar to (Mulandi, and, Ismail, 2019) that stated the just-in-time system has a positive and significant effect on the performance of commercial state corporations, and most organizations today have embraced the JIT system in the management of their inventories possibly because of its ability to eliminate waste. Similarly, the result of the study is evidenced from a literature review and supported by (Farzaneh, 2012) concludes JIT from a mathematic model view that JIT can eliminate the storage, capital, insurance, ordering, and transportation costs that depend on a certain condition.

The result of the study revealed that the EOQ has a positive and insignificant op operational performance. In essence, in water factories, EOQ is not effectively practiced as compared to other variables that are included in this study with relation to mean value and regression analysis. Therefore, the company should give attention to this practice and find out the means to improve the OP of the company. This finding is consistent with (Efiok et al., 2017) conclusion that the majority of the sample manufacturing companies were either aware of the existing inventory models were or ready to adopt simply to guide their inventory management practices. On the other hand, some firms who were aware of models complain about the practical complexities of EOQ, but others feel that the models were not relevant to their present inventory needs. The general assumption among participating flour manufacturing companies that are the practicability of the inventory models seems not to portray the daily economic realities and inventory problems that confront them. Therefore, to conclude that the existing inventory models have not gained wider acceptability and popularity among flour milling companies in Nigeria.

Lastly, the result of the study shows that IC has a positive and significant effect on OP. The result of this study is similar to (Mulei, and Were, 2017) the finding revealed that inventory control helped the ministry achieve maximum performance of service delivery and the regression analysis revealed that inventory control had a positive significant effect on the performance of the education sector in Kenya. This finding is evidenced from review literature related to the supervision of storage, supply, and accessibility of items to ensure an adequate supply without excessive oversupply is an important activity of inventory control (Miller, 2010).

5. Conclusions and recommendation of the Study

5.1. Conclusion

From the descriptive statistics, it can be understood that the dimensions of IMPs such as ABC, JIT, EOQ, and IC in mineral water factories in DDCA achieved a composite mean score above the average. This implies that the feeling of the respondents related to IMP currently in the company is relatively good. In addition to the mean result, the correlation analysis shows that IC has the highest correlation coefficient followed by JIT, ABC, and EOQ. This implies that ABC, JIT, and IC have a positive and strong relationship with OP, while the EOQ has a positive and moderate relationship with operational performance. From the regression analysis, ABC, JIT, and IC have a positive and significant effect on OP, while EOQ has a positive and insignificant effect on OP. Finally, the evaluation of the hypotheses test of each independent variable of parameter estimate analysis shows that IC has the highest effect on OP with the beta value followed by ABC, JIT, and EOQ.

5.2. Recommendation

Based on the findings, inventory management practices were relatively good and moderately practiced in mineral water factories. But, the mean score of activity-based cost practice were low as compared to other variables like economic order quantity, just-in-time, and inventory control. Therefore, the mineral water factories should give attention on activity-based cost practice and find out the means in order to improve operational performance of the manufacturing firms. From the finding shows that economic order quantity has a positive and insignificant effect on operational performance. Therefore, the company should give attention on economic order quantity practice to improving the appropriateness of this practice in the companies. In addition to this, inventory control has the highest mean value or has the highest percentage of contribution to operational performance with compared to other variables, Due to this fact the mineral water factories should give more emphasis for this practice because it was affecting the companies operational performance more than the rest of inventory management practices.

Competing Interests

The authors declare that there is no competing interest.

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