Effect of Inventory Management on Financial Performance of Manufacturing Firms in Rwanda, A Case Study of Bralirwa

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Abstract: *The manufacturing firms generally apply numerous and various inventories management techniques. Any choice of management practices to be adopted may have a significant impact on organizational level of its financial performance in terms of profitability. Manufacturing firms that efficiently apply these practices have an excellent financial performance. The study was conducted in BRALIRWA Ltd Company for the period 2013-2016. The purpose of the study is to examine the impact of inventory management on the financial performance of manufacturing firms in Rwanda. Specific objective was to examine the effects of lean inventory management system, information technology, lead time, and demand and supply on financial performance of BRALIRWA Ltd. The researcher adopted descriptive research design. Questionnaires were addressed to a group of respondents which were selected from among the staffs, and analyzing audited financial statements and other affordable financial reports to get meaningful results to the study. The data was analyzed using SPSS for Descriptive statistics to test the impact of inventory management practices and Correlation analysis was used to determine the nature and magnitude of the relationship among inventory management variables, and regression analysis. The findings indicated that there is a strong relation between lean inventory management systems, information technology, lead time and supply demand on the financial performance of manufacturing company this shown with a correlation of ; 0.621, 0.525, 0.598, 0.698 respectively. The R^2 also indicated 0.815 which implies a variation of 81.5% of performance of BRALIRWA Company with the four independent variables at a confidence level of 95. The study was useful on the scientific level, to the government of Rwanda, to manufacturing firms on the management of inventory. The study also concluded that improved anticipation of future developments in manufacturing firms in Rwanda will improve their performance and new technologies are promising to save costs and thus improving the performance of the manufacturing firms. It is recommended that manufacturing firms consider investing in modern technology and implement EDI.*

Keywords: Inventory Management, Financial Performance, Manufacturing Firms

1. Introduction

Inventory management is pivotal in effective and efficient organization. It is also vital in the control of materials and goods that have to be held (or stored) for later use in the case of production or later exchange activities in the case of services. The principal goal of inventory management involves having to balance the conflicting economics of not wanting to hold too much stock. Inventory problems of too great or too small quantities on hand can cause business failures. If a manufacturer experiences stock-out of a critical inventory item, production halts could result. Moreover, a shopper expects the retailer to carry the item wanted. If an item is not stocked when the customer thinks it should be, the retailer loses a customer not only on that item but also on many other items in the future. The conclusion one might draw is that effective inventory management can make a significant contribution to company's profit as well as increase its return on total assets. It is thus the management of this economics of stockholding, that is appropriately being refers to as inventory management. The reason for greater attention to inventory management is that this figure, for many firms, is the largest item appearing on the asset side of the balance sheet. (Yang et al, 2006) has argued that supply chains have evolved from traditional forecast-driven push to demand- driven pull systems over time, and that postponement is playing an increasingly important role in a supply chain. (Wanke, 2004) states that inventory management approaches are a

"function of product, operational and demand related variables such as delivery time, obsolescence, coefficient of variation of sales and inventory turnover" and that logistics managers are more likely to decentralize inventory in order to stock product close to the customer's facility if the customers demand a reduced delivery time. (Graman, 2006) argued that today, the cost of holding inventory, extensive product proliferation and the risk of obsolescence, especially in rapidly changing markets, make the expense of holding large inventories of finished goods excessive, and that high demand items naturally have safety stock assigned to them but in many organizations there are so many very-low-demand items that keeping any stock of these items is unreasonably expensive, so they argue that companies must now provide good service while maintaining minimal inventories. Therefore, inventory management approaches are essential aspects of any organization. In the earlier years, Inventory Management was treated as a cost Centre, since most of the department was spending money on inventory while Stores was holding huge stock of inventory, blocking money and space, Ramakrishna (2005). However, with the process of liberation and opening up of global economy, there has been a drastic change in the business environment, resulting in manufacturing organizations exposed to intense competition in the market place. Service companies' worldwide has been working out various strategies to face the challenges and to cut down manufacturing costs to remain competitive (Blomqvist, 2006).

Supply chain management is the process of efficiently integrating suppliers, manufacturers, warehouses and stores so that merchandise is produced and distributed in right quantities, to the right locations, and at the right time in order to minimize system wide costs while satisfying service-level requirements. In their tail environment, this process is well known and has been in use for a long time (Fawcett et al, 2009). Certain organizations have managed to streamline their supply chain networks to become industry leaders. The term supply chain management can be conveniently divided into two areas: inventory management and distribution. Besides these two areas there are many other decisions critical to streamlining the process, such as facility location, material procurement and adapting to changes in the system and environment (Rajeev, 2008).

Recent studies have shown that tremendous cost savings and potential revenue can be generated with the enhanced management of distribution and inventory. It was estimated that a company could reduce its total expenses by at least two percent through better inventory management and distribution of finished goods. This represents a percent age of total expenses, not just the amount providers spend on supplies (Schmidt, 2009).

According to RDB, the manufacturing sector in Rwanda is still small but steadily growing at an annual rate of 7%. Several policies and strategies such as the National Industrial Policy and the National Export Strategy have been developed to accelerate industrial and export growth. Hence, basing on the above background, the researcher wishes to carry on with findings on how the inventory management affects the financial performance of manufacturing firms in Rwanda. Thereafter, the findings enabled the researcher to get equipped with knowledge on the study that helped in making conclusions on the issue.

2. Statement of the Problem

In Rwanda to increase local domestic and foreign supply of manufactured goods, the Government has put in place the Special Economic Zone and four Industrial parks in Bugesera, Huye, Nyabihu, and Rusizi to address the short comings in the business environment by developing infrastructure, streamlining business regulations and facilitating fast moving investors, but inventory management was neglected while the most of manufacturing firms are newly settled after being relocated which can effectively affect their profitability. Thereafter, a few studies have been conducted on how various elements of inventory management impact financial performance of manufacturing firms in Rwanda. Modern inventory management in alcohol and soft drinks industry utilize new and more refined techniques that provide for dynamic performance of inventories to maximize customer service with decreased inventory and lower costs. This is therefore prompting the researcher to carry the study on the impact of inventory management on performance of an organization like BRALIRWA Ltd.

3. Objectives of the Study

The general objective of this study is to examine the effect of inventory management on financial performance of manufacturing firms in Rwanda. The study sought to address the following specific objectives:

1) To determine the effect of lean inventory management system on financial performance of BRALIRWA Ltd.
2) To investigate the effect of information technology in inventory management on financial performance of BRALIRWA Ltd.
3) To investigate how inventory replenishment frequency affects the financial performance of BRALIRWA Ltd.
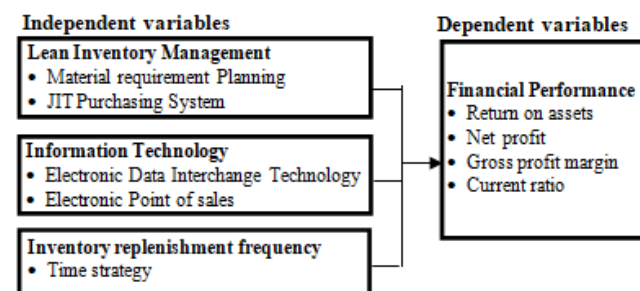
4. Conceptual Framework

Figure 1: Conceptual Framework

5. Methodology

- **Research Design**: This study applied both descriptive as well as quantitative research design
- **Target Population**: The population of interest in this research constituted BRALIRWA staffs. In line with this, the target population was 130 employees of BRALIRWA working in accounting, finance, logistics, and procurement departments, added on distributors.
- **Sample Size:** The researcher calculated the sample from the study population and come up with a sample size of 98 respondents.
- **Data Collection Instruments:** The primary data were collected through structured interviews and self - administered questionnaires.

6. Research findings

6.1 Demographic Information

The study sought to investigate the demographic information of the respondents. These data were important in ascertaining the background of the respondents and how they contribute to influence the objectives of the study. Demographic findings therefore presented in this section and they included; gender and age, education level, average monthly income category of enterprise and respondents main source of information about the investment market.

6.1.1 Distribution of Gender of respondents
The study sought to determine the distribution of gender among the study samples. The study findings revealed that majority (60%) of the study participants were female while male participants constituted 40 % of the study sample as indicated by figure 2.
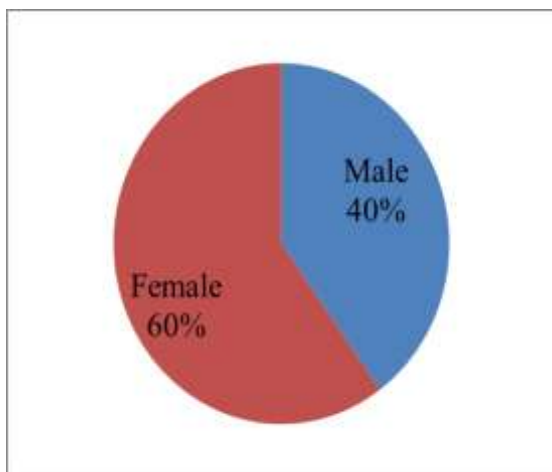
Figure 2: Gender distribution

6.1.2 Age of respondent

The study further sought to establish the distribution of age of the respondents. Data collected under age were presented in the table 1. Table 1 indicates that majority 52% of the respondents were aged between 31-40years, 25% of the respondents were aged below 30years, and 23% of the respondents were aged between 41-50 years.

Table 1: Age distribution of Respondents

Age Group	Frequency	Percent (%)
<30 years	5	7
31-40 years	45	64
41-50	20	29
Total	70	100.0

6.1.3 Level of Education

The study sought to determine the education level of BRALIRWA employees who participated in the study.
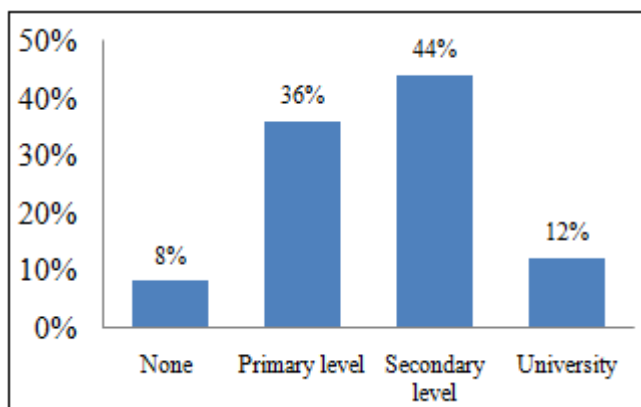

Figure 3: Distribution of Education level

Figure 3 indicates that 44% of the respondents had secondary level of education, 36% has primary level education, and 12% had attained university education level while 8% did not have any formal education.

6.1.4 Formal training in ICT

Analysis of data regarding respondents having received any formal training on ICT is indicated in table 2. The majority (62%) of the respondents reported having been

formally trained on ICT applications while 38% indicated they had not received formal training on ICT. This means that majority of the respondents have the relevant system knowledge to handle lean inventory management system.

Table 2: Formal training in ICT

	Frequency	Percentage (%)
Yes	33	38
No	53	62
Total	86	100

6.2 Effect of lean inventory management system on financial performance of BRALIRWA Ltd

The study sought to determine effect of lean inventory management system on financial performance of BRALIRWA Ltd. The following findings have been presented in order of inventory management practices, financial performance and correction analysis. Presentation and analysis of data on Inventory management practices has been based on the likert scale in the range 1-4; where:1 = The practice is not used at all, 2 = the practice is used to a small extent, 3 = The practice is used to some extent, 4= the practice is used to a great extent.Table3presentsmanagerialopinionontheextentofuseof the practice of lean inventory system in their firms. The major determinants in Lean Inventory System are Materials Requirement Planning, with 34% of the respondents strongly agreed with the statement 53% just agreed while 19% disagreed with the statement, accurate prediction of vendor delivery dates, majority (67%) of the respondents strongly agreed with the statement, 9% just agreed while 13% disagreed and agreements with suppliers for short cycle deliveries with 51% of the respondents strongly agreed with the statement, 33% just agreed with the statement while 16% disagreed. MRP is the most widely used system because all manufacturing firms have to prepare master production schedules, with accurate bills of materials which are key element in MRP system. Other parameters considered to be important determinants of Lean Inventory system include little or no expediting with Majority (69%) of the respondents strongly agreed with the statement, 19% just agreed while 11% disagreed and operation of JIT purchasing system with Majority (69%) of the respondents strongly agreed with the statement 19% just agreed while 12% disagreed. In general based on the results, Lean inventory system takes a 63% showing that BRALIRWA Company has employed Lean Inventory systems to some extent.

Table 3: Effect of lean inventory management systems on financial performance of BRALIRWA Ltd

Statement	4	3	2
Operation of JIT purchasing system where no safety stocks are kept	20(34%)	37(53%)	13(19%)
Agreements with supplier for short cycle Deliveries	44(62%)	18(26%)	8(12%)
Accurate prediction of vendor delivery dates	45(76%)	8(9%)	17(15%)
Operation of materials Requirements planning system (MRP) – where bills of materials are 100%accurate	48(60%)	19(34%)	3(6%)
Little or no expediting	45(69%)	13(19%)	10(12%)

Correlation between effects of lean inventory management system on financial performance of BRALIRWA Ltd

Table 4 below indicates that there was a significant relationship between lean inventory management system and financial performance (R=.621, P< 0.01). This implies that availing the company with necessary Lean inventory management system would improve the financial performance of the company by improving the quality process. The findings concur with Ma & Tang, (2001), who argued that Management Systems helps to develop quality process based reviews for process improvements that reduce process variability and aim for "zero defect". Inventory Management Systems facilitates resource integration and decision making through cross-functional teams that improve efficiency and effectiveness. One way to improve operations is to set up automated inventory tracking from the time you accept merchandise at the receiving dock or factory floor to the sale of your goods.

Table 4: Correlation between effects of lean inventory management system on financial performance of BRALIRWA Ltd

		Financial performance	Lean inventory Management system
Financial performance	Pearson Correlation	1	
	Sig. (2-tailed)		
	N	70	
Lean inventory management system	Pearson Correlation	.621**	1
	Sig. (2-tailed)	.001	
	N	70	70
**. Correlation is significant at the 0.01 level (2-tailed).			

6.3 Effect of information technology in inventory management on financial performance of BRALIRWA

The study sought to determine the effect of information technology in inventory management on financial performance of BRALIRWA Ltd. Table 5 shows the degree to which BRALIRWA company apply information technology in inventory management. It is clear that the entire firm has computerized their systems, with 38% of the respondents agreed while 20% strongly agreed with the statement. Computers can aid in stock control by setting stock control levels and calculating the amount of stocks to hold and dispatch. Linking firms computers with those of suppliers in a Real Time environment with56% of the respondents agreed with the statement, 36% strongly agreed while 8% disagreed and use of EDI technology with34% agreed while 10% strongly agreed with the statement are also considered important in information technology. The remaining parameter mean for technology is2.75, showing that BRALIRWA company has to some extent adopted information technology in their inventory management activities.

Table 5: Effect of information technology in inventory management on financial performance of BRALIRWA Ltd

	Strongly agree	Agree	Disagree
The firm has computerized all inventory management systems	17(20%)	33(38%)	36(42%)
The firm's computers are linked with those of suppliers in a real time environment	13(15%)		73(85%)
The firm uses Electronic Data Interchange Technology(EDI)	31(36%)	48(56%)	7(8%)
The firm uses Electronic Point of sale (EPOS)	9(10%)	29(34%)	48(56%)

Table 6: Correlation between effects of information technology on inventory management on financial performance of BRALIRWA Ltd

		Financial performance	Information technology in inventory management
Financial performance	Pearson Correlation	1	
	Sig. (2-tailed)		
	N	86	
Information technology in inventory management	Pearson Correlation	.525**	1
	Sig. (2-tailed)	.001	
	N	86	86
**. Correlation is significant at the 0.01 level (2-tailed).			

Table 6 indicate that there was a significant relationship between Information technology in inventory management and Financial performance (r =.525, p<0.01). This implies that when the company adopts relevant information technology facilities and trainings in inventory management this would lead to improved financial performance by the company. The findings conform to Carter and Price (1995) asserts that information is the life blood of all organizations. Inventory manager needs information technology in order to succeed in his work. Computers can assist stock control in calculating the optimum amount of stocks to hold and dispatch in order to satisfy the users requirements. The computer can do this by comparing inventory variables (stock levels, demand and delivery dates).The Electronic Data interchange, EDI is a system which enables direct communication between organizations without there being any human intervention. This technology has revolutionized inventory managementEffect of lead time affects the financial performance of BRALIRWA Ltd. The study sought to determine the effect of lead time affects the financial performance of BRALIRWA Ltd.

6.4 Effect of inventory replenishment frequency on financial performance of BRALIRWA Ltd

Table 7 indicates that 73% of the study participants felt that favourable and well-known time strategy affects the

profitability of organization to a very large extent. Also, 63% indicated that Creation of value affect the profitability. Further, 77% of the study participants felt that Improvement in continuity of supplies and lead time can be used as a filter in terms of a consumer's perception of quality. The study found out that favourable and well-known time strategy affects the profitability of organization to a very large extent; and that also they strongly agreed that creation of value affect the profitability of BRALIRWA Company. The study further showed that improvement in continuity of supplies and lead time can be used as a filter in terms of a consumer's perception of quality which in turn affects the profitability of the company to a large extent. The findings were in collaboration with Dimitrios (2008) who argued that Cycle-time reduction almost always means reduced costs, reduced inventory levels, improved production predictability, increased customer service, and better quality. To reduce cycle time, manufacturers need to streamline every aspect of their operations, especially the order-to-delivery process.

Table 7: Effect of inventory replenishment frequency on financial performance of BRALIRWA Ltd

Items	Yes %	No %
Favourable and well-known time strategy affects the profitability of organization to a very large extent	63(73%)	33(27%)
Creation of value affect the profitability	56(65%)	30(35%)
Improvement in continuity of supplies and lead time can be used as a filter in terms of a consumer's perception of quality	66(77%)	22(23%)

Table 8: Correlation between inventory replenishment and financial performance of BRALIRWA Ltd

Table 8 indicate that financial performance is significantly correlated to inventory replenishment (r=0.698, p<0.01).

		Financial performance	lead time
Financial performance	Pearson Correlation	1	
	Sig. (2-tailed)		
	N	70	
lead time	Pearson Correlation	.698**	1
	Sig. (2-tailed)	.000	
	N	70	70
**. Correlation is significant at the 0.01 level (2-tailed).			

6.5: Regression Analysis

A linear multiple regression analysis was used test the relationship between the four independent variables (lean inventory management systems, information technology, lead time and supplier demands)and the dependent variable; organizational performance. Statistical Package for Social Sciences (SPSS) was applied to code, enter and compute the measurements of the multiple regressions for the study. Coefficient of determination explains the extent to which changes in the financial performance of manufacturing firms can be explained by

the change in the independent variables (lean inventory management systems, information technology, and lead-time).

Table 9: Model Summary
According to the findings in the table below, the value of adjusted R^2 is 0.815. This indicates that a variation of 81.5% of performance of BRALIRWA company the four independent variables at a confidence level of 95.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.853[a]	.815	.807	12.63
a. Predictors: (Constant), (lean inventory management systems, information technology, and lead-time)				

Table 4.10: ANOVA[a]

The significance value is 0.000 which is less than 0.05 thus the model is statistically significant in predicting how the independent variables (lean inventory management systems, information technology, lead-time and supplier demands) on the dependent variable (financial performance of BRALIRWA company). The F critical at 5% level of significance was 2.56. The F calculated (value=5.69) was greater than the critical value (3.567>2.56) an indication that the independent variables (lean inventory management systems, information technology, lead-time and supplier demands) affect the organizational performance with reference to the BRALIRWA company.

	Model	Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	3.254	3	.751	5.690	.000[b]
	Residual	17.843	120	.132		
	Total	21.097	123			
a. Dependent Variable: Financial performance						
b. Predictors: (lean inventory management systems, information technology, and inventory replenishment frequency).						

Table 11: Coefficients[a]

The study adopted the following regression model
$$Y' = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + e$$
Fitting the coefficients to the model, the following regression equation was generated;

Y = 0.415 + 0.250 (Lean Inventory Management System) + 0.128 (information technology) + 0.184 (Lead time) +0.091 (Supply demands).

Model	Unstandardized Coefficients		Standardized Coefficients		Sig.
	B	Std. Error	Beta		
(Constant)	.415	.177		2.688	.008
Lean Inventory Management System	.250	.070	.166	1.861	.015
Information Technology	.128	.097	.096	1.112	.026
Lead time	.184	.070	.236	2.615	.010
Demand and supply	.091	.070	.237	1.113	0.15
a. Dependent Variable: Financial Performance					

7.Conclusions and Recommendations of the study

7.1 Conclusions

The study concluded that cost reduction is necessary for implementation of inventory management for performance of manufacturing firms also holding stocks and ordering costs may increase the performance of an organization. Cost reduction helps in preparing employees towards managing the inventory ideology and equips organization with sufficient resources and that inventory cost reduction helps in achieving profitability objective. The study also concluded that improved anticipation of future developments in manufacturing firms in Rwanda will improve their performance and new technologies are promising to save costs and thus improving the performance of the manufacturing firms. The study further concluded that Inventory Management System is a competitive tool in the organization for realizing its corporate competitive strategy; information sharing and a channels relationship affect the performance of the manufacturing firms and enhance productivity.

7.2 Recommendations

It is recommended that manufacturing firms should develop a policy framework to facilitate faster implementation of the best inventory management practices such as JIT and MRP. It is also recommended that manufacturing firms consider investing in modern technology and implement EDI. This will reduce inventory costs and improve returns.

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