

Full Length Research Paper

An assessment of just in time system on the financial performance of manufacturing firms in Nigeria

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Received 3 November, 2018; Accepted 6 February, 2019

The study examines the effect of Just-in-time on the financial performance of manufacturing organizations in Nigeria. The purpose of the research work is to determine the effect of application of just in time on cost reduction and return on investment of manufacturing firms in Nigeria. Primary data were collected through a self administered questionnaire on knowledgeable sample of employees selected to test the strength of model specified and hypotheses formulated on JIT and financial performance of manufacturing firms. Analysis was carried out using Multiple Regression model and findings revealed that 39.4 and 16.3% variations in cost reduction and returns on investment are due to the impact of JIT as explained by the predictor variables combined. This implies that JIT has contributed positively to the financial performance of manufacturing firms in Nigeria and manufacturers will benefit immensely from its adaptation. The study concludes that each of the cost components employed to measure the effect of JIT on cost reduction and returns on company's investment shows appreciable level of significance. The study therefore recommends the manufacturing firms should adopt JIT in cutting their production costs in order to achieve enhanced efficiency and eliminate waste to the barest minimum from the entire supply chain.

Key words: Just-in-time, financial performance, manufacturing, cost reduction.

INTRODUCTION

Organizational management is faced with inventory management problems continuously due to a lot of funds/capital tied down in it for production processes. Because of competition due to dynamic nature of global market, only firms that can adopt new strategies which help companies in delivering quality products at lowest prices in achieving their objectives can survive /or nowadays, survival of organizations depends largely on adoption of new strategies that can help companies in delivering quality products at competitive prices in

achieving their objectives. Therefore, improved performance of organizations depends on costs cutting, high level of productivity, guaranteed quality which helps in satisfying customer's requirements or taste (Raouf, 1994).

Management nowadays tried as much as possible to lower their production costs while improving on their product quality. This is achieved by adopting new manufacturing strategies like Just in Time (JIT), International Standards Organization (ISO), Total Quality

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Management (TQM) etc that have emerged at the last quarter of 20th century which have helped operations at reduced costs (Dreyfus et al., 2004).

The most important strategy which has been so effective and efficient in manufacturing operations in reducing product costs, improved product quality, increased productivity, and reducing wastage to the barest minimum is Just in Time (JIT) (Mazanai, 2012). It is an approach or a strategy that originated/developed in Japan in the '50s and subsequently adopted instantly by Toyota and other manufacturing firms in Japan which has helped in increasing productivity level while eliminating waste to the barest minimum (Kaneko and Nojiri, 2008).

The concept of Just in Time advocates the reduction of waste by making production process easier than ever before. It also helps in reducing excessive inventories during operations which leads to efficient uses of resources (Kannan and Tan, 2005). Previous studies have shown that Just in Time manufacturing system is a relatively new concept in Nigeria (Adeyemi, 2000). Obamiro (2009) further stressed that, to achieve a strong economy and world class competitiveness, Nigerian firms have focused on Japanese techniques in particular, Just in Time (JIT) manufacturing systems.

Performance is a key means of measuring firms, what they do, and how their immediate environments affect them. Though several scholars and researchers have written on the concept performance in academic literature, there have not been a consensus and acceptable definition despite many definitions from these scholars (Gavrea et al., 2011). Damanpour et al. (2009) opines that firm's performance covers three major areas; (a) Financial performance (profits, return on assets, return on investment, etc.....); (b) Performance according to product market (total sales/turnover, the share of the market/market share, etc.....); and (c) Return on shareholders' funds (total return on shareholders' fund, value added, etc.....). However, this study adopted financial performance as a variable.

The present economic situation in the country has forced many manufacturing firms to close shops due to high cost of production especially inventory related costs like ordering costs, inventory cost, stock-out costs, and most especially carrying/holding costs thereby having adverse or negative effect on return on investment, cost reduction and quality of products manufactured. According to Singh and Ahuja (2012), excessive investment on inventory jacked-up production costs and thereby reduces profits (ROI) of a manufacturing firm. In essence, firms should control their investment on inventory in order to reduce production costs and therefore increase profits.

It has been observed that due to problems of pilferage, evaporation, obsolescence, and deterioration in the quality of inventory (raw materials and work in progress) while in the store awaiting production, the quality of finished product and reliability of production facilities is

adversely affected thereby lowering the quality of production. Equally, keeping of finished products in store for too long leads to deterioration in product quality, increased obsolescence, waste and unreliable performance.

The question therefore arises; can this system be applied by manufacturing firms in Nigeria? What effects does JIT system have on ROI, reduction in production costs, and quality of products produced in Nigeria? Proffering solutions which answered above questions through research is the reason for this study.

Objectives of the study

The main objective of this research work was to evaluate effects of Just-in-Time on the financial performance of manufacturing firms in Nigeria. However, the following specific objectives will guide the study;

- i) To examine the effect of application of Just-In-Time on cost reduction in manufacturing firms.
- ii) To determine the effect of application of Just-In-Time on Return on Investment in manufacturing firms.

Significance of the study

This research work shall provide to both researchers and non researchers, to investors, customers and entire public the implications of just in time as strategic option available to improve organizational performance in manufacturing firms in Nigeria.

It will also serve as source of reference for researchers and students of management sciences on the meaning and the impact of just in time on provision for purchasing of consumable in manufacturing sector and its effects on industry's performance.

Scope of the study

This research work analyzes the effect of Just –In-Time system on the financial performance of manufacturing organizations in Nigeria. The work focuses on the senior staff personnel of accounting, costing, inventory, and production units of the company. The choice is based on their knowledge of the effect of JIT on the organization performance.

LITERATURE REVIEW

Conceptual review

According to Akbar et al. (2013), Just in Time is Japanese developed concept and has been put into use by many firms in Japan since early '70s. Perfection of the concept was further proved in Toyota plants by Talichi

Ohno as a way of enhancing consumer's request (Goddard, 1986). Concepts like Just-in-Time (JIT), Total Quality Management (TQM), Business Process Re-engineering, Management by Objectives (MBO), Job Enrichment, Empowerment and Downsizing are functions of management used at increasing organization's performance. Ohno (1982) sees Just in Time as a term which guaranteed the right spare at appropriate time, at right quantity when the organization is in operation.

Just in Time is a concept that helps to manufacture and deliver finished goods (Schonberger and Gilbert, 1983). JIT to be delivered, sub assemblies JIT to be assembled into final products, fabricated parts JIT to go into the sub-assemblies and sourced materials JIT to be converted into fabricated parts. Pillai (2010) believes that careful management of inventory will help in lowering costs. It was discovered in a study carried out by Adeyemi (2010) that Just in Time concept can help lowering costs and improve products quality in Nigeria environment. Wafa and Yasin (1998) corroborated other studies that Just in Time helps continuously in achieving organization's objectives by eradicating waste and increase output. In the manufacturing process, Just in Time assures that production costs are controlled by making sure that only quality products/parts are produced, in the right quantity, at the required time and where it is required using lower materials, equipment and human capital.

Broyles et al. (2005) opine that Just in Time has stood out for years by improving the organization's working conditions especially their procurement procedures. It has changed the competition in the global business environment from organization to organization to supply chain and supply chain. Companies and businesses affect our daily activities and lives, hence, successful businesses are a key to a nation's economic development. According to Gavrea et al. (2011), many researchers see firms and institutions as the engine room for economic, social and political development of a nation. Therefore, organizational performance achievement is an important index in measuring a firm's behaviour. Continuous performance is the objective of a firm's because it is through it that growth and survival can be sustained for a very long time (Gavrea et al., 2011).

However, Lebas and Euske (2005) see performance as an indicator of financial and non-financial used in getting information on the achievement of goals in an organization. Though, organizations remain in business for profit; however, there are various functions that firms performed which are affected by non-financial operations. Therefore, measuring performance can be viewed from both financial and non-financial indicators (Wruck and Jensen, 1998). Many scholars have empirically written on Just in Time concept and its effects on organizational achievements. Sakakibara et al. (1993) write on framework and measuring indicators for Just in Time based on sixteen main practices. Callen et al. (2000) opine that Just in Time production at the level of

operation is associated with higher output, reduced operational costs and increase in returns. Ahmad et al. (2002) investigated infrastructural performances in making adoption of Just in Time more effective using three perspectives; universal, contingency and configurationally and gave report of synergetic effect between Just in Time and infrastructural needs necessary to achieve higher firm's competitiveness.

Since the '70s, quality based competition has grown and brings about more interest, concern and happiness. Firms are more concern about product quality improvement so as to stay competitive in the global marketplace (Mahesh, 2016). The major aspect of product quality of any organization is the ability to grant all expectations of stakeholders and get value for it (Sanner and Wijkman, 2005). In essence, studies which are based on quality are measured using ISO index standards. According to Mahesh (2016), excellent quality product is now the benchmark for business survival; therefore, organizations that cannot guarantee quality products cannot survive any longer. He stressed further that the introduction of another concept called Total Quality Management (TQM) has brought about development in managerial concept. Total Quality Management (TQM) particularly is about making sure that quality production process is adhered to rather than checking for poor quality products after manufacturing process. According to him, companies that are successful understood serious effects of quality products on business growth, development and survival. Hence, many serious organizations that want to stay competitive maintain and increase their product quality standard continually.

As observed by Botchkarev and Andru (2011), Return on Investment (ROI) happened to be the most accepted measuring index applied in business analysis. Some years back, ROI was assumed to be a term in finance used in critical and figurative analysis of financial returns and costs (Botchkarev and Andru, 2011). Nowadays, however, Return on Investment (ROI) is been adopted and unanimously applied in finance by both the private and public sectors. They further opined that ROI is used in measuring and determining the effectiveness of an investment opportunity or to rank a number of investment opportunities. To evaluate Return on Investment (ROI), it is simply dividing the benefit (that is return) by the investment's cost outlay; the outcome is always in ratio or percentage.

Empirical review

Obamiro (2009) explored the extent of relationship between Just in Time and a firm's achievement in terms of performance of a selected number of firms in Nigeria environment using primary data collected through a self administered questionnaires of 300 knowledgeable staff

to test models specified and hypotheses formulated. The three hypotheses were tested using bivariate correlation technique and findings revealed that; there exists a significant relationship between Total Quality Management (TQM) and Just in Time; that human resources management was also positively related to Just in Time; and there was also a positive significant relationship between Just in Time and a firm's performance.

Adeyemi (2010) examined the extent to which Just in Time has helped manufacturing firms in developing economies like Nigeria using primary data collected through administered questionnaires on firms to know whether they have adopted Just in Time or not, the kind of Just in Time Production system adopted, and the gains accrued from its adoption. The results show that bigger and financially strong or buoyant firms adopt Just in Time than relatively smaller firms who are yet to have enough facts about the concept and benefits derivable from its adoption. Some factors were identified as militating against its adoption and the study therefore recommended that successful implementation of Just in Time are benchmarked on some factors like management commitment, ability to respond quickly to market tastes and needs for education and communication on the need for adoption of Just in Time based on its benefits.

He further recommended that world is now a global village and therefore, Nigerian firms cannot be lagging behind, hence, the need for complete adoption of Just in Time by firms in Nigeria in order to compete favourably with overseas suppliers and diversify their excess inventory ordered from abroad to produce or bring up new ideas and products. Also, the study however recommends workshops and seminars in reeling out necessary information on Just in Time to management of organizations yet to adopt it, so that they can be well informed and embrace the concept for the benefit of those firms and the economy at large.

Mazanai (2012) investigated the impact of Just in Time on efficiency, product quality and flexibility among production outfit, small and medium scale companies in South Africa using primary data collected from 82 questionnaires administered in the food, wood and furniture, metals, non-metals firms. Analysis was conducted using Spearman Correlation Coefficient technique and results of the study showed that most manufacturing firms among small and medium enterprises were not adopting Just in Time and it was further discovered that some factors are responsible for non-application of Just in Time by SMEs which include among others; lack of reliable supplier network, lack of adequate capital, and lack of information on gains accruable from adoption of Just in Time. It was however recommended that small and medium firms should be updated with information about Just in Time, how to adopt it, and benefits derivable from its adoption.

Melek and Fikri (2008) carried out an empirical

investigation on effects of Just in Time production and Total Quality Management (TQM) using primary data sourced from 122 production outfits from Turkey in 2005. Analysis of data collected was conducted using Multi-correlation and Multinomial Logistic Regression and findings revealed that there exists a linear relationship between using multidimensional performance index and those outfits that adopted Just in Time and Total Quality Management (TQM) than those that did not adopt the said concepts. It was therefore recommended that some elements defining the new production environment are the contingent attribute variables directed along the achievement measurement and knowing types of achievement measurement system.

Keitany and Riwo-Abudho (2014) examined effects of Lean production on organizational performance using flour producing companies in Kenya as their case study. Primary data were collected from a sample of 10 respondents selected through random sampling out of 42 target population and analyzed using descriptive statistic. The study identified some problems of applying Lean production system in order to reduce waste to the barest minimum. The study however recommended that as Lean production system is fully integrated management philosophy, the issue of improving on it on a continuous basis should be equally given to those functional areas of the firm which complements production operations. In essence, all functional areas of organization should be made to know their role in the Lean application and transformation process and this can be achieved through establishing a good interaction between internal customers and suppliers. Also, the top level management should encourage and back up with better leadership approach in order for the firm to benefit from it.

Qureshi et al. (2013) empirically examined elements involved in incorporating and adopting Just in Time management in cement industry of Pakistan using primary data sourced from four hundred operations managers of cement industry to elicit information about benefits cement industry have derived through adoption of Just in Time. Factor analysis was employed in investigating the relationship between the parameters linear functions and findings reveal that incorporating elements of Just in Time into their production process improves the competitiveness of cement industry considerably in Pakistan. Though the research realized the fact that incorporating Just in Time elements into the production processes faced some problems, findings suggested that product quality design, quality control, and management of stock effectively, planning of production processes and chain of product supply can help to solve those problems identified.

Theoretical Framework

The theoretical foundation of this study is rooted in the

Theory of Constraint (TOC) propounded by Goldratt and Cox (1992) in their publication on the title, 'The Goal' that was aimed at helping firms attain their organizational objectives repeatedly. The theory is an administrative or organizational criterion or model that sees any possible or achievable structure as being restricted in attaining most of its objectives by some problems. Their view was that there exists consistently a problem or factor militating against a firm's objectives and TOC developed a fascinated procedures in identifying the problem and reconstituting the other functional areas of organization around it. The TOC makes use of a familiar term "a chain is no stronger than its weakest link", meaning that procedures, operations, firms etc..... are endangered as a result of fragile and delicate person or segment that can consistently harm or smash them harmfully.

TOC is premised on the belief that firms can be evaluated and administered or manage by three different indices; throughput, operational expense, and inventory. The theory of constraint therefore supports this study in that it is relevant in the evaluating of how Just in Time affects financial performance of manufacturing firms because it helps to identify the constraint (inventory) and thereby restructuring the organization around the constraint.

METHODOLOGY

Research design

This research adopts survey method. 99 questionnaire items were distributed to a sample selected from the target population out of which 81 were returned and analyzed accordingly from which conclusions were drawn. Therefore, the response rate was 81.82% which is very acceptable for such research.

Population of the study/ sample size

The target study's population is the entire staff strength of selected units of Unilever Plc that work closely with inventory related activities. The sample size selected was by purposive sampling techniques in the inventory related division.

Sources of data

Adopted data for this research was sourced through the administration of questionnaires on personnel in store, production, purchasing and accounts departments totaling 99 out of which 81 were returned for analyses.

Research variables

Research variables in this study are the JIT and the financial performance. The study is testing the effect of JIT (independent variables) on the financial performance (dependent variables) in manufacturing firms in Nigeria.

Model/ analytical method

The analytical technique employed in this research is regression

analysis. The Classical Linear Regression Model (CLRM) can be written in terms of the k-variable Population Regression Function (PRF) model involving the dependent variable Y and k-1 explanatory variables X_2, X_3, \dots, X_k as:

$$Y_i = \beta_1 + \beta_2 X_{2i} + \beta_3 X_{3i} + \dots + \beta_k X_{ki} + u_i, \quad (1)$$

$$i = 1, 2, 3, \dots, n$$

Where, β_1 = the intercept, β_2 to β_k = partial slope coefficients, u = stochastic disturbance term, and

i = i^{th} observation, n being the size of the population.

This equation identifies k-1 explanatory variables (regressors) namely X_1, X_2, \dots, X_k and a constant term that is taken to influence the dependent variable. The essence of regression in econometrics is to generalize for the population from what we get from the sample.

Also considered along with regression analysis technique are the associated validity tests such as:

1) Coefficient of determination (R^2) measures the success of the regression in predicting the variation in the values of the dependent variable within the sample.

$$R^2 = 1 - \frac{SSE}{SST} \quad (2)$$

2) The adjusted R^2 (\bar{R}^2) penalizes R^2 for the addition of regressors which do not contribute to the explanatory power of the model.

The adjusted R^2 is computed as:

$$\bar{R}^2 = 1 - (1 - R^2) \frac{T-1}{T-K} \quad (3)$$

Where, T = Total sample size and K = Number of predictors....

3) The Akaike information criterion (AIC):

$$AIC = -2l/T + 2K/T \quad (4)$$

Where, l = likelihood of the model T = data likelihood with the given model and K = number of parameters in the model.

The Schwarz criterion (SC) is an alternative to the AIC that imposes a larger penalty for additional coefficients and it is given as:

$$SC = -2l/T + (K \log T)/T \quad (5)$$

Where, l = represents the likelihood of the model tested given the data; T = sample size and K = number of parameters which the model estimates.

F-statistic is a test of the hypothesis which helps in affirming that all of the slope coefficients (excluding the constant or intercept) in a regression are zero.

$$F = \frac{R^2/(K-1)}{(1-R^2)/T-K} \quad (6)$$

Model specification

For the purpose of this research, our response variable shall be represented by information of question 16, while the predictors are designated by questions 1 to 15 for the three models proposed for

Table 1. Variables entered/removed^a.

Model	Variables entered	Variables removed	Method
1	Cost Reduction (CR), Carrying/Holding Cost (HC), Ordering Cost (OC), Stockout Cost (SOC) ^b	.	Enter

^aDependent Variable: JIT benefit; b. All requested variables entered.

Table 2. Model summary.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.628 ^a	0.394	0.363	0.722

^aPredictors: (Constant); CR, Cost Reduction; HC, Carrying/Holding Cost; OC, Ordering Cost; SOC, Stockout Cost.

Table 3. ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	25.841	4	6.460	12.378	0.000 ^b
	Residual	39.665	76	0.522		
	Total	65.506	80			

^aDependent Variable: JIT benefit.

^bPredictors: (Constant); CR, Cost Reduction; HC, Carrying/Holding Cost; OC, Ordering Cost; SOC, Stockout Cost.

this research. Thus, model 1 becomes,

$$JIT = \alpha + \beta_1 Q1 + \beta_2 Q2 + \beta_3 Q3 + \beta_4 Q4 + \varepsilon \quad (7)$$

Where, $\alpha, \beta_1, \beta_2, \beta_3, \beta_4$ and β_5 are estimable parameters and ε_i = Random Error term which is assumed to be NIID $\sim (0, \sigma^2)$ while Q1, Q2, Q3 and Q4 are research questions that represent the predictor variables ordering cost (OC), holding cost (HC), stock out cost (SOC) and cost reduction (CR), respectively.

Model 2 can be expressed as;

$$JIT = \alpha + \beta_1 Q6 + \beta_2 Q7 + \beta_3 Q8 + \beta_4 Q9 + \beta_5 Q10 + \varepsilon \quad (8)$$

Here, Q6, Q7, Q8 and Q9 and Q10 are research questions representing the predictor variables customer's satisfaction (CS), control of market shares (CSH), returns on capital employed (ROCE), return on investment (ROI) and reduces wastages (RW), respectively.

RESULTS

Data presentation

The results of the analysis carried out on SPSS are depicted in Tables 1 to 8.

Explanation of the first 4 Tables

The intercept of -0.943 represents the estimate for the overall negative effect of JIT on cost reduction in manufacturing industry when all the inventory cost components are kept constants. That is, when the entire inventory cost components are not effective. All the remaining estimates of 0.284, 0.104, 0.515 and 0.142 show a unit improvement towards achieving benefits of JIT in manufacturing organizations based on reduction in ordering cost, holding cost, stock out cost and general cost reduction respectively. The R-squared values of 0.394 imply that only 39.4% of the variation in JIT benefit is jointly explained by the inventory cost components of ordering cost, holding cost, stock out cost and general cost reduction. The overall test of significance for the model is presented by F-statistic result of 12.378 with probability value of 0.0000. This implies that at 5% level of significance, we would reject the null hypothesis of no significance and assumes that the administration of inventory cost component has therefore contributed significantly as a tool for measuring the impact of JIT in manufacturer's cost reduction.

The model specification of Table 1 is written as:

$$JIT\ Benefit = f(OC, HC, SOC, CR) \quad (9)$$

Table 4. Coefficients^a.

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Constant	-0.943	1.355		-0.696	0.489
Ordering Cost (OC)	0.284	0.144	0.186	1.967	0.053
Carrying/Holding Cost (HC)	0.104	0.262	0.036	0.396	0.693
Stockout Cost (SOC)	0.515	0.108	0.471	4.771	0.000
Cost Reduction (CR)	0.220	0.142	0.153	1.549	0.125

^aDependent Variable: JIT benefit.

Table 5. Variables Entered/Removed^a.

Model	Variables Entered	Variables Removed	Method
1	Reduce Wastages (RW), Customer Satisfaction (CS), Returns on Capital employed (ROCE), Control of Market Shares (CSH), Return on Investment (ROI) ^b		Enter

^aDependent Variable: JIT benefit.

^bAll requested variables entered.

The OLS model of this functional relationship is given as:

$$JIT\ Benefit = \alpha + \beta_1(OC) + \beta_2(HC) + \beta_3(SOC) + \beta_4(CR) + \varepsilon_i \tag{10}$$

Substituting the coefficients, we have;

$$JIT\ Benefit = -0.943 + 0.284(OC) + 0.104(HC) + 0.515(SOC) + 0.220(CR) \tag{11}$$

Table 4 specified the OLS model results in respect of objective 1 and the model fitted into the table given as Equation (11) signifies that the overall model fitted is significant at 5% level based on the predictor variables considered in this research. However, it is also observed that only two explanatory variables namely, OC (statistically significant at 10% since Sig. p = 0.053 < α = 10%) and SOC (Statistically significant at 1% since Sig. p = 0.000 < α = 1%). All other variables are not statistically significant (Sig. p > 10%) and therefore must be eliminated from the model.

The final model becomes:

$$JIT\ Benefit = -0.943 + 0.284(OC) + 0.515(SOC) \tag{12}$$

Explanation of the second 4 Tables (Tables 5 – 8)

The intercept of -0.97 represents the estimate for the benefits of JIT in manufacturing industry at constant values of returns on investment. All the remaining estimates of -0.206, 0.828,-0.129, -0.112 and 0.116 show both unit improvement and reduction towards achieving

benefits of JIT on investment returns of manufacturing industry. These factors are customer’s satisfaction, control of market shares, returns on capital employed, and returns on investment and wastages reduction respectively. The R-squared value of 0.163 implies that only 16.3% of the variation in JIT benefits is jointly explained by the company’s returns on investment. The overall test of significance for the model is presented by F- statistic result of 2.924 with probability value of 0.018. This implies that at 5% level of significance, we would reject the null hypothesis of no significance and assume that the administration of JIT had contributed significantly as a tool for measuring the impact of JIT in getting adequate returns of investment in manufacturing industry. The model specification of Table 5 is written as:

$$JIT\ Benefit = f (CS, CSH, ROCE, ROI, RW) \tag{13}$$

The OLS model of this functional relationship is given as:

$$i \tag{14}$$

Substituting the coefficients, we have;

Table 6. Model summary.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.404 ^a	0.163	0.107	0.855

^aPredictors: (Constant), Reduce Wastages (RW), Customer Satisfaction (CS), Returns on Capital employed (ROCE), Control of Market Shares (CSH), Return on Investment (ROI).

Table 7. ANOVA^a.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	10.687	5	2.137	2.924	0.018 ^b
	Residual	54.819	75	0.731		
	Total	65.506	80			

^aDependent Variable: JIT benefit.

^bPredictors: (Constant); CR, Cost Reduction; HC, Carrying/Holding Cost; OC, Ordering Cost; SOC, Stockout Cost.

Table 8. Coefficients^a.

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	
	B	Std. Error	Beta			
1	(Constant)	-0.097	0.738		-0.131	0.896
	Customer Satisfaction (CS)	-0.206	0.349	-0.131	-0.590	0.557
	Control of Market Shares (CSH)	0.828	0.366	0.539	2.264	0.026
	Returns on Capital employed (ROCE)	-0.129	0.350	-0.087	-0.368	0.714
	Return on Investment (ROI)	-0.112	0.324	-0.083	-0.346	0.730
	Reduce Wastages (RW)	0.116	0.168	0.110	0.690	0.492

^aDependent Variable: JIT benefit.

$$JIT\ Benefit = -0.097 - 0.206(CS) + 0.828(CSH) - 0.129(ROCE) - 0.112(ROI) + 0.116(RW) + \epsilon \tag{15}$$

Note that only one variable, Control of Market Shares (CSH) is statistically significant with Sig. $p = 0.026 < \alpha = 5\%$, while all others are not statistically significant therefore must be removed from the equation. Then the model becomes:

$$JIT\ Benefit = -0.097 - 0.828(CSH) + \epsilon \tag{16}$$

CONCLUSIONS AND RECOMMENDATIONS

The study investigates the effect of JIT system on the financial performance of manufacturing firms in Nigeria. Primary data were collected and analyzed and conclusions were drawn from the results as follows:

According to the inferences deduced from the models

specified in this research work, it reveals that each of the cost components employed to measure the effect of JIT on cost reduction and returns on company’s investment shows appreciable level of significance. For instance, the empirical results of model (11) reveal that for a one thousand production units, JIT benefits in terms of reduction in ordering costs, carrying costs, stock-out costs and general cost will respectively be increased with a value of ₦284,000, ₦104,000, ₦515,000 and ₦220,000.

Empirical results reveal in the research analysis that all the cost reduction components (OC, HC, SOC and CR) have jointly brought about 39.4% variation in the operational costs of manufacturing firms due to JIT impact, and this has been found to be highly significant and therefore contributed significantly as tools for effective monitoring of JIT impact on cost reduction.

Considering the impact of JIT on returns on

investments as specified in model (15); the results have depicted a unit improvement towards achieving benefits of JIT by control of market shares and wastages/reduction components. Thus, a thousand unit increase in customers' satisfaction (CS), control of market share (CSH), returns on capital employed (ROCE) and return on investment (ROI) will impact JIT benefits with respective values of ₦206,000, ₦828,000, ₦129,000, ₦112,000 and ₦116,000. In essence, empirical results revealed that JIT implementation impacted significantly investment returns in manufacturing industry.

Thus, empirical results reveal that all the returns on investment components (CS, CHS, ROCE, ROI and RW) have jointly brought about 16.3% variation in the manufacturing company's returns on investment due to JIT impact, and this has been found to have contributed significantly as tools for effective monitoring of JIT impact on returns on investment.

Recommendations

The study recommends the following:

- 1) Manufacturing firms should adopt JIT to cut their costs, achieve greater efficiency, eliminate waste from the entire supply chain and improve product quality continuously in line with the reviewed literature and theoretical framework.
- 2) Application of JIT system will also enhance financial performance of manufacturing firms as confirmed in the findings and complimented by reviewed literature.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

REFERENCES

- Adeyemi SL (2000). Just-in-time: How workable is it in Nigeria. *Journal of Advances in Management* 1(1):19-27.
- Adeyemi SL (2010). Just-in-time production systems (JITPS) in developing countries: the Nigerian experience. *Journal of Social Sciences* 22(2):145-152.
- Ahmad A, Mehra S, Fletcher M (2002). The perceived impact of JIT implementation on firms' financial/growth performance. *Journal of Manufacturing Technology Management* 15(2):118-130.
- Akbar JK, Babu KN, Talari HF (2013). Just-in-time manufacturing system: from introduction to implement. Nagendra and Talari, Hamid, Just-In-Time Manufacturing System. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2253243
- Botchkarev A, Andru P (2011). A Return on Investment as a metric for evaluating information systems: taxonomy and application. *Interdisciplinary Journal of Information, Knowledge and Management* 6:245-270.
- Broyles D, Beins J, Franko J, Bergman M (2005). Just-In-Time Inventory Management Strategy and Lean Manufacturing. *Business Operations Management* P 78.
- Callen JL, Facher C, Krinsky I (2000). Just-in-time: a cross-sectional plant analysis. *International Journal of Production Economics* 63(3):277-301.
- Damanpour F, Walker RM, Avellaneda CN (2009). Combinative effects of innovation types and organizational performance: A longitudinal study of service organizations. *Journal of Management Studies* 46(4):650-675.
- Dreyfus LP, Ahire SL, Ebrahimpour M (2004). The impact of just-in-time implementation and ISO 9000 certification on total quality management. *IEEE Transactions on Engineering Management* 51(2):125-141.
- Gavrea C, Ilies L, Stegorean R (2011). Determinants of organizational performance: The case of Romania. *Management and Marketing* 6(2):285-300.
- Goddard WE (1986). Just-in-time: Surviving by breaking tradition. O. Wight Ltd.
- Goldratt EM, Cox J (1992). *The goal: a process of ongoing improvement*. North River Press, New York.
- Kaneko J, Nojiri W (2008). The logistics of Just-in-Time between parts suppliers and car assemblers in Japan. *Journal of Transport Geography* 16(3):155-173.
- Kannan RV, Tan CK (2005). Just in time, total quality management, and supply chain management: understanding their linkages and impact on business performance. *Omega* 33(2):153-162.
- Keitany P, Riwo-Abudho M (2014). Effects of lean production on organizational performance: a case study of flour producing company in Kenya. *European Journal of Logistics Purchasing and Supply Chain Management* 2(2):1-14.
- Lebas M, Euske K (2002). A conceptual and operational delineation of performance. *Business performance measurement: Theory and practice* pp. 65-79.
- Mahesh UD (2016). Total Quality Management (TQM): A strategy for competitive advantage. *International Journal of Research in IT and Management* 6(9):51-55. Available at: <http://euroasiapub.org/wp-content/uploads/2016/10/5IMSept-4033.pdf>
- Mazanai M (2012). Impact of just-in-time (JIT) inventory system on efficiency, quality and flexibility among manufacturing sector, small and medium enterprise (SMEs) in South Africa. *African Journal of Business Management* 6(17):5786-5791.
- Melek E, Fikri P (2008). The effect of competition, just in time production and total quality management on the use of multiple performance measures: an empirical study. *Journal of Economic and Social Research* 10(1):35-72.
- Obamiro JK (2009). Exploring the Relationships Between Just-in-time Technique and Manufacturing Performance: Empirical Evidence from selected Nigerian firms. *Manager (University of Bucharest, Faculty of Business and Administration)* 10:165-176.
- Ohno T (1982). How the Toyota production system was created. *Japanese Economic Studies* 10(4):83-101.
- Pillai NR (2010). Inventory management performance in machine tool SMEs: What factors do influence them?. *Journal of Industrial Engineering and Management* 3(3):542-560.
- Qureshi MA, Iftikhar M, Bhatti MN, Shams T, Zaman K (2013). Critical elements in implementations of just-in-time management: empirical study of cement industry in Pakistan. *SpringerPlus* 2(1):645.
- Raouf A (1994). Improving capital productivity through maintenance. *International Journal of Operations and Production Management* 14(7):44-52.
- Sakakibara S, Flynn BB, Schroeder RG (1993). A framework and measurement instrument for just-in-time manufacturing. *Production and Operations Management* 2(3):177-194.
- Sanner L, Wijkman PM (2005). Benchmarking business practices in Swedish manufacturing firms. Working paper No 3.
- Schonberger RJ, Gilbert JP (1983). Just-in-time purchasing: a challenge for US industry. *California Management Review* 26(1):54-68.
- Singh G, Ahuja IS (2012). Just-in-time manufacturing: literature review and directions. *International Journal of Business Continuity and Risk Management* 3(1):57-98.
- Wafa MA, Yasin MM (1998). A conceptual framework for effective implementation of JIT: An empirical investigation. *International Journal of Operations and Production Management* 18(11):1111-1124.
- Wruck KH, Jensen MC (1998). The two key principles behind effective TQM programs. *European Financial Management* 4(3):401-423.