IMPACT OF DATA PROCESSING MODE ON INVENTORY MANAGEMENT SYSTEM IN THE NIGERIAN BREWERY INDUSTRY

ODESOLA OLUSEGUN T., & PROF. (MRS.) AKINOLA, G. O.
[1]Registrar's Office, Obafemi Awolowo University, Ile-Ife, Nigeria
[2]Department of Management and Accounting,
Faculty of Administration, Obafemi Awolowo University, Ile-Ife, Nigeria
E-mail: segunodesola@oauife.edu.ng **Phone No:** +234-805-083-0117

Abstract
This study examined the impact of data processing mode on inventory management system in the Nigerian Brewery industry. Primary data were sourced through the administration of questionnaire to 100 respondents in the Nigerian Brewery industry. The population for the study comprises all members of staff of brewery companies quoted on the Nigerian Stock Exchange. Purposive sampling technique was used in selecting the three leading brewery companies in Nigeria. They represent 75% of the breweries quoted in the Nigerian Stock Exchange facts book namely the Nigerian Breweries Plc; Guinness Nigeria Plc; and International Breweries Plc. Purposive sampling was also used in selecting members of staff in the companies who are in management and technical categories in charge of inventory management. The data collected were analyzed using descriptive (tables and percentages) and inferential statistics (chi-square). The results showed that the batch processing representing 47.3% of the respondents is the commonest processing mode being used in the inventory management of most firms in the Nigerian brewery industry and also revealed that data processing mode has positive effects on performance, effectiveness and effectiveness of inventory management system. Based on this finding, the study concluded that batch data processing mode is the predominant processing mode and that appropriate data processing mode should be deployed for inventory management system in the Nigerian Brewery industry.

Keywords: Inventory, Data processing mode, ICT, Data processing, Inventory Management System

Introduction

The introduction of information and communications technology (ICT) has not only made reporting of events to be done at a fast speed as if the whole world is a small village through the use of internet but has also aided virtually all sectors of human endeavours. Mathur (2010) submitted that inventories are major determinant of the revenues of most business outfits. These inventories may comprise raw materials, work-in-progress, spare parts/consumables, and finished goods. It is not compulsory that a business outfit has all these inventory classes. Nonetheless, whatsoever may be the inventory items; they need well-organized management this is because generally a substantial portion of its capitals is invested in these inventories (Vohra, 2008).

Kanaracus (2008) said despite the fact that there was economic meltdown in 2008 which affected many businesses adversely all over the world, it was discovered that organizations kept on increasing their expenditures on the deployment of information and communications technology (ICT) systems in their operations which invariably increases their budgets but Petter, Delone and McLean (2008) were quick to react that firms only concentrate on unfolding, applying and assessing utilitarian ICT systems in their operations so as to achieve organizational goal and objectives.

Meanwhile inventory management could be regarded as the life-blood and backbone of any successful manufacturing setting. It refers to appropriate methods or techniques to manage raw materials, work-in-progress as well as finished goods to minimize cost in a bid to achieve the set organizational goals and objectives while Inventory are resources of an organization that are being kept by the organization for future use (Donald, 2013). Robert and Richard (2013) posit that inventory normally denotes physical goods to be traded and the materials needed to manage the service of a business. To Robert and Richard, there are two key purposes of inventory control, whether you are dealing with manufacturing, distribution, retail, or services, is to specify (i) when to order for the items as well as (ii) how big the order should be i.e. the size of the order.

Chowdhury (2000) described ICT as technologies that can process diverse kinds of information (video, text, audio and data), and make possible different forms of communications among human agents as well as information systems. Musa (2013) contended that information and communications technology (ICT) is a generic term that comprises of all advanced technologies in manipulating and communicating information. Obasan (2011) posited that the deployment of ICT in business organizations has considerately improved operations and performance of businesses in Nigeria.

Olawale (2014) in Breweries Sector Report 2014 posited that Africa has an end user market of over one billion people of beer consumption, average Gross Domestic Product growth of 5% up to 2020 and a beer consumption per capita of 9 liters (vs.25liter peer average),the growth of beer market in the continent of Africa is without doubt credible. Also, Olawale (2014) said that all eyes are on Nigeria as far as beer consumption is concerned being a heavily populated nation and largest (still growing) economy in Africa, with considerable latent for a double digit growth. The Nigerian brewery industry is not completely left to mainly Nigerian investors as leading international players like Heineken N.V controls 70% of Nigerian beer market with majority stake in Nigerian Breweries Plc and Champion Breweries Plc while Diageo controls 27% through its ownership of Guinness Nigeria Plc and SABMiller controls 3% through its stake in International breweries Plc and Pabod breweries Ltd.

Statement of the Problem

The brewery industry has many stocks to contend with, that is raw materials of different types, work-in-progress of varying degrees as well as finished products of different brands. So to monitor the levels of these varying categories of stock items physically has been discovered to be herculean task as this will be proned to human errors.

For instance, the National Agency for Food and Drug Administration and Control (NAFDAC) slammed a fine of N1 billion administrative charges on Guinness Nigeria Plc for its failure to adhere to the recommended good manufacturing practice procedures. It was learnt that the Enforcement Department of the agency had conducted a routine check on the company's factory in Ikeja, Lagos on November 5, 2015 where shocking revelations were made. The NAFDAC team came back with unsatisfactory appraisals about how some of the materials used in the production processes were being stored.

Even though there have been numerous studies (for example, Itod, Maji and Abdu (2010), Mathur (2010), and Ogbo, Onekanma, and Wilfred (2014) on the impact of inventory management on organizational performance much has not been done on the effect of ICT on inventory management *vice –a-vise* the data processing mode of the system most especially in the brewery industry. It will be recalled that an Enterprise Resource Planning(ERP) was designed to provide benefits of instantaneous capabilities and flawless communication for business in large organizations. There were very few studies to

corroborate the fact that the processing mode is real-time and that was why Davenport (1998) opined that due to the fast range of potentials and the well-presented statements of things that will definitely happen made by vendors, expectations of Enterprise Resource Planning (ERP) packages are high and that the promise of a standardized (off-the-shelf) solution to business integration troubles seems very alluring. In a nutshell, there is a sort of ambiguity with respect to the data processing mode of an inventory management system being deployed by breweries in Nigeria for their inventory.

Purpose of the Study

The purpose of this study is to examine the impact of the data processing mode(s) on inventory management system in the Nigerian Brewery industry.

Research Questions

What are the data processing modes of inventory management system in the industry?
What is the effect of data processing mode on performance of inventory management system of firms in the industry?

Does data processing mode impact on effectiveness and efficiency of the inventory management system?

Objectives of the Study

(i) Investigate data processing modes of inventory management system being deployed in the Nigeria Brewery Industry;
(ii) Examine the effect of data processing mode on inventory management system being deployed in the Nigeria Brewery Industry; and
(iii) Analyze the impact of data processing mode on effectiveness and efficiency of the inventory management system being deployed in the Nigeria Brewery Industry.

Hypotheses for the Study

Hypotheses for this paper were in null form. They are as follows:

(i) **Ho_1**: Data processing mode of an ICT driven inventory management will not improve performance of inventory management of firms in the Nigerian Brewery Industry.
(ii) **Ho_2**: Effectiveness and efficiency of an inventory management system does not depend on its data processing mode.

Methodology/Materials or Methods

Primary data were utilized for this study. The primary data were sourced through administration of questionnaire. The population for the study comprises all members of staff of brewery companies quoted on the Nigerian Stock Exchange. Purposive sampling technique was used in selecting the three leading brewery companies in Nigeria. They represent 75% of the breweries quoted in the Nigerian Stock Exchange factsbook namely the Nigerian Breweries Plc; Guinness Nigeria Plc; and International Breweries Plc. Purposive sampling was used in selecting members of staff in the companies who are in management and technical categories in charge of inventory management. These include Nigerian Breweries Plc (45); Guinness Nigeria Plc (35); and International Breweries Plc (20) totaling 100. Data on variables such as data processing mode, and impact of data processing mode on effectiveness, performance and efficiency of inventory management was sourced from the selected staff. Data collected were analyzed using appropriate statistics.

Literature Review
Historical Development

Inventory
It is very conspicuous that inventories occupy the greatest strategic place in the arrangement of working capital of most commercial enterprises and firms in the brewery industry are not an exception. Inventories constitute the major component of current asset in most business enterprises. In the scope of working capital, the effective control of inventory has posed the most grave problem to the firms in the brewery industry because about two-third of the current assets of firms in the industry are being seized in inventories. The revenue from inventory is a principal determinant of the turnover of working capital of business organizations and the firms in the Nigerian brewery are not an exception. It is therefore quite expected that inventory which helps in making the most of turnover occupies the most substantial place among current assets (Mathur, 2010).

Importance of Inventory Management
The primary objectives of inventory management according to Mathur (2010), are: to reduce as much possible funds investment in inventories and to minimize the probability of disruption in the manufacturing plan of a firm for lack of raw material, stock and spare parts. So it is crucial to have indispensable inventories and at the same time avoid excessive inventory because it constitute an unused resource to the organization. Therefore, investment in inventories should be just adequate in the optimal level. The author also submitted that the major dangers of excessive inventories are: excessive carrying cost, the risk of liquidity and the avoidable tie up of the organization's capitals and loss of profit. Mathur (2010) also opined that a successful inventory management should among others thing regulate investment in inventories and keep it at an optimal level, safeguard the inventory against decline, obsolescence and unapproved use, reduce the carrying cost and time, preserve adequate stock of raw material in time of short supply and expected price changes, minimize investment in inventories, ensure that finished goods are available for onward delivery to customers in a bid to fulfill orders, unhindered sales operation and efficient customer service, ensure that materials are available for use in manufacturing and production services as and when needed, ensure a constant supply of material to production department thereby enabling continuous production, and keep satisfactory stock of finished goods for unhindered sales operations.

Types of Inventory
Ile (2002) submitted that inventory can be classified into three types. These are: Raw Materials inventory (these are items purchased by a business for processing like water, malt, mash, yeast among others are some of the raw materials inventories that a company in the brewery industry may require for its production processes), Work-in-progress inventory (this is also known as goods-in-progress inventory- a middle stage of raw material inventory that is yet to be completed by the manufacturing plant to enter into another stage of production) and Finished goods inventory (it comprises of stock of finished goods - these could be stock of goods pending shipment or in the storeroom. Donald (2013) listed Spare parts, for machinery, equipment, among others and Consumables such as oil, paper, fuel among others.

Zengwa and Choga (2016), did a study on the Role of Information and Communications Technology (ICT) in Company Inventory Management in Zimbabwe: 2011-2013. The study discovered that the adoption of information and communications technology (ICT) has been dispersing rapidly in inventory management throughout the last few decades as businesses seek to improve efficiency through increased incorporation among suppliers and buyers but

was silent on the data processing mode of the inventory management system being deployed despite the fact that the study revealed that the companies studied had adopted an Enterprise Resource Planning (ERP) for their inventory management to improve transaction processes and sustained information sharing among different system users but some modifications were required to attain an well-organized and effective inventory management system.

Historical Development of Inventory Management System

The first initiative towards automation of the inventory management was spearheaded by the foremost world leading computer manufacturer; International Business Machine (IBM) when it introduced an inventory package called IMPACT (an acronym for Inventory Management Programme And Control Techniques) for the wholesale and retail trade (IBM, 1967). IBM's inventory package; IMPACT was criticized for common sense accompanied by mathematical solutions for simplified forms which involves so many exceptions and limitations that it is quite complex to gain insight into the fundamentals i.e. not being based on truly optimum set of rules but on heuristic (Kleijnen, 1978). The pioneering effort and initiative from IBM were an eye opener for other computer manufacturers as they followed with similar systems or other products that could offer a better deal.

Another computer manufacturer; International Computers Limited of London (ICL) also introduced its own system or product called SCAN aiming at assisting managers in inventory management (ICL, 1970). Siemens, another computer giant developed its system called HOREST (Siemens, 1970). It was designed and programmed to aid inventory management. During the 1980s, several inventory decision support systems were developed. Kiran and Loewenthal (1985) developed a system called an Integrated Decision System for Inventory Management (IDSIM) which is a microcomputer based decision support system. The new IDSIM entails a main program which interacts with six other well-designed subroutines that are clear as crystal to the user. This new system can be used to make decisions on inventory control variables such as order quantities, safety stocks and order points, at both the individual item and aggregate levels. The most current version of IDSIM is written in an interactive manner in order to facilitate its operation in the decision making process of an organization and allows the user of the software to alert the data and constraints and to do complex analyses at various points during the program execution.

Moras (1989) also developed another system called MICROLOT (Inventory Control System on the Microcomputer) and the program was written in BASIC language (Beginners All Purpose Symbolic Instruction Code), and runs on IBM and compatible microcomputers. It implements a decision support system for single-item stock problems with deterministic and stochastic demand distributions. MICROLOT features a friendly user interface and graphical aids. The deterministic case includes systems with constant (linear) demand and systems with time-varying demand. Periodic appraisal (order-up-to-level) and continuous review (order point) systems are addressed in the stochastic case. The most recent according to another author, Rouse (2015) is an Enterprise resource planning (ERP) is a category of business management software (an ICT powered inventory management system) which is usually a collection of integrated applications, that enables a business to collect, store, manage and deduce data from many business actions. These business activities or actions includes planning of product, cost, manufacturing or service delivery, marketing and sales, inventory management, shipping and payment.

Information and Communications Technology (ICT)

Information is the bone of today's business organizations, institutions and industries (Musa, 2013). To Musa, information and communication technology (ICT) cover all highly developed

technologies in manipulating and communicating information. Musa (2013) thereafter identified three core components of information and communications technology. These core components are information; the use of computers to process data into information, communications; communication of information through networks while technology; the technical know-how used for the transmission and this will determine the degree to which a firm makes use of information and communications technology towards accomplishing the organizational objectives.

Information and communications technologies (ICTs) play a significant role in the process of providing effective and efficient services, products and packages in order to better satisfy their customers in several service providing businesses, organizations and manufacturing firms (including the firms operating in the Nigerian brewery industry) worldwide. Corporations face a predicament in today's competitive marketplace, where on one hand, clienteles demand personalized products and services and want that their orders are filled speedily, however they do not want to pay a premium (an additional cost) for this customization and availability (Graman and Magazine, 2006).

Data Processing Mode and Inventory Management System

Even though there have been numerous studies about the impact of inventory management on organizational performance much has not been done on the effect of ICT on inventory management vice –a-vise the data processing mode of the system most especially in the brewery industry. Recalled that the well known data processing modes are Off line, On line, Real-Time, Time Sharing, Batch processing, Multiprogramming and Multiprocessing. Each has its own features, advantages and disadvantages which are taken into consideration before it is selected for an operation. It will be recalled that an ERP system was designed to provide benefits of instantaneous capabilities and flawless communication for business in large organizations. There are very few studies to corroborate the fact that the processing mode is real-time and that was why Davenport (1998) opined that due to the fast range of potentials and the well-presented statements of things that will definitely happen made by vendors, expectations of ERP packages are high and that the promise of a standardized (off-the-shelf) solution to business integration troubles seems very alluring. Implying that these features may not be obtainable when the ERP system is bought and deployed in business operations. Data is collected, entered, processed and then the batch results are produced. In a batch processing system, transactions are accumulated over a period of time and processed as a single unit, or batch. Whatever the time period in a batch system, there is some time delay between the actual event and the processing of the transaction to update the records of the organization.

Inventory management systems deployed by business organizations were deployed to automate day after day inventory related transactions in order to reduce costs and human error during data entry operations. Cheng & Chou (2007) and Swamidass (2007) submitted that previous empirical studies have also shown that deployment of ICT driven inventory management systems with appropriate data processing mode had not only help in safeguarding the service level but also reduces amount of inventory costs, which can be invested in other profitable business investments. In fact, these authors were emphatic when they submitted that there exists a close relationships between ICT implementation and inventory management performance and that real-time inventory decision support system has not only reduces the inventory costs but also assists in maintaining the service level greater than 90% for various demand patterns. Also, Yu & Ramanathan (2008) studied ICT adoption in UK firms and found out that businesses that had installed high technology in ICT achieved significant operational efficiency.

Deployment and implementation of Information and communications technology via the use of an appropriate data processing mode for inventory management operates as a tool for enhancing efficiency, economies of scale and cost reduction. Organizations are striving to achieve these trios in today's highly competitive business environment. It could not be out of order to say that ICT has been adopted in inventory management processes by business organizations as a competitive edge and to build strategic long term relationships along the supply chain.

Theoretical Framework

The resource-based view (RBV) is a model that sees resources as key to superior firm performance and that if a resource is valuable, rare, costly to imitate and can be organized (represented with acronym VRIO) to capture value attributes, the resource will enables the firm to gain and sustain competitive advantage. That is to say the company will have to subject the resource to VRIO structure (is the tool used to analyze a firm's internal resources and capabilities to find out if they can be a source of sustained competitive advantage) (Rothaermel, 2012, Barney, 1991).

This study was anchored on the resource-based theory because firms or companies in the Nigerian brewery industry have huge amount of inventory items that are germane to the manufacturing of various categories of products with heterogeneous resources that differ from one brewery to another. These features justify the adoption of this theory for this study. In this case, the firms in the brewery industry may see information and communications technology as a resource that should be deployed in a unique way for the organization to gain competitive advantage over others in the Nigerian beer market that has latent for double digit growth and this is in line with the submission of Bharadwaj (2000), who contend that the resource-based view (RBV) theory argues that ICT may be viewed as a resource and that organizations may choose to invest in ICT resources that are rare, inimitable, and non-substitutable.

Conceptual Scheme /Model

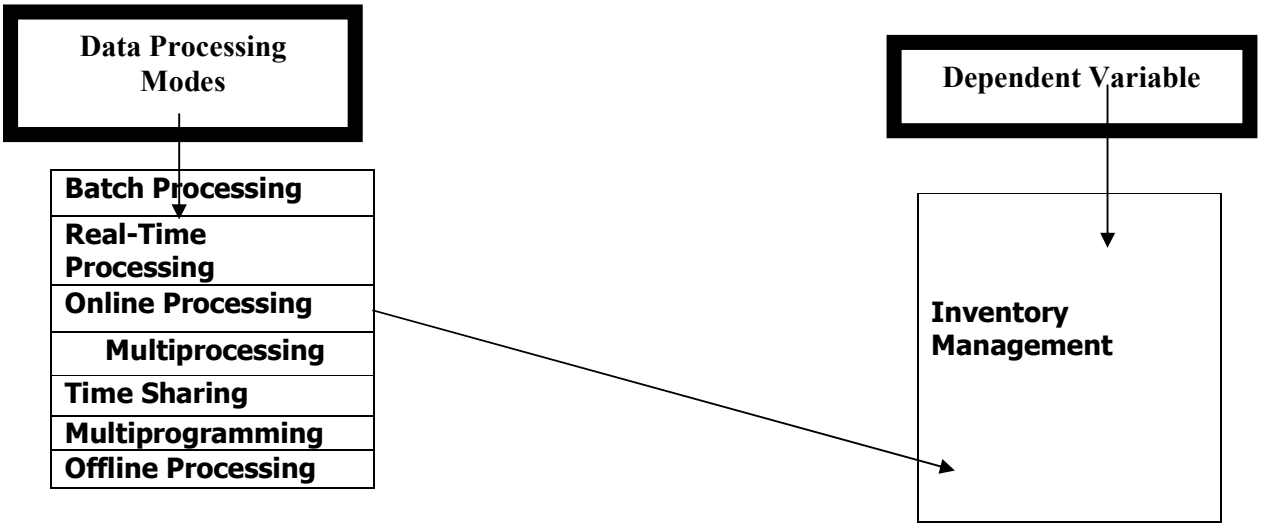

Fig. 1.1: Schematic Diagram showing the relationship between Data Processing Mode and Inventory Management. Source: Author, 2016

Results and Discussion

The processing mode of inventory management system employed in the Nigerian brewery industry as suggested by the respondents with the percentage of respondents each mode included: batch processing (47.3%), multiprocessing (20.2%), time sharing (18.0%), multiprogramming (9.0%), online (2.2%), real-time (2.2%), and offline (1.1%). This implied that batch processing is the major data processing mode of inventory management system employed in the Nigerian Brewery industry.

Table 1: The data processing mode of inventory management system employed in the Nigerian Brewery industry

Data Processing Mode	Percentage of Respondents (N= 89) (%)
Batch Processing	47.3
Multiprocessing	20.2
Time Sharing	18.0
Multiprogramming	9.0
Real-Time	2.2
Online	2.2
Offline	1.1

Source: Filed Survey, 2016

Testing of Hypotheses

For Hypothesis I: Inventory management performance is not a function of data processing mode of firms in the Nigerian Brewery Industry. Respondents were asked if they strongly agree, agree, undecided, disagree or strongly disagree with the notion that data processing mode of their inventory management systems reduces production breakdown, aids reduction in production costs, leads to reduction in delivery time, enhances forecasting and planning, speeds up inventory management processes, reduces paperwork, enhances better flow of information and reduces inventory cycle time. Their responses were presented in table 2.

Table 2: Effect of Data processing mode on performance of inventory management system

Options	Frequency
Strongly Agree	60
Agree	20
Undecided	4
Disagree	3
Strongly Disagree	2
Total	89

Source: Filed Survey, 2016

Testing of the hypothesis

Using $\chi^2 = \frac{\xi(\text{Observed frequency - expected frequency})^2}{\text{Expected frequency}}$

Expected frequency = $\frac{60 + 20 + 4 + 3 + 2}{5} = \frac{89}{5} = 17.8$

Table 3: Chi-square Table

Responses	**Observed (O)**	**Expected (E)**	**O -E**	**$(O-E)^2$**	**$\frac{(O-E)2}{E}$**
Strongly Agreed	60	17.8	42.2	1780.84	100.05
Agree	20	17.8	2.2	4.84	0.27
Undecided	4	17.8	-13.8	190.44	10.70
Disagreed	3	17.8	-14.8	219.04	12.31
Strongly Disagreed	2	17.8	-15.8	249.64	14.02
Total	89				**137.8**

Calculated χ^2 is 137.8 while the χ^2 from the table is obtained by assuming 5% level of significance and using M = N - 1 for degree of freedom, where N is the number of row of the table for the chi-square. Here, N is 5, therefore degree of freedom (M) = 5-1 =4. Therefore, the χ^2 from the chi-square table is 9.488. Since the computed χ^2; 137.8 is greater than 9.488, we therefore reject the null hypothesis (H_0) and accept the alternate hypothesis (H_1). That is to say, we conclude that Inventory management performance is a function of data processing mode of inventory management system of firms in the Nigerian Brewery Industry.

For Hypothesis II: Effectiveness and efficiency of an inventory management system does not depend on the data processing mode of firms in the Nigerian Brewery Industry. Respondents were asked if they strongly agree, agree, undecided, disagree or strongly disagree with the notion that data processing mode of their inventory management systems helps to remove market barriers, enhances processing of orders, helps in streamling supply chain by removing inefficient intermediaries and conclusively improving the effectiveness and efficiency of the inventory management processes. Their responses were presented in table 4.

Table 4: Effect of Data processing mode on the effectiveness and efficiency of the inventory management processes

Options	**Frequency**
Strongly Agree	65
Agree	15
Undecided	4
Disagree	2
Strongly Disagree	3
Total	89

Source: Filed Survey, 2016

Testing of the hypothesis

Using $\chi^2 = \frac{\xi(\text{Observed frequency - expected frequency})^2}{\text{Expected frequency}}$

Expected frequency = $\frac{65 +15+4+2+3}{5} = \frac{89}{5} = 17.8$

Table 4: Chisquare Table

Responses	Observed (O)	Expected (E)	O -E	$(O-E)^2$	$\frac{(O-E)2}{E}$
Strongly Agreed	65	17.8	47.2	2227.84	125.16
Agree	15	17.8	-2.8	7.84	0.44
Undecided	4	17.8	-13.8	190.44	10.70
Disagreed	2	17.8	-15.8	249.64	14.02
Strongly Disagreed	3	17.8	-14.8	219.04	12.31
					163.07

Calculated χ^2 is 162.629 while the χ^2 from the table is obtained by assuming 5% level of significance and using M = N - 1 for degree of freedom, where N is the number of row of the table for the chi-square. Here, N is 5, therefore degree of freedom (M) = 5-1 =4. Therefore, the χ^2 from the chi-square table is 9.488. Since the computed χ^2; 162.629 is greater than 9.488, we therefore reject the null hypothesis (H_0) and accept the alternate hypothesis (H_1). That is to say, we conclude that effectiveness and efficiency of an inventory management system depend on the data processing mode of firms in the Nigerian Brewery Industry.

Discussion

From the research conducted it was discovered that the most predominant data processing mode of the inventory management system being employed by breweries in Nigeria is Batch Processing. Batch processing from the study has a percentage of 47.3 compared to other processing modes identified in this study. The finding reveals what operates in the Nigerian Brewery Industry where there are huge volumes of inventories as a result of multiple product lines. This finding buttressed the fact that Nigeria's economy is still developing because full version of the Enterprise Resource Planning system has not been deployed in some segments of the economy. The study also revealed that data processing mode of inventory management system had positive effects on the performance of the of inventory management of firms in the Nigerian brewery industry. It was also discovered that data processing mode of inventory management system had positive effect on the effectiveness and efficiency of inventory management system of firms in the Nigerian Brewery industry from inventory. These findings are in agreement with the findings of previous studies of Yu and Ramanathan (2008), Cheng and Chou (2007) and Swamidass (2007) but not in line with the findings of Nah, Lau, and Kuang, (2001) and Soh, Kien, and Tay-Yap (2000). The two studies opined that Enterprise Resource Planning (ERP) system produce and access information in a real-time environment to facilitate rapid and better decisions and cost reductions that will eventually pave way for improved performance of the firms, efficient and effective inventory management and increase profitability from inventory.

Conclusion and Recommendation

This study examined impact of the data processing mode on the inventory management system in the Nigerian Brewery industry through the administration of questionnaire and the responses were analyzed using descriptive and inferential statistics. It concluded that batch data processing mode is the predominant in the industry, that data processing mode of inventory management system had positive effects on the performance as well as the effectiveness and efficiency of the of inventory management and that data processing mode of inventory management system had positive effect on profitability of firms in the Nigerian Brewery industry from inventory. It is recommended that Breweries in Nigeria should

deployed full version of enterprise resource planning system or a comparable Nigerian made system to enable the firms take the advantages of a real-time system.

References

Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management,* 17(1), 99-120.

Bharadwaj, A. S. (2000). A resource-based perspective on information technology capability and firm performance: An empirical investigation. *MIS Quarterly,* 24(1), 169-196.

Brynjolfsson, E., & Hitt, L. (2003). Computing productivity: Firm-level evidence. *Review of Economics and Statistics*, 85, 793-808.

Cheng J. C., & Chou, C. Y. (2007). A real–time inventory decision system using western Electric run rules and ARMA control chart. *Expert Syst. Appl.*, 35(3), 755–761. doi:10.1016/j.eswa.2007.07.019

Chowdhury, N. (2000). Poverty alleviation and information and communication technologies: Towards a motif for the United Nations ICT task force. Retrieved 14 October 2010, from: http://www.eb2000.org/shortnote19.htm

Davenport, T. H. (1998). Putting the enterprise into the enterprise system. *Harvard Business Review*, 76(4), 121-31.

Donald, W. (2013). *Inventory control and management*. 2nd Edition. West Sussex: John Wiley & Sons Ltd.

Graman, G. A., & Magazine, M. J. (2006). Implementation issues influencing the decision to adopt postponement. *International Journal of Operations & Production Management*, 26(10),1068 – 1083.

IBM. (1967). *Basic principles of wholesale IMPACT: Inventory management program and control techniques*. E20-8105-1, IBM, White Plains, New York.

ICL. (1970). *SCAN system 3 for inventory management-1900 series*. London: International Computers Limited.

Ile, N. M. (2002). *Management: A functional approach*. Enugu: Ochumba Printing and Publishing Co. Ltd.

Kanaracus, C. (2008). Gartner: Global IT spending growth stable. *InfoWorld.*

Kiran, A. S., & Loewenthal, A. (1985). An integrated decision system for inventory management. *Computers and Industrial Engineering*, 9(4), 379-386.

Kleijnen, J. P. C. (1978). Impact revisited: A critical analysis of IBM's inventory package - IMPACT. *Production and Inventory Management*, 71-90.

Learned, E. P., Christensen, C. R., Andrews, K., & Guth, W. D. (1969). *Business policy: Text and Cases*. Homewood, IL: Irwin.

Mathur, S. N. (2010). *Working capital management of cement industry in India: A Comparative Analysis of Selected Units.* Thesis PhD, Saurashtra University, Saurashtra.

Moras, R. G. (1989). MICROLOT: Inventory control system on the microcomputer. *Computers and Industrial Engineering*, 179(1-4), 441-446.

Musa, A. A. (2013). *Foundation of information and communication technology course manual*. Lagos: National Open University of Nigeria.

Nah, F., Lau, J., & Kuang, J. (2001). Critical factors for successful implementation of enterprise systems. *Business Process Management Journal,* 7(3), 285-96.

Obasan, K. A. (2011). Information and communication technology and banks profitability in Nigeria. *Australian Journal of Business and Management Research,* 1(4), 102-107.

Olawale, O. (2014). *Breweries sector report*. Lagos: Meristem Securities Limited.

Petter, S., DeLone, W., & McLean, E. (2008). Measuring information systems success: Models, dimensions, measures, and interrelationships. *European Journal of Information System,* 17, 236–263.

Prasanna, K. (2014). Information technology: Roles, advantages and disadvantages. *International Journal of Advanced Research in Computer Science and Software Engineering*, 4(6).

SIEMENS (1970). *Economic inventory control with HOREST, characteristics and special features*. Sienmens Aktiengesellschaft, BereichD Atenverarbeitung, D 8000 Munchen 70.

Soh, C., Kien, S. S., & Tay-Yap, J. (2000). Cultural fits and misfits: Is ERP a universal solution? *Communications of the ACM,* 43(4), 47-51.

Swamidass, P. M. (2007). The effect of TPS on US manufacturing during 1981–1998: Inventory increased or decreased as a function of plant performance. *Int. J. Prod. Res.*, 45(16), 3763–3778.

Vohra, N. D. (2008). *Quantitative techniques in management*. New Delhi, Tata McGraw- Hill Publishing Co. Ltd.

Wernerfelt, B. (1984). The resource-based view of the firm. *Strategic Management Journal,* 5(2), 171–180.

Yu, W., & Ramanathan, R. (2008). An assessment of operational efficiencies in the UK retail sector. *International Journal of Retail & Distribution Management,* 861 - 882.