# The Role of Information & Communication Technology (ICT) In Company Inventory Management in Zimbabwe: 2011-2013

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***Abstract:*** *The adoption of information and communications technology (ICT) has been spreading rapidly in inventory management throughout the last few decades with companies seeking to improve efficiency through increased integration among suppliers and buyers. The aim of this study is to ascertain the influence of information and communication technology in inventory management. A literature review carried out on the role of ICT in inventory management on developed and developing economies indicated that there were various integration dimensions of effects as well as different influencing factors. This study comprised of 300 participants and 186 were randomly selected. Eighty-eight percent response rate was realised. Questionnaires, interviews and observations were used as research methods.The study revealed that the companies had adopted an Enterprise Resource Planning (ERP) based on inventory management system which managed to integrate all the business processes using information technologies. The ERP software managed to improve transaction processes and supported information sharing among different system users but some improvements were required to achieve an efficient and effective inventory management system for the whole companies. It was recommended that the organisations had to improve the ERP systems in order to manage extended lead times, optimum inventory levels and inventory shelf lives as well as minimise losses caused by obsolescence, stock-outs and expirations.*

## I. Background to the Study

Inventories are assets held in the form of materials or supplies to be consumed in the production process or in the rendering of services. System users contributed to the information needs of businesses through the development of the Resources Events Agents (REA) model which brought information systems that integrated the entities and relationships into a compatible and manageable database system (Kandelin and Lin 1992).Since implementation companies embraced the coming in of new technology which has gone a long way in enhancing the handling of inventory in the entire company. The companies had Wide Area Networks supported by communication systems like Systems Application Programme (SAP) that integrated all their business operations into a single and manageable business profile.

The inventory management system integrated all the inventory materials in a common database and allocated material numbers to the items that were identified by the system. Users punched in short text of a desired item and the system searched and identified the item.The system then verified availability and the user went on to create a reservation for the required quantity. The reservation number generated by the system went through approval and users then proceeded to the stores department with the reservation document for issue. The system automatically reduced stock quantities from the database and all the issues were sequentially recorded. All processes were captured by the system, for example, goods receipts, reversals and transfer postings. The system captured all the events and transactions were tracked from the system which automatically recorded date, time, user, agents (who authorised the transactions) as well as leaving an audit trail.

The system did reserve stock and allowed users to create reservations for quantities even exceeding the stock quantity and stock-outs were realized on the final issue. Inventory items were described according to their size and packaging.The system did not provide information on the material status, date of acquisition, expiry dates and physical condition of the item. A user would determine the inventory status on collection and could discover items had expired, deteriorated and even become obsolete after all the issuing processes had been completed. This affected operations as one waited for replenishment of urgently needed inventory materials and obsolete materials had to be disposed which was a cost to most entities. Hence there was need for a continuous review of the current systems, incorporation of new technology as well as staff training on improved inventory management strategies.

## II. The Research Problem

The system did not indicate the material's shelf life and items ended up obsolete.There was no alert system to give an indication when items were approaching minimum stock levels to enable re-ordering. The systems did not take into account the nature of demand and lead time.

### Objectives of the study
The objectives of this study were to:
- identify the inventory management practices currently employed by the companies
- establish challenges in stock levels management
- suggest methods that could be used to monitor inventory shelf lives
- formulate feasible recommendations for the utilising of ICT strategies in inventory management

### Research questions
In carrying out the study the researchers had the following questions:
- What inventory management practices were used by companies?
- What were the weaknesses of the current inventory management system?
- How did the systems manage inventory levels?

## III. Research Methodology

The study adopted a descriptive survey design that sought to describe the characteristics of computerised inventory systems and used a mixedmethod approach.The researchers started with a quantitative as a primary methodology complimented by a qualitative approach. This strengthened the study by providing stronger evidence through convergence and collaboration. It was against this background that this research study adopted a mixed methodology research.The mixed method research provided better opportunities for answering the research questions and enabled the researchers to effectively evaluate the extent to which the research findings inferred.It produced reliable data. Questionnaires, observations and interviews were used as research methods.

## IV. Literature Review

In literature, Choudhury, V. (1997) reports that for internal integration companies often used Enterprise Resource Planning (ERP) systems which we recognise as essential ICT for supporting the internal sharing of information between functions and departments.For external integration most organisations have utilised automated information systems to support information-sharing between customers and suppliers.

Efficiency in inventory management was attained by substituting inventory with information through automated replenishment programmes (ARP), where the seller used information regarding product usage and inventory levels provided by the buyer to determine replenishment quantities (Daugherty et al. 1999).

Cachon and Fisher (2000) finds that information technology contributed effectively to lead time and batch size reduction, costs were reduced through information sharing across the supply chain. Inventory flows were faster and ordering processing improved. They also discover that lower levels of aggregation, information sharing by coordinating internally within a firm and externally with suppliers and customers was positively associated with operational and financial performance. Simch-Levy et al (2000) points out that one cannot make changes or improvements on purchased software. Security was compromised as the same software was used by many people and someone could take advantage of system flaws to gain access or even bring the whole system down. Developed countries were focusing on inventing new technology which proved costly to the whole system.

Shaprio (2001) reiterates that Information Technology (IT) contributed to the development of effective business processes and brought about innovations to the supply chain. Cachon and Fisher (2000) also stated that information sharing across the supply chain reduced costs, speedily facilitated inventory flows and improved the ordering process.

Kumar et al (2002) on a case study on Canadian companies reports the successful implementation and usage of ERP systems as they enabled the use of latest technology.There was availability of regular upgrades which made their system compatible with each other.

Mongare and Nasidai (2004) in their investigation find out that ICTs enabled centralized purchasing procedures through e-procurement.Companies were able to utilise markets efficiently with the availability of many suppliers offering competitive prices. They assume that the technological integration on inventory control implementation simplified buying process to make it more efficient as well as reduce inventory costs, increase compliance with procurement laws and regulations, provide better access to information and transparency in markets through a standardized purchasing process and also contribute to reduced paperwork. ICTs contributed to improved communications patterns, an increased demand for coordination of joint activities and new

organisational through their ability to store, transmit and process information and speed up inter-organisational activities (Sriram and Stump, 2004). Mongare and Nasidai (2004) reiterates that implementation of ICTs enhanced staff skills through training and system integration which allow effective flow of information, speed up processes and reduced paperwork. On the other hand, Mongare and Nasidai (2004) state that technological innovations brought about high cost of control through centralized procurement processes with the process becoming more complex with fewer employees who need expert knowledge of computerized systems and this has resulted in the automatic elimination of those players who lacked electronic capabilities and job losses as processes were being automated.

Obogne and Lidasan (2005) highlights that most companies lacked the financial resources to finance the high capital requirements and in developing economies some companies were not informed of the advantages and cost effectiveness of the technology and why it was expensive for them to acquire it. Obogne and Lidasan (2005) carried out a case study on the impact of ICT on logistics among firms and discover that ICTs allowed less waste, lower transactions, enhanced networks, more efficient supply chains and the ability to efficiently meet the customer needs. Obogne and Lidasan (2005) carried out a case study on the impact of ICT on logistics among firms and state that ICTs have allowed less waste, lower transactions, enhanced networks, more efficient supply chains and the ability to efficiently meet customer needs.

Fasanghari et al. (2008) on their study on the impact of ICT on Iranian automobile industry find out that ICT enhances supply chain networks and enables customer relationship management. The above studies revealed benefits of ICTs to the inventory management system.There was need for concentrated effort on discovering means and ways of utilising the available ICTs to enable an efficient flow of materials within an organisation before linking it with external factors. Ashrafi and Murtaza, (2008) assert that most SMEs were aware of the benefits of ICT adoption, but lack necessary ICT knowledge and skills.The costs of implementation were too high, but had no relevant information and advice on suitable and effective technologies.The SMEs had no time to implement ICT projects as they felt the country had no human and technical infrastructure to support ICT adoption.

Franklin et al (2009) made a country industry analysis and reiterate that high speed Internet use by employees were positively correlated with productivity in countries where ICT adoption was highest, but negatively related to labour productivity in other countries. It seemed that most studies revealed the importance of ICT in whole supply chain but little was done to address issues on inventory management as a function of Supply Chain Management.

SMEs experienced challenges in the implementation of modern ICT strategies in inventory management in an attempt to compete effectively due to the increasing needs in implementing more effective inventory management systems, lack of technical manpower, research and development, finance and education which placed them into a sustained negative position (Cocca and Alberti, 2010).

Russell and Taylor (2011) state that computer and information technology enabled real-time processes, online communication as well as the efficient flow of products and services across the supply chain which led to a reduction in inventory levels. Ali and Kurnia (2011) conducted a multiple case study on the Bahrain grocery industry to assess the IT adoption where the study reveals that most participants did not perceive technology such as EDI to be of beneficial interest, considering the high installation costs when cheap labour was locally available. Thoo et al, (2011) assumes that applying good inventory management yielded significant improvements in inventory cost and customer satisfaction. Companies that adopted information and communication technologies expanded and improved their business into new directions in the demand and supply process linkages.

Deraman et al (2012 reiterates that failure to effective ICT implementation was, due to lack of technical resources and human infrastructural development.

## V.    Data Analysis and Discussion

The study findings revealed a high response rate (88%) that was achieved in respect of questionnaires scheduled interviews and the observation exercise. The study revealed that the companies had computerised all inventory functions and implemented an Enterprise Resource Planning (ERP) system that collected data from all sources within an organisation and stored information at a central location where it could be retrieved and used.The ERP system holistically incorporated all the business activities such as stores, procurement and accounts through a Systems Application Programme (SAP) Materials Management (MM) module.The respondents acknowledged that the implementation of SAP inventory management standardised procedures and effective controls throughout the entities by determining optimal amounts of inventory to be held and dispatched in order to satisfy the user requirements. Comparative schedules on inventory variables such as inventory levels, demand, lead times and delivery dates were carried out as reviewed in literature by (Ackan and Fisher 2000). The MM module determined the optimum inventory levels for individual inventory items, which minimised both total inventory holding and ordering costs and influenced effective maintenance of optimal inventory

levels. The study further revealed the existence of Just in Time (JIT) processes within the MM module. Thirty five percent of the participants agreed that it was effectiveness in managing non-durable items like meals and beverages which did not need to be stored in inventory but can be requested on need basis. As reviewed in the literature inventory management systems like vendor managed system and Just- in- time inventory system it required that there be strong system that linked the supplier to the buyer in the form of electronic data interchange (EDI)as explained by Thoo et al (2011).

The study findings revealed that continuous improvement on ICTs brought about efficiency to the system with requests, authorisations and replenishment being done electronically in the system. The results revealed the respondents agreed that ICT enhanced automatic updates on withdrawals and replenishment that was effective to cost centres (Obsogne and Lackson 2005). The study further showed us that most respondents agreed that ICT enabled users to view all materials available in stock, enabled a centralised database on inventory information and generated expenditure reports. A higher number of respondents assumed that the systems were able to provide prompt response to requests where some were not even aware of the existence of a system enhanced auditing platform.

The study findings revealed that the participants cited lack of system alerts on depleting inventory levels, material obsolescence and expirations. It was also revealed by 95% of the participants that there was no Electronic Data Interchange (EDI) with suppliers which was hampering information sharing. Ninety percent agreed that the processes were affected by extended lead times. It was further revealed that 80% of the participants felt that the systems did not have integrated logistical functions that had to link all the business activities.Seventy percent felt that system improvements were costly to most organisations creating wastage to the companies due to expiration of materials and 60% also agreeing to material expirations (Ali and Kurnia 2011).

The findings that the system was not automated to handle inventory shelf life as some items were being affected by expiration and obsolescence. It also emerged that stores personnel were carrying out the mammoth task of having to physically check inventory items for expiry dates and obsolescence as there was no provision for system updates on material shelf life. Fifty percent of the participants revealed that some materials were reaching expiry dates whilst in inventory. Managing inventory shelf life was pointed out as a challenge to the system. The participants agreed to the need for stand-alone software that could be specifically written for inventory management that would monitor materials self live.

The research findings revealed that some items were being overstocked. Participants cited that the systemswere able to handle minimum stock levels as some items were out of stock at the time reservations were made. The study also showed that the ERP systems were not being fully utilised to the optimal inventory levels.

The respondents agreed to the need for automatic alerts on inventory items that have been kept on shelf for extended periods of time. The participants called for an extended ERP system that included approved suppliers/vendors.

## VI. Research Findings

The study revealed that the companies' adoption of ICT inventory management improved the inventory function through real-time processing of transactions, accessibility of information from a centralised database, productivity and efficiency across all the departments. The system enabled checks and balances on all inventory transactions. It also revealed that ICT assisted in promoting standardised inventory management procedures, reducing on work-load as well as on improving the quality for the inventory function.

The study also showed that though ICT has contributed to the effective management of inventories there were still areas to be improved as they negatively affected the efficiency of the whole system. The systems did not have automated applications to update users on inventory levels which led to frequent stock-outs on some materials as well as overstocking on others. The findings further revealed that inventory items were becoming obsolete and others expired whilst in stock due to lack of an alert system. The study asserted that the systems were not fully utilised as the companies experienced extended lead times when ordering materials and did not avoid through obsolescence.

## VII. Recommendations

On the basis of the above findings the following recommendations was made. It was recommended that the companies should invest in technology to embrace new ICT applications and solutions as they emerge to alleviate challenges that hampered effective inventory management. The study further recommended the automation of all critical processes to achieve efficiency. Automatic alert systems should be installed within the SAP programme to manage inventory shelf lives and provide automatic updates on inventory levels.

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