

Impact of ICT on Inventory Control and Management: A Case Study of Healthcare Institutions in Port Harcourt Metropolis

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Abstract:- This present study is focused mainly on the impact of Information Communication Technology (ICT) in Inventory Control and Management in Healthcare Institutions in Port Harcourt metropolis. Descriptive research design method was employed. One hundred (100) Respondents (Healthcare Workers) participated in the research. Open and closed-ended questionnaire was used to collect data and simple percentage was used to analyze the data. The result of the study revealed that (55%) of the respondents have not been trained in the use of ICT and only few of them use ICT in the control of inventory (40%). The workers were not provided with computers and other software (70%). The result also identified some challenges faced by the health workers in the use of ICT for control of inventories (78%). Recommendations are that the health workers should be well trained; provided with ICT equipment and organize seminars and workshops regularly in all healthcare institutions. The study has been able to show that ICT is a veritable tool in the control and management of inventories for effective healthcare delivery, even though it is not fully practiced in healthcare facilities in the study area.

Keywords: Information Communication Technology (ICT), Inventory Control, Healthcare Facilities

I. INTRODUCTION

1.1 Background of the Study

Information systems in healthcare have become increasingly advanced over the last decade or so, and their ever-growing range of capabilities have led to widespread use of these systems throughout the healthcare industry. In fact, use of some level of information management has become virtually universal among healthcare providers, facilities and health systems (TrioTree Technologies, 2018).

Today's healthcare is very important part of our society & for a healthcare provider to do their job in effective and efficient manner is very challenging. In multi specialty hospitals, lots of patients enter or exit in a day, it's really challenging to

maintain records of all patients manually. To reduce their burden or to manage hospital administration, financial or clinical aspects smart hospital information management system software came into existence. However to implement this system in hospitals the use of **HISTREE** an Enterprise Hospital Information System (HIS) is employed to make the day-to-day operations smooth and also provides detailed MIS reports and analytics capabilities enabling the hospital to take critical business decisions (TrioTree Technologies, 2016).

Clinical information system which is an efficient and flexible Hospital information system plays a vital role in hospitals. It is specially designed to manage the clinical, administrative and financial aspects of a hospital. It is also functions in the management of all information related to the patient record and hospital inventory, all hospitals rely on hospital information system software (TrioTree Technologies, 2016).

A digital administrative process is necessary to guarantee faster product ordering process with fewer errors, automatic ordering of replenishment products, less time spent by supplier and hospital on product range and item management, faster booking of incoming goods and more complete cost estimations with fewer errors (for reimbursement reasons) (The New York Times, 2016).

Inventory control, also known as stock control, involves regulating and maximising your company's inventory. The goal of inventory control is to maximise profits with minimum inventory investment, without impacting customer satisfaction levels. Inventory control is also about knowing where all your stock is and ensuring everything is accounted for at any given time. Today's modern information systems typically use computers; each one is connected to each other by an optimised network to carry out inventories in hospitals (TradeGecko, 2018).

Inventory control is concerned with the periodic review of materials in stock to detect those not required for planned production or for other purposes not required and whether obsolete materials continue to occupy storage space until removed from stores (Shivam, 2018).

The inventory control methods give us a means for determining an optimal level of inventory as well as how much should be ordered and when. There are several methods suggested for inventory controls.

The most important systems used for inventory control are:

(a) *ABC System: (Shivam, 2018).*

A firm using ABC system segregates its inventory in to three groups-A, B and C. The 'A' items are those in which it has the largest rupee investment. This group consists of the 20 per cent of the firm's rupee investment. The B group consists of the items accounting for the next largest investment, i.e., the B group consists of the 30 per cent of the items accounting for about 8 per cent of the firm's rupee investment.

The C group typically consists of a large number of items accounting for small rupee investment. C group consist of approximately 50 per cent of all the items of inventory but only about 2 per cent of the firm's rupee investment.

The Common Procedure for Categorization of Items into 'A', 'B' and 'C':

- 1) The categorisation can be made by comparing the cumulative percentage of items with the cumulative percentage of usage value.
- 2) All the items are to be ranked in the descending order of their annual usage value.
- 3) The cumulative percentage of items to the total number of items is also marked in another column.
- 4) The cumulative totals of annual usage values of these items along with their percentages to the total annual usage value are to be noted along-side.

• **The advantages of this system are listed below**

- 1) It helps in achieving the main objective of inventory control at minimum cost.
- 2) It helps in developing a scientific method of controlling inventories.
- 3) It gives closer control on costly items.

• **The Limitations of ABC Analysis**

- 1) The system analyses the items according to their value not according to their importance in the production process.
- 2) The analysis to be effective needs to be constantly undertaken and periodically reviewed by management.

- 3) Generally hundreds of items fall in category 'C' as a result a lot of time is spent on managing inventory.

(b) *Budgetary Control System:*

Budgetary control is a tool of management used to plan, carry-out and control the operations of business. It establishes pre-determined objectives and provides the basis for measuring performance against these objectives. Under this system the numbers of units of the materials to produce a finished product and the level of inventory to be maintained and the quantities to be purchased during the period are all pre-determined.

When these plans are projected in advance they are called budgets. Control over inventories is exercised on the basis of budgeted figures. Successful inventory budgeting depends upon the sales forecast. The budget on control system has the advantage of the co-ordination on the inventory consumption level and the expected consumption.

This system integrates and ties together all activities of the enterprise right from the planning to control. Control helps to eliminate or reduce unproductive activities and minimizing waste. It is an effective method of controlling activities of the business unit since it provides standards against which actual performance is measured.

(c) *Minimum-Maximum System:*

This is one of the oldest methods used in most of the business for controlling inventories. It is essential that proper control should be exercised on the level of the inventory to be maintained. Efficient management of inventory demands that both over and under investment in stock be avoided.

If higher levels of inventories are maintained stock level will be influenced by obsolescence, change in fashion and improvements in technicalities. Too much capital tied up in inventories results in the lower rate of return and the possibility of substantial loss from decline in market value.

Too small a quantity is likely to reduce the value of the business and proper servicing of the customers. According to this, a maximum level of inventory based upon the demand and the minimum level to prevent out of stock conditions for each item of stock are established. An order is placed when the minimum level is reached which will bring the quantity to the maximum level.

(d) *The Economic Order Quantity Approach:*

The Economic order quantity (EOQ) refers to the optimal order size that will result in the lowest total of order and carrying costs for an item of inventory given its expected usage, carrying cost and ordinary cost. By calculating an economic order quantity, the firm attempts to determine the order size that will minimise the total inventory costs (Shivam, 2018).

Even with the advance in technology, healthcare institutions still keep track of their inventories and records manually instead of the use of computers to order, track and reorder their goods and services. There are also problems of not knowing how to stock the right amount of inventory, not paying the right amount for the inventory (Economic Order Quantity), not knowing the reorder point as well as not ensuring the right amount of inventory is in the right place.

1.2 Objectives of the Study

- (i) To access the impact of Information Communication Technology in inventory control and management in health institutions in rivers state
- (ii) To assess the effect of the use of ICT in the smooth running of hospital administrations in health institutions in Port Harcourt Metropolis, River State.
- (iii) To identify the nature and practice of inventory control and management through the use of ICT in health institutions in Port Harcourt Metropolis, River State.
- (iv) To examine the challenges faced by health workers in the cause of using ICT to keep inventory in Hospitals in Port Harcourt Metropolis, River State.

1.3 Significance of the Study

The research project on the impact of information communication technology in inventory control and management will be of significant in the following areas:

- (i) In Hospital Information Systems which provide a common source of information about a patient's health history. The system has to keep data in a secure place and controls who can reach the data in certain circumstances. These systems enhance the ability of health care professionals to coordinate care by providing a patient's health information and visit history at the place and time that it is needed.
- (ii) The research would go a long way to help to increase awareness and knowledge about the benefits and importance of the use of ICT in the control and management of inventory in to enhance healthcare delivery.

Health authorities such as the physicians, pharmacists, nurses, and others health care providers will also gain insight into the current state of practice with regard to Health information through the use of ICT.

II. METHODOLOGY

2.1 Research Design

The design of the study is descriptive survey. A descriptive survey is concerned with ascertaining and establishing the status quo, facts or pieces of information at the same time of the research and presenting such facts as they are (Ogomaka, 1992). Similarly, Nwogu (1991) posits that, descriptive

surveys are those studies which aim at collecting data and describing in a systematic manner, the characteristics, features and findings about a given population.

2.2 Area of Study

The area of study is PortHarcourt Metropolis. Port Harcourt also referred to as (Ikwerre: Ígúócha; (Njoku, 2008; McCall, 2000; Okafor, 1973)Pidgin: *Po-ta-kot* (Hudgens,andTrillo,2003)is the capital and largest city of Rivers State, Nigeria. It lies along the Bonny River and is located in the Niger Delta. As of 2016, the Port Harcourt urban area has an estimated population of 1,865,000 inhabitants, up from 1,382,592 as of 2006 (Demographia,2016;Arizona-Ogwu, 2011).

The main city of Port Harcourt is the Port Harcourt City in the Port Harcourt local government area, consisting of the former European quarters now called Old GRA and New Layout areas. The urban area (Port Harcourt metropolis), on the other hand, is made up of the local government area itself and parts of Obio-Akpor accordingly (Izeogu, 1989). Port Harcourt, which is the current capital of Rivers State, is highly congested as it is the only major city of the state. The Greater Port Harcourt region, spans eight local government areas that include Port Harcourt, Okrika, Obio-Akpor, Ikwerre, Oyigbo, Ogu-Bolo, Etche and Eleme. Its total population was estimated at 2,000,000 as of 2009, making it one of the largest metropolitan areas in Nigeria (Ogbonnaet al., 2007).

Port Harcourt is a major industrial centre as it has a large number of multinational firms as well as other industrial concerns, particularly business related to the petroleum industry. It is the chief oil-refining city in Nigeria and has two main oil refineries that process around 210,000 barrels of crude oil a day, both operated by the Port Harcourt Refining Company (Port Harcourt Climate Normals 1961–1990;Nigerian Extractive Industries Transparency Initiative, 2014).

Like every other city in the country's south, religion in Port Harcourt is predominantly Christianity. Roman Catholics make up a significant portion of the Christian population (World66.com , 2014). There are scores of churches, parishes and priests within the Port Harcourt Catholic diocese(Ihejirika, 2009).The central church is the Corpus Christi Cathedral Parish in D-line(dccwo.org, 2014).

The city is also home to other Christian denominations such as Anglicans, Methodists, Baptists, Presbyterians, and members of Evangelical and Pentecostal groups. Very few number of residents adhere to the Islamic faith (World66.com , 2014).

2.3 Population of the Study

The target populations for this study are 100 healthcare workers between the ages of 18 and above, and are working in healthcare institutions in Port Harcourt Metropolis.

2.4 Sampling Procedure

Purposive sampling technique which is a type of non-probability or biased sampling was used in this study. It has to do with the use of specific cases which has specific characteristics to be studied. The researcher also used the stratified sampling technique, which entails dividing the target population into homogeneous sub-populations into Age, Marital status, Awareness level, Literate level (Educational Background), Income, est.

2.5 Sample Size

The sample size for this study is about 100 healthcare workers of 18 years and above.

2.6 Instrumentation

The instrument for data collection employed in this research is a questionnaire on the Use of ICT in Inventory control and management for healthcare delivery. The questionnaire were given to the respondents and retrieved immediately.

2.6.1 Validity of the Instrument

The instrument for data collection (Questionnaire) was validated by my supervisor Egba N. Ifeanyichukwu, the Head of ICT Department Rivers State College of Health Science and Technology, Port Harcourt.

2.6.2 Reliability of the Instrument

A pilot study was carried out using 10 healthcare workers in the area of study. The study was successful and proved the instrument reliable.

2.7 Method of Data Analysis

This study adopted the simple percentage method in the analysis of data. The respondents were divided into sub-groups as earlier stated and the percentage of those who said YES or NO was analyzed. Bar charts and pictographs were also used to analyze the data so collected.

III. RESULTS

3.1.1 Result of the Age of the Respondents

Table 3.1 showed that 44 respondents representing (44%) of the population were within the age 20-29 years, 40 (40%) were within the age of 30-49 years where as those within the ages of 50 and above were 15 (15%), participated in the study respectively.

S/N	Age Range	No of Responses	Percentage (%)
1.	20-30 years	44	44%
2.	30-49 years	40	40%
3.	50 years and above	15	15%
	Total	100	100%

3.1.2 Result of the Marital Status of the Respondents

The result in table 3.2 showed that close to half of the population of the respondents were single 48 (48%), a higher percentage were married 45 (45%), 5 respondents (5%) were divorced whereas 2 (2%) of the respondents were widows, and participated in the study respectively.

S/N	Marital Status	No of Responses	Percentage (%)
1.	Single	48	48%
2.	Married	45	45%
3.	Divorced	5	5%
4.	Widow	2	2%
	Total	100	100%

3.1.3 Result of the Educational Status of the Respondents

It was deduced from table 4.3 that greater percentage of the respondents 80 (80%) had tertiary school education; followed by those who had secondary education 20 (20%), while none of the respondents had educational status of primary education and non-formal education.

S/N	Educational Status	No of Responses	Percentage (%)
1.	Primary	0	0%
2.	Secondary	20	20%
3.	Tertiary	80	80%
4.	Non-formal	0	0%
	Total	100	100%

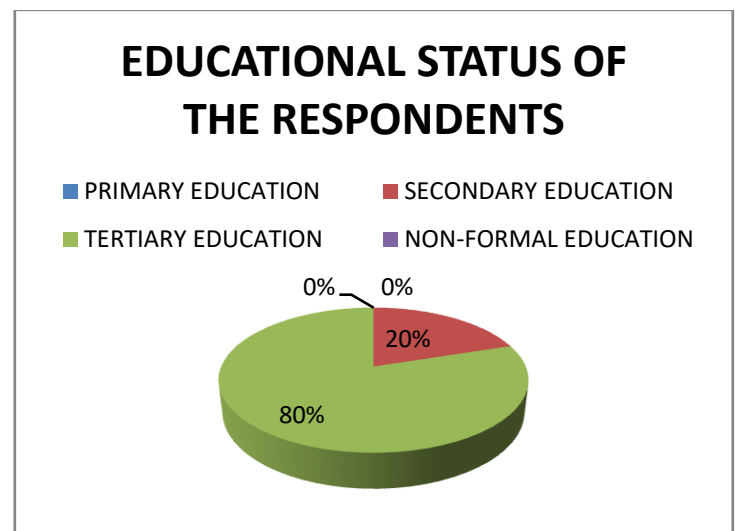


Figure 3.1 showing the graph of the educational status of the respondents

3.1.4 Result of the Yes and No Items in the Questionnaire

Forty five (45) respondents representing 45% of the population have been trained in the use of ICT, 55 (55%) was not trained. 40 (40%) said yes to the use of ICT in inventory control and management, 60 (60%) said no. 30 (30%) were provided with computer while 70 (70%) was not provided with computers. 78 (78%) agreed to having challenges in the cause of using ICT, whereas 22 (22%) said no.

S/N	Items	Yes (%)	No (%)	Total (%)
1.	Have you been trained in the use of ICT?	45 (45)	55 (55)	100 (100%)
2.	Do you use ICT in the control and management of inventories?	40 (40)	60 (60)	100 (100%)
3.	Were you provided with computers and other software's for use in control of inventory?	30 (30)	70(70)	100 (100%)
4.	Are there challenges faced by health workers in the cause of using ICT?	78 (78)	22 (22)	100 (100%)

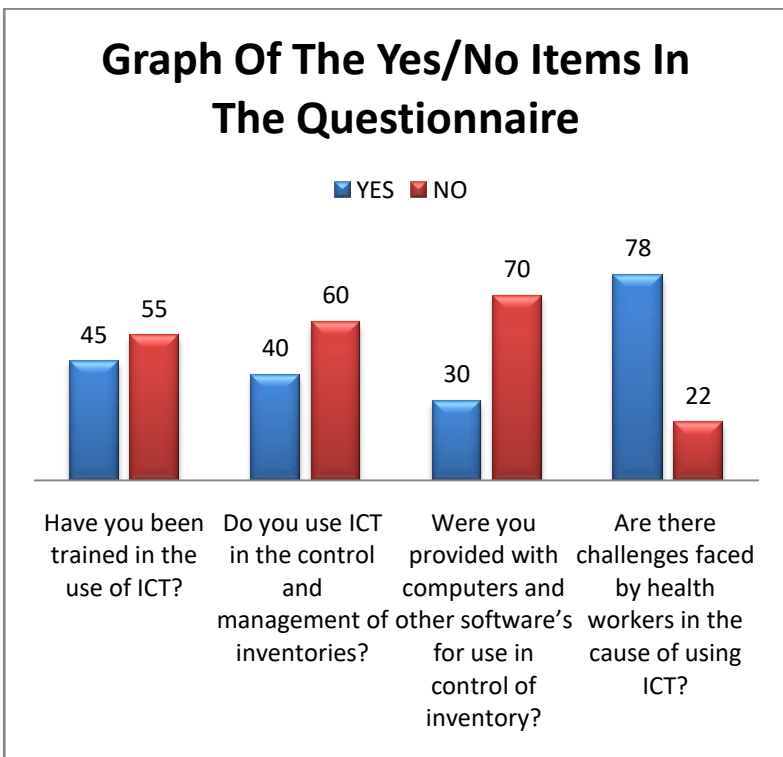


Figure 3.2: showing the graph of Yes/No Items in the Questionnaire

3.1.5 Result of the Nature and Practice of Inventory Control and Management Through the Use of ICT in Health Institutions

It was revealed in table 4.5 that 59 respondents representing 59% of the population said that the nature and practice of inventory control using ICT is bad; 24 (24%) said it is in a good shape whereas 17 (17%) said it was excellent.

S/N	Nature and Practice of Inventory Control and Management	Number of Responses	Percentage (%)
1.	Bad	59	59%
2.	Good	24	24%
3.	Excellent	17	17%
TOTAL		100	100%

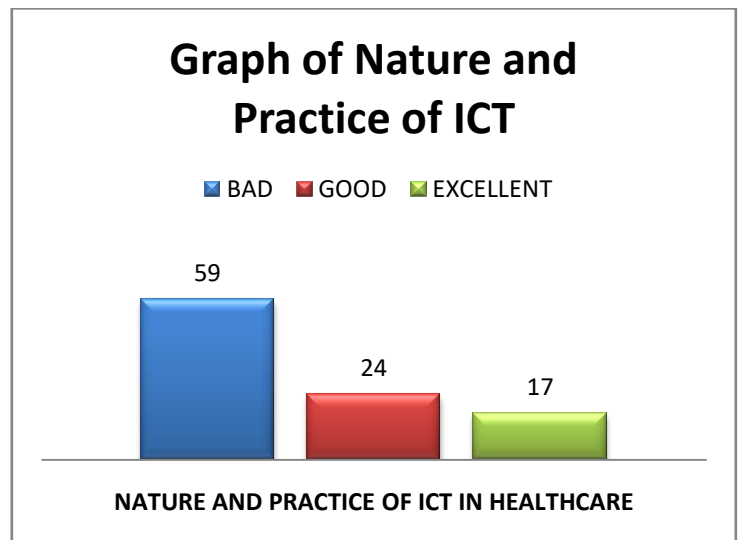


Figure 3.3: Showing the Nature and Practice of ICT in Healthcare Institutions

IV. DISCUSSION

4.1 Discussion of Findings

The result of the present study as seen in table 3.4 indicated that more than half of the populations of health workers have not been trained in the use of ICT. This means that greater percentages of those working in healthcare institutions are not computer literate. It also showed that some of the health institutions lack qualifies and trained ICT personnels.

The study also revealed that only few of them use ICT to control inventories while greater percentage of the health workers do not use ICT to control inventories.

The workers were not provided with computers and other softwares for use in the control and management of inventories for healthcare delivery.

The workers are faced with lots of challenges on the use of ICT which were; lack of qualified and trained personnels, inadequate distribution of ICT materials and equipment; poor maintenance of existing ones; inadequate power supply; poor network system; and that ICT is expensive to maintain.

The possible solutions as outlined in the cause of carrying out this study were that; the Government should employ qualified and trained staff in the use of ict; adequate distribution of ICT equipment and materials and equipment; provision of ICT health care delivery centers; provision of computers/laptops for all health workers; regular training of workers to keep them updated and acquainted with modern ICT programmes and techniques; organizing of seminars and workshops in the use of ICT as well as making ICT compulsory for all health workers for better and efficient healthcare delivery.

The nature and practice of inventory control and management through the use of ICT was seen as bad (59%) by majority of the respondents in the present study. This is to say that, inventory control which is concerned with the periodic review of materials in stock to detect those not required for planned production and for checking of obsolete materials not to occupy in storage space is not well practiced in health care institutions.

V. CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

This study has been able to find out that clinical information system which is an efficient and flexible Hospital information system plays a vital role in hospitals as well as a digital administrative process which is necessary to guarantee faster product ordering process with fewer errors, automatic ordering of replenishment products, less time spent by supplier and hospital on product range and item management, faster booking of incoming goods and more complete cost estimations with fewer errors.

The study also identified some problems and possible solutions which at the end of the day gave a new and novel direction on how ICT and inventory control in healthcare should be practiced.

5.2 Recommendations

The following recommendations were made, based on the findings of the study:

1. Government should employ qualified and trained staff in the use of ICT.
2. There should be adequate distribution of ICT equipment and materials.
3. ICT health care delivery centers should be established in every region in the state.
4. Computers/laptops should be provided for all health workers.
5. Regular training of workers should be encouraged to keep them updated and acquainted with modern ICT programmes and techniques.
6. Seminars and workshops should be organized on the use of ICT.
7. ICT should be made compulsory for all health workers for better and efficient healthcare delivery.

8. The nature and practice of inventory control and management through the use of ICT should be encouraged in every healthcare center.

COMPLIANCE WITH ETHICAL STANDARDS

Conflict of Interest: Authors have declared that no conflict of interest exists.

Financial Disclosure: The finances were used according to plan and were disclosed to all the authors.

Funding/Support: There was no special funding for the project. The funding was done by the authors.

Ethics Approval: All authors hereby declare that all questionnaires have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the laid down ethical standards.

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