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Evaluating effects of ICT on materials management at Electricity Company of Ghana (ECG) Takoradi

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Abstract
This study was carried out to assess the effects of Information Technology on material management. This was undertaken using Electricity Company of Ghana (Takoradi) as the case study. The study focused on staff of ECG and questionnaires were used to collect relevant data. There was 100% response rate. The findings revealed that ECG performed some materials and warehouse operations and activities which included material estimation, budgeting, planning and programming. The findings also revealed that the use of information technology helps to reduce time spent on material purchasing and also reduces the time to source materials. On effects of information technology on material management, it has helped to provide timely customer service, keep track of items, and there is as well potential loss of proprietary and confidential information in using information technology. The researcher' work revealed that there can be technological cost, for example, software use for effective and efficient material and warehouse operations. The study therefore recommends that; the organization should strive to ensure warehouses are adequately automated by management systems that can improve how materials can be managed. Also, employees should undergo further training in order to adapt to the emerging technologies for materials and warehouse operations to be effective. The level of materials handling must be high, in order to know the minimum and maximum level of material to control demand estimation and procuring of materials. Backup plans must also be provided in case information technology on warehouse management fails, so that challenges will not arise.

Keywords: evaluating, effects, ICT, materials, management, electricity, company, Ghana, Takoradi

1. Introduction
1.1 Background of the Study: According to Miller (2010), material management involves all activities put in place to ensure that customers have the needed product or service. It coordinates the purchasing, manufacturing and distribution functions to meet the marketing needs and organizational needs of availing the product to the customers. Material management is primarily involved with specifying the size and placement of stocked goods. It is required at different locations within a facility or within multiple locations of a supply network to protect the regular and planned course of production against the random disturbance of running out of materials. Information technology plays a very important role in the supply chain of organizations. Warehousing may also be considered as a commercial building for storage of goods, or an intermediate area for storing raw materials or products until they are needed for production or consumption (Richards G., 2017). Warehousing is a part of logistics which serves as the backbone on which the whole supply chain of an organization runs. According to Fiala (2005) [10], supply chain is defined as a system of suppliers, manufacturers, distributors, retailers and customers in which material, finance and information flows connect participants in both directions. At various points in the supply chain, goods, materials, component parts, work- in- progress, finished goods, etc are stored temporary before further work or distribution to the final consumer or customer.

Ensuring effectiveness in material management is key to the success of the whole supply chain as it helps to reduce waste and enhance value creation in the supply chain. Material management can be made more effective with the introduction of information technology to help ensure a cost-effective warehouse operations. Innovations in information processing, telecommunications, and related technologies known collectively as "information technology" (IT) are often credited with helping fuel strong growth in many economies (Coombs et. al., 1987) [7]. Through the use of computer technology and electronic data transfer characterized by fast, accurate and comprehensive collection, analysis and use of data, there has been a stepwise improvement in service levels, inventory reduction, effective

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Utilization of resources (such as storage space and handling of equipment cost), reduction or elimination of paperwork and clerical errors, helped in easy tracking of goods, etc.

1.2 Statement of the Problem

Problems of materials management and control have been around for a very long time. The need to collect food when it is readily available and then store it for times of shortage is perhaps the fundamental stock holding problem, which was tackled long ago by man. According to Sunil and Sameer (1998) [22], to compete more effectively in a global marketplace, it is important that firms understand the issue of inventory control and align their supply chain appropriately. Lack of materials oversight in the warehouse of organizations cause a stockpile of inefficiencies within the warehouse which slows down operations and increases cost as well. Without adequate insight into location and layout, pickers take longer time to find the items needed. Poor security in the warehouse also leads to theft and pilferage whilst excess movement and excess staffing becomes challenges to the organization as a result of an inability to easily track items in stock. Poor warehouse management systems also may also lead to excess stock which has a ripple effect on working capital. Late detection of expiry dates also becomes cost to the organization. All these costs could however be avoided.

Warehousing is costly in terms of human resources and of the facilities and equipment required, and its performance will affect directly on overall supply chain performance. Inadequate design or managing of warehouse systems will jeopardize the achievement of required customer service levels and the maintenance of materials integrity, and result in unnecessarily high cost of business operations (www.ciilogistics.com, accessed July 2020). Strategic use of IT tools or facilities enable an organization to: easily do stock tracking, quick identification of outdated materials, reduction of clerical errors which may lead to overstocking or under-stocking with ripple effects on holding cost and poor customer service delivery respectively. An MRP (Materials Requirement Planning) system for instance is a strong IT tool that helps to relate demand for material directly to the master production schedule which helps to reduce shortage of materials with less demand in production (Bai L. & Zhong Y., 2008). Therefore, this research is aimed at assessing the effects of information technology (IT) on materials management in an organization at Electricity Company of Ghana (Takoradi).

1.3 Objectives of the Research
1.3.1 General Objective
The main objective of the study is assessing the effects of information technology (IT) on materials management at Electricity Company of Ghana (Takoradi branch).

1.3.2 Specific Objectives
The specific objectives are to;
- To find out some of the IT tools that can be used to manage materials in the warehouse at ECG.
- To ascertain the effects of IT on the performance of materials operations at ECG.
- To identify some of the challenges associated with the use of IT in the management of materials at ECG.

1.4 Research Questions
The research questions for this study are as follows:

- What are some of the IT tools that can be used to manage materials in the warehouse at ECG?
- What are the effects of IT on the performance of materials operations at ECG?
- What are some of the challenges associated with the use of IT in the management of materials at ECG.

1.5 Justification of the Study
As researcher, this study will broaden the skills and knowledge in the field of stores and warehouse management. It will enable the researcher to provide consultancy service in the area of information technology and warehouse as well as contributing to academic since the project study will serve as a guide for future references and studies in the area of information technology and warehouse management.

The research will also serve as a source for relevant information to the management of the ECG in the Central Region to use it as a guideline to identify some of the challenges the company has been facing and as a result, will enable in finding possible solutions.

With this study, the government will realize the relevance of information technology and warehouse management and as a result, will formulate policies to regulate the use of information technology and warehouse management in the county.

Information technology and warehouse management are very important to every society, since they make material and available and in god condition to people. Information technology and warehouse also help society to gain knowledge and understanding of the concept of information technology and warehouse management.

1.6 Scope of the Study
The research will cover the effects of information technology in the management of materials at Electricity Company of Ghana. This research will be conducted within the boundaries of Takoradi.

1.7 Limitations of the Study
Due to series of research limitations such as inadequate purchasing proactive books, and supply management books at the library. This makes the work tough for the researcher. This is because one must go outside for available information.

The major limitation of the study was time factor since the research work has to be blended with major academic work making it more difficult for the researcher to devote the needed attention to the study.

Financially, the cost of transportation in carrying out the research was not left. This type of study requires enough money to enable researcher visit the necessary places for collection of data information. Insufficient fund hindered an in-depth study of the research since it was financed from the researcher little pocket money for the research.

Finally, the unwillingness of the respondents to respond.

2. Literature Review
In this section, the researcher try to review literature related to the topic: the effects of information technology on materials management how it will contribute to organizations efficiency, effectiveness and profitability.

2.1 Overview of Materials Management

Materials management involves the coordinating of materials availability, controlling, utilization and procuring of materials. Materials management is the direction of activities with the purpose of getting the right inventory in the right place at the right time and in the right quantity and it's directly linked to production function of any organization which implies that the inventory management system operated will affect the profitability of an organization directly and indirectly (Alm, 2000).

Materials are the stock of raw materials, work in progress, finished goods and supplies held by a business organization to facilitate operations in the production process, (Pandey, 1995). Also if the company fails to manage its inventory efficiently, it is likely to face profitability problems (Block and Hirt, 1987).The goal of inventory management therefore is to provide the inventories required to sustain operations at minimum costs (Dickerson 1995).

Materials management helps organization to establish the proper inventory levels through the economic order quantity; and to keep track of this level through inventory control system which many are manual such as two bin method and red line method, or computerized inventory control systems. Proper Materials management also require an organization to undertake stocking and use appropriate method to value stock so as not to under or over state profits (Kotabo, 2002).

A very key component of logistics management is warehouse and inventory management. Warehouses are essential components of any supply chain. In a warehouse items are handled in order to level out the variability and imbalances of the material flow caused by factors such as seasonality in demand, production scheduling, transportation, and consolidation of items (Guet al., 2007). Inventories in warehouses are capital intensive assets that require storage areas, handling equipment, and information systems (Nils and Stefan 2013).

The capital and operating costs of warehouses represent about 20- 25% of the logistics costs (Frazelle, 2002; Baker and Canessa, 2009) [11, 12, 2]. Therefore, improvements in the planning and control of warehousing systems can contribute to the success of any supply chain.

2.2 Overview of Warehouse Operations
A warehouse is typically divided into functional areas that are designed to facilitate the material flow (Tompkins et. al., 2010) [23]. The main warehouse areas are outlined in the following: receiving area, reserve and forward storage area, and shipping area. Operations in the receiving area include the processing (i.e., unloading) of carriers, item identification, and quantity and quality inspection. Received items are then moved to a storage area or directly to the shipping area. The storage area is often divided into a reserve and a forward storage area.

The reserve storage area covers typically distant and heavily accessible locations, e.g., the uppermost part of a rack, and is used to ensure the replenishment for the forward storage area. Customer demand is primarily satisfied from the forward storage area, where the items are typically stored in convenient sizes and the storage locations are easily accessible. In the shipping area, items are sorted, consolidated and loaded on the carriers. While this is a general material flow in a warehouse, the actual material flow depends mainly on the role of the particular warehouse in the supply chain.

Specialized warehouses are established to fulfill the different requirements, e.g., production warehouse, distribution warehouse and cross-dock. The main function of a production warehouse is buffering and storage, it supplies raw or semi-finished material for production and may prepare finished items for shipment; the typical objective is the minimization of operation and investment costs given the storage capacity and response time (Rouwenhorst et al., 2000) [19].

Distribution warehouse (or distribution center) handles, in addition, the distribution of items. In this case, the general objective is to achieve high throughput at minimum operational and investment costs. In a cross-dock (or transshipment center), storage is scarcely presented, incoming items are immediately sorted and new customized shipments are created (De Koster et. al., 2007) [8].

2.2.1 The Objectives of holding Materials in the warehouse
In the past, warehouses were referred to as cost centers and rarely adding value. But the increasing need for transfer of products across cities, countries and continents resulting from movement of production to the Far East, the growth in e- commerce and increasing demands from end users, have caused a change in the perception of warehouses. They are vital components within today's supply chain (Richards, 2011). According to Bassin (1990) [3], effective inventory management is essential in the operation of any business. Lining Bai and Ying Zhong (2008) [17], stress that it helps to reduce cost items such as capital cost for inventory and holding cost of flows. According to Rushton, Croucher, and Baker (2010) [20], warehouse operations could easily be the costliest element of the supply chain if strategic measures are not put in place. There is therefore pressure on warehouse managers to increase productivity and accuracy, reduce cost of inventory whilst improving on customer service levels.

2.2.2 Materials costs incurred in procurement process
Purchase costs
According to peurifoy (2000), the purchase cost of an item is the purchase price from an external source including transportation and freight costs. For construction materials, it is common to receive discount for bulk purchases, the unit purchase cost declines as quantity increases. These reductions may reflect manufactures marketing policies, economies of scale in the material production, or scale economies in transportation. There are also advantages in having homogeneous material. For example, a bulk order to insure the same color or size of items such as bricks may be desirable. Accordingly, it is usually desirable to make a limited of large purchases for materials. Cordell

In some cases, organizations may consolidate small orders from a number of different projects to capture such bulk discounts; this is basic saving to be derived from a central purchasing office.

Cordell (2006) noted that the cost of materials is based on bargaining leverage, quantities and delivery time" Cordell continues that organization with potential for long term purchase volume can command better bargaining leverage. While orders in large quantities may result in lower unit prices, they may also increase holding costs and thus cause problems in cash flow. Requirements of short delivery time also adversely affect unit prices. Furthermore, design

characteristics which include items of odd sizes r shape should be a void. Since such items normally are not available in the standard stockpile, purchasing them causes higher prices.

Order costs include expenses of making requisitions, analyzing alternatives, writing purchase orders, receiving materials, checking on orders, and maintaining records of the entire process. Order costs usually only a small portion of total costs for material management in construction projects, although may require substantial time.

Holding costs

Tersine (2002), say that the holding costs or carrying costs are primarily the result of capital costs, handling, storage, obsolescence, shrinkage and deterioration. Capital costs results from the opportunity cost or financial expenses of capital tied up in inventory. Once payment for goods is made, borrowing costs are incurred or capital must be inverted from other productive uses.

Consequently, a capital carrying cost is incurred equal to the value of the inventory during a period multiplied by the interest rate obtainable or paid during that period.

He notes that capital costs only accumulate when payment for materials actually occurs; many organizations attempt to delay payments as long as possible to minimize such costs. Handling and storage represent the movement and protection charges incurred for materials. Storage costs also include the disruption caused to other project activities by inventories of materials that get in the way.

Lange, (2006), adds that obsolescence is the risk that an item will lose value because of changes in specification shrinkages are the decrease in inventory over time due to theft or lose.

Deterioration reflects a change in material quality due to age or environmental degradation. Many of these holding costs components are difficult to predict in advance; a project manager knows only that there is some chance that specific categories of cost will occur. In addition to these major categories of costs, there may be ancillary costs of insurance, taxes (many states treat inventories as Taxable property), or additional fire hazards.

Unavailability cost

According to Laugero (2002) the unavailability cost is incurred when a desired material is not available at the desired time. In manufacturing industries, this cost is often called the stock- out or depletion cost. Shortages many delay work, thereby wasting labor resources or delaying the completion of the entire project. Again, it may be difficult to forecast in advance exactly when an item may be required or when a shipment will be received. While the project schedule gives one estimate, deviations from the schedule may occur during construction. Moreover, the cost associated with a shortage may also be difficult to assess, if the material used for one activity is not available, it may be possible to assign workers to other activities and, depending upon which activities are critical, the project may be delayed.

Tradeoffs of Costs in material Management

Laugero (2002) asserts that to illustrate the type of trade-offs encountered in material management, a particular item has to be ordered for a project amount of time required for processing the order and shipping the item is uncertain.

Consequently, the project manager must decide how much lead time to provide in ordering the item. Ordering early and thereby providing a long lead time will increase the chance that the item is available when needed, but it increases the cost of inventory and the chance of spoilage on site. It also adds that, in more realistic situation, the manager would also contend with the uncertainty of exactly when the item might be required. Even if the item is schedule for use on a particular date, the work progress might vary so that the desired date would differ. In many cases, greater than expected work progress may result in on savings because materials for future activities are unavailable.

2.3 ICT tools commonly used in Materials Management Operations

Information Technology (IT) can be defined as the use of electronic machines and programmes for the processing, storage, transfer and presentation of information (Bell, L C. and Stukhart, G.,1986) [4]. The emphasis to integrate ICT tools in industries today serve as a vehicle for operational efficiency and strategic management; the interest generated by researcher in this area has been a topic of interest and debate for a number of researcher (Tushman, 1986; Nielsen & Erdogan, 2006; Kraus, 2006; Dyer, 2006; Wagner, 2000; Breidenstein, 2001) [28, 5].

Common ICT tools that enable an efficient and effective management of stock in inventory or in a warehouse include: The Use of Bar Code and Bar code scanners/Readers, Biometric Verification Systems, Warehouse Management System (WMS), Electronic Data Interchange Systems (EDI), etc.

2.3.1 Bar Code Systems of Technology

Barcodes are "printed horizontal strips of vertical bars used for identifying specific items". A "scanning device reads the barcode by moving a beam across the symbol". The first barcode system was developed around the 1940s and 1950s, since then people have become very accustomed to their use, through common applications such as in retail and grocery markets (Granneman S., 2003) [13]. This tool enables inventory and warehouse managers to easily and quickly track stock levels, items going out of date, the price and quantity of items left in stock, etc.

2.3.2 Biometric Verification System

Pilferage is one of the major challenges in the management of warehouses. The Biometric Verification System (BVS) enable warehouse and inventory managers to easily track the time of employees arrival at the warehouse. The identification of individuals and the time at which they entered the warehouse are recorded and stored in the database of the system. It serves as a great security tool that helps to easily track items lost in inventory.

2.3.3 Warehouse Management System (WMS)

Warehousing Management System (WMS) are best described as the advanced technology and operating processes that optimizes all warehousing functions. These functions typically begin with receipts from suppliers and ends with shipments to customers; it also includes all inventory movement and information flows in between these functions. Successful WMS solution are generally designed to merge computer hardware, software, and peripheral equipment with improved operating practices for

managing inventory, space, labor and equipment in warehousing and distribution centers. Implementation of warehouse management system allow a company to increase its competitive advantage by reducing labor cost, improving customer service, increasing inventory accuracy, and improving flexibility and responsiveness.

2.3.4 Electronic Data Interchange System (EDI)
According to Arnold et. al. (1997) [1], the use of an EDI enables the exchange of transaction information such as purchase order, invoice and materials requirement planning information. It helps to eliminate time wastage, reduces paper work which most times lead to clerical errors and facilitates easy communication between suppliers and customers. According to the U.S. Department of the Treasury, (1999) [9], EDI standards eliminate the need for human intervention in the interpretation of incoming and outgoing data.

2.3.5 Value Added Network (VAN)
A third party network, also known as a value added network or VAN, serves as an intermediary between trading partners. A VAN is an electronic service provider that receives, stores, and transmits EDI and other electronic messages for trading partners.

This system helps to administer cross- company inventory on the basis of real-time information. Key supply chain partners can benefit from the use of this system so that management of all partners can make prudent forecast. This goes a long way to decrease the incidence of bullwhip effect which has ripple effects on value creation of the whole supply chain. The system is therefore a crucial element of the supply chain success.

3. Methodology of the study
This section presents the methodology used for the study. It presents the tools that were used to describe and analyze data collected for the purpose of this research. It explains the research design, sources of data collected for the study, the population of the study, sample and sampling procedure, the methods used for data analysis and profile of the organization for the study.

3.1 Research Design
In this research, a multi-method approach was adopted. The study adopted both quantitative and qualitative approach. Thus, both qualitative and quantitative data was collected to answer the research questions. The interview and questionnaire have a very simple structure to enable the researcher to cover all research questions. Personal observation by the researcher will enable them to better understand the opinions of the respondents.

3.2 Population of the Study
A population is a group of individuals, persons, objects, or units from which samples are taken for measurement (Saunders et al., 2009) [21]. The population that is being studied is also called the target population (Mann, 1995) [18]. The target population for the study consists of staff and management of ECG. Questionnaires will be successfully administered and interviews will conducted as well

3.3 Sample and Sampling Procedure
For the purpose of this study, a purposive sampling was used in the selection of the procurement entity within the

region. A simple random technique was adopted in the selection of the staff and management. In all 30 staff of the company was selected of which 20 of the staff work at the managerial position which include the General Manager, Middle Managers, the accountant and Stores Officers.

3.4 Data Collection Instruments
In this study a structured questionnaire will be administered which enables the researcher to address the objectives of the study. Both primary and secondary sources of data will be used.

The primary sources of data will be obtained through interviews and questionnaires and secondary sources of data will also be obtained from published and unpublished articles and journals, text books and the internet. A "face to face" discussions and the administration of questionnaires will enable the researcher to easily compare and contrast all the responses of the respondents. The interview and questionnaire will have a very simple structure to enable the researcher to cover all research questions.

The questionnaire was divided into four sections. The first section had to do with the respondent's demographic characteristics such as age, sex, educational level whilst the second part was to identify some ICT facilities or tools used to manage inventory or warehouse operations at ECG. The third section sought to obtain information on the effects of ICT on the performance of warehouse or material operations whilst the fifth section tries to obtain information on the challenges associated with the use of the ICT tools in the management of materials and warehouse operations in the organization.

3.5 Sources of Data Collection
The use of both primary and secondary sources of data collection will be used to obtain information for the study.

3.5.1 Primary Source of Data
The researcher used questionnaires to solicit for respondents views on assessing the effects of information technology on materials management at electricity company of Ghana (central region) taking into consideration the literacy level of the respondents, namely, staff of ECG (Central Region), questionnaires would be appropriate.

3.5.2 Secondary Source of Data
The researcher gathered data from both published and unpublished articles. Data will also be gathered from the website, journals, books, newspapers, magazines, magazines of different institutions, along with different related studies about change within ECG (Central Region) to supplement the research.

3.6 Data Analysis
Most of the questions was of the closed ended type although few are of the open ended type of questions. The open-ended questions solicit free responses from the respondents, and the closed-ended questions allow respondents to choose one response out of several as a result of the low literacy levels of most of the respondents. The questionnaire consists of both categorical and scale type question items. Likert-scale question items are used to gather the information on the perceptions of the respondents. The questionnaire was pre-tested using a selected group of respondents from the target population to ensure reliability and validity of the

questions and the responses. The secondary data used for the study was sourced from the website of the organization, other related researches on warehouse and inventory management operations, etc. These contribute immensely to the success of the study. All data was coded and analysis will be carried out using the Statistical Package for Social Sciences (SPSS) and Microsoft Excel to measure the means and standard deviations of perceptions obtained. Notwithstanding, the challenges to be faced during the data collection, it does not in any way affect the reliability, validity, credibility, and accuracy of the result.

Data was presented in tables and graphs, and analysis was mainly done using descriptive analysis where issues of similarity and dissimilarities of responses will be compared and statistical tools such as percentages, the mean and standard deviation enabled the researcher to have a good quantitative comparative analysis of responses. The number of respondents to a question is represented by "N" whilst "s.d" was used to represent standard deviation.

3.7 Organizational Profile

Power Distribution Service Ghana (PDS) formerly Electricity Company of Ghana (ECG) is a limited liability company wholly owned by the government of Ghana. The electricity company of Ghana limited (ECG) was incorporated under the companies code, 1963 (act 179) in February 1997. it began as the electricity department on 1st April 1947 responsible for distribution power in the entire country and later became the electricity division in 1962. It was subsequently converted into the electricity corporation of Ghana by (NLCD 125) in 1967.In 1987, the northern electricity department (NED) was established under the Volta River Authority (VRA), to take over from ECG, the responsibility of electric power distribution in northern part of Ghana.

Since then ECG has been responsible for distribution of electricity in six political/administrative regions in southern Ghana namely, Ashanti, Central, Eastern, Greater Accra, Volta and Western regions. Their core mandate is to deliver quality and reliable electricity services backed by a customer-oriented workforce to propel Ghana's socio-economic development and to be among the best power utility companies in Africa.

3.7.1 Function of PDS
- To transmit, supply and distribute electricity.
- To purchase electrical energy in bulk (from VRA) or any other supplier for distribution.
- To construct, reconstruct, install, assemble, repair, maintain, operate or remove sub-transmission stations, electrical appliances, fittings and installations.
- To execute and supervise national electrification programmes on behalf of government.
- To carry out any other activity incidental or conducive to the attainment of the objectives above.

4. Presentation of findings, analysis and discussions

This section presents the summary of the data gathered and results using frequency tables. The main aim of the study was to assess the effect of information technology on materials management at Electricity Company of Ghana (Takoradi). To solicit for responses 30 questionnaire were administered. All were retrieved which represent 100% response rate.

4.1 Demographic Characteristics Of Respondents

This section of the study elaborates the demographic characteristics of the surveyed respondents. The section discusses the gender, age, educational background, working experience and position held in the company.

Table 1: Demographic Characteristics of Respondents

Socio demographics	Frequency	Percentage
Gender		
Male	19	63.3
Female	11	36.7
Age of respondent		
Below 20 years	0	0.0
21-30 years	15	50.0
31-40 years	10	33.3
41-50 years	5	16.7
51+ years	0	0.00
Educational background		
No formal schooling	3	10.00
Basic	2	6.7
Secondary	10	33.3
Tertiary	15	50.0
Job Description		
Manager	5	16.7
Supervisor	6	20.0
Forklift Operator	2	6.7
Loader	9	30.0
Accounts	3	10.0
Customer Service	3	10.0
Security	2	6.0
Years worked with the Company		
1-3 years	7	23.3
4-6 years	16	53.3
7-10 years	5	16.7
11+ years	2	6.7

From table 4.1 presents descriptive characteristics of respondents in terms of gender, age, educational background, job description and years worked with the company. Thirty respondents made up of 19 males and 11 females took part in the survey representing 63.3 and 36.7 respectively. The age distribution was made up of the following, below 20 years representing 0%, 21-30years representing 50.0%, 31-40 years representing 33.3%, 41-50years representing 16.7% and 51years and above representing 0%. 10.0% had no formal education, 6.7% had basic education, 33.3% had their secondary education and 50.0% had tertiary educational background. 16.7% of respondents were managers in the job description, 20.0% were also supervisors in the job description, 6.7% were forklift operators, 30.0% were loaders, 10.0% were accountant, 10.0% were customer service and 6.7% were security in the job description. 23.3% of the respondents have worked within the organization for 1-3 years, 53.3% of the respondents have worked within the organization for 4-6 years, Also, 16.7% of the respondents have worked within the organization for 7-10 years and 6.7% of the respondents who have worked within the organization for 11years and above.

In conclusion, from table 1, it is observed that majority of the respondents are males. Respondents explained that most of the customer service personnel are females as a result of the less energy involved in the work whereas most of the other operations require a lot of energy which account for the high level of males in the organization. This is represented by a percentage of 63.3. This indicates that ECG

has an active and energetic working force. This is represented by a percentage of 50. It can also be deduced from table 1 that respondents are highly educated as most of them have completed their tertiary education.

4.1 Tools used in Materials Management

Table 2: Information Technology tools used in materials management

Variable	Frequency	Percentage
Bar code scanners used in warehouse	1	3.3
Biometric verification systems used to effectively speed product identification in warehouse	1	3.3
Electronic Data Interchange systems used to share data with suppliers	3	10
Modern material management procedures implemented to ensure efficacy is achieved	17	56.7
Recent ICT tools installed to reduce material handling deficiencies	8	26.7
Total	30	100

Source: Field Work, 2020

From table 2, 1 respondents representing 3.3% used barcode scanners in warehouse, 1 respondents representing 3.3% used biometric verification systems to effectively speed product identification in warehouse, 3 respondents representing 10% used electronic data interchange systems to share data with suppliers, Also, 17 respondents representing 56.7% used modern material management procedures to implement the efficacy achieved and 8 respondents representing 26.7% used recent ICT tools installed to reduce material handling deficiencies. In conclusion,

Table 2 shows the IT tools used in the management of materials and warehouse operations at ECG as perceived by staff and management of the company. Most respondents indicated that the warehouse uses modern warehouse management systems (WMS) to ensure efficient material handling which represents 56.7%. This was followed by modern warehouse tools to reduce material handling deficiencies and represented 26.7%.

4.2 Effects of Information Technology on material management

Table 3: Effects of Information Technology on material management

Variable	Frequency (N)	Mean*	Standard Deviation
Improvement in communication between warehouse staff	25	6.93	.258
Reduction in operation and material cost	25	6.93	.258
Stock taking in warehouse made easier	25	6.67	.617
Reduction in pilferages of inventory	25	6.60	.632
Enhancement of data accuracy on inventory	25	6.82	1.136
Overall Mean		6.79	

*Scale (Mean): 0 – 2.0 = Low, 2.01 – 4.99 = Moderate, 5.00 – 7.00 = High
Source: Field Work, 2020

With regards to table 3, it indicates a high level of impact when linked with the scale given. Therefore, information technology improves communication between warehouse staff, reduces operation and material cost, makes stock taking in warehouse easier, reduces pilferages of inventory and enhance data accuracy on inventory. All the variables under the use of information technology poses a high impact on the organization which brings about a positive effect.

This is in support with what Harold (2002) [15] stated, through technology, one can gain cost advantage through pioneering lower cost products design and creating low-cost ways to perform needed operations.

5. Summary of findings, conclusions and recommendations: This section comprises of the summary of the research findings made in the preceding sections, conclusions drawn and the general recommendations made from the research work. It is also the final section of the study.

5.1 Summary of Research Findings
5.1.1 Demographic Characteristics of Respondent
From the findings, it can be concluded that ECG has an active and energetic working force which is demonstrated by a percentage of 50.0 as most of them were found to be within the age 21-30. The result also indicates that most of the respondents are highly educated as most of these respondents have completed their tertiary level of education with a percentage of 50.0 and a frequency of 15. Majority of the workers are loaders with a frequency of 9 and a percentage of 30.0. Apparently, most workers have spent between 4 to 6 years working with ECG. This came with a frequency of 16 and a percentage of 53.3.

5.1.2 Information Technology tools used in material management
From the findings of the researcher, it can be concluded that ECG, uses ICT tools in managing their materials. It can also be concluded that there is a positive relationship between the use of ICT tools and the performance of materials and warehouse operations at Electricity Company of Ghana. The study revealed that modern material management procedures are implemented to ensure efficiency at the warehouse. This came with a frequency of 17 and a percentage of 56.7.

5.1.3 Effects of Information Technology on Materials Management
Effect of information technology on material management can be summarized into two in which the first part summarizes the positive effect of information technology on

warehouse operations and the second part summarize the negative effect of information technology on warehouse operations. Information technology has helped provide timely customer service, kept track of items and when warehouse efficiency is effective would lower operating costs. The effect of information technology has helped provide communication links and higher inventory turnover. The negative effect of information technology on warehouse operations is in terms of security and legal environment.

5.1.4 Challenges of Using IT in Material Management Operations

Using information technology comes with it associated cost and challenges. The research work revealed that there can be technological cost for example software used for effective and efficient warehouse activities or operations. Integration of information technology to external platforms can also be a challenge in which there must be availability of infrastructure to support the technology and supplier's technological capacity. When challenges of information technology are not minimized, it becomes difficult to manage warehouse operations and activities well which will affect demand estimation, procurement of materials, storage and issue of materials at the warehouse, maintenance and effective control of materials.

6. Conclusion

Information technology in material management to be effective comes along with it challenges although the impact of information technology in material management can reduce time spent on sourcing and purchasing of materials which in the long run enhance decision making process and improves on the communication links between warehouse staff. The study reveals that information technology contribute greatly to effective material and warehouse efficiency and can help in material estimation, budgeting, planning and programming, provide timely customer service and keep track of items. Therefore, the researcher encouraged Electricity Company of Ghana to continue and improve upon information technology in material management.

7. Recommendation

Recommendations are suggested for implementation based on our observation and respondent's suggestions to effective information technology in material management at Electricity Company of Ghana:

- Implementation of well structure IT system: Information technology implementation comprises of various operations systems that organization can adopt in order to improve performance of various functions. It is recommended that ECG should strive to ensure warehouses are adequately automated by management systems that can improve how warehouses can be managed.
- Information Technology experts: Further training on information technology is also recommended for employees in order to adapt to the emerging technologies for warehouse operations and activities to be effective.
- Backup plan: Electricity Company of Ghana needs a backup plan in case information technology on material management fails so that challenges will not arise when

information technology is interrupted with either power supply internet jam.
- Awareness of material handling: The level of material handling must be high and an avenue must be created for that in order to know the minimum and maximum level of material to control demand estimation and procuring of materials.

8. Suggestion for future researcher

This study sought to assess the effects of information technology (ICT) on material management at ECG. The study was only limited to ECG in Takoradi. We would therefore recommend that other researcher research into this same area of study but this time, include other organizations in order to obtain a good comparative study.

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