

**KWAME NKRUMAH UNIVERSITY OF SCIENCE AND
TECHNOLOGY, KUMASI-GHANA**



College of Art and Social Sciences

Department of Information Systems and Decision Sciences

KNUST School of Business ✓

**AN ASSESSMENT OF THE INVENTORY MANAGEMENT SYSTEM – CASE
STUDY OF C. WOERMANN (GHANA) LIMITED.**

By

JOHN KWAME AWUKU DZUAZAH (B Sc Hons)

December, 2008.

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**A Thesis Submitted to the Department of Information Systems and Decision Sciences,
Kwame Nkrumah University and Science Technology in Partial Fulfilment of the
Requirements for the Award of the Degree of
Master of Business Administration (MBA) in
Logistics and Supply Chain Management**

KNUST School of Business

College of Art and Social Sciences

December, 2008.

L.BRARY

DECLARATION

I hereby declare that this submission is my own work towards the Master of Business Administration (MBA) and that to the best of my knowledge it contains no material previously published by another person or work which has been accepted for the award of any other degree elsewhere, except where acknowledgement has been made in the full text.

JOHN KWAME AWUKU DZUAZAH
(CANDIDATE)



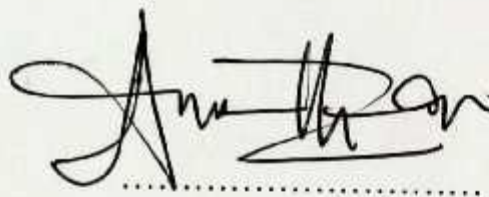
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Date

DEDICATION

This thesis is dedicated first, to my Lord Jesus Christ who always gives me victory in all my endeavours, and also to my family who have stood by me through it all. Your patience and support when daddy and husband was a student have been outstanding and indeed very remarkable. Your love and understanding have been great, I love you all.

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I also wish to register my appreciation to all authors of books and journal articles from which I cited references for my work and indeed all individuals who readily provided me with relevant information for this research, I am very grateful to all of you.

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ABSTRACT

Inventory generally represents a large portion of assets of majority of organizations, if not the largest (Brian Jennings 2007). If your business handles any inventory or is largely made up of purchasing and selling items (as in the case of C. Woermann Ghana Limited), then the abilities within your Inventory Management System can effectively make or break your business.

To achieve the purpose of this study, objectives were set capture three-folds:

- (i) to assess the current inventory management and control systems as practiced by C. Woermann (Ghana) Limited [CWGL] as well as some selected retail and wholesale organizations in the Kumasi Metropolis,
- (ii) to identify problems faced by CWGL and these selected retailers in utilizing modern technology in inventory management and control systems, and
- (iii) to generate any recommendation(s) for achieving improved and efficient inventory management system for CWGL and such selected retail/wholesale organizations, as well as for any further research.

The methodology for this thesis involved in-depth interviews and administration of questionnaires with the staff and management of CWGL.

The study strongly suggests that there is a need for staff training on inventory management issues. Further research needs to be conducted to understand and document the practices, problems, and needs of different segments of the retail and wholesale sector. Training material needs to be developed which, through case studies/histories of successful (and failed) implementations of inventory management and control systems, illustrates the options available to retailers for improving their operations.

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LIST OF ABBREVIATIONS

- CWGL: C. Woermann (Ghana) Limited
- DRP: Distribution requirements planning.
- DSS: Decision Support System
- EIF: Effective Inventory Management
- EOQ: Economic Order Quantity
- EPOS: Electronic point of sale.
- ERP: Enterprise resource planning
- FIFO: First-In-First-Out
- GSEs: Grocery Shops Enterprises
- HIFO: Highest-In-First-Out
- HR: Human Resource
- HRD: Human Resource Department
- IM: Inventory Management
- IMS: Inventory management system.
- ITR: Inventory Turnover Ratio
- JIT: Just-in-time.
- KNUST: Kwame Nkrumah University of Science & Technology.
- KSB: Knust School of Business.
- LIFO: Last-In-First-Out
- MM: Materials Management
- MRO: Maintain, repair and operation.
- MRP: Materials requirements planning.
- NIFO: Next-In-First-Out

PDM: Physical Distribution Management

RFID: Radio frequency identification.

ROP: Reorder point

SMEs: Small and Medium Enterprises

SS: Safety stock

T&D: Training and development

VMI: Vendor-managed inventory

WIP: Work-in-Progress

CHAPTER ONE

1.0 INTRODUCTION AND BACKGROUND OF STUDY

Inventories are a significant portion of the current assets of any business enterprise (Kruger, 2005). Inaccuracies in an inventory creates a range of problems, including loss of productivity, the manufacturing of unwanted items, a reduction in the levels of customer commitment, the accumulation of costly physical inventories and frustration (Meyer, 1991). The costs of any of these inaccuracies can indeed be significant.

Therefore, the cost savings that accrue from improved practices in inventory management (IM) are substantial (Meyer, 1991). IM and control are crucial to a firm because mismanagement of inventory threatens a firm's viability (Sprague and Wacker, 1996). The management of inventories influences a firm's financial strength and competitive position because the approach taken to IM directly affects working capital, production and customer service (Ng et al., 1993; Vergin, 1998).

Better management of corporate inventories therefore can improve cash flow and return on investment. Nevertheless, majority of companies [retailers, wholesalers and manufacturers] suffer through periodic inventory rituals – that is, crash inventory-reduction programmes are instituted every year or so. However, the lack of comprehensive understanding of inventory management techniques and trade-offs often causes customer service levels to drop, so the programmes are abandoned.

Inventories represent the largest single investment in assets for many manufacturers, wholesalers and retailers (Jennings, 2007). Inventory investments represent over 20 per cent of the total assets of manufacturers, and well over 50 per cent of the assets of wholesalers and retailers (Jennings, 2007). In C. Woermann (Ghana) Limited (CWGL) for instance, inventories represent close to 90% of the entire company's assets (*Source: Mr. Carsten Duwer-Managing Director of CWGL, June 2008*).

Competitive markets of the past 30 years have led to a proliferation of products as companies have attempted to satisfy the needs of diverse market segments. Majority of customers expect high levels of product availability. For many firms, the result has been higher inventory levels (Appiah, 1999).

Since capital invested in inventories must compete with other investment opportunities available to the firm, and because of the out-of-pocket costs associated with holding inventory, the activity inventory management is extremely important. Management must have a thorough knowledge of inventory carrying costs to make informed decisions about logistics system design, customer service levels, the number and location of the distribution centres, inventory levels, where to hold inventory and in what form, transportation modes, product schedules, and minimum production runs. For example, ordering in smaller quantities on a more frequent basis will reduce inventory investment, but may result in higher ordering costs and increased transportation costs.

It is necessary to compare the savings in inventory carrying costs to the increased costs of ordering and transportation to determine of how the decision to order in smaller quantities will affect profitability. A determination of inventory carrying costs also is necessary for the new product evaluation, the evaluation of price deals/discounts, make-

or-buy decisions and profitability reports. It is thus imperative to accurately assess firm's inventory carrying costs.

Obviously, a better approach to inventory management is not only required but necessary. This thesis thus seeks to assess the entire inventory management system, and to provide the requisite knowledge required to understand inventory concepts and improve the practice of inventory management with the focus on C. Woermann (Ghana) Limited (CWGL).

1.1 STATEMENT OF THE PROBLEM

In Ghana and indeed elsewhere around the world, many firms and organizations; both commercial and manufacturing, are facing liquidity problems. In Ghana for instance, the cost of capital, in the form of interest rates and overdraft facilities is high, currently ranging between 25 and 40% per annum.

Regardless of these high interest rates, some organizations keep large quantities of inventories in their warehouses or stores in anticipation of customer demands. The salient question then is, "How much inventory to hold?" If large inventories are held up, the organization is tying or locking up working capital that could otherwise be used elsewhere in the business. There is also the risk that inventories held may deteriorate or become obsolete. On the other hand, inadequate inventories can lead to shortages resulting in poor service to clients or customers. If these situations are to be managed or avoided, the organization must operate an efficient inventory management system, thus the need for this piece of academic study.

1.2 OBJECTIVES OF THE STUDY

The main objective for undertaking this thesis is to consider the various techniques available for the effective and efficient management of inventories (stocks) so as to save costs and improve upon business performance.

Specific objectives shall however include the following:

- I. To assess the current inventory management practices of C. Woermann (Ghana) Limited, (CWGL).
- II. To identify any problems or challenges faced by CWGL in utilizing modern technology in IM and control systems.
- III. To generate any recommendation(s) for achieving improved and efficient inventory management system for CWGL as well as for any further research.

1.3 JUSTIFICATION OF THE STUDY

Proper management of the inventory system is important to the successful operations of most organizations. Unfortunately, its importance is not always readily appreciated by majority of managers or business owners. This may be due to a failure to recognize the link between inventories (stocks) and achievement of organizational goals or simply due to ignorance of the impact that good inventories management have on costs and profits.

Majority of organizations in Ghana are facing liquidity problems. The cost of capital in the form of interest rates and overdraft facilities from the commercial banks are high, currently ranging between 25 and 40% per annum (Source: Business & Financial Times, Issue No.: 842. Also see www.bizandft.biz)

Yet most organizations maintain large quantities of inventory items in their warehouses, stores or shops in anticipation of customer demands. Most of these inventories, in most instances may not be 'fast moving', and may even be considered as 'dead stock' in other cases. The situation has reached alarming levels particularly among small and medium enterprises (SMEs).

The salient or key question then is:

- How much inventory to keep?
- How much inventory to buy?
- When to buy?
- What degree of control should be exercise?
- Etc.

Answers must be found to these questions so as to:

- a) Avoid locking up capital (working capital) that could be used elsewhere in the business,

- b) Prevent deterioration or obsolescence, theft or even fire, and
- c) Avoid shortages and losing valued clients or customers.

To help address these concerns, it becomes imperative that a study of this nature be conducted to thoroughly examine the entire inventory management system in order to find answers to the above concerns.

1.4 RESEARCH QUESTIONS

The study will also endeavour to find answers to the under listed research questions in order to determine whether the inventory management (IM) practices of CWGL meet the prescribed standard best practices.

- 1) Is inventory management (IM) a core strategic function of CWGL?
- 2) What IM practice(s) are currently being used by C. Woermann (Ghana) Limited [CWGL]?
- 3) Does this practice(s) conform to standard best practices in the industry?
- 4) What are the problems or challenges faced by these CWGL and other retailers/wholesalers in utilizing modern technology in IM and control systems?
- 5) What measures can be put in place to improve upon the inventory management system of CWGL and possibly other retail/wholesale organizations?

1.5 SCOPE OF THE STUDY

Inventories represent the largest single investment in assets for many manufacturers, wholesalers and retailers. Inventory investments represent over 20 per cent of the total assets of manufacturers, and well over 50 per cent of the assets of wholesalers and retailers. In C. Woermann (Ghana) Limited for instance, inventories constitute 95%.

In view of the high investment in inventory by a typical wholesale and retail service organisation such as CWGL, where about 75% of inventory investment are set aside for wholesale purposes, and 20% for retail purposes. Therefore the selection of CWGL as a case-study is in the right direction.

1.6 LIMITATIONS OF THE STUDY

In almost all research work there are definitely bound to be limitations which may in one way or the other limit the research work. In the case of this research, some limitations encountered include:-

- 1) Time constrain as a result of combining full time job with the rigorous academic work.
- 2) This study of CWGL should be extended to several other organizations within the retail and wholesale industry in order to arrive at findings that are more generalizeable across the industry.
- 3) The unwilling and reluctant manner with which some of the staff

interviewees responded to the questions for fear of being victimized by management.

1.7 ORGANISATION OF THE STUDY

This dissertation shall be organized as follows:

- Chapter one shall constitute a general but brief introduction on inventory management system,
- Chapter two shall comprise of a review of relevant literature on inventory management,
- Chapter three to capture an appropriate research methodology and organizational profile of the study,
- Chapter four shall involve an analysis of any relevant findings of the study, and
- Chapter five shall comprise an overview or summary of findings, make any appropriate recommendation(s) and then a conclusion of the study.

CHAPTER TWO

2.0. LITERATURE REVIEW

2.1. INTRODUCTION & DEFINITION OF INVENTORY & INVENTORY MANAGEMENT

Mentzer *et al.* 2007 in their book "Handbook of Global Supply Chain Management" defined *inventory* as any item or resource stocked by an organization either for resale or for the purposes of manufacturing, whereas *inventory system* constitutes the policies, procedures, and control measures that monitor the inventory levels and determine the timing and quantities of replenishment. According to Krajewski and Ritzman (2005), in their book; Operations Management: Processes and Value Chains, however, inventory is said to be created when the receipt of materials, parts, or finished goods exceeds their disbursement; it is depleted when their disbursement exceeds their receipt.

While inventory management (IM) is defined in several different ways, the concept implies the establishment of strategic objectives and the positioning for inventories (Sprague and Wacker, 1996). As such, IM is the active control program, which allows a firm to manage its manufacturing, sales, purchases, distributions and payments (Lavelly, 1996). This research examines these items with due consideration given to the specific features of CWGL, and possibly the retail and wholesale industry in general.

Generally, inventory management has significance for any enterprise in an inventory intensive manufacturing industry because effective practices in IM will allow an enterprise to minimize inventory costs and therefore, avoid the dire consequences that come with a shortage of material resources. This sequence of events has special

significance in the context of IM. Eloranta and Raisanen (1988) argue that poor quality forecasts are the main factors contributing to this sequence of events in small and medium enterprises (SMEs). Chikan (1990) observed that a sound IM system is a decisive factor in a firm's success.

Natarajan (1991) discussed the linkages between IM and competitive advantage, bringing into focus the integration of strategic and competitive factors such as cost, delivery and quality. Natarajan (1991) argues that reducing the throughput time by faster value addition to the materials provides a firm with a distinct edge in competitive environments. However, inventory costs are determined not only by their level of inventory but also by the time the materials spend in the system.

Mantho (1994) classified IM into three broad areas:

- (1) *Inventory record keeping*: due to the availability of computers at a reasonable price, SMEs have found it appropriate to automate their inventory records through computerization.
- (2) *Inventory decision-making*: many models can be integrated into computer based inventory systems.
- (3) *Material requirement planning (MRP) system*: MRP is an IM information system concerned with getting the right materials to the right place at the right time.

However, contemporary IM systems are more challenging because of several variables. In a fluid IM environment, these factors include high inflation rates at certain periods, low availability of traditional materials, high costs of labour leading to less making and

more buying, increasing numbers of suppliers entering the procurement market and rapid development of micro-processors and software in decision-making support systems. In addition, new technological innovations lead to the development of substitutes (for example, smart materials replacing steel and aluminum), which add to the challenges for IM (Mohanty, 1985). In this light, IM must be oriented to the quite specific needs of the particular enterprise. The extent to which these problems exist in retail and wholesale organizations in Kumasi metropolis provide useful insights into the status of IM generally.

The IM practices of SMEs in Finland and Greece were studied by Chikan and Whybark (1990) to identify the experiences of managers concerning IM. In Finland, 15 case studies of IM were undertaken, including examining the role of IM in corporate planning, inventory decision-making and performance measurement. The findings revealed that IM decisions are made at the operational level with minimal guidance from the top. Furthermore, the lack of accurate, real-time and suitable aggregate information of material flows and stock levels prevented these enterprises from setting precise quantitative goals for IM. Furthermore, financial pressures forced the enterprises to reduce their inventories, which eventually led to internal as well as external stockouts (Chikan and Whybark, 1990).

The second study included observations of 30 SMEs in northern Greece. A principal finding was that while all firms had computerized information systems for the purposes of inventory record keeping and accounting, no decision-making models were applied in the process. The use of an integrated decision support system (DSS) was not even considered by these Greek entrepreneurs – this was seen as being both

unnecessary and costly. The major restraint of the use of computers was not their cost or the availability of software but rather, the attitudes and knowledge of managers and workers (Chikan and Whybark, 1990). For Chikan and Whybark (1990), the SMEs were slow to adopt and implement contemporary IM practices.

A well-operated integrated production-inventory system is a decisive success factor under a variety of conditions (Chikan, 1990). However, concerning performance, SMEs are often satisfied with the end-of-year stocktaking, trading and profit and loss accounts. In most SMEs, the balance sheet rules even though many benefits can be derived from implementing a perpetual inventory system. In systems of this type, all stock items are periodically and randomly checked throughout the year. Given that many SMEs lack professional expertise and generally take decisions based on intuition and elementary IM practices (Mohanty, 1985), investments in inventory are not always costed accurately or appropriately.

2.2 WHAT IS INVENTORY MANAGEMENT

In his article entitled "Inventory Management – the big picture", Messrs. Natarajan (1991), defines Inventory Management (IM) as the process of planning, monitoring and controlling the materials used at various stages of manufacturing a product. Our definition of inventory includes raw materials, WIP (works-in-process or partially assembled goods), the finished goods themselves and MROs (maintenance/repair/operating supplies needed to keep our machines working well). The concept of

inventory has also been extended to embrace such non-traditional definitions as airlines seats, hotel rooms and concert tickets.

Managing inventory makes sense in a business because it helps minimize costs like warehousing and shelving costs, spoilage and obsolescence, delivery and transportation, interest and cost of money (keeping inventory implies that your money is asleep and not earning interest), (Appiah, 1999).

Retail/wholesale stores, groceries, restaurants, factories and organizations delivering services benefit greatly from inventory management. For example, a food chain has perishable raw materials that need to be used up quickly (Silver, 1981).

A manufacturer that overproduces an MP3 player will have too much finished goods that may be outdated within a year. And a bookstore that keeps accumulating unsold books must dispose of these stocks or sell them at bargain prices to free up shelf and warehouse space.

Inventory management can thus be briefly described as:

- Acquiring an adequate supply and assortment of merchandise from which customers can buy.
- Providing safety stocks to meet unexpected demand or delays in inventory Replenishment (Mantho, 1994).
- Maintaining clear, correct, and current records.

- Purchasing the proper assortment of goods in quantities that will maintain inventory levels consistent with business requirements, while providing adequate safety stocks.
- Reducing excessive inventories promptly, so that the dollars realized from clearing overstocks can be invested in merchandise with a greater market potential (Natarajan, 1991)

2.3 SCOPE OF INVENTORY MANAGEMENT

Inventory Management covers a wide variety of activities. These activities will vary from organization to organization. The scope of inventory management will also be influenced according to whether it is primarily concerned with materials management (MM) or physical distribution management (PDM) or centralized or decentralized, (Appiah, 1999). There is clearly a significant difference in the complexity of managing inventory based at a single location and that where inventory is located at possibly hundreds of distribution centres. Globalization is another factor that increases the complexity of inventory management (Natarajan, 1991). Irrespective of such considerations, however, IM is likely to be comprised of activities such as:

- Demand management-ensuring that required operational and maintenance supplies are available in the right quantities and at the right time
- Forecasting future demand requirements
- Implementing lean inventory policies, such as JIT contracts to minimize investment in inventory

- Liaising with purchasing to ensure that supplies are replenished in accordance with corporate and procurement policies
- Developing cost-effective systems and procedures relating to the ordering, procurement and budgeting of supplies
- Controlling the receipts, inspection (where necessary), recording, location and issue of supplies to users
- Ensuring the safety and security of supplies and the avoidance of loss as a result of deterioration, theft, waste and obsolescence
- Coordination of inventory to ensure that supplies can be rapidly located
- Preparation and interpretation of reports on stock levels, stock usage and surplus stock
- Liaison with auditors regarding all aspects of inventory
- Appropriate disposal of scrap, surplus and obsolete items, (Natarajan, 1991), and (Waters, 2003).

2.4 TYPES OF INVENTORY:

According to Messrs. Silver (1981) in his article entitled "Operations research in inventory management", inventories are classified in various forms (or types) depending on the nature of the business. The classification of supplies or inventory purposes will vary according to the particular undertaking. In manufacturing, and enterprise, for instance, inventory might be classified into four (4) kinds namely:

2.4.1 Raw Materials Inventory:

This consists of basic materials that have not yet been committed to production in a manufacturing firm, (Silver, 1981). Raw materials that are purchased from firms to be used in the firm's production operations range from iron ore awaiting processing into steel to electronic components to be incorporated into stereo amplifiers. The purpose of maintaining raw material inventory is to uncouple the production function from the purchasing function so that delays in shipment of raw materials do not cause production delays.

2.4.2 Stores and Spares:

This category includes those products, which are accessories to the main products produced for the purpose of sale, (Silver, 1981). Examples of stores and spares items are bolts, nuts, clamps, screws etc. These spare parts are usually bought from outside or some times they are manufactured in the company also.

2.4.3 Work-in-Process Inventory:

This category includes those materials that have been committed to the production process but have not been completed. The more complex and lengthy the production process, the larger will be the investment in work-in-process inventory. Its purpose is to uncouple the various operations in the production process so that machine failures and work stoppages in one operation will not affect the other operations, (Silver, 1981).

2.4.4 Finished Goods Inventory:

These are completed products awaiting sale. The purpose of finished goods inventory is to uncouple the productions and sales functions so that it no longer is necessary to produce the goods before a sale can occur. www.azinventorymanagement.com

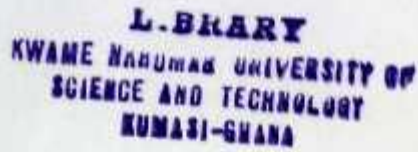
2.5 OTHER CLASSIFICATIONS OF INVENTORY:

According to (Mentzer, et.al, 2007), inventory might also be classified as *consumables*; these comprises such items often classified as indirect and that do not form part of a saleable product and that may be sub-classified into production, such as detergents, maintenance, such as lubricating oil, office, such as stationery, welfare, such as first-aid supplies and so on – all of which are often referred to as maintenance, repair and operating (MRO) items.

Following the point of view of supply chain however, inventory may also be classified into:

- 2.5.1 **Primary Inventory** – raw materials, components and subassemblies, work-in-progress (WIP) and finished goods,
- 2.5.2 **Support Inventories** – MRO consumables of various categories (Bowersox, et.al 2007).

A third classification of inventory according to Messrs. Liang (1997) may be carried out as follows:



- 2.5.3 Production application inventory** – these include such items as raw materials, components, subassemblies, work-in-progress, and finished goods,
- 2.5.4 Demand type inventory** – involves *independent* demand inventory (which mostly comprises of finished goods or other end items), and *dependent* demand inventory (which are typically subassemblies or components used during the production of a finished or end product).
- 2.5.5 ABC analysis** – classification carried out in terms of class A items, B items, and C items,
- 2.5.6 Other inventories** – these often constitute maintenance, repair and operating materials not embodied in the finished or end product.

2.6 SOME EXAMPLES OF INVENTORY USED IN VARIOUS BUSINESSES:

Some examples of inventories used in various businesses include:

- 1. Department Stores or Supermarkets:** inventories include gifts cards, clothing, furniture, carpets, stationery, toys, spare parts, machinery & equipment, household supplies, frozen and canned food, drug items etc., (Appiah, 1999),
- 2. Motor Firms:** inventories saloon cars, light trucks such as vans/buses and pickups, trucks, motor cycles, spare parts etc., (Appiah, 1999),
- 3. Manufacturing:** includes raw materials, component parts, work-in-process, finished goods, spare parts, and consumables/supplies, (Appiah, 1999),

4. **Computer Firms:** includes computers, monitors, keyboards, printers, UPS, accessories, etc., (Appiah, 1999).

2.7 SOME INVENTORY CONTROL TERMINOLOGIES

2.7.1 LEAD TIME

The period taken to obtain a requirement or replenishment from the time the need is ascertained to its fulfillment. Simply, it is the period between initiating an order and receiving it for use. It is often expressed in days, weeks, months, etc., (Tersine, 1994) and (Appiah, 1999). The lead time comprises the following activities:

- Preparation of requisitions
- Forwarding of requisition to purchasing or procurement
- Processing of purchasing from enquiry to preparation of the order
- Transmission of order to supplier
- Execution of order by supplier
- Transportation of order
- Receipt, inspection and storage, and finally
- Issue to production or sales

2.7.2 DEMAND OR USAGE RATE

The amount or quantity required by sales, production etc. Usually expressed as a rate of demand per week, month, or year (Kruger, 2005). Estimates of the rate of demand during the lead time are critical factors in inventory control systems.

2.7.3 ECONOMIC ORDER QUANTITY (EOQ)

According to Langley (1976), the EOQ is a calculated or determined ordering quantity which minimizes the balances of cost between inventory holding or carrying costs and acquisition or ordering costs.

2.7.4 MINIMUM STOCK OR BUFFER STOCK OR SAFETY STOCK

This is the reserve stock kept on hand to take care of greater than normal usage or demand during the procurement lead time. It also covers errors in determining the lead time. The minimum stock level depends on company policy guided by past experience on materials usage and suppliers' lead time.

2.7.5 MAXIMUM STOCK LEVEL

This is the highest quantity of items to be held in stock. It is dependent on the minimum stock level and the re-order quantity, (Appiah, 1999). Other critical factors include storage facilities, availability and proximity of sources of raw materials, possible price fluctuations, economic ordering quantity and availability of capital.

2.7.6 RE-ORDER POINT/LEVEL (ROP)

According to Bookbinder & Lordahl (1989), the ROP is the quantity or level of stock at which a further replenishment order should be placed. The re-order level is dependent on the lead time, the demand or usage during the lead time and the safety stock level - if any.

2.7.7 REPLENISHMENT

Within the context of a *warehouse*, (Saxena, 2004), replenishment is the process of moving inventory from secondary storage areas into fixed storage locations. Within a *supply chain* or a *multi-plant environment*, replenishment is the process of moving inventory between facilities to meet demand.

2.7.8 ORDER OR RE-ORDER LEVEL QUANTITY

This is the number or quantity of items most economical to order, (Bookbinder, & Lordahl, 1989). In some types of inventory control systems this is the Economic Order Quantity, but in some other systems a different value is used.

2.7.9 FINISHED GOODS

Inventory that is in a salable or shippable form based upon its location within the supply chain, (Tersine, 1994). An item considered a finished good in a supplying plant might be considered a component or raw material in a receiving plant.

2.7.10 JIT

The term Just-in-time (JIT) according to Messrs. Appiah (1999) is usually thought of as describing inventory arriving or being produced just in time for the shipment or next process. Actually JIT is a process for optimizing manufacturing processes by eliminating all process waste, including wasted steps, wasted material, excess inventory, etc.

2.7.11 KANBAN

This term is often used as part of a just-in-time production operation where components and sub-assemblies are produced based upon notification of demand from a subsequent operation (Appiah, 1999). Historically, kanban has been a physical notification such as a card (kanban cards) or even an empty hopper or tote sent up the line to the previous operation.

2.7.12 OBSOLETE

The condition of being no longer of use due to passage of time, usually associated with old, outdated designs (Appiah, 1999).

2.7.13 OBSOLESCENCE

The process by which inventory becomes obsolete (Appiah, 1999).

2.7.14 SAFETY STOCK (SS)

Quantity of inventory used in inventory management systems to allow for deviations in demand or supply.

2.8 INVENTORY CONTROL

Inventory control may be explained as the clerical control of the movement of inventory into and out of stores and their levels so that the combined costs of ordering, holding and stock-out are at a minimum, (Verma, 2006).

2.9 OBJECTIVES OF INVENTORY CONTROL

There are two main objectives of inventory control according to (Waters, 2003). These are to:

- i. Maximize the level of customer service (i.e. have the right quality of goods in sufficient or right quantities, from the right source and at the right time)
- ii. Minimize the cost of providing the desired level of customer service.

Achieving these two objectives requires a trade-off involving a compromise between cost and customer service. The goal therefore is to attain the desired level of customer service at the lowest cost possible.

2.10 THE FUNCTIONS OF INVENTORY CONTROL

The main functions of inventory control according to (Ballou, 2005) are:

- i. Inventory (stock) recording, and

- ii. Provisioning.

2.11 INVENTORY RECORDING

Control is based on the use of stock record card to;

- Record all movement of all inventory categories (sample of stock record card shown in Table 1)
- Show what inventory is available at each storage point and where it is located, (Ballou, 2005).

Table 1

INVENTORY CONTROL CARD

E.g. 2130 Toaster:

DATE	ON HAND	IN	OUT
8/1	27		
8/2	26	1	
8/4	38		12
8/6	36	2	
8/8	35		1
8/10	32		3

A separate record is maintained for each item in inventory. The stock status is shown at the end of each day. All changes in inventory are shown as in or out. In the "In" column, you would list all orders received from suppliers, returns from customers, etc. In the "Out" column, you would identify all sales, returns to suppliers, etc.

Another useful inventory record is a sales summary such as that shown below. This information is needed for determining the adequacy of inventories and for order preparation. The sales summary can be compared periodically with stock on hand so the items that are not showing sufficient sales activity can be cleared through price reductions, scrapped, or otherwise disposed of (Ballou, 2005). In this way, space and dollars invested in inventory are available for more active and potentially more profitable items.

2130 Toaster:

MONTH	SOLD	ORDERED	RECEIVED
JAN.	12	10	9
FEB.	14	15	-
MAR.	7	-	15
APR.	15	15	15
MAY	8	15	15
JUNE	9	12	12
JULY	10	10	8
AUG.			

2.12 PROVISIONING

Larson, (1989) defines provisioning as the process of determining requirements for items in advance taking into account;

- Lead times
- Existing inventory

- Usage rates
- Changes expected in consumption patterns
- Items committed to planned task
- Policy on inventory levels

2.13 SOME INVENTORY MANAGEMENT STRATEGIES & BEST PRACTICES

In a competitive industry such as retail or wholesale sector, the goal is to maximize profit while minimizing the amount invested in inventory, (Jennings, 2007). Therefore if your bottom line is based on calculated inventory valuations, then sound inventory management could dramatically impact where your business really is financially versus the numbers you might be estimating for your inventory levels. Below are some strategies to good inventory management that would help your business become or remain profitable.

2.13.1 Knowing the Value of Your Inventory at any given Point or Time

To have access to the value of your inventory at any point gives your business the ability to effectively plan and assess your financial position. In some cases a business' setup has the ability to reconcile the value of inventory on a regular basis; otherwise a physical count is required for complete accuracy (Jennings, 2007). Regardless the cost of your inventory is the foundation to profitability for your company.

Obviously there are dozens of business-operating expenses, but knowing the value of your inventory at any given point is critical for determining your pricing and profitability. Without an Inventory Management System your best guess would be to

review your inventory account balance. However the problem with this option is it may not accurately reflect items that are in inventory but not yet recorded in the books. For example, you may have received or sold items that have not been invoiced and therefore not yet recorded. What is needed is an Inventory Management system that provides you with inventory costing method options, such as *LIFO* (Last-In-First-Out), *FIFO* (First-In-First-Out), Highest-In-First-Out (HIFO), weighted cost and standard cost etc. (Saxena, 2006). Depending on which cost method you use will directly impact your balance sheet, income statement and cash flow in different ways and it is important to understand what they are.

2.13.2 Inventory Valuation Approach or Method Being Used

It is important to understand your valuation method because it can impact profit margins and your income statement based on which method you are using (Saxena, 2006). The valuation methods available, for example, are *First-In-First-Out (FIFO)*, *Last-In-First- Out (LIFO)*, *Highest-In-First-Out (HIFO)*, *Next-In-First-Out (NIFO)*, *Weighted Average and Standard Cost*.

FIFO is an approach in which the tracking of inventory and costs assumes the first items purchased are the first items sold. This matches inventory flow similar to what you would expect in a retail establishment in which new items would be placed behind the existing items on a shelf so, in theory, the oldest items would be the next sold. Of course even if the actual flow of inventory does not match this, the cost and valuation will follow this pattern and, as a result, costs recorded on sales will be based on the

oldest and most likely lowest items, and the current valuation will always be based on the value of the most recent costs. In this case the result is that the costs of the items will be lower and the result is higher recorded profit and taxes.

LIFO is an approach in which the tracking of inventory and costs assumes that the last items purchased are the first items sold, (Saxena, 2006). This flow would be less common in practice because it would be as if a business always purchased the newest items on the front of a shelf and the items on the back of the shelf could be much older. Regardless, costs of items sold will be based on the most recent items purchased and the value of inventory will be based on the oldest items. In this case the outcome is that the cost of items will be higher and result in lower recorded profit and lower taxes.

Average cost creates an average based on the cost of all inventory items and takes the approach that the current cost most accurately reflects the cost of all items by

using an average cost. This method is most effective with a computer system that can track and update costs as soon as items are received. This method will impact the resulting profitability and inventory valuation, but the results will vary depending on whether items increased in cost over time, by how much, how frequent the items were purchased and so forth.

Standard cost uses a static cost entered manually for an item and any variation with the actual cost is recorded in a variance account. The advantage to this method is that the user has more control over the costing being used and can prevent valuation changes that are not wanted or don't match the business environment, (Saxena, 2006). However,

in many businesses the inability to effectively update the cost for items could easily make this method useless.

Overall any business may have good reason to use any of the valuation methods described above to meet the needs and objectives or requirements of their business. The main point to remember is that the method used can impact what your profits and inventory value may look like. Having a good management system can be central to effectively understanding how these methods impact your accounting so that you can make intelligent business decisions based on reality, not based on variance resulting from valuation methods, (Saxena, 2006).

2.13.3 Automation of the Ordering Processes

If your business has a lot of inventory, then regularly ordering and purchasing those items is something that needs to be addressed, (Mantho, 1994). To do this effectively requires a purchaser who can spend time analyzing sales, monitoring inventory levels, and make orders as needed to keep items in stock for customers (or for projects in the case that the items are used for raw materials). While the specific needs of any business vary widely, it is likely that management of inventory can be dramatically improved with computer-assisted ordering.

Overall the key to this is the ability to take advantage of an integrated system that makes it possible to streamline purchasing by automating it. This not only frees up time to focus on other aspects of your business, but it prevents errors and the potential for

overlooking needs since it automatically generates orders based on the actual Inventory levels (Schreibfeder, 2008).

So how much time could you save by automating your orders? How many times have customer's needs gone unfilled because stock on some items was low? Look for a good integrated Inventory Management system that can make all these problems go away and give you a competitive advantage by streamlining your order process.

There are systems where purchase order, sales and inventory are integrated and work seamlessly together -- systems that have the ability to set up minimum and maximum quantities for an item (Nahmias, and Smith, 1994). When that item runs low, the system can then automatically generate an order based on those numbers and current inventory levels. There are even good systems that can generate orders based on "the least expensive vendor" or other criteria that you can establish so that you can get the best deal possible for your needs and business.

While there may always be a need for careful ordering and review, an option to automate the ordering and fulfillment of the staple items is beneficial. It frees up your time so that you can focus on the areas in inventory and purchasing that require greater attention.

2.13.4 Knowledge of Your Vendors

Who are your vendors? How many vendors have you purchased your inventory items from? Are they late delivering orders? If so how often? Do quoted prices differ from

prices listed on an invoice? These are all questions you may have about your vendors. Based on your business and business needs—delivery timeliness, availability of items and service may vary in importance (Waller et.al, 1999). For example, you may be more interested in timely and quick supply of items, or you may want the cheapest price and you can handle late shipments or poor service, or you may be somewhere in the middle, or you may have some items you need shipped on time and others that you don't.

Managing your vendors and tracking what they provide and how they meet your needs is critical to your business. In many industries cultivating good relationships with vendors often provides a competitive advantage that can make your business excel. With a good integrated system you can collect and gather the information you need to make good decisions about your vendors (Sinha et.al, 1989). In addition, with a complete, integrated, IM system you can also provide your Vendors information to help them better serve you.

2.14 ECONOMIC ORDER QUANTITY (EOQ) MODEL:

The economic order quantity (EOQ) is the optimal ordering quantity for an item of stock that minimizes cost (Langley, 1976).

To calculate the EOQ, a mathematical model of reality must be constructed. All mathematical models make assumptions that simplify reality. The model is only valid when the assumptions are true or nearly true, so, when an assumption is modified or

deleted, a new model is constructed. To determine the most cost effective quantities of screws or other components you will need to use the EOQ formula.

The basic Economic Order Quantity (EOQ) formula is as follows:

$$EOQ = \sqrt{\frac{2(\text{Annual usage in units})(\text{Order cost})}{(\text{Annual carrying cost per unit})}}$$

2.14.1 EOQ Assumptions:

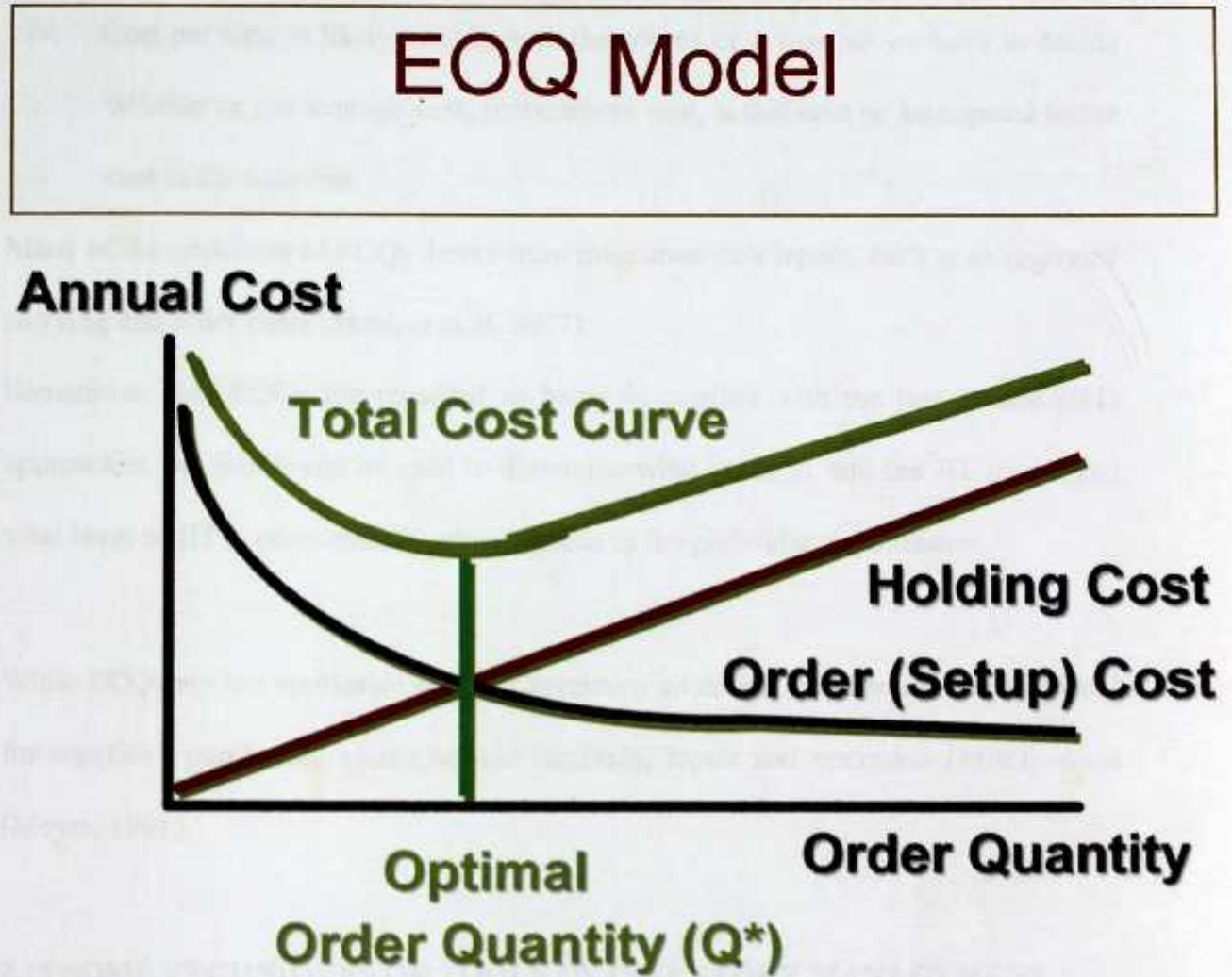
The basic (or simple) EOQ model makes the following assumptions (Mentzer et.al, 2007):

- Known & constant demand over time
- Known & constant lead time
- There is no limit on order size, due either to stores capacity or other constraints
- Cost of placing an order is independent of the size of the order – the delivery charge is also independent of the quantity ordered
- All prices are known & constant – there are no quantity discounts
- The cost of holding a unit of stock does not depend on the quantity in stock
- Exactly the same quantity is ordered each time that a purchase is made.

Diagrammatic illustration of a typical Economic Order Quantity Model is as captured in Figure 1.

Figure 1

Diagrammatic illustration of the EOQ Model



SOURCE: Researcher's own construct-December 2008

2.14.2 Limitations of EOQ:

- i. Annual demand is a forecast, so it is unlikely to be an exact figure.
- ii. Order costs are assumed to be constant, but these may change due to the use or the introduction of e-purchasing

- iii. The interest rate is assumed to be constant, but, in practice, interest rates frequently change
- iv. Cost per item is likely to change in the course of a year, so we have to decide whether to use average cost, replacement cost, actual cost or anticipated future cost in the equation.

Many of the criticisms of EOQs derive from inaccurate data inputs, such as exaggerated carrying and order costs (Mentzer et.al, 2007).

Sometimes also, EOQs are regarded as being in conflict with the just-in-time (JIT) approaches, but EOQs can be used to determine what items fit into the JIT model and what level of JIT is economically advantageous to the particular organization.

While EOQs are not applicable to every inventory situation, they should be considered for repetitive purchasing situations and maintain, repair and operation (MRO) items (Meyer, 1991).

2.15 SOME TECHNIQUES OR TOOLS OF INVENTORY MANAGEMENT

ABC analysis (*Pareto analysis*), barcoding, radio frequency identification (RFID) and inventory softwares are four important tools of inventory management.

2.15.1 ABC ANALYSIS (*Pareto analysis*)

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ABC or Pareto analysis for inventory (*also known as distribution by value*) is an inventory control technique for classifying inventory items according to some measure of importance – usually annual usage value – so that varying degree of control efforts can be exercised, (William, 2004).

The rationale is that inventory consists of high value items – i.e. the '**Vital few**' and low value items, also referred to as the '**Trivial many**'. The extent of control should vary depending on the value inventory held (Caldwell, 2007).

The law of Mal-distribution or the 80/20 Rule (*which was discovered by Italian statistician Vilfredo Pareto - 1848-1923*) states that:

- About 20% of the population own 80% of the nation's wealth,
- About 20% of employees cause 80% of problems,
- About 20% of items account for 80% of a firm's expenditure,

According to ABC or Pareto analysis, high value items (*A-class items*) require *high investments* and therefore *low safety inventory*.

Low value items (*C-class items*) require *low investments* and therefore *high safety inventory*. The degree of control should be rigid.

In between the high and low value items are medium value items (*B-class items*). These require moderate control measures (William, 2004).

ABC analysis for inventory is valuable for small businesses without large computer inventory tracking systems because it allows you to place the most resources on those items that are contributing the most to your sales (William, 2004).

2.15.1.1 Some merits of ABC analysis

According to Messrs. William (2004), ABC analysis is valuable because it:

1. Allows for stricter monitoring and controls of high dollar volume items, the items that contribute the most to your sales;
2. For businesses without adequate computer tracking systems, ABC analysis provides a higher level of inventory control than the "gut" feeling or guesstimating control method. Higher control level also allows fewer resources to be spent on clerical duties, and shortages.
3. Due to the high level of inventory control in ABC analysis for inventory, there is an increase in turnover and service levels. Constant monitoring of the high dollar volume items allows a manager to track the items and to maintain proper inventory levels.
4. Prioritizing items helps allocate resources more efficiently. Because there is a formal method of inventory control, management can spend more time forecasting changes in policy and other costs instead of wasting time making ordering decisions and preventing spoilage.

2.15.1.2 Some drawbacks of ABC analysis

There are also a few drawbacks to ABC analysis for inventory (William, 2004). Some of these include:

- Products in lower categories, B, C, etc. may have only slightly less dollar value or even similar dollar values as the A product, but be given less controls due to the lower ranking. Prioritizing causes some items to be monitored less rigorously.

- ABC analysis does not work for every situation. In manufacturing dependent goods is essential to completing the final good. Not having a good inventory control system for the dependent goods will cause production of the final product to be delayed. Customers may also expect complementary goods to be in stock. If the items are not ranked high, managers may fail to have the item in stock
- In addition because dollar volume is calculated based on unit cost, profit is not considered in the equation. This flaw can be mitigated by using profit margin contribution instead of dollar volume. However because many small businesses only use cash registers to track sales information, profit margin requires calculating the unit cost and subtracting cost of the goods in order to determine how to rank the items. Dollar volume is often used because it simplifies the ranking process and is usually a good indicator of the items that contribute the most profit.

Vilfredo Pareto's Rule:

The Italian statistician Vilfredo Pareto (1848-1923) discovered a common statistical effect. The rule stated that;

- About 20% of the population own 80% of the nation's wealth,
- About 20% of employees cause 80% of problems,
- About 20% of items account for 80% of a firm's expenditure,

2.16 BARCODING

Invented in the 1990s, barcodes accelerate the flow of products and information throughout business (Mentzer, et.al, 2007). The most familiar example of the use of barcodes is electronic point of sale (EPOS), which is when retail sales are recorded by scanning product barcodes at the checkout tills. An EPOS system verifies checks and charges transactions, provides instant sales reports, monitors and changes prices and sends intra-and inter-stores messages and data.

Some production applications for barcoding include:

- Counting raw materials and finished goods inventories
- Automated sorting of cartons and bins on conveyor belts palletisers
- Lot tracking
- Production reporting
- Automated warehouse applications, including receiving, put away, picking and shipping
- Identification of production bottlenecks
- Package tracking
- Access control
- Tool cribs and spare parts issue.

2.16.1 Benefits of Barcoding

Barcoding provides the following benefits (Mentzer, et.al, 2007):

- i. *Faster data entry:* barcode scanners can record data five to seven times as fast as a skilled typist

- ii. *Greater accuracy:* keyboard data entry creates an average of one error in 300 keystrokes, but barcode entry has an error rate of about 1 in 3 million
- iii. *Reduced labour costs:* as a result of time saved and increased productivity
- iv. *Elimination of costly over- or under stocking* and the increased efficiency of JIT inventory systems
- v. *Better decision making:* barcode systems can easily capture information that would be difficult to collect in other ways, which helps managers to make fully informed decisions
- vi. *Faster access* to information
- vii. *the ability to automate* warehousing
- viii. *Greater responsiveness to customers and suppliers.*

2.17 RADIO FREQUENCY IDENTIFICATION (RFID)

An RFID tag contains a silicon chip that carries an identification number and an antenna able to transmit the number to a reading device (William, 2004). This means improved inventory management and replenishment practices, which, in turn, results in a reduction of interrupted production or lost sales due to items being out of stock.

The reduction in the cost of chips to a point where they can be used to track high-volume, low-cost stores and individual items rather than an aggregate SKU (stock keeping unit) is revolutionary in its implications for inventory control and intelligence.

The following advantages and limitations of RFID technology (Caldwell, 2007) are listed by.

2.17.1 Advantages:

- i. *Line of sight:* tags can be read without being visible to the scanner. They can be read as long as they pass through the field emitted by the reader. This reduces manual handling and, therefore, cost.
- ii. *Range:* tags can be read over a very long range – many hundreds of metres in the case of specialised tags. RFID devices used in mass logistics applications need a range of at least 1 metre and up to 4 or 5 metres (Zipkin, 2000).
- iii. *Bulk read:* many tags can be read in a short space of time – a typical read rate is hundreds of tags per second (Zipkin, 2000).
- iv. *Selectivity:* data can be inserted into the tags so that they are only read if the value requested from the reader is the same as the value embedded within the tag. This allows the reader to read only pallets or only outer cases.
- v. *Durability:* barcodes can be ripped, soiled and performance is impaired if they become wet. These are not issues that affect RFID tags.
- vi. *Read/write:* data incorporated within the tags can be updated to accommodate simple changes in status-such as 'paid for' or 'not paid for' retail electronic article surveillance tags-or more complicated information, such as a car's warranty and service history (Zipkin, 2000).

2.17.2 Limitations:

The following limitations are associated with the RFID according to Messrs. Schreibfeder (2008).

- i. Cost RFID tags will always be more expensive than barcodes. The cost is offset by the extra business benefits that RFID technology can provide. It is envisaged that the cost of tags will drop dramatically as production volumes are increased.
- ii. Moisture depending on the frequency used, radio waves may be absorbed by moisture in the product or the environment.
- iii. Metal radio waves are distorted by metal. This means that tags might be unable to be read if there is metal within packaging or the environment (warehouse automation).
- iv. Electrical interference: electronic noise, such as fluorescent lights or electric motors, may produce interference with radio frequency communications.
- v. Accuracy: it can be difficult to identify specific tags separately from all the others that are within the range of the reader. For example, when attempting to read a tag identifying a pallet, the reader may also the tags on all the cases on the pallet as well.
- vi. Overcompensation: additional data stored within the tag will provide functionality. However, this will increase both the cost of the tag and the time required to read it.
- vii. Security: the ability to write information into tags is one of the main benefits of RFID technology. The mechanism required, however, needs to be secured to ensure that roque parties are unable to write false information into the tag.

2.18 INVENTORY SOFTWARES:

Numerous software programmes are available, providing complete inventory and stock management systems. Such software can provide such facilities as maintaining supplier and customer databases, create picking lists and receipts, provide instantaneous stock balances and automatic reordering, barcode reading, support grouping of inventory items, remove barriers between suppliers and customers, enhance profitability and implement such approaches as JIT, MRO, ERP, DRP and VMI (Schreibfeder, 2008).

2.19 GENERAL BENEFITS OF INVENTORY MANAGEMENT

Jon Schreibfeder (2008), an IM expert in his latest book titled "*Achieving Effective Inventory Management*" 4th edition, lists the following general benefits for IM:

- Complete inventory control
- Up-to-date information about the value of the inventory
- Complete visibility and traceability on quantities in hand, quantities committed and quantities sold
- Response time to demand changes is reduced significantly
- Increased sales
- Knowledge of the exact size of merchandizing inventory
- Frequent analysis of purchases, sales and inventory records
- Eliminating unnecessary usage of warehouse space for unneeded part of

inventory

- Reduction in excess merchandize stock
- Taxes and insurance premiums paid on excess merchandize inventory are avoided
- Providing timely accurate information pertaining to inventory location, movement and valuation, receipt of goods, sale and return of goods and profits you can make sure that your inventory is visible throughout a network.

With comprehensive inventory management you can set your product catalog to hide products that are not in stock, or change prices based on the amount of products available in the warehouse (Schreibfeder, 2008). The quantity of inventory available can be displayed to the shopper and this can prevent unnecessary confusion when the shopper adds items not available to a shopping cart. The store buyer can be automatically notified about low inventory levels.

Information technology is a key player in the transformation of real time purchasing into a strategic business function. The challenge is to find a way to put these technologies to use and create values for competitive advantage to customers (Mentzer, et.al, 2007).

CHAPTER THREE

METHODOLOGY AND ORGANISATIONAL PROFILE

3.1.0 RESEARCH METHODOLOGY

3.1.1 METHOD OF DATA COLLECTION

There are various instruments that can be used to gather primary and secondary data depending on the nature of the research being undertaken, the characteristics of the sample to be used and the type of the research design. The three most common data collection techniques used in research include observation, analyzing documents and asking questions through interviews and questionnaires. For the purposes of this study, the instrument used was mainly by administering questionnaires and conducting face-to-face interviews.

However, based on our research objectives, as previously stated, which were to understand the nature of inventory management and control systems used by CWGL and the obstacles or challenges they face in utilizing modern technologies to improve upon these systems. Given these objectives it was decided that the best way to proceed would be to first assess the current IM practices of CWGL and to compare that with what existing standard best practice in the industry. Thus the population studied was restricted primarily to the staff of CWGL (comprising operational, tactical and strategic management staff) and some key distributors (customers) of the company.

The study was conducted in two phases. In the first phase, in-depth interviews were

conducted with individual staffs (including management) with extensive experience in the retail business in CWGL. The objective was not so much to understand the details of their particular organization and way of doing business, but rather to understand historical trends and the broad segments within the industry. During this first phase a *second objective* was to spend time within the stores and warehouses of CWGL, as non-participant observers, to see how the inventory control processes work.

The *third objective* of this phase was to develop and test a questionnaire which would serve as a research instrument during the second phase of the study. During the second phase of the research, the objective was to conduct a survey of selected staffs and customers of CWGL. Appendix A captures a list of individuals surveyed (interviewed). The survey was conducted through face-to-face interviews.

The topics covered in the study included systems for recording sales and purchases, systems for checking inventory, procedures for re-ordering inventory, and for management control. Information was also obtained regarding business ownership and human resource management (skill levels, compensation, training, and organization structure).

A sample questionnaire for staff and customers of CWGL is included in Appendix B, while Appendix C captures a face-to-face interview conducted with management staff of CWGL.

In this chapter and subsequent ones to follow, inventory management and control systems as observed in CWGL are outlined through a detail description of these systems.

3.1.2 POPULATION

The target population for the study involves all clients/customers and staffs of CWGL. The clients/customers of CWGL were made up of individual distributors and owners of small enterprises in the metropolis (both Kumasi and Accra). The staffs include the strategic level management, tactical level management, and the operational staffs of CWGL. CWGL has a total a staff population of one hundred and five (105), and a client/customer population (mostly wholesalers/distributors) of three hundred and seventy-five (375) evenly distributed among various product lines (*such as vehicle tyres, vehicle batteries, motor vehicle spare parts, Bosch power tools, generating plants of all sizes, air compressors, lawn mowers, STIHL 070 power tools and spares, house water pumps and spares, etc.*).

3.1.3 SAMPLE OF RESPONDENTS AND SAMPLE PROCEDURES

To obtain a representative sample of CWGL clients/customers and staff for the study so as to ensure valid generalization the client/staff population were clustered along three

(3) categories, namely clients/customers, top/middle level management staffs (strategic/tactical), and operational staffs. Forty (40) samples were selected made up of all six (6) top/middle level management staffs, fourteen (14) operational staffs [comprising staffs from the stores, sales/marketing, and accounts/finance departments] and twenty (20) clients/customers. The sample for the study was drawn using cluster, systematic, and simple random sampling techniques. A second interview questionnaire was issued to cover only the strategic-level management of CWGL to explore detailed information on current IM practices been used by the company. In all, the questionnaire had five sections to gather information about:

- the basic characteristics of the company,
- variety and quantities of inventory,
- Current IM practices,
- Factors hindering or facilitating IM practices and general problems relating to IM. Respondents were asked to gauge the extent to which they agreed with various statements or propositions. Most items were constructed as short statements and respondents were asked to provide their views on a five point likert scale.

The researcher between June 2008 and August 2008 executed the data collection phase. The methodology adopted for the study produced an analysis that was mainly descriptive. The basic characteristics of the IM activities of CWGL are set out, highlighting share of inventory and material cost in the total output value. The status of IM is described, the practices used for IM are explored and the reasons for low and high

inventories are offered. A 16.0 version of SPSS software programme was used to run the coded findings for proper analysis. The average practice level of some of the important IM activities was identified and, finally, a review of the scope for IM in CWGL is presented.

3.1.4 RESEARCH DESIGN

The research design adopted or used in the study is **descriptive survey**. The study intended to report the way things are (i.e. to assess the inventory management situation of CWGL). Considering the objectives of the study, it is clear that the descriptive survey was the appropriate design that could lead to the drawing of meaningful conclusion (s) from the study. In brief the design was used to identify and describe the inventory management practices of CWGL, compare with the acceptable standard best practice(s) in the industry and to recommend measures to help improve upon the inventory management systems of CWGL.

3.1.5 RESEARCH INSTRUMENT

The research instruments used in data collection were the researchers own design questionnaire and interview guide. The questionnaire design was design mainly for clients/customers and staff of CWGL, while special interviews was conducted among

the top/strategic-level management staffs of the company. The questionnaire was categorized into two main sections A and B. Section A sought data about the background of the respondents, whereas section B was used to obtain data about the respondents attitude towards managing inventory and measures to improve upon the entire inventory system.

In the case of the interviews with the management staff of the company, it was used to obtain data on the current inventory management system being used, outreach of clients/customers, identify problems or challenges facing the company in their inventory management processes, the competency levels of the their staffs, strategy and measures of improving upon IM. Majority of the questions to the staff and management of CWGL asked were open-ended, thus giving the respondents the opportunity to freely express themselves and to allow the researcher to elicit information and opinion the respondents may have on a number of issues. However, the questionnaires to client were mostly multiple choice with some "Yes" or "No" answers.

3.1.6 DATA COLLECTION TECHNIQUE

Questionnaires were administered personally to the respondents in their various places of business with the support of one field officer from the stores department of CWGL who had initially been briefed. The presence of the researcher was necessary as it enabled the establishment of rapport between the researcher and the various respondents

and also facilitated complete understanding of the questionnaire. The client population was divided by hundred (100). Using systematic and simple random sampling technique, the starting point was determined and the questionnaires personally administered since majority of the clients/customers could not read nor write.

3.1.7 DATA SOURCE

The data used consists mainly of primary and secondary. This is because part of the study required the use of already established facts, theories and principles of inventory management from available literature.

3.1.8 DATA PRESENTATION AND ANALYSIS

Given the nature of the issues that were to be investigated, it was decided that a combination of quantitative and qualitative methods were to be used in the analysis of this case study of which quantitative was used extensively.

The responses were coded using constant comparative analysis, whereby key incidents were identified and assigned to an emergent open coding scheme (Goulding, 2002). As new incidents were uncovered from the data, this coding scheme was subjected to continual re-evaluation and re-interpretation, until all the options (responses) were

eventually coded. A 16.0 version of SPSS software programme was used to run the coded findings for proper analysis.

3.2 C. WOERMANN (GHANA) LIMITED COMPANY PROFILE

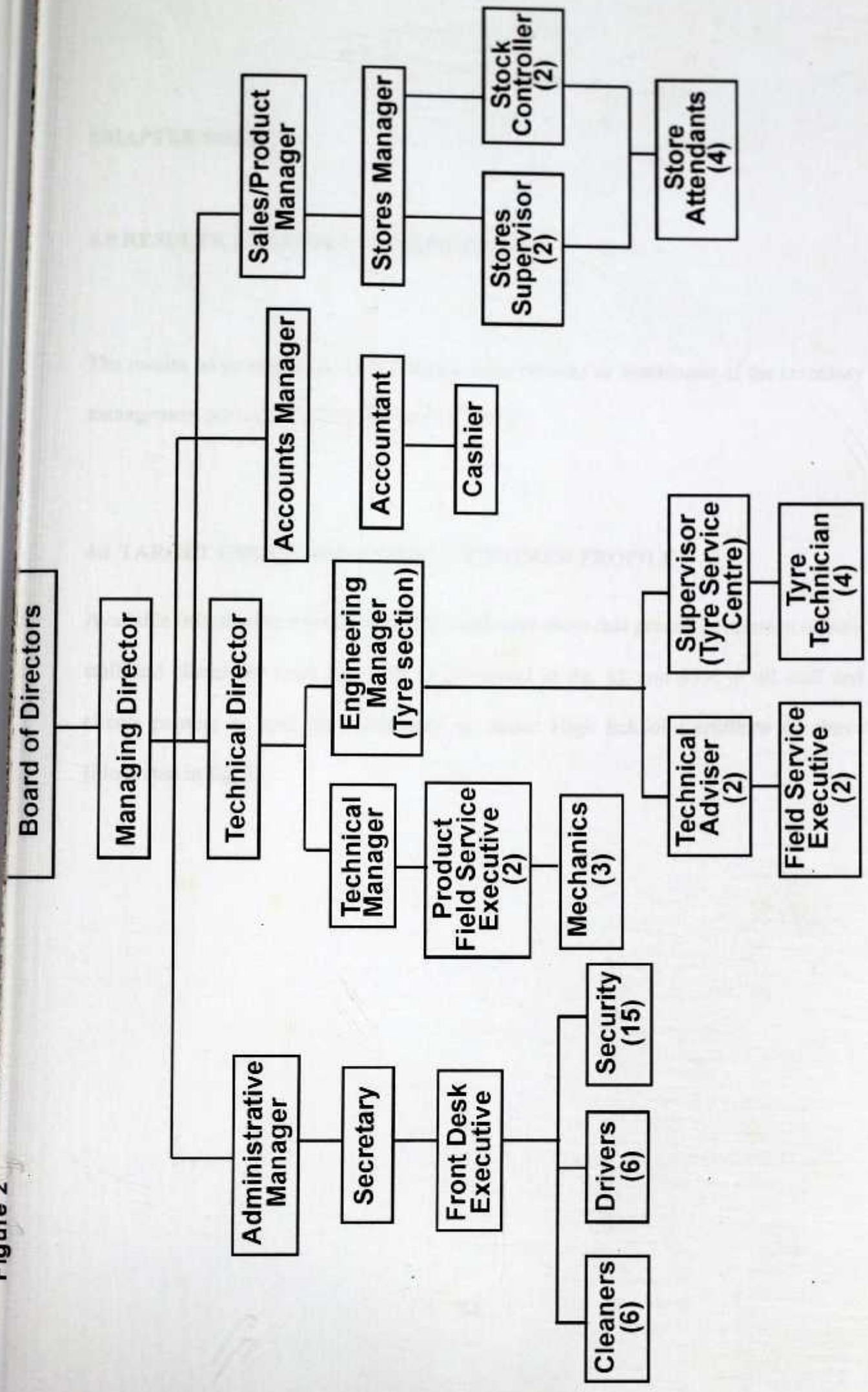
C. Woermann (Ghana) Limited (CWGL) was established in Ghana in April 1954, with the commencement of business operations in the same year at the current head office location in Accra (*i.e. Avenor junction, off the Accra-Nsawam road*). It was however incorporated in 1963 under the Companies Code, 1963 (Act 179) by the Registrar General Department in Accra, Ghana as a company limited by liability to provide domestic and industrial technical supplies and services to its clients. CWGL is a subsidiary of C. Woermann GmbH, Hamburg-Germany, established in 1837 by Messrs. Carl Woermann (a German national). The company currently has two offices in Accra (head office-serving the Southern part of Ghana), and Kumasi (branch office- serving the Northern part of Ghana).

CWGL has a structured inventory management system (IMS) that is capable of generally managing the checks and balances of inventory in the course of doing business. CWGL has a process that all clients go through in taking delivery of their stocks. For all cash or cheque payments (for same day), clients are instantly served or supplied at the stores. However, for all credit purchases, approval is first sought either

from the branch head in Kumasi or any of the top-level management staffs at the head office in Accra.

Even though CWGL does not have written policies and procedures that clearly outline their inventory management guidance for their trading activities, clearly delineated lines of authority and responsibility for managing their inventory activities, individual staffs and indeed clients throughout the trading areas are made fully aware of all the policies and procedures that relate to their specific activities. The Board of Directors, top/middle-level management, stores department as well as other members of the organization also play vital roles in their inventory management process. Figure 2 illustrates the organizational chart or structure of the company (i.e. CWGL).

Figure 2



CHAPTER FOUR

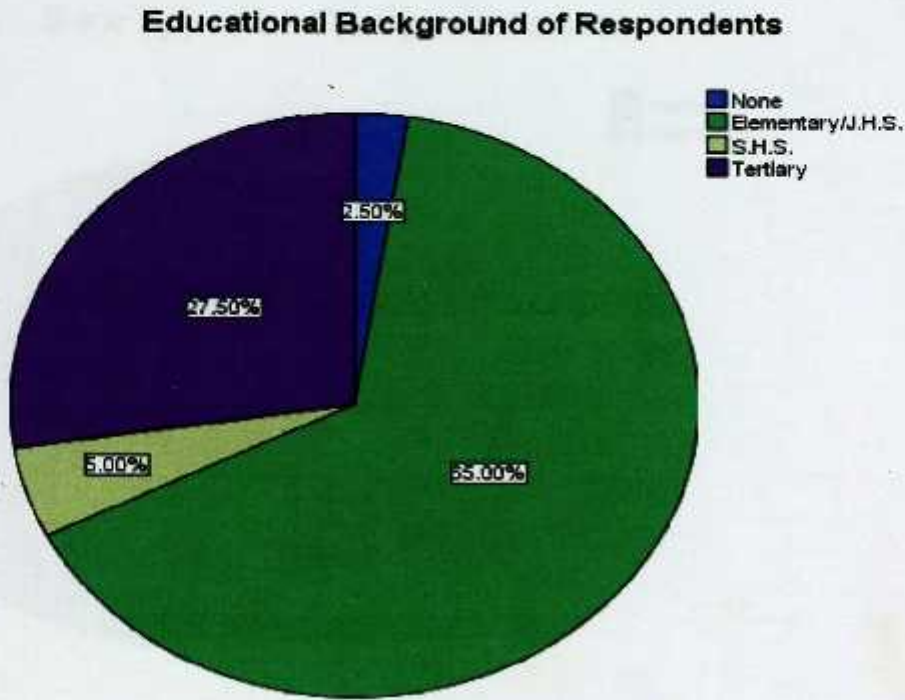
4.0 RESULTS, ANALYSES AND DISCUSSION

The results, as presented in this report generally provide an assessment of the inventory management processes and or practices of CWGL.

4.1 TARGET GROUP AND CLIENT/CUSTOMER PROFILE

Available information from the research conducted show that greater population of both staff and clients are male (i.e. 93% as illustrated in fig. 4), and 85% of all staff and clients possess at least an Elementary or Junior High School Certificate or above (illustrated in fig. 3).

Figure 3

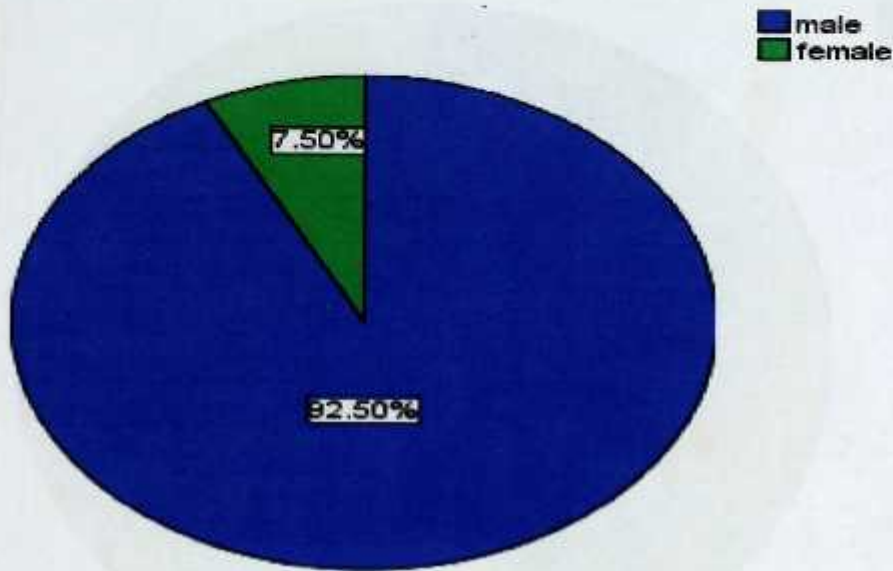


SOURCE: Field survey conducted by Researcher in July 2008

Majority (87%) of both staff and clients have known or worked with the company for at least nine (9) years or more (as captured in Fig. 5), and with a total of 93% of the same population ranging between 27-44 years (illustrated in Table 2), which effectively means that they are still strong and within the legally employable age group .

Figure 4

Sex type of Respondents



SOURCE: Field survey conducted by Researcher in July 2008

Table 2

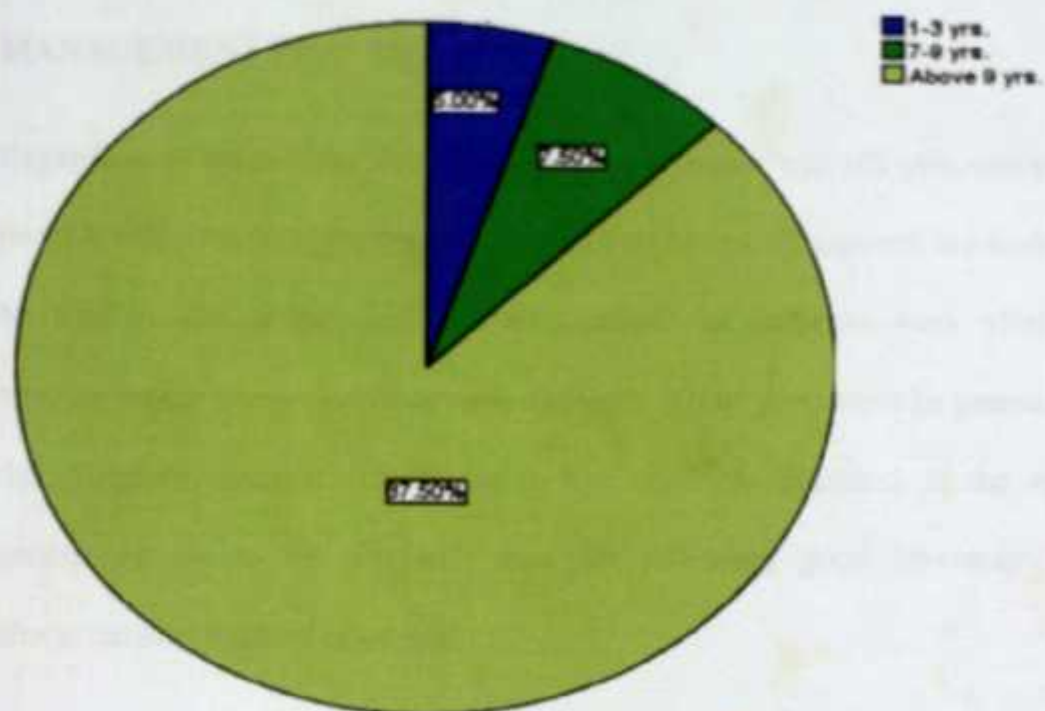
Age group of Respondents

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 18-26yrs	1	2.5	2.5	2.5
27-35yrs	16	40.0	40.0	42.5
36-44yrs	21	52.5	52.5	95.0
above 44 yrs	2	5.0	5.0	100.0
Total	40	100.0	100.0	

SOURCE: Field survey conducted by Researcher in July 2008

Figure 5

How long have known or worked with CWGL



SOURCE: Field survey conducted by Researcher in July 2008

CWGL generally targets prospective clients who have set up their business for well at least one year. However, this does not mean that all clients must have perfect businesses running before being considered by the company. The requested business experience is often on a marginal basis, for example a home based business and sometimes it is not enough that the prospective client has to prove "some activity" in the type of business without having been an entrepreneur himself/herself. The critical point is that there is not only a vision but a practical understanding about the product, brand, the local

market and the customers.

4.2 SOME GENERAL CHARACTERISTICS OF GOOD INVENTORY MANAGEMENT PRACTICES

Regardless of what some data processing salespeople will tell you, computers do not provide solutions to inventory management problems. Computers are tools. They must be used in the proper business environment in order to work effectively. This environment is comprised of several elements. All of them must be present in order for the inventory management system to live up to its potential. If the system is not performing up to its potential, then the following good inventory management characteristics must be examined;

4.2.1 ESTABLISH AN APPROVED STOCK LIST FOR EACH WAREHOUSE

Most dead inventory is "D.O.A." (Dead on arrival). Order only the amount of non-stock or special order items that your customers have to buy. Before adding an item to inventory, try to get a purchase commitment from your customer. If this is not possible, inform the salesperson who requests the item that he or she is personally responsible for half the carrying cost of any part of the initial shipment that isn't within six months.

4.2.2 RECORD ALL MATERIALS LEAVING YOUR WAREHOUSE

For good inventory practice, there should be an appropriate paperwork for every type of stock withdrawal. Under no circumstance should an item leave the warehouse without being entered in the computer. Eliminate “no charge/no paperwork” material swaps. All product samples should be charged to a salesman accounts until they are either returned to stock or charged to the customer. From the research conducted, about 75% of the respondents agreed that CWGL keeps record of all stocked items, whereas the rest of the 25% respondents were not sure about the record keeping process (as captured in table 3 below).

Table 3

Does CWGL keep records of all stocked items in warehouse?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Strongly agree	27	67.5	67.5	67.5
Agree	3	7.5	7.5	75.0
Not sure	10	25.0	25.0	100.0
Total	40	100.0	100.0	

SOURCE: Field survey conducted by Researcher in July 2008

4.2.3 TIMELY PROCESSING OF DOCUMENTATIONS FOR ALL STOCKED ITEMS

As a general principle, all printed picking documents should be filed at the end of the day. Stock receipts should be put away and entered in the computer system within 24 hours of arrival. Stocked receipts should be put in place.

Results from the interview conducted in CWGL (as captured in table 4) indicated a rather divided response since the number that responded in the affirmative was almost equal the number of those who were either not sure whether this process was being followed or remained neutral in their response when the question was posed.

Table 4

Do you process documentations for stocked items on time?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	21	52.5	52.5	52.5
Not sure	10	25.0	25.0	77.5
N/A	9	22.5	22.5	100.0
Total	40	100.0	100.0	

SOURCE: Field survey conducted by Researcher in July 2008

4.2.4 WHETHER THE ORDERING PROCESSES ARE AUTOMATED

In any business with a lot of inventory (such as the case of CGL), there is the need for regular ordering and purchasing of at all times. To do this effectively requires a purchaser who can spend time analyzing sales, monitoring inventory levels, and make orders as needed to keep items in stock for customers (or for projects in the case that the items are used for raw materials). While the specific needs of any business vary widely, it is likely that management of inventory can be dramatically improved with computer-assisted ordering.

Overall the key to this is the ability to take advantage of an integrated system that makes it possible to streamline purchasing by automating it. This not only frees up time to focus on other aspects of your business, but it prevents errors and the potential for overlooking needs since it automatically generates orders based on the actual Inventory levels.

So how much time could you save by automating your orders? How many times have customer's needs gone unfilled because stock on some items was low? Look for a good integrated IM system that can make all these problems go away and give you a competitive advantage by streamlining your order process.

There are systems where purchase order, sales and inventory are integrated and work seamlessly together -- systems that have the ability to set up minimum and maximum quantities for an item. When that item runs low, the system can then automatically generate an order based on those numbers and current inventory levels. There are even good systems that can generate orders based on 'the least expensive vendor' or other

criteria that you can establish so that you can get the best deal possible for your needs and business.

While there may always be a need for careful ordering and review, an option to automate the ordering and fulfillment of the staple items is beneficial. It frees up your time so that you can focus on the areas in inventory and purchasing that require greater attention. From the research conducted in CWGL however, it was crystals clear that this process was not been practiced as evident in results captured in table 19.

Table 5

Are the ordering processes automated?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid No	38	95.0	95.0	95.0
Not sure	2	5.0	5.0	100.0
Total	40	100.0	100.0	

SOURCE: Field survey conducted by Researcher in July 2008

In responding to the question of automation of ordering processes, 95% responded in negative with 5% in the positive.

4.2.5 IS IM A CORE STRATEGIC FUNCTION OF CWGL?

Jon Schreibfeder (2008) in his article entitled "Implementing Effective Inventory Management" likened the incorporation of corporate strategic planning into IM to the painting of a house. He intimates that even if you use the most expensive paint available, if the surface has not been scraped and sanded, the paint will peel off. He thus concludes that the most expensive system will not deliver the results expected by a distributor unless it is operating in a business environment that ensures inventory accuracy.

When the question was posed, 97% to the responses affirmed this statement, with only 3% responding in the negative. The results is as illustrated in both table 6 and Figure 6.

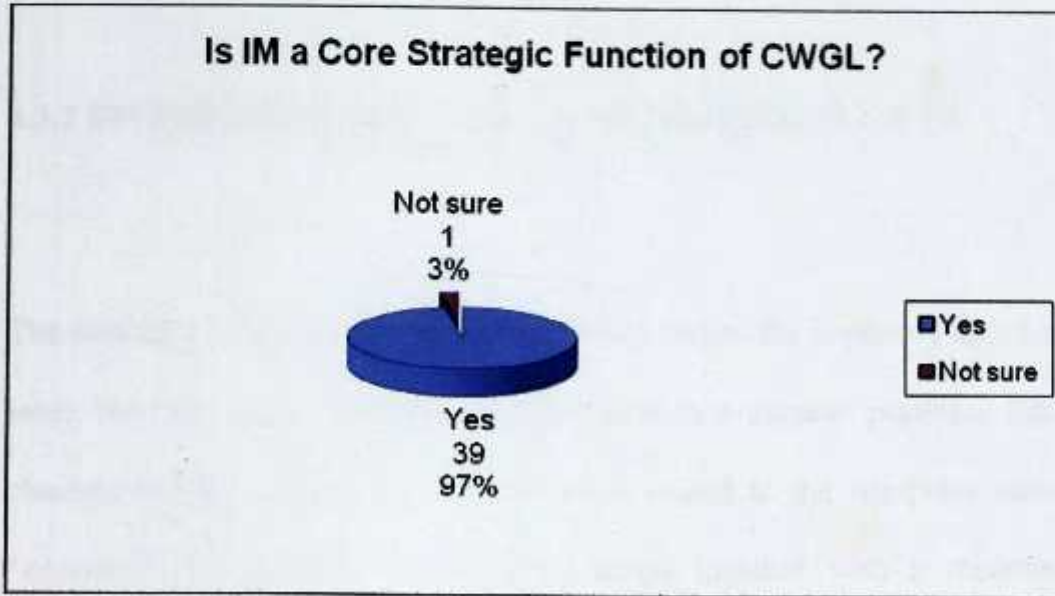
Table 6

Is IM a core strategic function of CWGL?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	39	97.5	97.5	97.5
Not sure	1	2.5	2.5	100.0
Total	40	100.0	100.0	

SOURCE: Field survey conducted by Researcher in July 2008

Figure 6



SOURCE: Field survey conducted by Researcher in July 2008

4.3 BRIEF ASSESSMENT OF IM PROCEDURES AT CWGL

4.3.1 INVENTORY MANAGEMENT IN CWGL

Sales: Average inventory on hand (for each of the 2-branch offices across the country) is worth in excess of GHC 7 million. Average monthly sales for each branch office ranges between GHC 800,000 – GHC 1.3 million. Inventory turnover time is about six months. Business is run on cash or cheque payments for the same day. Some of the

institutional buyers are given 30 days credit. All sales are recorded through cash memo receipts which are issued for every item sold. These are also recorded in cash register.

4.3.2 INVENTORY REORDERING & RECORDING IN CWGL

The inventory level of each product is tracked. When the inventory falls below a certain level, the item and quantity-on-hand is added to a demand purchase list. After being checked by the stock controller, the list is routed to the computer room, where the "expected" (as per records) inventory levels together with a recommended order quantity, is added on to the list. The list is then again sent to the stock controller for final approval. Purchase orders are handled by the Stores Manager, who reorders inventory weekly. Local items take 3-4 working days for delivery, while imported items take 8-12 weeks.

4.3.3 INVENTORY PROCESS IN CWGL

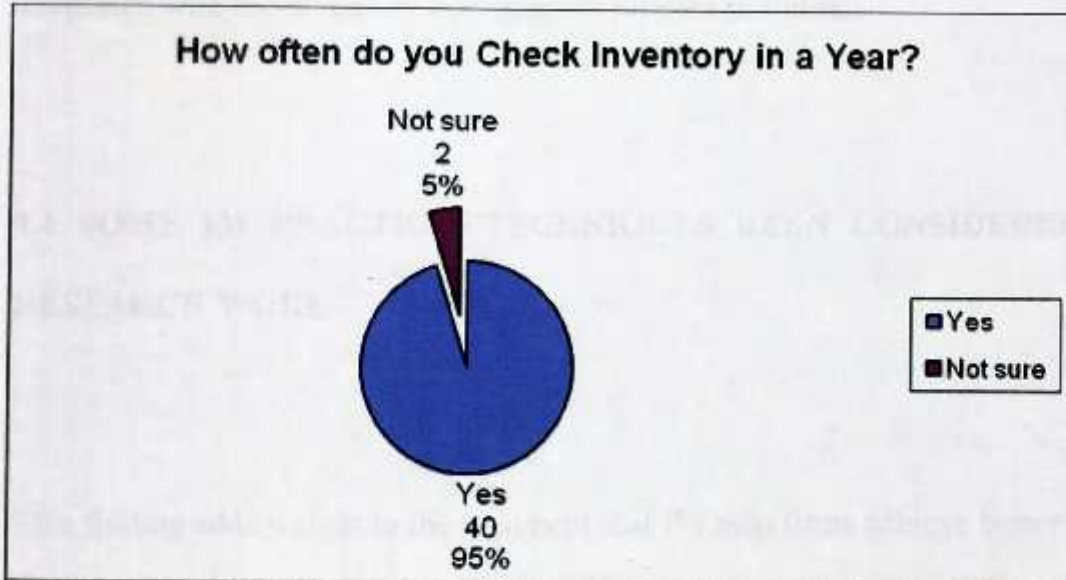
When delivery is received, it is checked against the purchase invoice, and then is sent to the stock controller in the computer room. There are often no items purchased locally, and therefore all imported products are placed on the shelves and or in the warehouse immediately.

4.3.4 INVENTORY CHECKING IN CWGL

Inventory checking takes between 3 to 4 days, and is done twice a year.

There is almost no inventory shrinkage at the store. Products once sold are not returnable, unless in some special cases where there are guarantees. Beginning of month inventory is recorded. The twice yearly checking is often considered sufficient for keeping the management informed regarding inventory and sales. Figure 7 illustrates responses from management and staff regarding how often inventory is checked per year in CWGL. Majority (95%) of responses affirmed that inventory is checked twice in a year, whereas 5% were not sure.

Figure 7



SOURCE: Field survey conducted by Researcher in July 2008

4.3.5 INVENTORY CONTROL IN CWGL

Cash receipts are used for inventory control. When the cash memo book finishes, the cash memo receipts are used for updating the inventory database. Sales are also recorded. The computer programme is also capable of generating "0 quantity" message. A customer mailing list is kept within the computer database which is kept current by constantly adding new customers and change of address information. The management believe that it is usual for a store to get stuck with a particular item, "but good management is to put it on sale when there is still time, because once the season elapses, then one is really in deep trouble". Computer inventory-level reports and salesmen observations are used to detect slow moving products. Management feel that the computer generated reports (regarding sales, inventory, and profit calculations) assist them in making correct decisions. Plans are far advanced to make the system even more integrated with the inventory management process in future.

4.4 SOME IM PRACTICES/TECHNIQUES BEEN CONSIDERED IN THIS RESEARCH WORK

This finding adds weight to the argument that IM help firms achieve better utilization of resource and hence achieve increases in performance. It is essential for firms to practice a number of formal IM techniques. In addition, lead-time reduction significantly

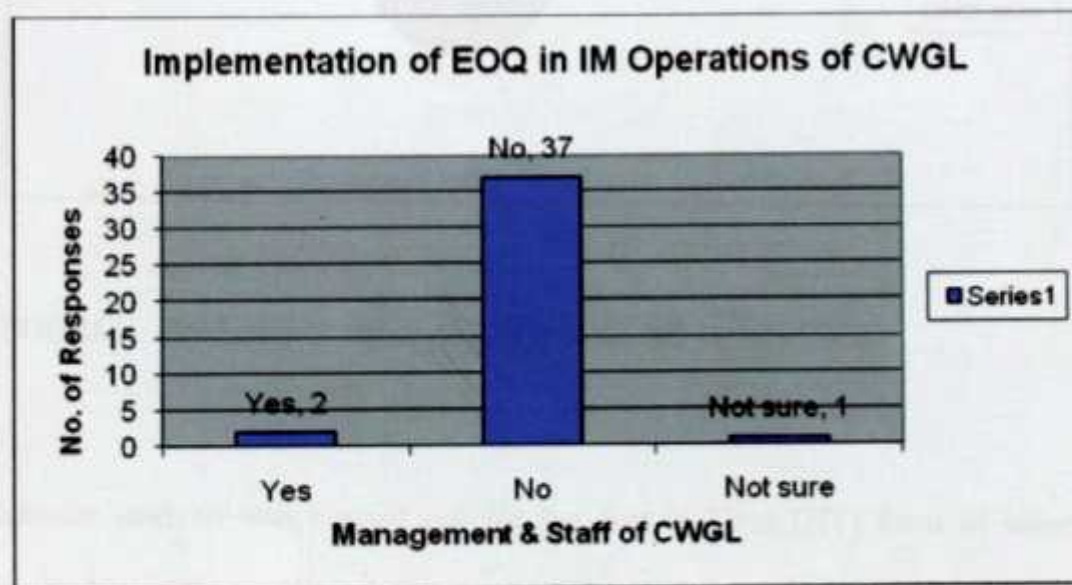
contributes to the IM performance. Crandall and Burwell (1993) observed the role of lead-time reduction in improving the performance of enterprises.

For the purposes of this research work IM practices or techniques such as the Economic Order Quantity (EOQ), Vendor Managed Inventory (VMI), Just-In-Time (JIT) inventory, ABC analysis and the use of IM Softwares were considered.

4.4.1 IMPLEMENTATION OF EOQ THE OPERATIONS OF CWGL

Results obtained from the research conducted revealed that the Economic Order Quantity (EOQ) approach of IM is currently not being implemented by CWGL. The survey results indicate that 92% of the responses said no, with a total of 8% either affirming or not sure that EOQ is currently being practiced in the company. Figure 8 illustrates the findings.

Figure 8



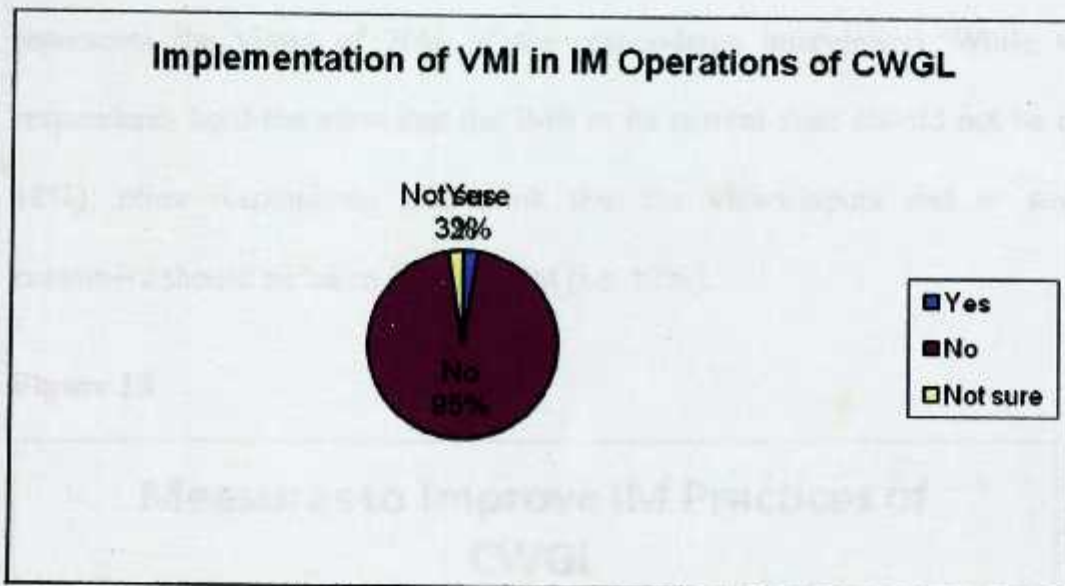
SOURCE: Field survey conducted by Researcher in July 2008

4.4.2 IMPLEMENTATION OF VMI THE OPERATIONS OF CWGL

By the same analysis, results obtained from the survey conducted that the Vendor Managed Inventory (VMI) approach of IM is currently not being implemented by CWGL. The survey results showed that 95% of the responses said no, with a total of 5% either affirming or not sure that VMI is currently being practiced in the company.

Figure 9 illustrates the findings.

Figure 9



SOURCE: Field survey conducted by Researcher in July 2008

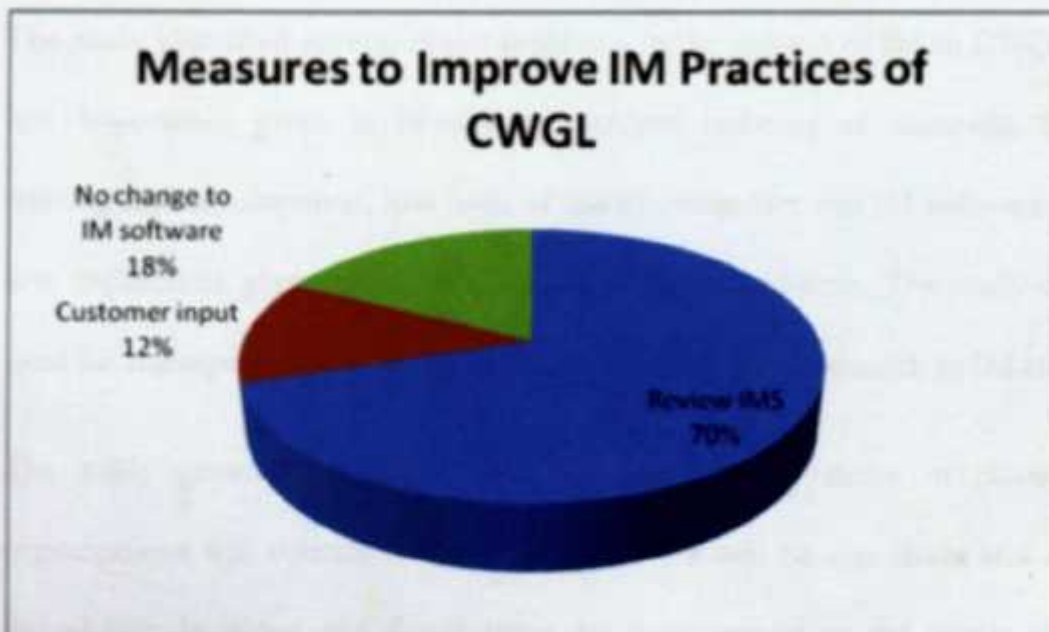
Similar analysis was carried out for the Just-In-Time (JIT) form of inventory, ABC analysis and the use of IM Softwares. The results indicated that with exception the use

of IM Softwares that was currently being implemented by CWGL, the other techniques or practices are not being adhered to or implemented.

4.5 MEASURES TO IMPROVE IM OF CWGL

As may be illustrated below in Figure 10, the research reveals that a complete review or overhaul of the current inventory management system (IMS) could help improve upon IM of CWGL, and indeed other retail and wholesale establishments. This view represents the views of 70% of the respondents interviewed. While some of the respondents hold the view that the IMS in its current state should not be changed (i.e. 18%), other respondents also think that the views/inputs and or suggestions of customers should be taken into account (i.e. 12%).

Figure 10



SOURCE: Field survey conducted by Researcher in July 2008

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 INTRODUCTION

A summary of the findings of and general conclusions drawn on the basis of this study are presented in this chapter. It is concluded with recommendations for two extreme (2) entities: C. Woermann (Ghana) Limited [CWGL] on one side and the research community on the other.

5.1 SUMMARY OF FINDINGS

The study identified several major problems in the context of IM in CWGL including a low importance given to forecasting, random ordering of materials, low levels of training and development, low level of use of computers and IM softwares, as well as a low importance given to purchasing and variable lead-time. The study confirmed the need for management of CWGL to alter drastically their approach to IM issues.

The study generally revealed that with good IM systems in place majority of organizations will operate more efficiently; there will be less chaos and also less need for ad-hoc decisions and fire-fighting by management or the owner-managers. The

system will provide a one-stop solution to handling purchases, sales, re-orders, expenses, employee and customer information.

In this research however, C. Woermann (Ghana) Limited [CWGL] did not utilize fully and effectively all the relevant IM practices in their operations.

5.2 CONCLUSION

In conclusion, it can be deduced on the basis of the foregoing and field observations that, there are considerable differences in the procedures employed by CWGL and possibly many other retail/wholesale establishments for managing inventory. These range from informal mechanisms employing visual checks and elementary documentation, to sophisticated computer-based systems for tracking purchases and sales, and for supporting re-orders and overall management control. It was also observed from the study conducted, that majority of the IM best practices were not been adhered to by CWGL [as observed in Chapter four (4) of this study], even though IM happens to be a core strategic function of the company.

On the question of measures to adopt in order to improve upon IM system of the company however, majority of both staff (including management) and clients (who responded to the questionnaires) unanimously agreed that the current IM software being used by the company be reviewed to include IM systems such as the enterprise resource planning (ERP) and materials requirements planning (MRP).

Generally, organizations with good systems in place will in no doubt operate more efficiently; there will be less chaos and also less need for ad-hoc decisions and fire-fighting by the management. The system will provide a one-stop solution to handling purchases, sales, re-orders, expenses, employee and customer information (Schreibfeder, 2008).

Three important aspects used to judge the quality of a firm's IM practices are;

- i. the systematic character of the operation,
- ii. the use of computers and
- iii. the application of modern methodology (Chikan, 1990).

In this context however, the level of computerization for IM activities of CWGL was low.

5.3 RECOMMENDATION (S)

In the light of the foregoing, the following recommendations are put forth for two (2) categories of entities: C. Woermann (Ghana) Limited [CWGL] as a focal organization, and the research community on the other hand.

5.3.1 RECOMMENDATIONS FOR C. WOERMANN (GHANA) LIMITED

For CWGL, it is recommended that:

- Enterprise resource planning (ERP) system should be factored into the current IM software being used by CWGL to provide functions to calculate safety stocks (SS), make demand forecast and determine reorder point (ROP) for each item contained in the database based on the item's demand history.
- Materials requirements planning (MRP) system should also be considered in the IM software being used by CWGL to ensure that right materials are procured to the right place at the right time.
- With ERP and MRP systems in place, it is also recommended that the ordering process should be automated in order to free up time to focus on other aspects of the business, and also to prevent errors and the potential for overlooking needs since it automatically generates orders based on the actual inventory levels.
- There is the need for market information on the sector concerned in order to form a good basis for all correct marketing decision making.
- Coding systems have to be developed for organizing the various product items being handled; prices and other data needs to be entered.
- There is the need for proper correlation of purchasing, stocking and sales in order to prevent overstocking and under-stocking with all their attendant dangers.
- Store personnel and attendants need to be motivated and trained periodically to understand the new procedures and to maintain the new system.

In the case of CWGL the above recommendations are necessary in view of the fact that the situation is complicated further by such factors or challenges as a lack of training & development (T&D) and a general lack of progress in the area of human resource development (HRD). The use of a formal inventory ordering policy, such as fixed quantity ordering or fixed period ordering policy was not observed. Instead, a random policy of ordering was followed for material or inventory procurement.

5.3.2 RECOMMENDATIONS FOR FURTHER RESEARCH

For further research, the following recommendations are put forward for consideration:

- Due to the limited time and resources available for this research, it is recommended for a similar study to be conducted, but with a multi-case research design for a number of retail and wholesale organizations operating not only in the Kumasi metropolis but across the entire country.
- Further research needs to be conducted to understand and document IM practices, obstacles, and aspirations of different segments of the retail and wholesale sector.
- Based on this research, teaching material needs to be developed which, in simple language and illustrated with easy-to-understand case studies/histories, explain the options available to retailers and wholesalers for improving their operations.

In Ghana, and possibly elsewhere in the world, nothing is as convincing to a practical businessman as a good success story (*this is attested to by the popular TV3 programme titled "M'asem"*- meaning "my story"). And nothing teaches more than an expensive failure. Stories of successful implementations of inventory management and control systems need to be documented and disseminated. Stories of failures would nevertheless also prove equally valuable.

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APPENDIX A: LIST OF INDIVIDUALS SURVEYED

Mr. Carsten Duwer

Managing Director

C. Woermann (Ghana) Limited.

Nsawam Road/Avenor Junction

Accra-Ghana

+233-21-221 777 / 225 141

Mrs. Joycelyn Edusei-Opoku

Central Inventory Control (CIC) Manager

C. Woermann (Ghana) Limited.

Nsawam Road/Avenor Junction

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+233-21-221 777 / 225 141

Mr. Samuel Gyamfi

Products Manager

C. Woermann (Ghana) Limited.

Nsawam Road/Avenor Junction

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Mr. Thomas Sarpong

Stores Manager

C. Woermann (Ghana) Limited.

Asokwa Plot 9 Block Lake Road (Briscoe Junction)

Kumasi-Ghana

+233-51-37597 / 22952

APPENDIX B: QUESTIONNAIRE FOR STAFF & CUSTOMERS OF CWGL

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY-
KUMASI, GHANA

(COLLEGE OF ART AND SOCIAL SCIENCES)

KUNST SCHOOL OF BUSINESS

QUESTIONNAIRE

TOPIC: AN ASSESSMENT OF THE INVENTORY MANAGEMENT SYSTEM –
CASE STUDY OF C. WOERMANN (GHANA) LIMITED.

The purpose of administering this questionnaire is to assess the entire inventory management system of C. Woermann (Ghana) Limited and to assist management and staff of the company with the requisite knowledge required to understand inventory concepts and to improve upon the system in order to minimize losses and increase profitability. A very candid response would be very much appreciated.

INSTRUCTION: Please kindly tick the most appropriate box beside each question where possible. Very frank and candid response would be highly appreciated. Your confidentiality is assured.

Staff & Management of CWGL:

1. Age group: A/ 18-26 yrs. [] B/ 27-35 yrs. [] C/ 36-44 yrs. D/ Above 44 yrs. []

2. Sex type: Male [] Female []
3. What is your marital status? A/ Single [] B/ Married [] C/ Divorce [] D/ Widow [] E/ Never married
4. What level of education have you attained? A/ None [] B/ Elementary/J.H.S. [] C/ S.H.S. [] D/ Tertiary []
5. Which department do you belong in the company? A/ Stores [] B/ Sales/Marketing [] C/ Accounts/Finance D/ Management staff E/ Not applicable []
6. What is your ranking in the company? A/ Top level management (*Strategic level*) [] B/ Middle level management (*Tactical level*) [] C/ Staff (*Operational level*) [] D/ Customer []
7. How long have you known or worked with the company? A/ 1-3 years [] B/ 4-6 years [] C/ 7-9 years [] D/ Above 9 years []
8. Is inventory management a core strategic function of CWGL? A/ Yes [] B/ No [] C/ Not sure [] D/ Can't remember []
9. Does the company have an inventory management system or software which keeps and tracks all inventory records? A/ Yes [] B/ No [] C/ Not applicable []
10. If your response to Q9 is yes, is such system or software capable of meeting customer satisfaction at all times? A/ Yes [] B/ No [] C/ Not always [] D/ Not applicable []

11. What in your opinion can be done to improve upon the IM software?.....

12. Do you have properly-appointed and regular warehouse attendants? A/ Yes [] B/ No [] C/ Not sure [] D/ Can't remember []
13. Do you use bin locations for all stocked items? A/ Yes [] B/ No [] C/ Not all items [] D/ Not applicable []
14. Are these bin locations properly assigned to all stocked items? A/ Yes [] B/ No [] C/ Not sure [] D/ Not applicable []
15. Does CWGL keep appropriate records for all stocked items leaving the warehouse? A/ Strongly agree [] B/ Agree [] C/ Disagree [] D/ Strongly disagree [] E/ Not sure []
16. Do you process all paperwork (in terms of stock receipts and stock issued) in a timely manner? A/ Yes B/ No C/ Not sure D/ Not applicable []
17. Do you undertake physical stock-checking? A/ Yes [] B/ No [] C/ Not sure [] D/ Can't remember []
18. How often do you physically check stock in a year? A/ Once [] B/ Twice [] C/Thrice [] D/ Four times []
19. Is the ordering process automated? A/ Yes [] B/ No [] C/ Not sure [] D/ Not applicable []
20. Do you know who your company's vendors are? A/ Yes [] B/ No []
21. If your response to Q20 is yes, then are these vendors delivering orders on time?

22. What do you think can be done in order to improve upon the inventory management system of CWGL?

.....
.....

23. An IM practice such as the Economic Order Quantity (EOQ) is currently been practiced by CWGL. A/ Strongly agree [] B/ Agree [] C/ Disagree [] D/ Strongly disagree [] E/ Not sure []

24. An IM practice such as the Vendor Managed Inventory (VMI) is currently been practiced by CWGL. A/ Strongly agree [] B/ Agree [] C/ Disagree [] D/ Strongly disagree [] E/ Not sure []

25. An IM practice such as the Just-In-Time (JIT) is currently been practiced by CWGL. A/ Strongly agree [] B/ Agree [] C/ Disagree [] D/ Strongly disagree [] E/ Not sure []

26. An IM practice such as the use of the ABC analysis (Pareto analysis) is currently been practiced by CWGL. A/ Strongly agree [] B/ Agree [] C/ Disagree [] D/ Strongly disagree [] E/ Not sure []

27. An IM practice such as the use of inventory management softwares is currently been practiced by CWGL. A/ Strongly agree [] B/ Agree [] C/ Disagree [] D/ Strongly disagree [] E/ Not sure []

Thank you very much for taking time off your busy schedules to complete this questionnaire. Your input is very much appreciated.

APPENDIX C: INTERVIEW OF MANAGEMENT STAFF OF CWGL

jjkad A]- MANAGEMENT PROFILE/HISTORY:

1. Owners:-..... Education:-..... Age:-.....
2. Business started in:-..... By whom:-.....
3. Prior business experience?.....
.....
- 4a. When did you get involved in retail/wholesale business?.....
- 4b. How did you get involved in retail business?.....
.....
.....
5. What is used to make decisions? A/ Customer research [] B/ Past sales [] C/
Vendor reports [] D/ Advertisements E/ Others, please specify.....
.....
- 6a. Are you receptive to changes? A/ Yes [] B/ No []
- 6b. What changes have you made in the last one year?.....
- 6c. Did it work out to your advantage?.....
.....
- 7a. How do you see yourself/company, one year front now?.....
.....
- 7b. Five years front now?.....
.....
- 8a. Is there a retailer organization (like Ghana Union of Traders Association) for your
business? A/ Yes [] B/ No []

8b. If answer to 8a is yes, provide name of retailer organization.

.....

[ikad B] STORE/SHOP PROFILE:

1. Type of store/shop.
2. Merchandise type (Cosmetics, Clothes, Grocery, Candies, Toys, Linens, Flower Shop etc.)
3. How did the store/business grow over course of time?
4. What are top 3 operating principles (e.g. profitability, customer satisfaction, store image?)

[ikad C] SALES:

1. Company's (Stores') average inventory on hand?
2. Average sales/Week.....
Sales /months.....
Sales /year.....
3. U of transactions/day.....
Transactions/week.....
4. U of credit transactions,
5. Number of wholesale vs. retail transactions/volume?
6. Percentage (%) of orders received on phone/store visits!
7. Busiest business time (seasonally)?
 - During day.....
 - Of week.....

- Of month.....
- Of year

8. What different factors directly affect sales?

- Weather
- political stability

9. How are items identified which are candidates for promotions or mark-downs?

10. What kind of damaged products can be returned to the supplier?

- How it affects the store revenue/image (return/refund policy)?

ijkad DJ PRODUCTS:

1. Number of items

2. Price range, for merchandise

3. How is variety and quantify of each assortment/brand decided?

4. Brands?

- Manufacturer
- dealer (retailer name)
- generic (no name).

5. Item categories?

- scrambled merchandise (florist & greeting cards)
- complementary goods (cats & tires, stereo & tapes)
- substitute goods (man\ brands of same item).

7. Number of vendors for each category?.....

8. What guidelines are used to remove a product from shelf?

[ikad E] INVENTORY RECORDING & CALCULATION:

1- How are sales documented?

- How often cash receipts are issued!
- How often cash receipt are used for inventory control?

2- How are purchases documented?

3- Are permanent records on all transactions maintained? A/ Yes [] B/ No []

- If Yes', for how long?.....

4- How are returns & damages processed /handled?

5- Returned item would go to? stock room _shelf

6- Prices are masked on merchandise? A/ Yes [] B/ No []

7- Pricing/coding takes place in? back room sales floor.

8- Inventory system used ? physical inventory (dollar control /unit control)

- How often

9- Do you use perpetual (book) inventory system? A/ Yes [] B/ No []

If "Yes', how do you do it? A/ total no. of units [] B/ sales [] C/ returns [] D/ by using receipts [] E/ other []

10. Do you record beginning of month inventories? A/ Yes [] B/ No []

- End of month inventories? A/ Yes [] B/ No []

11. Is book inventory maintained through out the year? A/ Yes [] B/ No []

12. Inventory takes place in? A/ back room [] B/ sales floor []

13. Overview of record keeping system.

.....
.....
.....

[ikad F] INVENTORY CHECKING:

1. How frequently the inventory is checked"!

2. Time spent on inventory checking?

- Daily.....
- Weekly.....

3. How many employees are dedicated to inventory control?.....

None.....

4. How often physical inventory is conducted to check the accuracy of book figures to adjust against shrinkage/returns"!

.....

5. Does inventory checking change with season? A/ Yes [] B/ No []

6. Are sales and inventory records reviewed regularly? A/ Yes [] B/ No []

7. Are all type of records monitored for accuracy? A/ Yes [] B/ No []

8. Inventory shortage? Per month

9. How much inventory shrinkage (monthly) is due to

- Shoplifting.....
- Employee theft (pilferage)
- Inventory recording errors.....

10. What measures are taken to prevent?

- Shopper theft while store is open.....
- Shopper theft while store is closed.....
- Employee theft.....
- Damage.....

11. How much is being spent currently to reduce inventory shrinkage due to:

- Shoplifting.....
- Pilferage.....
- Inventory recording errors.....

12. Is there any industry average for inventory shortage? A/ Yes [] B/ No []

- If Yes', what is it?.....

13. Are inventory shortages compared with industry averages? A/ Yes [] B/ No []

14. What mechanism is employed by the store to detect shortage of a certain item in market & to inform customers of its availability @, their store.

15. A brief inventory process (for a single item)

16. A detailed inventory process (non-participant observation).

[jkad G] INVENTORY RE-ORDERING:

1. How often the product or merchandise is re-ordered?

A/ daily [] B/ bi-weekly [] C/ weekly [] D/ bi-monthly [] E/ monthly [] F/
other.....

How long each order takes.....

2. Percentage (%) of supply purchased from manufacturer on credit.....

3. Merchandise? ___delivered ___ picked up.

4. What terms are taken into consideration, when negotiating purchases?

A/ date of delivery [] B/ quantity purchased [] C/ price-profit margin [] D/
discounts [] E/ form of delivery [] F/ other, specify.....

5. How often would you not stock an item, until the competition does so?

6. A sales person walks into your store with a new item, what would it take him to
convince you to put the new item in stock?

A/ type [] B/ size [] C/ usefulness [] D/ ads [] E/ colour [] F/ company
standing [] G/ credit terms [] H/ profit margin []

7. What is done (procedure of re-ordering) when cut-of-stock?

8. How are sales people informed about the unavailability of a product?

9. What is done (procedure of re-ordering) when a product is not on shelf?

10. Who makes following decisions?

- What merchandise to stock.....
- How much to stock.....
- When to stock.....
- Where to stock.....

11. How are the following decisions made?

- What merchandise to stock.....
- How much to stock.....
- When to stock.....

- Where to stock.....

12. How are re-order points calculated & observed? (stock level @ which new orders must be placed)

13. What guidelines are used to add/drop products?

A/ declining sales [] B/ profits [] C/ prices [] D/ appearance of substitute []
E/ loss of usefulness [].

14. A customer comes in and asks for a certain product, you are out of it, this happens many times.

- what is done to prevent this from happening in the future?

15. How soon is such situation detected?

How is it cured?

[ikad H] INVENTORY CONTROL:

1. Have you ever been stuck with large inventories? A/ Yes [] B/ No []

- If 'Yes' why did it happen?

- How did you use that experience to avoid such future incidence?

- How could it be avoided in the first place?

- What damage was caused by it, financially & otherwise?

2. How do you decide, how much stock be placed on shelf/in store room?

3. How are slow moving items identified?

4. You want to get certain information (current stock level, cost, retail price, order information – last order, when to place next order, with whom, order delivery

time/period, product turn over etc.) about an item X, how and what would you do to get this information?

5. Do you think a formal, organized inventory control management system will help-?

- Sales A/ Yes [] B/ No []
- Image A/ Yes [] B/ No []
- Revenue A/ Yes [] B/ No []

6. If inventory control management system is formalized/tightened, how are your employees going to react?

A/ like [] B/ dislike []

- Why?.....

7. What suggestions, you have to improve your own inventory management?

.....
.....
.....

8. What new technologies have you used in last 1 year for inventory control system?

[ikad I] MANAGEMENT CONTROL:

1- How much time/month is devoted by management to strategic issues?

- What are those issues?

2- How is current inventory system used to formulate retail/wholesale assortment strategy?

3- How is a balance kept between inventory level & out-of-stock condition?

4- How is stock turnover measured/determined?

5- How is stock age measured/determined?

6- How is inventory information used to consider non deletion strategies such as cutting costs, revising marketing efforts, adjusting prices & cooperating with other retailers?

7- Which is considered most important & how much it is?

_____ sales/employee _____

_____ average customer transaction size _____

- How is it calculated?

APPENDIX D: LIST OF SUPPLEMENTARY TABLES

Table 1

Age group of Respondents		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-26yrs	1	2.5	2.5	2.5
	27-35yrs	16	40.0	40.0	42.5
	36-44yrs	21	52.5	52.5	95.0
	above 44 yrs	2	5.0	5.0	100.0
	Total	40	100.0	100.0	

Table 2

Sex type of Respondents		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	male	37	92.5	92.5	92.5
	female	3	7.5	7.5	100.0
	Total	40	100.0	100.0	

Table 3

Educational Background of Respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	None	1	2.5	2.5	2.5
	Elementary/J.H.S.	26	65.0	65.0	67.5
	S.H.S.	2	5.0	5.0	72.5
	Tertiary	11	27.5	27.5	100.0
	Total	40	100.0	100.0	

Table 4

Marital status of Respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Single	4	10.0	10.0	10.0
	Married	29	72.5	72.5	82.5
	Divorce	4	10.0	10.0	92.5
	Widow	1	2.5	2.5	95.0
	Never married	2	5.0	5.0	100.0
	Total	40	100.0	100.0	

Table 5

Functional Department

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Stores	3	7.5	7.5	7.5
	Sales/Marketing	11	27.5	27.5	35.0
	Accounts/Finance	3	7.5	7.5	42.5
	Management staff	3	7.5	7.5	50.0
	Not applicable	20	50.0	50.0	100.0
	Total	40	100.0	100.0	

Table 6

Position in CWGL

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Top level management staff (Strategic level)	3	7.5	7.5	7.5
	Middle level management staff (Tactical level)	3	7.5	7.5	15.0
	Staff (Operational level)	14	35.0	35.0	50.0
	Customer	20	50.0	50.0	100.0
	Total	40	100.0	100.0	

Table 7

How long have known or worked with CWGL?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1-3 yrs.	2	5.0	5.0	5.0
	7-9 yrs.	3	7.5	7.5	12.5
	Above 9 yrs.	35	87.5	87.5	100.0
	Total	40	100.0	100.0	

Table 8

Is IM a core strategic function of CWGL?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	39	97.5	97.5	97.5
	Not sure	1	2.5	2.5	100.0
	Total	40	100.0	100.0	

Table 9

Is there an IM software which tracks all records?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	18	45.0	46.2	46.2
	N/A	2	5.0	5.1	51.3
	4	19	47.5	48.7	100.0
	Total	39	97.5	100.0	
Missing	System	1	2.5		
Total		40	100.0		

Table 10

Does the IM software meet customer satisfaction?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	1	2.5	2.5	2.5
	Not always	39	97.5	97.5	100.0
	Total	40	100.0	100.0	

Table 11

As a customer what can be done to improve the IM software?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Review IM software	34	85.0	85.0	85.0
	N/A	6	15.0	15.0	100.0
	Total	40	100.0	100.0	

Table 12

Do you have regular warehouse attendants?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	39	97.5	97.5	97.5
	Not sure	1	2.5	2.5	100.0
	Total	40	100.0	100.0	

Table 13

Do you use bin locations for all stocked items?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	1	2.5	2.5	2.5
	Not all items	39	97.5	97.5	100.0
	Total	40	100.0	100.0	

Table 14

Are bins properly assigned to all stocked items?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	29	72.5	72.5	72.5
	Not sure	5	12.5	12.5	85.0
	N/A	6	15.0	15.0	100.0
	Total	40	100.0	100.0	

Table 15

Does CWGL keep records of all stocked items in warehouse?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	27	67.5	67.5	67.5
	Agree	3	7.5	7.5	75.0
	Not sure	10	25.0	25.0	100.0
	Total	40	100.0	100.0	

Table 16

Do you process documentations for stocked items on time?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	21	52.5	52.5	52.5
	Not sure	10	25.0	25.0	77.5
	N/A	9	22.5	22.5	100.0
	Total	40	100.0	100.0	

Table 17

Do you undertake physical stock checks?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	39	97.5	97.5	97.5
	N/A	1	2.5	2.5	100.0
	Total	40	100.0	100.0	

Table 18

Number of times stocks are taken in a year

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Once	40	100.0	100.0	100.0

Table 19

Are the ordering processes automated?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	38	95.0	95.0	95.0
	Not sure	2	5.0	5.0	100.0
	Total	40	100.0	100.0	

Table 20

Do you Know your company's vendors?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	38	95.0	95.0	95.0
	No	2	5.0	5.0	100.0
	Total	40	100.0	100.0	

Table 21

Do vendors deliver orders on time?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	1	2.5	2.5	2.5
	Not always	39	97.5	97.5	100.0
	Total	40	100.0	100.0	

Table 22

How will you assess the company's services?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Good	5	12.5	12.5	12.5
	Good	25	62.5	62.5	75.0
	Poor	3	7.5	7.5	82.5
	Not applicable	7	17.5	17.5	100.0
	Total	40	100.0	100.0	

Table 23

Suggestion(s) for improving IM practices in CWGL

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Review IMS	28	70.0	70.0	70.0
	Consider customer input	5	12.5	12.5	82.5
	No change to software/system	7	17.5	17.5	100.0
	Total	40	100.0	100.0	

Table 24

How will you rate the attitude of staff in stores?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very friendly	4	10.0	10.0	10.0
	Friendly	12	30.0	30.0	40.0
	Hostile	4	10.0	10.0	50.0
	N/A	20	50.0	50.0	100.0
	Total	40	100.0	100.0	

Table 25

How will you rate the attitude of management?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very friendly	7	17.5	17.5	17.5
	Friendly	21	52.5	52.5	70.0
	hostile	4	10.0	10.0	80.0
	N/A	8	20.0	20.0	100.0
	Total	40	100.0	100.0	

Table 26

Are you happy with the current system of managing inventory?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	10	25.0	25.0	25.0
	No	30	75.0	75.0	100.0
	Total	40	100.0	100.0	

Table 27

Does CWGL Implement EOQ in their IM Operations?

Yes	2
No	37
Not sure	1
Total	40

Table 28

Does CWGL Implement VMI in their IM Operations?

Yes	1
No	38
Not sure	1
Total	40