CHAPTER ONE

1.0 INTRODUCTION

An inventory control system contains a list of orders to be filled and then prompts workers to pick the necessary items, and provides them with packaging and shaping information, inventory control may be used to automate a sales order fulfillment process and also manage in and outward material of hardware. Automation is the replacement of human workers by technology. For optional sales and inventory management process, robust functionality is needed for managing logistic facilities. Ware house management functions for inventory control cover internal ware house movements and storage and its support helps in the recording and tracking of materials on basis of both quantity and value.

This application takes care of all supply orders reducing cost for warehousing, transportation while improving customer service. It significantly improves inventory turns, optimizes flow of goods and shortens routes within warehouse and distribution centres. it also improves cash flow, visibility and decision making providing efficient execution of task using this fast and reliable computerised method.

1.1 HISTORICAL BACKGROUND OF THE STUDY

The Petroleum Equalisation Fund Management Board is a scheduled Parastatal of the Ministry of Petroleum Resources ,established by Decree No.9 of 1975 (as amended by Decree No. 32 of 1989), mainly to administer Uniform Prices of Petroleum products through out the country . This is achieved by reimbursing a marketer's transportation differentials for petroleum products movement from depots to their sales outlets (filling station), in order to ensure that products are sold at uniform pump price throughout the country. The source of the Fund is from principally the net surplus revenue recovered from Oil Marketing Companies.

It has an Operational Office in Lagos, five (5) Zonal Offices as well as twenty-two (22) Depot Offices located at the 21 NNPC Depots and Marketers' storage facilities at Apapa and Ibafon. It is headed by the Executive Secretary who is the Chief Administrative Officer, responsible for the day to day operations of the fund.

In 1979, Government, conscious of the fact that petroleum products supply did not reach the remotest parts of the country encouraged Major Marketers to open filling stations in those areas.

The purpose of this Charter is to explain what we do, how we provide effective and efficient services and our commitment to all Stakeholders and customers. It also welcomes feedback as a means of assessing our performance and meeting expectations.

(a) Mission Statement

The Management and Staff of the Petroleum Equalisation Fund (Management) Board are pleased to present our Service Delivery Charter. There shall, be, for the purpose of administering the fund in accordance with the provisions of this Act, a body to be known as the Petroleum Equalization Fund Management Board (hereafter in this Act referred to as the "the fund").

The legislative Charter of the Board as provided by Decree No.9 of 1975 as amended by Decree No. 32 of 1989 (now Chapter 352) of the Laws of the Federation 1990)

The Petroleum Equalisation Fund (management) Board is committed to equalize the transportation differentials in white products marketing and a Uniform Prices of Petroleum Products obtains in the country and stakeholders are promptly and fairly treated in the process.

The PEF(M)B as a good corporate organization would strive to dutifully implement all government directives, especially in ensuring transparency, probity and accountability. It would collaborate with all Stakeholders in ensuring prompt settlement of Marketers claims to enhance the distribution of petroleum products to make them available at reasonable costs nation-wide.

In addition to its primary functions, the Board would, with its new computerization structure, strive to build a data/information bank for accurate data on the level of lifting and distribution of petroleum products throughout the federation

(b) Vision

To become an efficient, technology-driven, stakeholder-oriented and pro-active partner in facilitating the transportation and distribution of Petroleum Products nation-wide by the year 2020 .The Petroleum Equalisation Fund (Management) Board values and promotes high ethical standards of a responsible public service organization, and it's specifically committed to: Transparency, Efficiency, Responsiveness and Integrity.

© Service Provision and Delivery

What We Do: In broad terms, the Board performs two (2) basic functions, namely:

(i) The Administration of price equalization scheme to ensure the sustenance of Government Policy of Uniform Pump Prices for petroleum products nation- wide;

(ii) The administration of bridging payment scheme to complement the Nigeria National Petroleum Companies pipeline distribution network of petroleum products to all the depot areas nation-wide, during breakdown/maintenance of local refineries and or pipeline breaks/vandalisation.

(d) The Equalisation Scheme:

I. The consumer pays the in – build transportation cost of N2.30kobo per litre irrespective of where the product is purchased. The amount is not static because of government policy.

II. Transportation cost is related in distance traveled between the points of lifting the products (Depots) and the points of sale (filling stations)

III. The marketer serves as an agent of the PEF (M) B in collecting the allowances build – into the price structure, and transfers same to the Board for equalization or bridging purposes. The allowance collected for bridging is N1.87Kobo. This also changes from time to time.

(e) Bridging Fund Scheme:

Bridging is the movement of petroleum products by long distance road haulage (i.e above 450 kilometres) from a depot/refinery to another depot experiencing scarcity. Bridging is resorted to only when there is a pipelines break or where the refinery feeding the depot(s) experiencing products scarcity is shut for Turn Around Maintenance (TAM).

(f) Penalty for Non Payment of Allowance:

(1) The Board shall from time to time, by notice served by registered post on the oil marketing company concerned, specify the date on which any net surplus revenue due from that oil marketing company shall be paid to the Board.

(2) If any sum is not paid within twenty-one days of the specified date, a sum equal to ten per centum of the amount on unpaid shall be added for each month or part of a month after the

date on which payment should have been done.

(3) The Board may, if it thinks fit, remit in whole or in part any penalty imposed under this section.

(g) Offences and Penalty:

(1) Any person who fails to comply with any requirement made by the Secretary under section 10 of this Act, shall be guilty of an offence and liable on conviction to a fine of N50,000.

(2) Any person who-

(a) Knowingly or recklessly furnishes in pursuance of any requirement made under section 10 of this Act, any return or other information which is false in any material; or

(b) Willfully makes a false entry in any record required to be produced under that section with intent to deceive, or makes use of any such entry which he knows to be false, shall be guilty of an offence and liable on conviction to a fine of N50,000 or to imprisonment for five years.

(3) Where an offence under this Act by a body corporate is proved to have been committed with the consent or connivance of, or to be attributed to any neglect on the part of, any director, manager, secretary or other similar officer of the body corporate (or any person purporting to act any such capacity) he as well as the body corporate shall be deemed to be guilty of the offence and may be proceeded against and punished accordingly.

(h) Those We Serve:

1. Staff of Petroleum Equalisation Fund (management) Board
2. Independent oil marketing companies
3. Major oil marketing companies
4. Stakeholders of oil industries
5. Government organizations
6. Third-party
7. General public.

(i) Our Standard and Target

- Our staff must be at the depots to sight products and stamp marketers documents at all times during official working hours.
- Collection of NTA and issuing of receipts for same to marketers on daily basis.
- Collection and acknowledgement of marketers Claims within 24hours
- Claims to be scrutinized by the depot staff and forwarded to the head office within 5 working days.
- All Claims received at the depots for processing will be ready for payment to marketers at the depot within 37 working days.

(j) Our Expectations from those we Serve

- Bridged products must be delivered within stipulated time limit (presently set at 10days).
- Marketers to report any breakdown of vehicle immediately to Petroleum Equalisation Fund (management) Board receiving depots within the stipulated time limit (48hours).
- Marketers should make all necessary payments to Petroleum Equalisation Fund (Management) Board and depot owners. There should therefore be evidence of such payments including National Transportation Average (NTA) allowance.
- Evidence of delivery of correct volume of products lifted.
- There must be evidence of Petroleum Equalisation Fund (management) Board loading and receiving depot stamps and signatures.
- There must be evidence of stamps and signatures of other agencies at the receiving depot especially Pipeline Products Marketing Company (PPMC) and Department of Petroleum Resources (DPR.)
- Orderly presentation of Claims in the following way:
    1. Application on original letter headed paper indicating type of Claim with amount being Claimed and duly signed.
    2. Each meter ticket from Pipeline Products Marketing Company depots should have the following attachments (a) Receipt for product payment. (b) DO5 (c) Bridging approval from Pipeline Products Marketing Company (d) Bridging Note also from Company.
- Out return report on original letter headed paper duly signed by the particular station manager confirming that products and volume were actually delivered to that station.
- Submission of Daily products distribution schedule.

- Evidence of payment of National Transportation Average allowance by marketers who are in the contribution zones.
- Marketers making Bridging /NTA or Inter-district/ NTA claims should present them in different files but must be submitted at the same time.
- Depot and Petroleum Products Marketers Association and Major Marketer have to submit detailed and correct addresses of destination of all lifted products.

Monitoring Targets:

(i) Ensure payment of reimbursement to marketers within 37 working days.

(i) Quarterly visits to depot offices by Zonal Coordinators to asses the level of compliance on the standard rule.

(ii) Monthly operational meetings by unit head to evaluate performance.

(iii) Quarterly reports from Zonal and depots offices on performance.

(iv) Annual general operations meeting.

(v) Periodic Stakeholders Forum for assessing targets and improvements in service delivery.

(l) Standards:

(i) Timeliness in payment of reimbursements.

ii) Accurate record keeping and prompt up-dating mechanisms

(M) Feedback Mechanism

The PEF(M)B would gauge public and Stakeholders perception of its performance through the following means:

(i) Stakeholders consultations/meetings with Marketers and other players in the downstream sector of the petroleum industry.

(ii) Responses to quarterly survey of marketers, transporters, unions, staff and the public on the effects of the Board's operations.

(iii) Reports from Staff at the 21 depots, Major Marketers, PPPRA, NNPC, NIPCO and DAPPMA facilities on operations perception of the Board's performances.

(iv) Returns through opinion/suggestion boxes and reactions to publications in the in-house news Magazine of the Board.

(n) **Obligations**

- **Management:** To become an efficient, technology – driven, stakeholder – oriented and pro-active partner in facilitating the transportation and distribution of petroleum products nation – wide.

Also in discharging its functions, the Board shall provide a conducive work environment. Staff and Stakeholders shall respect the right of all Nigerians to quality service which would engender development.

- **Staff:** They are expected to exhibit high level of dedication to their job, hard work, honesty and transparency.
- **Customers:** Marketers are expected to submit genuine claims for reimbursement and should be within the agreed period of six months to enable the board keep to its set objectives.

  On the part of third-party, a company must be registered with the board. Contractors should operate based on the contractual agreement entered into with the board. They are expected to provide quality service.
- **Nigerian Public:** Prompt, reasonable, honest and transparent in making any demands on us or in benefiting from any of the service(s) we provide

1.2 **STATEMENT OF THE PROBLEM**

The Petroleum Equilisation Fund (Management) Board PEF(m)B is to an extent manually operated and reveals a number of problems.

- The recording of sales and cash received are done manually on a book that appears rough, thus the books are exposed to physical damage, information can be lost and dust particles are accumulated.
- The long list supply order waiting to be attended to on daily basis.
- The control system is time consuming, less accurate and less efficient and the environment is not user friendly.
- Inaccuracies often ensue from human error.

  The manually system is quite tedious and can be reduced or eliminated with the introduction of the proposed system.

1.3 SIGNIFICANCE OF THE STUDY

The study is primarily aimed at increasing efficiency in operation, reducing maintenance and running cost, monitoring the supply of goods and its distribution and increase profit in the Petroleum Equilisation Fund (Management) Board PEF(M)B by introducing an automated inventory control system.

1.4 OBJECTIVES OF THE STUDY

The main objective of the study is to develop an automated Inventory Control System Petroleum Equilisation Fund (Management) Board. While other subsidiary objectives include:

I. To provides total asset visibility.
II. To ensure the reduction inventory stocking levels giving full inventory history
III. To reduces lead time, shelf space, and errors due to damage, fatigue of staff and overall cost of operations.
IV. To facilitates “just in time” deliveries

V. To provides higher level security as the system would be pass worded to prevent unauthorized access.

VI. To shortens cross docking time and spends up sort/ pick up rate.

VII. To helps the management plan, monitor, optimize resources and ascertain their financial position at any time.

1.5 SCOPE OF THE STUDY

The scope of this study covers the Petroleum Equilisation Fund (Management) board as whole, and its customers which include retailers, distributors and the general public.

1.6 LIMITATIONS AND CONSTRAINTS OF THE STUDY

- No authority to give bridging approval, but reimburse marketers for bridged products
- Central Bank of Nigeria's policy/processes as it affects payment of claims and third party payments.
- Checkmating the activities of marketers. Surveillance and control/ pricing control.
- Non payment of Bridging and NTA allowance by marketers as at when due.
- Delays in remittance of Bridging allowance due to reconciliation process between the Board and PPMC.
- Lack of up to date of reconciliation of Major Marketers lifting's and activities as at when due.

1.7 DEFINITION OF BASIC CONEPTS

- **Automation:** this is the use technology or computers to control and process data reducing the need for human intervention.
- **Database:** this refers to a large store of related data on a computer that user can access and modify.
- **Password:** this is a secret code that must be entered into a computer to enable access to its applications. it is made up of numbers, letters, special characters or a combination of any of the above categories.
- **Inventory control system:** a list of orders to be filled prompts workers to pick the necessary items and provides them packaging and shipping information.

- **Computerization:** this is the conversion of a manually operated system to a controlled, organized and automated system.
- **Research:** a careful study of a subject to discover facts, establish a theory or develop a plan of action based on the facts discovered.
- **System: A** set of computer components functioning together.
- **Technology:** the study of techniques of mobilizing resources such as information for accomplishing objectives that benefit man and his environment .
- **Software:** A computer program or set of instructions that direct a computer to perform processing functions.
- **Information System:** A collection of producers, people, instructions and equipments to produce information in a useful form.
- **Processing:** This is dealing with something according to an established procedure.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 DEVELOPMENT OF AN INVENTORY MANAGEMENT SYSTEM

An inventory is basically a detailed list of all the items in stock. Inventory consists of raw materials, work-in-process and finished goods. In today's highly competitive market, businesses need to maintain an appropriate level of stock to meet the customer demands at any time. Inventory management is part of the supply chain management. Over the past years, the concept of supply chain management (SCM) has been given a considerable attention. This is an approach to view the supply chain as a whole rather than as a set of separate processes (Harry, 2005).

Supply Chain Management (SCM) can be defined as the systematic and strategic coordination of the traditional business operations". The main aim of supply chain management SCM is to improve the long term performance of each firm as well as the whole supply chain (Mentzer et al, 2001). Inventory management involves "system and processes of maintaining the appropriate level of stock in a warehouse" (Barcodes, 2010). These activities includes identifying necessary inventory requirements, and creating replenishment processes, tracking and monitoring the usage of items/stock, reconciling inventory balances as well as reporting inventory status (Barcodes , 2010). It is basically the process of efficiently controlling the amount of stock in order to avoid excess inventory. Reliable inventory management will therefore minimize the cost associated with inventory (Sande, 2003).

Inventory management involves a wide scope of processes ranging from inventory forecasting, replenishment, demand forecasting as well as quality management (Wikipedia, 2009).

Presently, there are two major approaches to inventory management system:

- Materials requirement planning (MRP): MRP is simply a management system in which sales are converted into loads by sub-unit and time. In this system, orders are "scheduled more closely thereby reducing inventory and making delivery times shorter and more

predictable" (Hedrick, 2003). MPR review order quantities periodically and as such allow ordering only what is currently needed. This helps keep inventory levels very low.

- Just-in-Time (JIT): JIT approach ensures that a business should only keep inventory in the right quantity at the right time with the right quality (David, 2004). Most organizations adapt to this system to integrate inventory management for a more competitive advantage (Rubin, 2007). It eliminates inventories rather than optimize them.

2.2 **THE IMPACT OF INVENTORY MANAGEMENT SYSTEM**

The following are some of the benefits of inventory management (Kenneth, 2002):

- Inventory management systems can help reduce the time to respond to changing market demand of products and can help control excess stock
- IMS provide a means for business to effectively manage or control their inventory
- IMS helps businesses to constantly analyse their business processes such as sales and purchasing in order to make efficient inventory decisions
- The inventory management systems (IMS) can provide total insight on stock transactions.
- Inventory management system can provide hands on knowledge on inventory which might lead to increased sales and efficient customer services.

2.3 WHY KEEP INVENTORY

Inventory refers to a detailed list of all the items in store or warehouse. According to Hamlet (2009), inventory refers to the items that are stored in warehouses or distribution centres in excess of what the store needs (Inman, 2010).

The following are the reason why business keeps more inventory than they currently need (Inventory Management, 2010).

1. **Meet Demand**: this ensures that customers get the product or item that they want when they want it.

2. **Keep Operations running**: When for example manufacturers run out of stock to manufacture certain product, the whole production process or operations will be halted and thus manufacture of the finished product. In order to prevent this, most manufacturers purchase excess inventory.
3. **Lead time**: When a shop or a factory places an order for a particular item, the period of time between the order placements and when the order is received is known as lead time. Business therefore should have hands on inventory during the lead time in order to keep its operations running.
4. **Hedge**: This involves keeping inventory against inflation in price of products. This allows the buyer to buy at a lower price than when the price increases.
5. **Quantity Discount**: Quantity discount refers to reduction in price of an item when purchasing in bulk. This always influences most businesses to buy more than it needs which might lead to excess inventory.
6. **Smoothing Requirements**: Businesses sometimes acquire access inventory for products that have unpredictable demands in order to meet demand.

According to (Zenze, 2004), inventory management involves knowing the following Questions:

- The size of replenishment order that will be required
- The time this order will be placed
- And finally how frequent inventory records should be analysed

2.4 BEST PRACTICE IN INVENTORY MANAGEMENT

In an effort to maximise their return on investment (ROI) and avoid excess inventory, many businesses invest a fortune in inventory management systems.

According to Kotler, (2003), he stated that most of these systems fail to render expected services and rather result in excess inventory. This is because software can only optimise the values it has and not what it could be and as a result, it neglects some important external influences like changes in the management process. He stated that "World's best practice inventory management demands that the inventory management system is optimised not just the inventory.

Inventory management therefore goes beyond software system and as stated by Phi Kotler (2003) inventory management involves combination of 'know-how, process and reporting' that collectively provide a means of maximizing availability while minimizing cash investment. In the report, he stated five level of world's best practice inventory management that when fully implemented, can enable businesses to reduce their inventory investment or cost. These levels are:

1. **Ad Hoc**: this level require less control as inventory is expensed when purchased on an 'as needed' basis and used immediately.
2. **Storage:** this level involves the storage of items for use and not strictly controlled. Here, inventory is expensed when purchased. This approach tends to increase total expenditure as items are purchased in 'economic quantities' and discourage review and development due to lack of control
3. **Capitalisation**: This approach entails the use of software solution to control inventory and provide good availability. Unfortunately, most businesses use their software mostly for counting and accounting.
4. **Software Optimisation**: at this level, inventory is capitalised and the levels of stock are optimised based on a risk/return algorithm. Software solution can automatically adjust stock levels based on the history of demand and supply but these level are not trusted by most business because they believe the supply and demand may not represent actual usage
5. **System Optimisation**: At this level, all factors influencing inventory investment are reviewed periodically. The main purpose of inventory management is to minimise overall cash investment without increasing risk. This according to Philip Slater is the world's best practice in inventory management (Kotler, 2003).

Capitalisation and system optimisation goes hand-in-hand. For an effective system, the management is therefore required to possess the "know-how", measures, policy development, and reporting required to take the business to level 5 (System Optimization) and not just the software alone (Kotler, 2003).

2.5 INVENTORY CONTROL SYSTEM

According to Business Link (2006) an organisation has an efficient inventory control only when they have the "right amount of stock in the right place and at the right time" (Business Link, 2006). Inefficient Inventory control can leads slower sales and disappointed customers.

Inventory control basically deals with reducing the total cost of inventory. Inventory control is very relevant for businesses, especially businesses dealing with a large variety of products. As site by Zenze (2004), Inventory management or control can be used to streamline warehouse processes in order to track orders and shipment (Arsham, 2006). Other important applications of inventory management systems are in manufacturing, shipping, and receiving. There are three main factors in inventory control decision making process (Arsham, 2006).

1. **The cost of holding the stock**: this is the cost associated carrying inventory over time and involves having items in storage. This includes interest, taxes, insurance, spoilage, breakage and warehousing cost like light, rent.
2. **The cost of placing an order**: this is the cost of ordering and receiving inventory which include shipping cost, preparing invoices, determine how much is needed and moving goods.
3. **The cost of shortage**: this cost involves what is lost if the stock is insufficient to meet all demand. This normally happens when demand exceeds the supply of inventory on hand.

Michael (2002)) argued that "the easiest way to manage inventory is with a computer inventory management system. The systems below help to reduce the time spent in managing inventory:

- Point-of-sale terminals: this system updates stock level automatically and provide a more error free sales transaction
- Barcodes and barcode readers which proved a way to effectively input inventory and "stock takes" faster into the system
- Job costing and inventory systems which are systems that also automatically update stock counts as orders are being made.

- Electronic Supplier product catalogs: allows the use of electronic devices like CD/DVDs to record inventory data.

These systems ensure accurate inventory records through the use of electronic and wireless technologies that provide error free data. These systems are very efficient in that they:

- Keep only up-to-date records of items and remove all sold items from the system
- It is possible to Review stock reports periodically to check the products status and identify low demand products.
- Periodically check record to ensure the level of accuracy of the system and to check against physical stock quantities.

2.6 METHODS OF INVENTORY CONTROL

There are several methods of inventory control which include (Hedrick, 2010):

- **Visual control**: this is used to determine if additional inventory is required through visual examination. This method is mostly used in small businesses and may not require any records.
- **Tickler control**: this is the physical counting of small portion of the inventory on a regular basis.
- **Click Sheet Control**: this involves the recording of items as they are used on a sheet of paper and used for reorder purposes
- **Stub control**: mostly used by retailers and allow managers have certain control of prices.

Today, the growth of businesses has provided a necessity to develop a more complicated and highly analytical form of inventory management. The above inventory management systems became difficult and inefficient. As a result, computer systems to control inventory was introduced. These systems include (Sande,2003):

- **Point-of-sale terminals**: this stores information of each item that is used or sold.

- **Off-line point-of-sale terminals:** this transmits sales information directly to the supplier's computer system. The supplier then uses this information to ship necessary items automatically to the retailers

The last method for inventory control is carried out by an external agency. As sited by Floyd Hedrick, it involves removal of unwanted products from stock which can be returned to the manufacture. This however has to occur after an agreement and frequent scheduled visit by the manufacturer's representative to the large retailer in order to record stock count and writes the reorder (Hamlet , 2006).

The main aim of the above systems was to provide a more efficient system that will be able to identify the cost of each inventory (Hamlet, 2006). According to the report, two main control values are used:

1. The Economic order quantity (EOQ) that is the size of the order
2. The reorder point which is the lowest quantity that a stock or an item can be before more quantity is ordered.

The Economic Order Quantity (EOQ) is a formula that is used mainly for calculating the annual cost for ordering an item. It is widely used by most businesses and involves the actual cost of placing an order, the cost of carrying inventory as well as the annual sales rate. (Lysons, 2001).

2.7 INVENTORY MANAGEMENT SYSTEMS

An Inventory management system is a system that automates all the processes involved in inventory management. These system are a vital part of any successful business and is basically used to efficiently track inventory using both hardware and software tools. The types of inventory tracked with an inventory management system includes almost any type of quantifiable products like clothing, household products, food, as well as equipment (Benson, 1999).

These inventory management systems can influence the overall efficiency of a company's performance resulting in profits. Through the end of 1980's, sales and accounting related

modules were the main focus of majority of software solution for retailer, manufacturers, and wholesalers. During the early 1990's, many distributors began to notice the relevance of an effective way of controlling and managing their largest investment of corporate assets which is inventory. This lead to the development of comprehensive inventory management modules and systems by several software companies (Finchley, 2009).

Presently, many businesses rely on modern inventory management systems to automate and integrate all aspects their business operations from order management, shipping management, billing systems, to inventory control all in one software package (Finchley, 2009). Inventory management systems must have ability to "track sales and availability, communicate with suppliers in near real-time and receive and incorporate other data like seasonal demand" (Finchley, 2009).

This means that the system must tell the storeowner for example when its stock level is low so as to reorder and how much to purchase.

Information technology provided a way to convert sales and purchasing into a strategic business operation. Businesses now are faced with the challenge of finding out how to use these technologies to gain value and competitive advantage. Inventory management system can deliver these advantages (Stylus Systems, 2008).

Modern inventory management systems now depend on barcodes, and potentially RFID systems to enable automatic identification of objects. According to a case study at Wal-Mart, for products selling between 1 and 15 units a day, RFID was able to reduced Out of Stocks by up to 30% (Finchley, 2009).

In order to record an inventory transaction accurately, "the inventory management system uses a bar code scanner or RFID reader to identify products automatically, and then collects additional information on the specific product from the operators via fixed wireless terminals, or mobile computers" (Finchley, 2009). Mathieu defined RFID (Radio Frequency Identification) as" a data collection technology that uses electronic tags also known as electronic label to store data and can be used to identify items just like bar codes".

The main difference between RFID and bar codes is that RFID uses wireless technology to transmit information into the system and can be inserted within packages and does not have to be close to the scanner. On the other hand, barcodes require line of sight and closure to the scanner for information to be read.

As stated by Mathieu, RFID tagged cartons rolling on a conveyer belt can be read many times faster than bar-coded boxes (Barnes et al, 2004).

Large software companies like IBM, Microsoft, SAP, and Oracle have already designed effective inventory management systems for large businesses. These software solutions cost thousands to millions of dollars. They have now turned to focus on smaller businesses. Some of the popular inventory (supply chain) management systems produced by Microsoft include Great Plains and Solomon, which are now joined together and called Microsoft Dynamics GP (Quittner, 2008).

2.8 IMPLEMENTING EFFECTIVE INVENTORY MANAGEMENT SYSTEMS

Inventory management is very relevant for today's businesses in order to ensure quality control in businesses which presently is centred mostly on customer satisfaction. Inefficient inventory control or management can therefore cause customer dissatisfaction when they run out of stock of an item the customer needs. In order to avoid this, most businesses are willing to invest large amount of money in acquiring an effective and efficient inventory management systems. A good inventory management system will be able to alert the retailer when it is time to reorder. It is also an important way automatically tracking moving inventory.

An efficient inventory management system helps to minimize the risk of error. For example, if a business orders large quantity of goods, and say 10,000 are missing. Manual counting each goods is likely to result in error but these errors can be avoided using an automated inventory management system. In retail stores, an inventory management system can also be used to track theft of retail merchandise, providing valuable information about store activities (Finchley, 2009).

Inventory management systems must be designed to reflect and support company's strategic plan as well as adapt to market changes due to worldwide marketing or new technology.

It should also provide relevant information to efficiently monitor inventory movements, coordinate and integrate internal processes like accounting or billing, manage people and equipment and communicate with customers. Inventory management system must be able to integrate the following processes in order to ensure continuity between functions (Finchley, 2009):

- **Sales Forecasting**: this requires the system to provide necessary information to coordinate business operations effectively and manage equipment and people. It should allow managers to make accurate and real time decisions.
- **Sales and Operations planning:** inventory management should control or handle fluctuations in market demands and lead time
- **Company's Strategic goals:** Alignment with company strategy is an important aspect of the business and necessary for its success and therefore inventory management should be designed to align with the company's strategic goal and market demand.
- **Production and materials requirement planning**: inventory system s should provide a balance of demand and supply at a minimised cost, inventory level and work load to achieve customer satisfaction.

These processes however vary from business to business depending on how the businesses carry out its processes, and on the market demand.

2.9 BENEFITS OF USING INVENTORY MANAGEMENT SYSTEMS

The following are some of the advantages that businesses achieve while using inventory management software:

- Businesses get faster return on investment (ROI) which is as a result of lower carrying cost.
- Inventory software can provide accurate up-to-date information about inventory thereby improving sales forecasts.
- Replenishment Planning. This means that Inventory management software can notify businesses the safest time to delay order without affecting customer satisfaction and cost.

- It also proved the ability to separate safety stock according to customer satisfaction and profitability.
- Increased sales
- It can also encourage sales staff to promote products without running out of stock by improving inventory visibility (Finchley, 2009).

2.10 SUCCESSFUL INVENTORY MANAGEMENT SYSTEMS

For any successful business, inventory management must be a critical aspect of its business. The most important aspect of an efficient inventory management is to achieve accurate data in terms of figures and facts and to implement policies to protect this information (Inventory Management, 2007).

A successful inventory management system will provide businesses with proper inventory control that reduces overall operating cost leading to customer satisfaction as well as give a competitive advantage. As sited by Alan Smith, a well-structured inventory management system should be able to adjust to an existing system (Rubin, 2007)

Success in manufacturing industry entails producing the right products, in the right quantities, at the right time, with good quality, and at a price the customer is willing to pay. Success in the manufacturing industry requires producing the right products, in the right quantities, at the right time, with good quality, and at a price the customer is willing to pay. The flexibility to respond to compliance standards and the ever-changing needs of customers, such as providing real-time visibility into global operations, is also imperative for success. Meeting these demands requires the ability to make quick decisions based on accurate data.

Successful inventory management has to do with balancing the cost of keeping inventory with the benefits gained from inventory. Some of the reasons for inventory management include (Hedrick, 2003):

- Obtaining lower prices by purchasing products in bulk
- Keeping stock low just enough to meet demand and avoid excess inventory
- Maintaining a wide range of stock

- Increasing inventory turnover or return on investment
- Having adequate inventory on hand so as to provide reliable customer services

However, the degree of success in addressing these issues varies within the functionality of inventory as well as the type of business. A successful inventory management system will accelerate the process of tracking and removing from inventory those items that needed by customer. This process minimises the lead-time for order fulfillment (Finchley, 2009).

Ideally, in order to avoid late re-order times, inventory software should be able to adjust the order quantity and delivery lead time to match that of the supplier's performance.

2.11 FUTURE OF INVENTORY MANAGEMENT SYSTEMS

During the late 1990s, there was a large amount of businesses investing in integrated order and inventory system which were basically designed to reduce the amount of inventories as well as manage stock level (replenish stock). There were a wide range of system integration options based on the business needs and financial ability (Kenneth, 2007).

However, these "stand-alone" systems do not integrate well with each other. In 1996, a study by the International Mass Retail Association (IMRA), concluded that stand alone warehouse Management System (WMS) for example which perform only individual business operations will become obsolete because of their lack of integration well with other systems (Kenneth, 2002).

Presently, organisations can no longer compete effectively in isolation of their suppliers and other entities. The future success of many businesses depends on the co-ordination and co-operation of efforts, thereby making supply Chain management important. JIT and VMI are the two of the philosophies that have been used to update supply chain relationships and management (David, 2004).

The trend now in inventory management is to strives to improve not just specific aspect of the supply chain but system-wide (the entire supply chain) efficiency through automatic replenishment programs (ARPs) like the vendor managed inventory (VMI). In this system, the

vendors are responsible for inventory replenishment or restocking of inventory for their retailers. They get retailers warehouse or point of sale information and use it to track retailer's inventory thereby placing the whole responsibility for inventory management of the shoulders of the vendors (Gale Group, 2002). Popular Automatic replenishment programs (ARP) includes continuous replenishment planning (CRP) and vendor managed inventory (VMI). CRP and VMI are similar but differ in the sense that VMI also decides what and when to ship. Another widely used ARP is the efficient consumer response (ECR) used within the grocery industry and quick response (QR) programs which are common in the apparel industry (Barnes, et al, 2004).

Future inventory management systems will be able to integrate all business processes for the whole supply chain. Another future development would be the use of RFID with GPRS to track inventory.

2.12 ANALYSING INVENTORY ADJUSTMENTS

Inventory Adjustment as the name implies is implemented as a stock adjuster with the main objective of synchronising the system with the actual stock on hand. In a case study with a large food distributor, he stated that the company began a program to achieve effective inventory management. As part of the program, they were cycle counting products and entering inventory adjustments as they find any miss match between the quality of a product in their warehouse and the inventory maintained by their computer system (Finchley, 2009).

In his analysis, stated that the company was able to adopt a system that improved their future inventory accuracy that is methods of handling stock in order to prevent additional stock discrepancies. They did this by carefully analysing the reasons for inventory adjustments (Finchley, 2009). This I believe was because most inventory adjustments are the result of problems encountered in the normal handling of materials.

The reason to make inventory Adjustments are basically the same for most businesses irrespective of the systems and operative methodologies they are using but the way these inventory adjustments are made will affect the inventory cost differently. The main reasons why inventory adjustments are required are (Finchley, 2009):

- Some of the products in inventory are damaged or spoiled and therefore cannot be sold
- Material is missing from inventory
- Product in inventory might be out-dated or cannot be sold because it has been in inventory for too long
- More products available in the inventory than is recorded in the system
- The remaining inventory in stock is less than the quantity a customer will normally buy

Some inventory management system like Food Connex implement inventory adjustment modules. According to Food Connex (2007) , inventory adjustment can be categorized as follows (Solutions, 2009):

- Stock Quantity Adjustments as a result of spoilage, damage, theft, samples. These are adjustments made when stock in a store or warehouse is removed from the warehouse or store for a known reason (kotler, 2003).
- Quality Adjustment due to a Receiving Error. The adjustments are made when the quantity entered as received into the system was incorrect. This will result in the re-calculation of the average cost of that item (Kotler, 2003).
- Cost Adjustment due to a Receiving Error: when the cost of an item is entered incorrectly this will require inventory adjustment. This will also cause the average cost of the item to be re-calculated (Kotler, 2003).

Based on the information presented, every inventory adjustment should be considered as an opportunity for businesses to improve which can result to greater corporate profitability.

2.13 CHALLENGES OF INVENTORY MANAGEMENT SYSTEMS

Several inventory management systems now include many new features designed to help distributors effectively manage their inventory. However, after implementing such systems, many businesses still continue to face the same challenges they experience with their old system. These challenges include (Finchley, 2009):

- Stock-out and lost sales
- Inaccurate On-hand and available-for-sale quantities in their systems
- Unsatisfactory return on investments from inventory

Others problems might be due to the inventory management system like (Finchley, 2009):

- Software is too complicated for the users
- Software does not contain necessary features for effective inventory management

The most common reason that most businesses do not achieve their inventory management goals however nothing to do with the computer system has they are using. Computers do not provide solution to inventory management problems. Computers are tools" (Finchley, 2009).

Inventory management systems however, "are just as good as those people who that use the system" (Zenze, 2004). It means that inventory management system will not make up for a failure to align businesses with strategy, inefficiency, or poor insight into the business supply and demand. According to Mark Ferguson, "The major misunderstanding that a lot of businesses faced with inventory management systems is believing that the software itself is enough to solve their inventory problems". Steven A., a Professor of Technology and Management at Georgia Institute of Technology in Atlanta also stated that most businesses buy "really, supply chain software suite are sophisticated software that only automate basic business processes irrelevant of weather they are good or bad (Zenze, 2004).

2.14 ACCURATELY TRACKING A MOVING INVENTORY

One of the common issues with inventory management systems is accurately tracking a moving inventory. Large business with hundreds and thousands of items, managing inventory is a difficult task. The challenge now has shifted from managing on-site physical inventory to

managing inventory information anywhere in the supply chain (Oracle, 2009). Complicating the issue is that most businesses have very complex supply chains where inventory details are recorded across multiple channels and consist of other distinct system.

2.14.1 Inaccurate Data

Inaccurate data entry can lead to excess stock thereby leading to inefficient inventory management or control. This can also result to unreliable customer services. According to Michael (2002), "an average of 30% of information in retailer system is incorrect and as much as 60% in wholesaler and supplier systems".

Inventory Accuracy involves having the available quantity of an item in the computer system agree with what is actually on the shelf in your warehouse" (Finchley, 2009).

This shows that inventory management system is responsible for ensuring inventory accuracy. According to Hamlet (2002), maintaining accurate inventory records is very important to business and can be achieved through the following techniques:

- Bar coding
- Automatic recording and checking
- Batch control
- Store empowerment
- Perpetual inventory checking (Zenze, 2004)

When inventory accuracy doesn't exit, it might lead to:

- Waste of valuable company time
- Waste of money and resources
- Disappointed customers

Good inventory policies are therefore irrelevant if management are unaware of what inventory they have on hand. This might be due to inventory inaccuracy as such; accuracy of records should be vital aspect in inventory systems. Microsoft Dynamics noted that, "increased automation and item tracking capabilities help improve inventory accuracy and better match the

goods on hand with customer demand". A part from reducing inventory costs, inventory management system also connects inventory control, sales order processes and purchasing with demand. Improve cash flow as well as ensure that stocks are available when needed (Microsoft, 2010).

2.15 COMPUTERS AND INVENTORY

Automation can dramatically impact all phases of inventory management, including counting and monitoring of inventory items; recording and retrieval of item storage location; recording changes to inventory; and anticipating inventory needs, including inventory handling requirements. This is true even of stand-alone systems that are not integrated with other areas of the business, but many analysts indicate that productivity—and hence profitability—gains that are garnered through use of automated systems can be increased even more when a business integrates its inventory control systems with other systems such as accounting and sales to better control inventory levels.

As Dennis (2009) noted in *PC Week,* business executives are "increasingly integrating financial data, such as accounts receivable, with sales information that includes customer histories. The goal: to control inventory quarter to quarter, so it doesn't come back to bite the bottom line. Key components of an integrated system … are general ledger, electronic data interchange, database connectivity, and connections to a range of vertical business applications."

2.16 WAREHOUSE LAYOUT AND OPERATION

The move toward automation in inventory management naturally has moved into the warehouse as well. Citing various warehousing experts, Sarah Bergin contended in transportation and distribution magazine that the key to getting productivity gains from inventory management is placing real-time intelligent information processing in the warehouse. This empowers employees to take actions that achieve immediate results. Real-time processing in the warehouse uses combinations of hardware including material handling and data collection technologies. But according to these executives, the intelligent part of the system is sophisticated software which automates and controls all aspects of warehouse operations.

Another important component of good inventory management is creation and maintenance of a sensible, effective warehousing design. A well-organized, user-friendly warehouse layout can be of enormous benefit to small business owners, especially if they are involved in processing large volumes of goods and materials. Conversely, an inefficient warehouse system can cost businesses dearly in terms of efficiency, customer service, and, ultimately, profitability. Transportation and Distribution Magazine (2006) cited several steps that businesses utilizing warehouse storage systems can take to help ensure that they get the most out of their facilities. It recommended that companies utilize the following tools:

1. **Stock locator database**—"The stock locator database required for proactive decision making will be an adjunct of the inventory file in a state-of-the-art space management system. A running record will be maintained of the stock number, lot number, and number of pallet loads in each storage location. Grid coordinates of the reserve area, including individual rack tier positions, must therefore be established, and the pallet load capacity of all storage locations must be incorporated into the database.
2. Grid coordinate numbering system—Warehouse numbering system should be developed in conjunction with the storage layout, and should be user-friendly so that workers can quickly locate currently stocked items and open storage spaces alike.
3. **Communication systems**—Again, this can be a valuable investment if the business's warehouse requirements are significant. Such facilities often utilize fork lift machinery that can be used more effectively if their operators are not required to periodically return to a central assignment area. Current technology makes it possible for the warehouse computer system to interact with terminal displays or other communications devices on the forklifts themselves. "Task assignment can then be made by visual display or printout, and task completion can be confirmed by scanning, keyboard entry, or voice recognition," observed Transportation and Distribution.
4. **Maximization of storage capacity**—Warehouses that adhere to rigid "storage by incoming lot size" storage arrangements do not always make the best use of their

space. Instead, businesses should settle on a strategy that eases traffic congestion and best eases problems associated with ongoing turnover in inventory.

Some companies choose to outsource their warehouse functions. "This allows a company that isn't as confident in running their own warehousing operations to concentrate on their core business and let the experts worry about keeping track of their inventory, wrote Bergin. Third-party inventory control operations can provides companies with an array of valuable information, including analysis of products and spare parts, evaluations of their time sensitivity, and information on vendors. Of course, businesses weighing whether to outsource such a key component of their operation need to consider the expense of such a course of action, as well as their feelings about relinquishing that level of control.

2.17 ADVANTAGES OF USING AN AUTOMATED INVENTORY CONTROL MANAGEMENT SYSTEM

Do you want to cut down costs and increase productivity of your manufacturing unit? Then an automated inventory system is your best option. With manufacturing houses trying hard to recover from the aftermath of economic recession, a fully automated inventory system can surely come handy. Hence manufacturers looking to cut down on their production and labor costs must adopt more automated systems for better work integration and systematic operation. Adopting an automated inventory system for your manufacturing facility can surely boost productivity besides adding other advantages as well (Rubin, 2007).

1. There are several inventory challenges faced by manufacturers, industrial distributors as well as by the maintenance department of an industrial setup. Problems may range from loss or theft of simple machine tools to that of other major disciplinary issues like faulty attendance records, discrepancy in inventory processing records, and so on. Industrial automatic vending machines like- auto lockers, auto scaling devices, auto dispensing units come handy under such situations. With an automated system in place, there is no easy access to company inventory as every single item used by the employee is recorded in the machine memory and can be checked if required from time to time. Hence it helps to cut down on loss or damage of company property considerably.

2. The latest software controlled automated inventory systems besides giving you the real-time data usage records would also help to modernize the ERP system. This in turn reduces your costs for indirect supplies to about 40 percent.

3. Another major advantage of using automated inventory stations like remote dispensing and vending systems is to secure point-of-access to high-use tools and supplies in large industrial establishments with a fast-paced working operation.

4. Yet another benefit of using an automated inventory system is that it enables access and proper control over the dispensed items like no other. It tracks each vending transaction and sort every single item dispensed by the name of the employee, the job and department of the individual, the shift of duty and the budget or cost of the item dispensed - all of these in just within a few seconds.

5. With such amazing advantages available, it will be unwise not to install an automated inventory system at your manufacturing unit (Barnes et al, 2004).

2.18 INVENTORY MANAGEMENT SOFTWARE

According to Lysons (2001) Inventory management software is a computer-based system for tracking inventory levels, orders, sales and deliveries. It can also be used in the manufacturing industry to create a work order, bill of materials and other production-related documents. Companies use inventory management software to avoid product overstock and outages. It is a tool for organizing inventory data that before they will generally be stored in hard-copy form or in spreadsheets. It is often associated with and is similar to distribution software with the following:

- **Features**

Inventory management software is made up of several key components, all working together to create a cohesive inventory for many organisations' systems. These features include:

- **Order management**

Should inventory reach a certain threshold, a company's inventory management system can be programmed to tell managers to reorder that product. This helps companies avoid running out of products or tying up too much capital in inventory.

- **Asset tracking**

When a product is in a warehouse or store, it can be tracked via its barcode and/or other tracking criteria, such as serial number, lot number or revision number.[3] Nowadays, inventory management software often utilizes barcode, radio-frequency identification (RFID), and/or wireless tracking technology.

- **Service management**

Companies that are primarily service-oriented rather than product-oriented can use inventory management software to track the cost of the materials they use to provide services, such as cleaning supplies. This way, they can attach prices to their services that reflect the total cost of performing them.

- **Product identification**

Barcodes are often the means whereby data on products and orders is inputted into inventory management software. A barcode reader is used to read barcodes and look up information on the products they represent.[5] Radio-frequency identification (RFID) tags and wireless methods of product identification are also growing in popularity.

- **Purpose**

Companies often use inventory management software to reduce their carrying costs. The software is used to track products and parts as they are transported from a vendor to a warehouse, between warehouses, and finally to a retail location or directly to a customer.

Inventory management software is used for a variety of purposes, including:

- Maintaining a balance between too much and too little inventory.
- Tracking inventory as it is transported between locations.
- Receiving items into a warehouse or other location.
- Picking, packing and shipping items from a warehouse.
- Keeping track of product sales and inventory levels.
- Cutting down on product obsolescence and spoilage.

- **Manufacturing uses**

Manufacturers primarily use inventory management software to create work orders and bills of materials. This facilitates the manufacturing process by helping manufacturers efficiently assemble the tools and parts they need to perform specific tasks. For more complex manufacturing jobs, manufacturers can create multilevel work orders and bills of materials, which have a timeline of processes that need to happen in the proper order to build a final product. Other work orders that can be created using inventory management software include reverse work orders and auto work orders. Manufacturers also use inventory management software for tracking assets, receiving new inventory and additional tasks businesses in other industries use it for.

- **Advantages**

There are several advantages to using inventory management software in a business setting.

- **Cost savings**

In many cases, a company's inventory represents one of its largest investments, along with its workforce and locations. Inventory management software helps companies cut expenses by minimizing the amount of unnecessary parts and products in storage. It also helps companies keep lost sales to a minimum by having enough stock on hand to meet demand.

- **Increased efficiency**

Inventory management software often allows for automation of many inventory-related tasks. For example, software can automatically collect data, conduct calculations, and create records. This not only results in time savings, cost savings, but also increases business efficiency.

- **Warehouse organization**

Inventory management software can help distributors, wholesalers, manufacturers and retailers optimize their warehouses. If certain products are often sold together or are more popular than others, those products can be grouped together or placed near the delivery area to speed up the process of picking, packing and shipping to customers.

- **Updated data**

Up-to-date, real-time data on inventory conditions and levels is another advantage inventory management software gives companies. Company executives can usually access the software through a mobile device, laptop or PC to check current inventory numbers. This automatic updating of inventory records allows businesses to make informed decisions.

- **Data security**

With the aid of restricted user rights, company managers can allow many employees to assist in inventory management. They can grant employees enough information access to receive products, make orders, transfer products and do other tasks without compromising company security. This can speed up the inventory management process and save managers' time.

- **Insight into trends**

Tracking where products are stocked, which suppliers they come from, and the length of time they are stored is made possible with inventory management software. By analysing such data, companies can control inventory levels and maximize the use of warehouse space. Furthermore, firms are more prepared for the demands and supplies of the market, especially during special circumstances such as a peak season on a particular month. Through the reports generated by the

inventory management software, firms are also able to gather important data that may be put in a model for it to be analyzed.

- **Disadvantages**

The main disadvantages of inventory management software are its cost and complexity.

- **Expense**

Cost can be a major disadvantage of inventory management software.[16] Many large companies use inventory management software, but small businesses can find it difficult to afford it. Barcode readers and other hardware can compound this problem by adding even more cost to companies. The advantage of allowing multiple employees to perform inventory-management tasks is tempered by the cost of additional barcode readers.

- **Complexity**

Inventory management software is not necessarily simple or easy to learn. A company's management team must dedicate a certain amount of time to learning a new system, including both software and hardware, in order to put it to use. Most inventory management software includes training manuals and other information available to users. Despite its apparent complexity, inventory management software offers a degree of stability to companies. For example, if an IT employee in charge of the system leaves the company, a replacement can be comparatively inexpensive to train compared to if the company used multiple programs to store inventory data.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY AND ANALYSIS OF THE EXISTING SYSTEM

3.1 RESEARCH METHODOLOGY

This has to do with the specification of procedures for collecting and analysing data necessary to define or solve the problem for which the research is embarked upon. The scope of this research covers the Petroleum Equilisation Fund (Management) Board

3.1.1 Primary Source

This involves oral interviews conducted with various personnel in Petroleum Equilisation Fund (Management) Board Abuja receiving and sharing their experience about the difficulties they undergo in using the manual inventory control system.

3.1.2 Secondary Source

This includes the use of textbooks, dictionaries, journals, newspapers, electronic books and internet downloads to collect data and aid comprehension of the system.

3.1.3 Observational Method

This covers my personal visit to the Petroleum Equilisation Fund (Management) Board during the business time. I observed the warehouse which looked disorganised, the queue of retailers waiting to be attending to and the difficulties faced by the staff in service delivery.

3.2 ANALYSIS OF THE EXISTING SYSTEM

The existing system is one that has been manually operated over the years. It is a system in which all the methods controlling inventory is of a manually approach. Critical analysis of this system reveals that is prone to errors. Careful analysis also shows that due to the complexities of the manual system, records of inventory kept are inaccurate and manually operated n such a way that requires the clergy to register sales on a book, thereby making a staff handle two or three jobs at a time.

An example is a stiff trying to register sales and at the same time rushing back to face a queen of impatient retailers waiting to be attended to. This makes the place so crowded with customers with just one person attending to them. Sometimes, due to unavailability of staff, customers who have other things to do, end up missing their various appointments. As a result of this, the attendant finds it very difficult to have an accurate record as pressure is being, mounted on him. The attendant might end up writing an order meant for another customer and have it delivered to the wrong person.

Petroleum Equilisation Fund (Management) Board operates manually and has not adopted computerised mode of operation. This generates inadequate records or exercise improper management of the company and in extreme cases, the company may loose her customer.

3.3 OBJECTIVES OF THE EXISTING SYSTEM

The aim objectives of the existing system are to provide services to customer and keep records of the complete inventory. Other includes;

a) Supporting inventory management that helps record and task materials
b) Performing physical inventory and optimizing warehouse resource
c) Performing cash flow, visibility and decision making
d) Generating reports o know the financial status of the company at the end of the month and on yearly basis.

3.4 PROBELEMS OF THE EXISTING SYSTEM

As we know, manual inventory control systems are quite tendous time consuming and less efficient and accurate in comparison to the computerised system the Petroleum Equilisation Fund (Management) Board has the following problem/weakness:

a) Compilation of inventory records consumes a lot of time and manpower
b) Some record get lost over time while some are not easily found
c) It involves los of paperwork and data processing is very slow.

d) The environment is not user friendly.
e) The system does not calculate and give financially reports at a glance and as such, the degree of decision making in urgent matters is not applicable.
f) The system is unable to detect faults within the system in case of rectifying fraud.
g) It takes a long to time for mistakes to be rectified and sometime throws the system into confusion.

3.5 JUSTIFUCATION FOR THE NEW SYSTEM

The new system will among other things help to:

- ❖ Manage track sales, contacts, accounts, opportunities, issue priority, product life cycles and track product features and issues.
- ❖ Maintain accuracy in database handling.
- ❖ Improve flexibility.
- ❖ Increase efficiency and reliability of the system.
- ❖ Restrict access to critical database for official use.
- ❖ Provide a user friendly interface.
- ❖ Save time, manpower and paperwork.

These, no doubt will possibly affect the quality of services rendered to customers.

CHAPTER FOUR

4.0 DESIGN, IMPLEMENTATION AND TESTING OF THE EXISTING SYSTEM

4.1 DESIGN STANDARD

The major fact taken into consideration in the design of the new system is the automation of the inventory control system for effective management. In the course of the design, the daily reports on customer order status are captured; databases were created to keep customer order.

4.1.1 Input Specification

Inputs are raw materials that are fed into the computer for processing. The systems accept input through the mouse and the keyboard. The registering of the data of records is done via the mouse and keyboard. The mouse plays an important role in closing windows, validating password. The keyboard is used to enter text and values into the boxes.

4.1.2 Output Specification

An output is the information or result obtained from processing data which has been fed into the computer e.g. screen, printer etc. the major output documents here will be the accounts and financial reports and also customers.

4.1.3 Processing

There are items which are sold distributed to customers. An order is placed by the customer-required details which are item name, quantity, and delivery time. The order processing executes, looks up the stock of each item to find out which is available or not and fulfils the order. The system periodically checks the stock of each item and if is found below the order level, and order is placed for more production. After formalities are fulfilled, bill is generated by the system and sent to the customer. The work area is automated and maintained by the management to generate a more efficient system.

4.1.4 Database File Design

Files used in this project are made up of different data types. Some of the files are designed and linked with database. There are several advantages of storing data in database and Microsoft Access was used in this project design.

- All data is stored at one location when a database is used, all tables are stored in a single file thus, and we need not deal with separate buttons using the single database file. Though all data is stored in a single file, distinctions exist because tables are used since each table is stored as a separate entity in the files.
- It is possible to define relationship between tables and these are also stored in the database.
- It is possible to define validation at fields as well as table level and this ensures accuracy of data being stored.
- Query, report, sorting etc are also used.

4.2 SYSTEM REQUIREMENTS

The requirements for the implementation of this system are as follows;

- ❖ Hardware requirement.
- ❖ Software requirement.
- ❖ Functional requirement.
- ❖ Non-functional requirement.

4.2.1 Hardware Requirement

For effective operation of the newly designed system, the following minimum hardware specifications are recommended:

a) The computer system to use should be 100% IBM compatible since they are considered done systems.
b) The computer system processor to be used be Intel Pentium technology.
c) The minimum Random Access Memory (RAM) should be 128MB.
d) The system should have a hard disk of at least 20GB, 3.5 floppy drive and CD-ROM drive.

e) The system to use should be equipped with 14" VGA or SVGA monitor (colored).
f) The mouse, keyboard and printer are also required.

The listed configurations are the minimum requirements, but if the configurations are of higher versions, the processing derived will definitely be better and the program will run faster.

4.2.2 Software Requirements

The following specification are needed

a) Operating System-Certified distribution of Windows.
b) Front end-Visual Basic 6.0 Professional Edition.
c) Black end-Microsoft Access 2007

Some additional features of VB like Data grind, Data Report.

A **Input /Output**

I. System shall have a form to accept the customer details.
II. System shall have a form to customer order.
III. System shall display transaction details.
IV. System should provide facility for change in address/name.
V. System should maintain details about placing order/dispatch or order status.

B. **Error Handling**

I. System should report any errors on duplicate primary keys.
II. System should report out of range values on numeric fields.
III. System should report data type mismatches on fields on the form.
IV. System should report invalid dates.
V. System should report violation of rights authorization.
VI. System should report invalid login errors.

4.2.3 Non –Functional Requirements

I. All user manuals should be provided in the necessary format.

II. Application should support 5 simultaneous user.

III. Transaction should be completed within seconds.

IV. There will be backup procedure to maintain records.

4.3 **SYSTEM IMPLEMENTATION**

The new system is designed to be put into efficient use here, we will look into the various technical aspects that influenced the successful implementation of this system and determine the effective operation of the system. System implementation follows the approval of the system proposal and its objectives, thus it is to arrive at a satisfactory, implemented, completed, and function evaluated automated system. It also embodied the preparation of resources including equipments and personnel.

The supplier login password and identification is entered, he checks, tracks order, dispatch order on customer and sends invoice after which he updates records. The customer studies and makes a list of requirement, places the order, makes payment and receives his invoice

4.3.1 System Flowchart

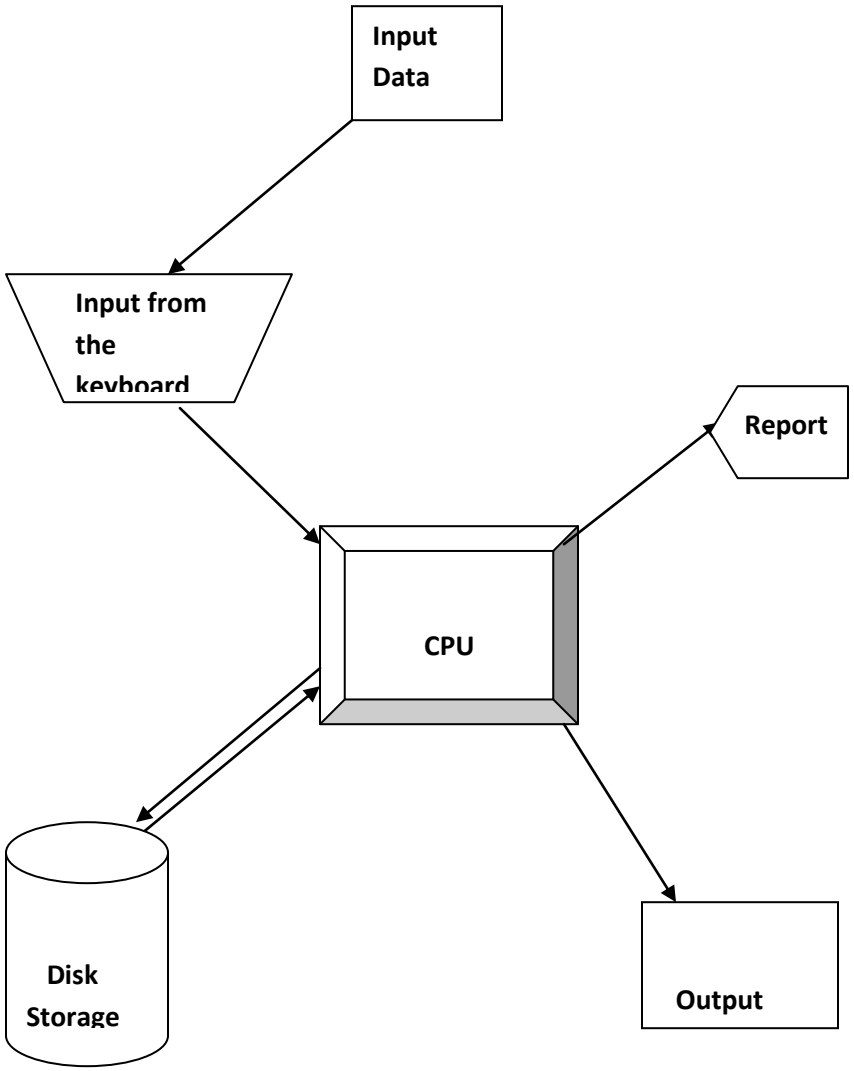

Fig 4.1: System Flowchart

4.3.2 Sequence Diagram for Supplier

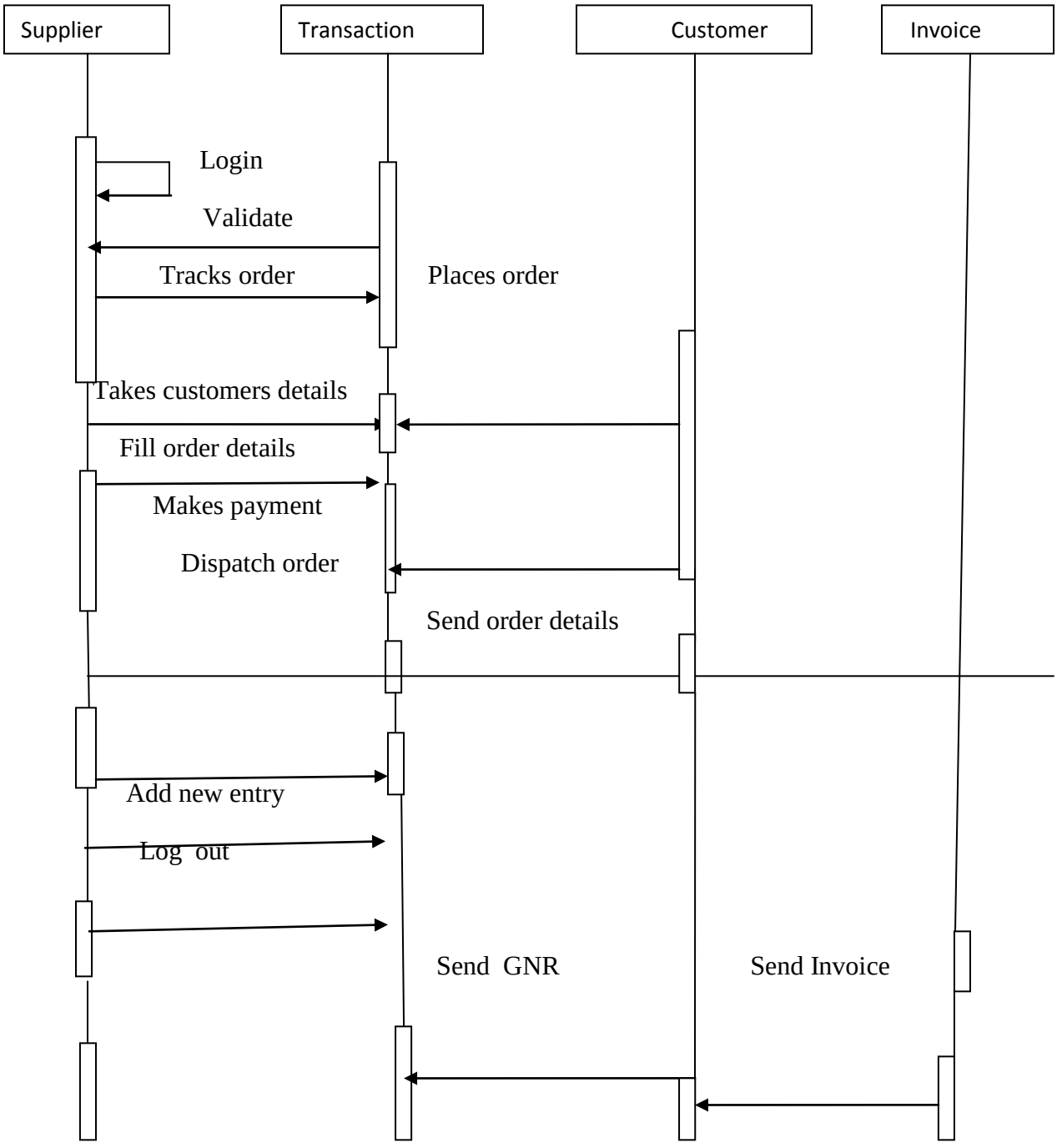

Fig 4.2: Supplier Sequence Diagram

4.4 SYSTEM TESTING

Testing presents an interesting anomaly for the software engineer where he attempts to build Software from an abstract concept to a tangible product. During testing, the engineer creates Series of test cases to discard preconceived

CHAPTER FIVE

5.0 SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 SUMMARY

The main objectives of the study have been to determine the automated control system for a manufacturing organization and the subsidiary objectives are:

1. To provide total asset visibility
2. To ensure the reduction in inventory stocking levels giving full inventory history
3. To reduce lead time, shelf space and errors due to damage, fatigue of staff and overall cost of operations

In order to provide a theoretical framework for examining the above issues, related literatures were reviewed. The literature reviewed covered the concept, of development of inventory management system, impact of inventory management system, best practice in inventory management system, inventory control system, methods of inventory control system, implementing effective inventory management system, benefits of using inventory management system, successful inventory management system, future of inventory management system, analyzing inventory management system, challenges of inventory, accurately tracking a moving inventory, and Finally, the advantages of using automated inventory control management system.

5.2 CONCLUSION

Based on the literature review, it was quite evident that most organizations strive to improve their inventory operations without increasing inventory cost. The main idea however was to integrate and automate all of these processes to achieve a one single cohesive software package. By investing in inventory management systems, organizations can achieve strategic business objective and increase their return on investment ROI.

The purpose of this project is to provide a more reliable solution to Petroleum Equalization Fund (Management) Board Stores to gain a competitive edge and realize its objectives through increased sales and reduced cost.

5.3 RECOMMENDATIONS

If one thing must be researched in the automated inventory control system with the mind of perfecting it and making it more useful in the real sense of things, it is the security of information handling software. The security of inventory control system is very crucial considering the prevention of inventory crime and similar vices so it is worth further researching.

Therefore, I Recommend that that petroleum equalization fund management board Abuja should set up a powerful computer based system.

REFERENCES

Barnes, J.G. and Cumby, J.A. (2005). *The Cost of Quality in service- oriented Manufacturing Companies: Better Customer Service* Delivery *through* Improved Inventory Control Systems: Beverly Hills: CA: Bolts Publisher.

Benson, D.J. (2001). *Applying Automated Inventory Control Systems in Manufacturing Industrie:*. London: D.P Publications Ltd.

Benson, F.T. (1999). *Inventory Management*: *An Instruction Manual:* London: Ashore Color Press Go Spot.

Finchley, O.S. (2001*). Developing Strategic Rules Engine for Warehouse Management Systems*: Hollywood Illinois: Richard D Irion Inc.

Gramaccioni, S.J. (2009). *Improving Warehouse Organization*: California: Good Year Publishing Company.

Gonroos, C. (2001). Warehouse Management and Inventory: Managing the Moments of Truth in Competitive Manufacturing Organizations: Massachusetts, Toronto: Lexington Books.

Hamlet. (2006). *Cultivating Alliances with Customers, International Journal of Organizational Management*: New York: Vol. 7. Issue 3, PP.255-287.

Harry, E.G. (2005). *Tracking Inventory*: London: Underwood Pitman.

Haywood, R.J. (1984). *Warehouse Management Systems*: California: Academic Publishers Limited

Kenneth. D.C. (2002). *Contemporary Inventory Management Systems*: New York: McGraw Go Spot.

Kotler, I.C. (2003). *Inventory Control Management in the 21st Century*: Charlotte (USA): Mac-Williams and Capital Publishers Inc.

Lysons, M.C.(2001). *Systematic Planning for Change*: Palo Alto, California:

Mayfield Publishing Company.

Michael, G.T. (2002). *RFID Concept: Principles and Practice*: New York: John

Wiley and Sons L.td.

Microsoft Encarta Dictionary, (2009). *Inventory. Retrieved May 24, 2011*:

"About VB" http://VB./ABOUT VB. html. Retrieved April 30, 2011.

Monzerka, J.G (2002). *Sales Management, Theory and Practice*: London:

Paul Chapman Publication.

Rechheld, F.F. and Bills C. (2004). *Loyalty-based Management*: Harvard Business Review, Harvard University: March-April, pp. 64-73.

Rosenberg, I.J. (2000). *A Simple Approach to Service Delivery. Journal of*

Customer Retention: Toronto: Vol. 1, pp. 45-51.

Rubin, K. (2007). *Computer Applications for Inventory Control Systems*:

Boston: MCGraw Hill.

Sande, O.F. (2003). *Automated Warehouse Management Systems. Journal of Information Technology*: Massachusetts: Vol.2,PP.35-43.

Zenz, A.Z. (2004). *How Inventory Control Systems Really Work*: New Jersey, USA: Peterson Educational Inc.

APPENDIX

PROGRAM OUTPUT (SOURCE CODES)

```
Dim intprice As Currency

Dim intquant As Currency

Dim intquanr As Currency

Dim inttotal As Currency

Dim intquan As Integer


Private Sub mnuSale_Click()

End Sub


Private Sub cmdcal_Click()

End Sub


Private Sub Adodc1_MoveComplete(ByVal adReason As ADODB.EventReasonEnum, ByVal
pError As ADODB.Error, adStatus As ADODB.EventStatusEnum, ByVal pRecordset As
ADODB.Recordset)

With Adodc1.Recordset

   If .EOF Then

      Adodc1.Caption = "End of File"

   Else

      Adodc1.Caption = "Record " & .AbsolutePosition & " of " & .RecordCount

   End If

End With

End Sub
```

```
Private Sub Check1_Click()
End Sub

Private Sub Check2_Click()
    If Check2 Then
    txtdate.Text = lbldate.Caption
    txttime.Text = lbltime.Caption
    Else
    txtdate.Text = ""
    txttime.Text = ""
    End If
End Sub

Private Sub chkcrude_Click()
    If chkcrude Then
    txtprice.Text = "15000000"
    txtquant.Text = "150"
    txtpro.Text = "Crude Oil"
    txtcom.SetFocus
    Else
    txtprice.Text = ""
    txtquant.Text = ""
    txtpro.Text = ""
    txtcom.SetFocus
```

```
    End If
End Sub

Private Sub chkdiesel_Click()
    If chkdiesel Then
    txtprice.Text = "15000000"
    txtquant.Text = "70"
    txtpro.Text = "Diesel"
    txtcom.SetFocus
    Else
    txtprice.Text = ""
    txtquant.Text = ""
    txtpro.Text = ""
    txtcom.SetFocus
    End If
End Sub

Private Sub chkdrum_Click()
    If chkdrum Then
    txtprice.Text = "5000000"
    txtquant.Text = "100"
    txtpro.Text = "Drums"
    txtcom.SetFocus
    Else
    txtprice.Text = ""
```

```
    txtquant.Text = ""
    txtpro.Text = ""
    txtcom.SetFocus
    End If
End Sub

Private Sub chkfuel_Click()
    If chkfuel Then
    txtprice.Text = "10000000"
    txtquant.Text = "100"
    txtpro.Text = "Fuel"
    txtcom.SetFocus
    Else
    txtprice.Text = ""
    txtquant.Text = ""
    txtpro.Text = ""
    txtcom.SetFocus
    End If
End Sub

Private Sub chkgas_Click()
    If chkgas Then
    txtprice.Text = "15000000"
    txtquant.Text = "90"
    txtpro.Text = "Gas"
```

```
    txtcom.SetFocus
    Else
    txtprice.Text = ""
    txtquant.Text = ""
    txtpro.Text = ""
    txtcom.SetFocus
    End If
End Sub

Private Sub chknozz_Click()
    If chknozz Then
    txtprice.Text = "350000"
    txtquant.Text = "50"
    txtpro.Text = "Nozzel"
    txtcom.SetFocus
    Else
    txtprice.Text = ""
    txtquant.Text = ""
    txtpro.Text = ""
    txtcom.SetFocus
    End If
End Sub

Private Sub chkoil_Click()
    If chkoil Then
```

```
    txtprice.Text = "2000000"
    txtquant.Text = "100"
    txtpro.Text = "Oil"
    txtcom.SetFocus
    Else
    txtprice.Text = ""
    txtquant.Text = ""
    txtpro.Text = ""
    txtcom.SetFocus
    End If
End Sub

Private Sub chktan_Click()
    If chktan Then
    txtprice.Text = "20000000"
    txtquant.Text = "42"
    txtpro.Text = "Tanker"
    txtcom.SetFocus
    Else
    txtprice.Text = ""
    txtquant.Text = ""
    txtpro.Text = ""
    txtcom.SetFocus
    End If
End Sub
```

```
Private Sub chktruck_Click()
    If chktruck Then
    txtprice.Text = "15000000"
    txtquant.Text = "50"
    txtpro.Text = "Truck"
    txtcom.SetFocus
    Else
    txtprice.Text = ""
    txtquant.Text = ""
    txtpro.Text = ""
    txtcom.SetFocus
    End If
End Sub

Private Sub cmdcalcu_Click()
'If IsNumeric(txtquan.Text) Then
    intprice = Val(txtprice.Text)
    intquant = Val(txtquant.Text)
    intquan = Val(txtquanr.Text)
    intquan = Val(txtquan.Text)
    inttotal = intprice * intquan
    intquanr = intquant - intquan
    txttotal = inttotal
    txtquanr = intquanr
```

```
  ' End If
If intquant < intquan Then
   txtquan.Text = ""
   txttotal.Text = ""
   txtquanr.Text = ""
     MsgBox "Your demand is more than available quantity", vbInformation, "Excess Demand"
      End If
If txtquan.Text = "" Then
   MsgBox "Please enter the quantity you need", vbInformation, "Attention !!! "
   txtquan.SetFocus
End If
   txtprice.Text = "#" & FormatNumber(intprice)
   txttotal.Text = "#" & FormatNumber(inttotal)
End Sub

Private Sub cmdDelete_Click()
   With Adodc1.Recordset
   .Delete
   .MoveNext
   If .EOF Then
      MsgBox "Recordset is Empty", vbInformation, "No Records"
   End If
End With
End Sub
```

```
Private Sub cmdedit_Click()
    txtcom.Locked = False
    txtcus.Locked = False
    txtmodel.Locked = False
    txtquan.Locked = False
    txtdate.Locked = False
    txttime.Locked = False
    txtpro.Locked = False
    txtprice.Locked = False
    txtquant.Locked = False
    txtquanr.Locked = False
    txttotal.Locked = False
    txtsup.Locked = False
    txtadd.Locked = False
    cmdsave.Enabled = True
    cmdnew.Caption = "&New"
End Sub

Private Sub cmdnew_Click()
    Adodc1.Recordset.AddNew
    txtcom.SetFocus
    cmdsave.Enabled = True
    cmdnew.Caption = "&New"
    txtcom.Locked = False
    txtcus.Locked = False
```

```
    txtmodel.Locked = False
    txtquan.Locked = False
    txtdate.Locked = False
    txttime.Locked = False
    txtsup.Locked = False
    txtadd.Locked = False
End Sub

Private Sub cmdsave_Click()
    Adodc1.Recordset.Update
End Sub

Private Sub Form_Load()
   txtcom.Locked = True
    txtcus.Locked = True
    txtmodel.Locked = True
    txtquan.Locked = True
    txtdate.Locked = True
    txttime.Locked = True
    txtpro.Locked = True
    txtprice.Locked = True
    txtquant.Locked = True
    txtquanr.Locked = True
    txttotal.Locked = True
    txtsup.Locked = True
```

```
    txtadd.Locked = True
End Sub

Private Sub mnuBack_Click()
'Form3.lblquan.Caption = Form1.lblremain.Caption
'Form3.lblquant.Caption = Form1.lblquan.Caption
'Form3.lblpro.Caption = Form1.lblname.Caption
    Unload Me
    Form1.Show
End Sub

Private Sub mnuDetail_Click()
    Unload Me
    Form2.Show
End Sub

Private Sub mnuDeve_Click()
    MsgBox "Developed by Ugochukwu E.Onyeka", vbInformation, "Developer"
End Sub

Private Sub mnuExit_Click()
Dim intresponse As Integer
intresponse = MsgBox("Do you want to Quit", vbYesNo + vbInformation, "You Quit")
If intresponse = vbYes Then
End
```

```
End If
End Sub

Private Sub mnuphone_Click()
   Dim strphoneno As String
   Dim vntbookmark As Variant
   On Error GoTo handleerror
   strphoneno = InputBox("Type Phone Number", "Find Number")
   With Adodc1.Recordset
   vntbookmark = .Bookmark
   .MoveFirst
   .Find "phoneno Like '" & strphoneno & "*'"
   If .EOF Then
      MsgBox "No Matching Records Found", vbOKCancel, "Type the correct Phone Number"
      .Bookmark = vntbookmark
   End If
   End With
mnuphone_click_exit:
   Exit Sub
handleerror:
   MsgBox "Operation Failed", vbInformation, "Type the correct Phone Number"
End Sub

Private Sub mnure_Click()
   Unload Me
```

```
    Form6.Show
End Sub

Private Sub mnusales_Click()
    Unload Me
    Form4.Show
End Sub

Private Sub Timer1_Timer()
    lbltime.Caption = Time
    lbldate.Caption = Date
End Sub
```