

INVENTORY MANAGEMENT SYSTEM
A STUDY OF PIDILITE INDUSTRIES

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STATEMENT ABOUT THE PROBLEM

The three primary functions that characterize the occupation are management, coordination, and control of inventory and systems of inventory management. Management of inventory records and relevant details is an important area of concern for every organization, whether it is large or small. And also calls for efficient planning and maintenance. Think of a situation when you have to look into various registers to find and enter each and every minor mandatory detail. And the situation goes worse when you need to manage a number of such registers. Every register need to be updated to make the records up to date. Obviously, managing number of such records and registers manually sounds to be truly a laborious job

and calls for efficient and effective planning and implementation of effective skills to get the job done.

But what for, if not all but a maximum part of the job of management can be done automatically with just the click of a button!! Sounds a bit relieving and interesting, isn't it!! Here comes the concept of

WHAT IS INVENTORY

Despite its importance to the supply chain, inventory is not universally well understood. It is variously characterized, both positively and negatively, as an economic asset to a non-income-producing use of capital funds. Only when considered in light of all quality, client service and economic factors—from the viewpoints of purchasing, manufacturing, sales and finance—does the whole picture of inventory become clear. No matter the viewpoint, effective inventory management is essential to supply chain competitiveness.

Inventory is a list for [goods and materials](#), or those goods and materials themselves, held available in stock by a [business](#). Inventory are held in order to manage and hide from the customer the fact that manufacture/supply delay is longer than delivery delay, and also to ease the effect of imperfections in the manufacturing process that lower production efficiencies if production capacity stands idle for lack of materials. In other words, Inventory is a quantity or store of goods that is held for some purpose or use (the term may also be used as a verb, meaning to take inventory or to count all goods held in inventory). Inventory may be kept "in-house," meaning on the premises or nearby for immediate use; or it may be held in a distant warehouse or distribution center for future use. With the exception of firms utilizing just-in-time methods, more often than not, the term "inventory" implies a stored quantity of goods that exceeds what is needed for the firm to function at the current time (e.g., within the next few hours).

WHY KEEP INVENTORY?

Why would a firm hold more inventory than is currently necessary to ensure the firm's operation? The following is a list of reasons for maintaining what would appear to be "excess" inventory.

MEET DEMAND.

In order for a retailer to stay in business, it must have the products that the customer wants on hand when the customer wants them. If not, the retailer will have to back-order the product. If the customer can get the good from some other source, he or she may choose to do so rather than electing to allow the original retailer to meet demand later (through back-order). Hence, in many instances, if a good is not in inventory, a sale is lost forever.

KEEP OPERATIONS RUNNING.

A manufacturer must have certain purchased items (raw materials, components, or subassemblies) in order to manufacture its product. Running out of only one item can prevent a manufacturer from completing the production of its finished goods. Inventory between successive dependent operations also serves to decouple the dependency of the operations. A machine or workcenter is often dependent upon the previous operation to provide it with parts to work on. If work ceases at a workcenter, then all subsequent centers will shut down for lack of work. If a supply of work-in-process inventory is kept between each workcenter, then each machine can maintain its operations for a limited time, hopefully until operations resume the original center.

LEAD TIME.

Lead time is the time that elapses between the placing of an order (either a purchase order or a production order issued to the shop or the factory floor) and actually receiving the goods ordered. If a supplier (an external firm or an internal department or plant) cannot supply the required goods on demand, then the client firm must keep an inventory of the needed goods. The longer the lead time, the larger the quantity of goods the firm must carry in inventory.

A just-in-time (JIT) manufacturing firm, such as Nissan in Smyrna, Tennessee, can maintain extremely low levels of inventory. Nissan takes delivery on truck seats as many as 18 times per day. However, steel mills may have a lead time of up to three months. That means that a firm that uses steel produced at the mill must place orders at least three months in advance of their need. In order to keep their operations running in the meantime, an on-hand inventory of three months' steel requirements would be necessary.

HEDGE.

Inventory can also be used as a hedge against price increases and inflation.

Salesmen routinely call purchasing agents shortly before a price increase goes into effect. This gives the buyer a chance to purchase material, in excess of current need, at a price that is lower than it would be if the buyer waited until after the price increase occurs.

QUANTITY DISCOUNT.

Often firms are given a price discount when purchasing large quantities of a good.

This also frequently results in inventory in excess of what is currently needed to

meet demand. However, if the discount is sufficient to offset the extra holding cost incurred as a result of the excess inventory, the decision to buy the large quantity is justified.

SMOOTHING REQUIREMENTS.

Sometimes inventory is used to smooth demand requirements in a market where demand is somewhat erratic.

There are three basic reasons for keeping an inventory:

- ® **Time** - The time lags present in the supply chain, from supplier to user at every stage, requires that you maintain certain amount of inventory to use in this "lead time"
- ® **Uncertainty** - Inventories are maintained as buffers to meet uncertainties in demand, supply and movements of goods.
- ® **Economies of scale** - Ideal condition of "one unit at a time at a place where user needs it, when he needs it" principle tends to incur lots of costs in terms of logistics. So Bulk buying, movement and storing brings in economies of scale, thus inventory.

CONTROLLING INVENTORY

Inventory management, or inventory control, is an attempt to balance inventory needs and requirements with the need to minimize costs resulting from obtaining and holding inventory. There are several schools of thought that view inventory and its function differently. These will be addressed later, but first we present a foundation to facilitate the reader's understanding of inventory and its function.

Firms that carry hundreds or even thousands of different part numbers can be faced with the impossible task of monitoring the inventory levels of each part number. In order to facilitate this, many firms use an ABC approach. ABC analysis is based on Pareto Analysis, also known as the "80/20" rule. The 80/20 comes from Pareto's finding that 20 percent of the populace possessed 80 percent of the wealth. From an inventory perspective it can be restated thusly: approximately 20 percent of all inventory items represent 80 percent of inventory costs. Therefore, a firm can control 80 percent of its inventory costs by monitoring and controlling 20 percent of its inventory. But, it has to be the correct 20 percent.

The top 20 percent of the firm's most costly items are termed "A" items (this should approximately represent 80 percent of total inventory costs). Items that are extremely inexpensive or have low demand are termed "C" items, with "B" items falling in between A and C items. The percentages may vary with each firm, but B items usually represent about 30 percent of the total inventory items and 15 percent of the costs. C items generally constitute 50 percent of all inventory items but only around 5 percent of the costs.

By classifying each inventory item as an A, B or C the firm can determine the resources (time, effort and money) to dedicate to each item. Usually this means that the firm monitors A items very closely but can check on B and C items on a periodic basis (for example, monthly for B items and quarterly for C items).

Another control method related to the ABC concept is cycle counting. Cycle counting is used instead of the traditional "once-a-year" inventory count where firms shut down for a short period of time and physically count all inventory assets in an attempt to reconcile any possible discrepancies in their inventory records. When cycle counting is used the firm is continually taking a physical count but not of total inventory. A firm may physically count a certain section of the plant or warehouse, moving on to other sections upon completion, until the entire facility is counted. Then the process starts all over again. The firm may also choose to count all the A items, then the B items, and finally the C items. Certainly, the counting frequency will vary with the classification of each item. In other words, A item may be counted monthly, B items quarterly, and C items yearly. In addition the required accuracy of inventory records may vary according to classification, with items requiring the most accurate record keeping.

There are three types of costs that together constitute total inventory costs: holding costs, set-up costs, and purchasing costs.

HOLDING COSTS.

Holding costs, also called carrying costs, are the costs that result from maintaining the inventory. Inventory in excess of current demand frequently means that its holder must provide a place for its storage when not in use. This could range from a small storage area near the production line to a huge warehouse or distribution center. A storage facility requires personnel to move the inventory when needed and

to keep track of what is stored and where it is stored. If the inventory is heavy or bulky, forklifts may be necessary to move it around.

Storage facilities also require heating, cooling, lighting, and water. The firm must pay taxes on the inventory, and opportunity costs occur from the lost use of the funds that were spent on the inventory. Also, obsolescence, pilferage (theft), and shrinkage are problems. All of these things add cost to holding or carrying inventory.

SET-UP COSTS.

Set-up costs are the costs incurred from getting a machine ready to produce the desired good. In a manufacturing setting this would require the use of a skilled technician (a cost) who disassembles the tooling that is currently in use on the machine. The disassembled tooling is then taken to a tool room or tool shop for maintenance or possible repair (another cost). The technician then takes the currently needed tooling from the tool room (where it has been maintained; another cost) and brings it to the machine in question.

There the technician has to assemble the tooling on the machine in the manner required for the good to be produced (this is known as a "set-up"). Then the technician has to calibrate the machine and probably will run a number of parts, that will have to be scrapped (a cost), in order to get the machine correctly calibrated and running. All the while the machine has been idle and not producing any parts (opportunity cost). As one can see, there is considerable cost involved in set-up. If the firm purchases the part or raw material, then an order cost, rather than a set-up

cost, is incurred. Ordering costs include the purchasing agent's salary and travel/entertainment budget, administrative and secretarial support, office space, copiers and office supplies, forms and documents, long-distance telephone bills, and computer systems and support. Also, some firms include the cost of shipping the purchased goods in the order cost.

PURCHASING COST.

Purchasing cost is simply the cost of the purchased item itself. If the firm purchases a part that goes into its finished product, the firm can determine its annual purchasing cost by multiplying the cost of one purchased unit (P) by the number of finished products demanded in a year (D). Hence, purchasing cost is expressed as PD.

Now total inventory cost can be expressed as:

® $\text{Total} = \text{Holding cost} + \text{Set-up/Order cost} + \text{Purchasing cost}$ or $\text{Total} = H(Q/2) + S(D/Q) + PD$

® If holding costs and set-up costs were plotted as lines on a graph, the point at which they intersect (that is, the point at which they are equal) would indicate the lowest total inventory cost. Therefore, if we want to minimize total inventory cost, every time we place an order, we should order the quantity (Q) that corresponds to the point where the two values are equal.

® There are a number of assumptions that must be made with the use of the EOQ. These include:

- ® Only one product is involved.
- ® Deterministic demand (demand is known with certainty).
- ® Constant demand (demand is stable through-out the year).

® No quantity discounts.

® Constant costs (no price increases or inflation).

While these assumptions would seem to make EOQ irrelevant for use in a realistic situation, it is relevant for items that have independent demand. This means that the demand for the item is not derived from the demand for something else (usually a parent item for which the unit in question is a component). For example, the demand for steering wheels would be derived from the demand for automobiles (dependent demand) but the demand for purses is not derived from anything else; purses have independent demand.

Recent industry reports show that inventory costs as a percent of total logistics costs are increasing. Despite this rise, many organizations have not taken full advantage of ways for lowering inventory costs. There are a number of proven strategies that will provide payoff in the inventory area, both in client service and in financial terms. Some of these strategies for lowering inventory costs involve having less inventory while others involve owning less of the inventory you have. Regardless of which techniques you employ, proactive inventory management practices will make a measurable difference in your operations.

INVENTORY MANAGEMENT

Inventory Management System deals with the maintenance of equipments.

Inventory Management is a discipline that encompasses the principles, concepts and techniques for determining what to order, when to order and how much to order.

The right amount of inventory involves the balance between what is required to service your customers and what is financially practical.

Precise control and safeguarding of inventory is an essential task for a successful, well-organized company; businesses require timely and accurate information on inventory location, movement, and valuation. The Inventory Management module for Sage MAS 90 and Sage MAS 200 ERP systems provides data pertaining to the receipt of goods, the movement of goods within or between locations, the sale, removal, or other disposition of goods, kitting capabilities, lot and serial tracking, and the precise valuation and status of goods remaining in inventory at any point in time. When used in conjunction with other Sage MAS 90 and 200 modules, Inventory Management is the cornerstone of an effective manufacturing or distribution solution. Inaccurate inventory counts can cost you sales and delay shipments past the promise date. Out-of stock items as well as overstocked items in inventory can be devastating to your business. Additionally, an overstated or understated inventory valuation can result in incorrectly reported assets within your financial statements.

Inventory Management offers comprehensive reporting capabilities to keep you on top of inventory status. Generate reports on item pricing, stock status, detailed sales history, backorder information, reorder points and recommendation, valuation, turnover, sales analysis, and much more. And adding the Business Alerts module can keep your staff on top of quantity changes to critical inventory items, to keep stocking levels precisely where you want them. Properly used, the Inventory Management module can help bring about the formulation of new or improved purchasing policies, sales policies, pricing methods, and even enhanced customer

service. Inventory Management could also provide your company with an additional edge over competitors who are unable to access the same strategic information.

FEATURES OF INVENTORY MANAGEMENT

Extended Pricing –

Equip your sales team to improve customer satisfaction and beat the competition by creating flexible pricing options and rules for each customer. With extended pricing you can:

- ® Create standard price schemes such as percentage-off, value-off, and net pricing, along with personalized pricing options.
- ® Implement powerful date-sensitive functionality for sales and promotions.
- ® Navigate the system using drill-down, zoom, and special menu capabilities that offer a fast learning curve and easy visibility into your pricing index.

Bill of Materials -

Increase productivity by providing a superior solution for tracking the components and subassemblies used in light manufacturing and similar production and assembly operations. With bill of materials you can:

1. Define the exact order of your assembly process, up to 10 levels deep.
2. Attach electronic notes to bills to detail exact component use at every assembly level.
3. Track the actual cost for assembled items, plan for future changes, and manage current and past items.
4. Schedule transactions into the future without reserving stock.
5. Cradle-to-Grave Serial/Lot Tracking -

6. Transform time-consuming searches into quick, efficient processes by identifying all instances of an item with a single trace. With cradle-to-grave serial/lot tracking you can:
7. Increase visibility into serial/lot number lifecycles.
8. Conduct powerful searches using an item's serial or lot number.
9. Complete widespread searches across all transactions, including bills of materials and customer orders.
10. Consolidate like lot numbers in all lot number entry windows to gain an accurate view of inventory for a given lot number—including manufactured date and expiration date—without juggling multiple records.
11. Instant Access to Transaction Information -
12. Get instant information on all transactions related to any item you define in the inquiry windows—including lot number, price levels, and item type—and drill down as needed. Query originating documents, and then drill down for details about Field Service, Project Accounting or Manufacturing documents.

Stock Count and Discrepancy Alerts –

Maintain an accurate stock count schedule and investigate stock discrepancies quickly with system alerts that notify you when inventory is due for counting or when differences occur between an item's reported status and warehouse presence.

In-Transit Inventory Transfers

- ® Input a middle site into the transfer process to allow for via tracking to prevent salespeople from selling material that isn't currently in the destination warehouse.

- ® Accurate inventory quantities at both from site and to site allow more realistic promise dates and improve inventory management.
- ® Increased Lot Flexibility
- ® Notify employees when a lot is close to its expiration date, so they can determine the best course of action.
- ® Inventory Control preferences offer optional password protection, so your people can control the selection of expired lots.
- ® Detailed Insight into Inventory Usage -
- ® More effectively analyze sales, transfers, and materials used for manufacturing by drilling down to each transaction that reduces inventory, including those in debited and credited accounts.
- ® Access supply and demand information using Allocated and On Order drill downs and view item allocations in existing orders quickly and easily.
- ® Narrow search results by providing date ranges for item transaction inquiries.

Inventory Management includes the integrated management and control of assigned items of material. The work involves a number of processes such as:

- ® **Requirements Determination** - Planning for and determining current and future supply requirements to meet customer needs;
- ® **Material Distribution** - Planning and determining the distribution and positioning of supplies among major supply stations, stock points, or using activities;

- ® **Procurement Authorization** - Preparing recommendations and directives for the procurement of material, indicating the types of items, quantities, and at all times, the sources; and
- ® **Funds Management** - Analyzing planned or scheduled material requirements and forecasts to determine categories and quantities of items, as well as funds required.

Inventory management involves several common elements. Among the more important of these are:

- ® utilization of increasingly sophisticated electronic data processing systems as integral parts of material control, record, and data communications systems;
- ® use of scientific or business type decision rules and formulas to make material control decisions that optimally balance cost and material support effectiveness;
- ® development and implementation of various material standardization programs;
- ® planning and coordinating material actions to assure properly phased support to major items of equipment and/or weapon systems in test phases, in production, in service, and during phaseout periods; and monitoring the quality of input and output of automated inventory management systems and recommending system and programming changes to improve timeliness, accuracy, and utility of inventory information for users.

Inventory Control includes performing one or more of a wide variety of staff or administrative functions such as:

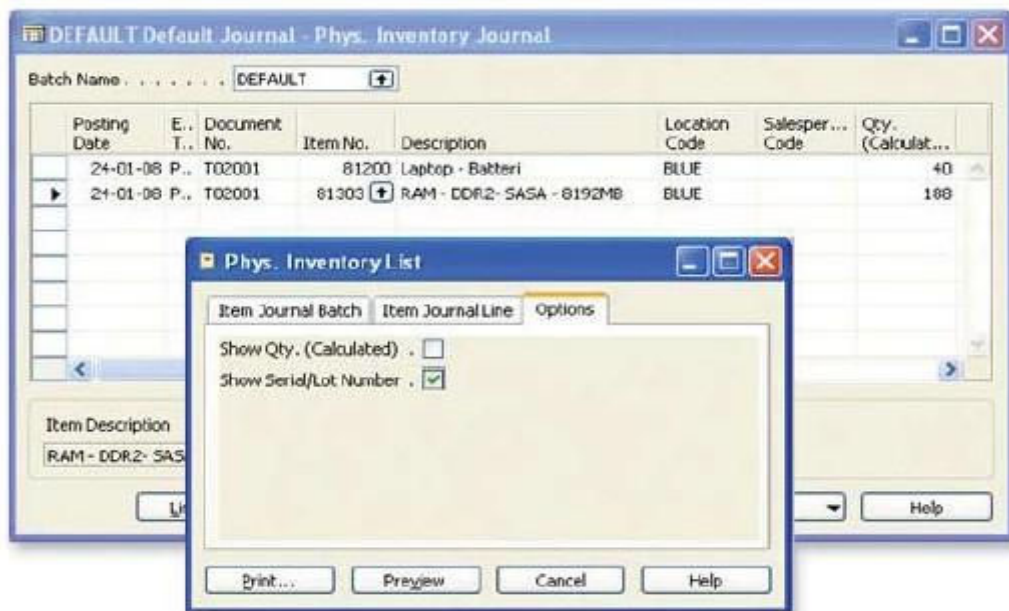
- ® Initiating, developing, installing, or administering a control program.

- ® Providing guidance on or conducting surveys of supply and inventory management functions.
- ® Analyzing, evaluating, revising, or developing new inventory management systems.
- ® Developing long-range material support plans.
- ® Directing, guiding, or reviewing material support programs, functions, and actions implemented by others; and/or
- ® Performing quality assurance and review functions.
- ® Inventory specialists satisfy these responsibilities by:
 - ® Controlling and authorizing funding for material so that the proper kind, quality, and quantity are available at the correct time and place.
 - ® Maintaining records and controls over material in stock, due in, or planned for the distribution system on a quantitative and monetary basis; and
 - ® Controlling the distribution or redistribution of stock within the supply system.
- ® Inventory management work is classified in this series when duties and responsibilities demonstrate that the preponderance of the work requires performing most of the preceding functions and, at least three of the following:
 - ® Managing items with difficult supply and demand patterns related to seasonal factors, program changes, changes in end-use applications, and similar elements;
 - ® Making supply system decisions which consider more than the status of an individual item or the problem presented by a particular supply transaction, e.g., interchangeability of items among different equipment or systems;
 - ® Exercising substantially independent authority to --

- ® establish and revise reorder frequencies;
- ® establish stock levels for individual items on a selective basis; and manage assigned items in such a manner as to achieve effective supply support while remaining within authorized or available funds;
- ® Programming requirements for assigned items, including phasing procurements and deliveries and determining best use of funds saved through judicious management;
- ® Reviewing planned work programs, schedules, and other planning data.
Advising others regarding major categories of material which will be needed and pointing out material areas most likely to cause difficulties;
- ® Planning and coordinating material support for assigned program or project areas including extensive provisioning conferences and personal contacts to negotiate stock levels, phased production, changes in work schedules, or other means of alleviating material problems;
- ® Serving as a central point of contact and exchange of information for personnel of supply, production, maintenance, and other organizations relative to material support problems affecting an assigned program or project area;
- ® Recommending changes in automated data bases and systems of data storage, formats, and reports; and/or
- ® Participating in planning for new data processing systems in terms of defining the nature of information required, organizational responsibilities, computer network requirements, and the nature of output desired from inventory management systems.

BENEFITS

1. Centralized inventory management consolidates inventory information by tracking lot numbers, on-hand levels and expiration dates, making the re-ordering process more efficient.
2. Enables simultaneous tracking and documenting supplies during studies to reduce redundant data entry and increase workflow efficiency.
3. When multiple officials are involved in a case, the statistical report accurately correlates the supplies used with the correct user, eliminating mis-charges and appropriately tracking resources.
4. Provides stand-alone inventory management system for the institution with the capacity to integrate with a hospital's existing inventory system, significantly reducing go-live times and improving departmental efficiency.
5. Optional interface to institution's/company's material management system significantly reduces ongoing inventory maintenance, and ensures accurate pricing data for case cost reports and auto-decrements supply levels.
6. Comprehensive inventory reports help automate key administrative responsibilities, such as tracking inventory item usage by vendor and physician, maintaining in-stock value of consignment verses non-consignment items, and providing notification of items with upcoming expirations.



Quickly identify discrepancies in your inventory by comparing actual quantities with system records.

Help reduce purchasing and inventory costs. Connect inventory control, purchasing, and sales order processing with demand planning and help reduce costs, improve cash flow, and help ensure that you have the right stock available when you need it.

Gain visibility into inventory processes. Effectively balance availability with demand and track items and their possible expiration dates throughout the supply chain to help minimize on-hand inventory, optimize replenishment, and increase warehouse efficiency.

Improve customer satisfaction. Make more accurate order promises and intelligent last-minute exceptions with access to up-to-date inventory information. Respond quickly and knowledgeably to customer queries for improved customer service.

Reduce time to market. With integrated order, inventory, and distribution processes, as well as item tracking capabilities, your business can reduce manual data entry and get your goods to market fast.

TECHNIQUES AND SOFTWARE OF INVENTORY MANAGEMENT

Inventory management is the active control program which allows the management of sales, purchases and payments. Inventory Management and Inventory Control must be designed to meet the dictates of the marketplace and support the company's strategic plan. The many changes in market demand, new opportunities due to worldwide marketing, global sourcing of materials, and new manufacturing technology, means many companies need to change their Inventory Management approach and change the process for Inventory Control.

Despite the many changes that companies go through, the basic principles of Inventory Management and Inventory Control remain the same. Some of the new approaches and techniques are wrapped in new terminology, but the underlying principles for accomplishing good Inventory Management and Inventory activities have not changed.

The Inventory Management system and the Inventory Control Process provides information to efficiently manage the flow of materials, effectively utilize people and equipment, coordinate internal activities, and communicate with customers. Inventory Management and the activities of Inventory Control do not make decisions or manage operations; they provide the information to Managers who make more accurate and timely decisions to manage their operations. The basic

building blocks for the Inventory Management system and Inventory Control activities are:

- ® Sales Forecasting or Demand Management
- ® Sales and Operations Planning
- ® Production Planning
- ® Material Requirements Planning
- ® Inventory Reduction

Inventory management software helps create invoices, purchase orders, receiving lists, payment receipts and can print bar coded labels. An inventory management software system configured to your warehouse, retail or product line will help to create revenue for your company. The Inventory Management will control operating costs and provide better understanding. We are your source for inventory management information, inventory management software and tools.

SOME INVENTORY MANAGMENT SOFTWARES ARE

AdvancePro by AdvancewareTechnologies, EverestAdvanced by Everest Software, NTSWMS by National Technology Services etc...

OTHER LOT-SIZING TECHNIQUES

There are a number of other lot-sizing techniques available in addition to the facts stated above. These include the fixed-order quantity, fixed-order-interval model, the single-period model, and part-period balancing.

FIXED-ORDER-QUANTITY MODEL.

EOQ is an example of the fixed-order-quantity model since the same quantity is ordered every time an order is placed. A firm might also use a fixed-order quantity when it is captive to packaging situations. If you were to walk into an office supply store and ask to buy 22 paper clips, chances are you would walk out with 100 paper clips. You were captive to the packaging requirements of paper clips, i.e., they come 100 to a box and you cannot purchase a partial box. It works the same way for other purchasing situations. A supplier may package their goods in certain quantities so that their customers must buy that quantity or a multiple of that quantity.

FIXED-ORDER-INTERVAL MODEL.

The fixed-order-interval model is used when orders have to be placed at fixed time intervals such as weekly, biweekly, or monthly. The lot size is dependent upon how much inventory is needed from the time of order until the next order must be placed (order cycle). This system requires periodic checks of inventory levels and is used by many retail firms such as drug stores and small grocery stores.

SINGLE-PERIOD MODEL.

The single-period model is used in ordering perishables, such as food and flowers, and items with a limited life, such as newspapers. Unsold or unused goods are not typically carried over from one period to another and there may even be some

disposal costs involved. This model tries to balance the cost of lost customer goodwill and opportunity cost that is incurred from not having enough inventory, with the cost of having excess inventory left at the end of a period.

PART-PERIOD BALANCING.

Part-period balancing attempts to select the number of periods covered by the inventory order that will make total carrying costs as close as possible to the set-up/order cost. When a proper lot size has been determined, utilizing one of the above techniques, the reorder point, or point at which an order should be placed, can be determined by the rate of demand and the lead time. If safety stock is necessary it would be added to the reorder point quantity.

Reorder point = Expected demand during lead time + Safety stock

Thus, an inventory item with a demand of 100 per month, a two-month lead time and a desired safety stock of two weeks would have reorder point of 250. In other words, an order would be placed whenever the inventory level for that good reached 250 units.

Reorder point = $100/\text{month} \times 2 \text{ months} + 2 \text{ weeks' safety stock} = 250$

OTHER SCHOOLS OF THOUGHT IN INVENTORY MANAGEMENT

There are a number of techniques and philosophies that view inventory management from different perspectives.

MRP AND MRP II.

MRP and MRP II are computer-based resource management systems designed for items that have dependent demand. MRP and MRP II look at order quantities period

by period and, as such, allow discrete ordering (ordering only what is currently needed). In this way inventory levels can be kept at a very low level; a necessity for a complex item with dependent demand.

JUST-IN-TIME (JIT).

Just-in-time (JIT) is a philosophy that advocates the lowest possible levels of inventory. JIT espouses that firms need only keep inventory in the right quantity at the right time with the right quality. The ideal lot size for JIT is one, even though one hears the term "zero inventory" used.

STEPS TO EFFECTIVE INVENTORY MANAGEMENT

There are two different approaches organizations can make with regard to inventory.

They can assume it is just a necessary evil and start a special inventory reduction program whenever cash gets tight. Or they can make strategic decisions on the level to carry, put an inventory management process in place to actively manage inventory and continually improve the business results..

A STUDY OF INVENTORY MANAGEMENT IN PIDILITE INDUSTRIES

COMPANY PROFILE: -

Since its inception in 1959, Pidilite Industries Limited has been a pioneer in consumer and specialties chemicals in India. Over two-third of the company's sales come from products and segments it has pioneered in India. The product range includes Adhesives and Sealants, Construction and Paint Chemicals, Automotive Chemicals, Art Materials, Industrial Adhesives, Industrial and Textile Resins and Organic Pigments and Preparations. Most of the products have been developed through strong in-house R&D. The Group's turnover is about US \$ 450 Million for the year 2008-09

In a recent report by Economic Times, Pidilite ranked 131st amongst the top 500 listed companies in India.

Pidilite Industries is the market leader in adhesives and sealants, construction chemicals, hobby colours and polymer emulsions in India. Brand name Fevicol has become synonymous with adhesives to millions in India and is ranked amongst the most trusted brands in India. Pidilite is also growing its International presence through acquisitions and setting up manufacturing facilities and sales offices in important regions around the world. Fevicol is now the largest selling adhesives brand in Asia. Fevicol is synonymous with adhesives in India. Pidilite offers an extensive range of consumer, craftsmen, engineering and industrial adhesives under Fevicol brand name. Excellent quality, extensive product range, close relations with

customers and award winning advertisement have made Fevicol one of the most trusted brands in India and the largest selling adhesives brand in Asia

Pidilite USA Inc., wholly owned subsidiary of Pidilite, acquired Cyclo brand in June 2006. The product range includes maintenance, performance and appearance products for DIY (Do-it-Yourself) and professional car care segment. Cyclo products are sold in USA and over 50 other countries. Pidilite USA Inc., wholly owned subsidiary of Pidilite, acquired Sargent Art brand in June 2006. Sargent Art has been selling world-class art materials in USA for over 50 years. The products range includes crayons, tempera colours acrylic colours, markers, modeling clay and many other products. Pidilite offers a range of hobby & craft products under the Hobby Ideas brand name. The products are complemented with book, videos and training workshops to make hobby fun and easy for hobby enthusiasts. Pidilite has also opened India's first chain of hobby & craft retail stores under the Hobby ideas brand name. The shops offer a large variety of hobby & craft products sourced from around the world.

Pidilite offers a wide range of constructions chemicals under the Dr. Fixit brand name. The extensive product range is used for waterproofing and repair for both new & old constructions. Dr. Fixit is market leader in retail market of construction chemicals and the products are available in all leading cement, hardware, tile and paint shops. Pidilite acquired Roff brand in 2004. Roff is a pioneer in construction chemicals in India and is well known for modern tile fixing solutions like tile-on-tile and waterproof tile joints. Pidilite also sells several construction chemicals under

Roff name for application in waterproofing, sealing, flooring, concrete treatment & plastering.

INVENTORY MANAGEMENT AT PIDILITE

The company has complete and accurate knowledge of the stock across the units and inventory management at all units greatly improved post implementation.

Matching aspiration with execution is an important ingredient for success, especially for companies playing in the global market. And to execute well, visibility into operations is a pre-requisite. As Pidilite Industries figured, a robust system can provide this much needed visibility. So they chose **SAP® Business One application to automate operations** across global locations. And reaped the benefits.

Pidilite Industries Limited (PIL) specializes in the areas of Specialty Chemicals (Industrial adhesives, Pigments, Textile resins, Leather chemicals), Consumer products (Stationery & Art Material, Fabric Care & Maintenance Products), Construction Chemicals, Paints, Adhesives and Sealants. Pidilite's Fevicol, Steelgrip, Acron, Dr. Fixit, Fevitite and M-seal are among the most well known brands in India. The company, fast becoming a global player, recorded revenues of over Rs.1111 cr in FY08-09. To fuel its quick rise, the company has made investments in a number of mid-sized manufacturing and distribution companies located in the UAE, Singapore and Thailand.

CHALLENGES: SINGLE INTEGRATED SYSTEM

Pidilite was on a path of rapid expansion. With Pidilite aiming at markets spread across the globe, transparency of, and control over, business operations across the

extended organization was posing a big challenge for the top management. Pidilite needed a single integrated and, more importantly, universal solution which would enable them to establish central transaction and management control. This would, in turn, enable accurate and on time generation of consolidated MIS reports, helping top management to monitor the health of individual companies efficiently.

Second, the local management needed systemic support to run their day to day operations. Generating timely and accurate MIS reports, recording daily transactions and reporting to central office on time was a great challenge at all the individual offices. Another important area which needed immediate attention was inventory management. “Thus, it was clear that we needed a system that would be universal, as well as handle country specific localization needs,” says Zoeb Adenwala, the company’s Chief of IT.

Decision to implement SAP Business One

Pidilite looked for a solution that was universal yet locally adaptable. They evaluated a few options before deciding on SAP Business One. Pidilite felt that SAP provided them the much needed adaptability and flexibility. SAP also inherently possessed control and check features for management control which was important for Pidilite, considering their widespread offices and future global expansion plans. Also, SAP was web-enabled, had the necessary reporting capabilities and had local product support at all the locations considered for implementation. So, SAP was a clear winner.

Managing a multi location implementation

The biggest challenge Pidilite had to deal with was managing simultaneous implementation across global locations. While the company put together a competent internal team, they realized that not many members had first hand experience working at these locations nor did they have an understanding of the local systems in place.

After a careful consideration, Octopus-e International was selected as the implementation partner for all the locations. Octopus-e set up an experienced team to handle the complexities of the project. The Big Bang implementation approach was followed and implementation was kicked off in July 2006 across all the locations simultaneously. Standard modules including sales, purchase, inventory, finance and banking were implemented and the solution was customized according to local tax and reporting structures. “Even though there were challenges in coping with language issues and understanding the local context, Octopus-e drew on their experience to deal with them,” says Atul Kshetry, Director, Octopus-e International. “Pidilite needed a common chart of accounts for all the companies; mapping the chart of accounts across the three countries accurately was quite challenging for the implementation team. With the help of the dedicated internal team and our own team, the implementation was completed in just three months.

SYSTEM ANALYSIS

System Analysis refers into the process of examining a situation with the intent of improving it through better procedures and methods. System Analysis is the process of planning a new System to either replace or complement an existing system. But before any planning is done the old system must be thoroughly understood and the

requirements determined. System Analysis is therefore, the process of gathering and interpreting facts, diagnosing problems and using the information to re-comment improvements in the System. Or in other words, System Analysis means a detailed explanation or description. Before computerized a system under consideration, it has to be analyzed. We need to study how it functions currently, what are the problems, and what are the requirements that the proposed system should meet.

System Analysis is conducted with the following objectives in mind:

- ® Identify the customer's need.
- ® Evaluate the system concept for feasibility.
- ® Perform economic and technical analysis.
- ® Allocate functions to hardware, software people, database and other system elements.
- ® Establish cost and schedule constraints.
- ® Create a system definition that forms the foundation for all the subsequent engineering work.
- ® Requirement Analysis/ SRS of the Component

PROBLEM DEFINITION

To provide the basic services related to the Supply of the material to maintain their PRE-SO (Supply Order) and POST-SO details. The product will take care of all the supply orders. Pre-So is maintained from the starting of the financial year. It is concern to keep the records of each Supply Order, which is received, from firm, supplying equipments. These equipments are then assigned a unique ISG Number given by BRO, further they are supplied to different project departments of BRO.

The reference of Last Purchase Price (LPP) of the equipments corresponding to the ISG (Initial Stocking Guide) is maintain to form the transaction sheet of the particular financial year.

PERFORMANCE REQUIREMENTS

The following performance characteristics should be taken care of while developing the system :

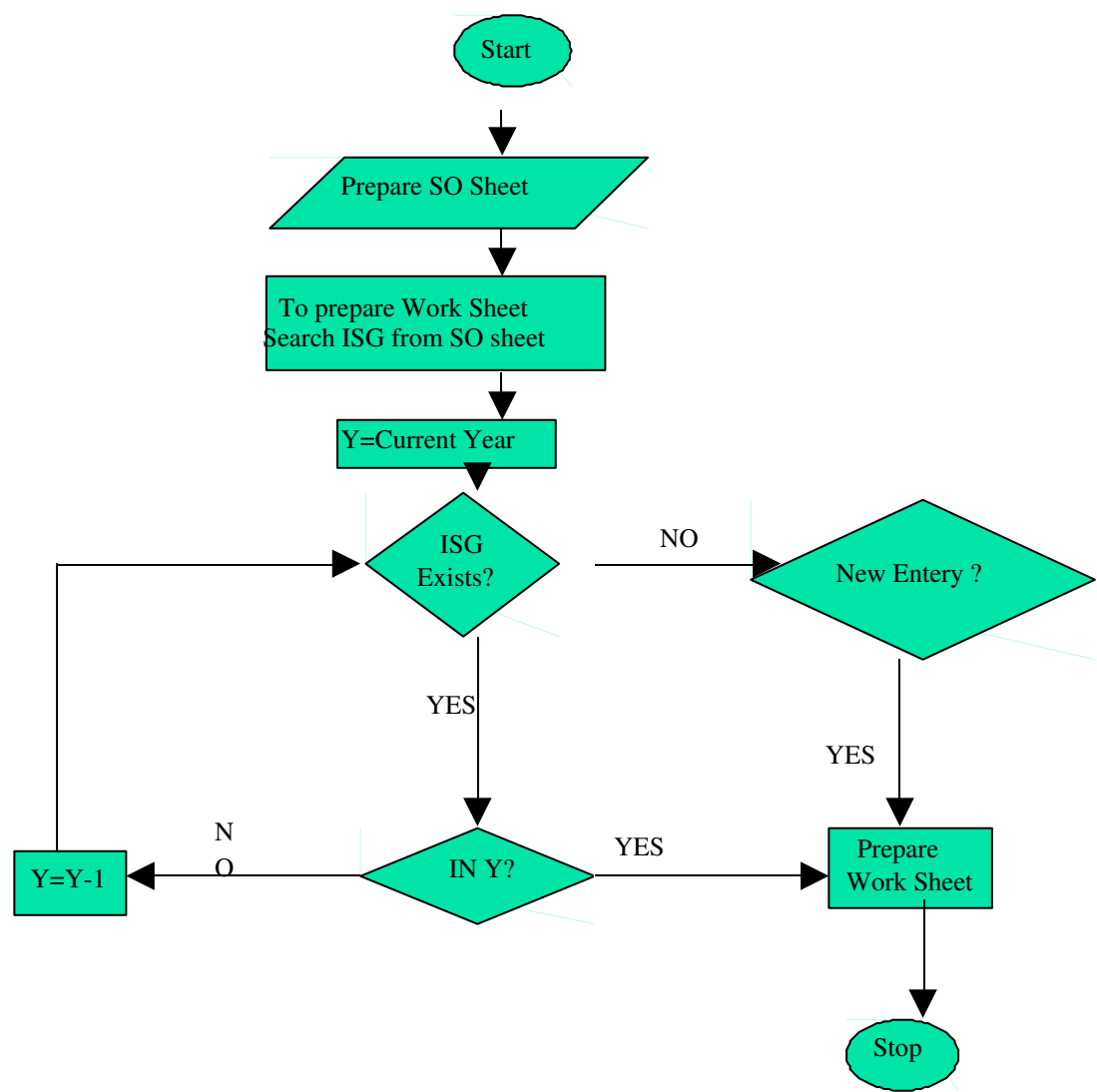
- ® **User friendliness:** The system should be easy to learn and understand so that new user can also use the system effectively, without any difficulty.
- ® **User satisfaction:** The system should meet user expectations.
- ® **Response time:** The response time of all the operations should be low. This can be made possible by careful programming.
- ® **Error handling:** Response to user errors and the undesired situations should be taken care of to ensure that the system operates without halting.
- ® **Safety:** The system should be able to avoid or tackle catastrophic behavior.
- ® **Robustness:** The system should recover from undesired events without human intervention.

DESIGN GOALS

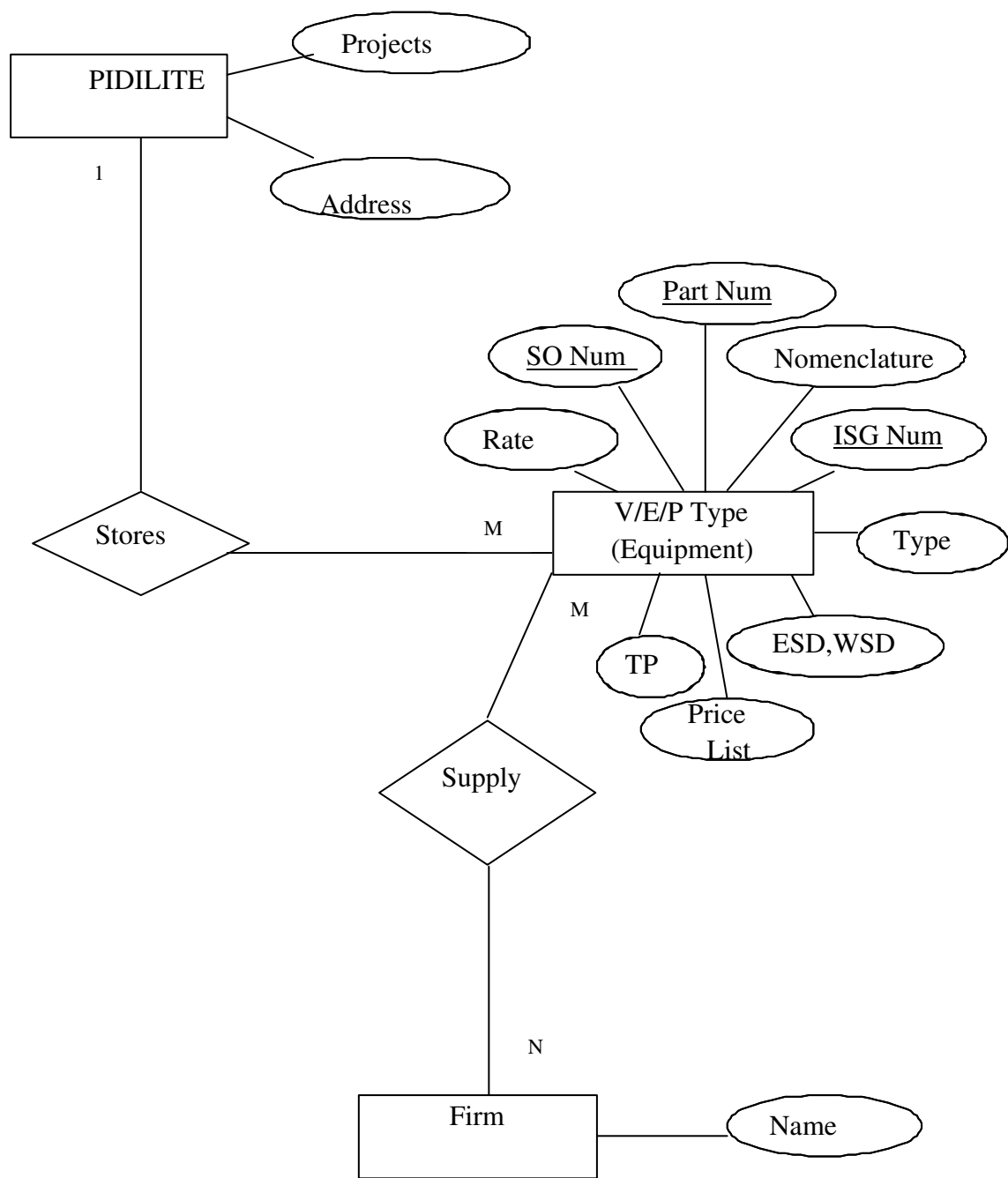
- ® The following goals were kept in mind while designing the system:
- ® Make system user-friendly. This was necessary so that system could be used efficiently and system could act as catalyst in achieving objectives.

- ® Make system compatible i.e. It should fit in the total integrated system. Future maintenance and enhancement must be less. Make the system compatible so that it could integrate other modules of system into itself.
- ® Make the system reliable, understandable and cost-effective.

FUNCTIONAL FLOW OF THE SYSTEM



DATA FLOW DIAGRAM



The Data Flow Diagram shows the flow of data or information. It can be partitioned into single processes or functions. Data Flow Diagrams can be grouped together or decomposed into multiple processes. The DFD is an excellent communication tool for analysts to model processes and functional requirements. Used effectively, it is a useful and easy to understand modeling tool. It has broad application and usability across most software development projects. It is easily integrated with data modeling, workflow modeling tools, and textual specs. Together with these, it provides analysts and developers with solid models and specs. Alone, however, it has limited usability. It is simple and easy to understand by users and can be easily

extended and refined with further specification into a physical version for the design and development teams. The different versions are Context Diagrams (Level 0), Partitioned Diagrams (single process only -- one level), functionally decomposed, and leveled sets of Data Flow Diagrams.

DATA STORE

A repository of information. In the physical model, this represents a file, table, etc.

In the logical model, a data store is an object or entity.

DATA FLOWS

DFDs show the flow of data from external entities into the system, showed how the data moved from one process to another, as well as its logical storage. There are only four symbols:

1. Squares representing external entities, which are sources or destinations of data.
2. Rounded rectangles representing processes, which take data as input, do something to it, and output it.
3. Arrows representing the data flows, which can either, be electronic data or physical items.
4. Open-ended rectangles representing data stores

There are several common modeling rules for creating DFDs:

1. All processes must have at least one data flow in and one data flow out.
2. All processes should modify the incoming data, producing new forms of outgoing data.
3. Each data store must be involved with at least one data flow.
4. Each external entity must be involved with at least one data flow.
5. A data flow must be attached to at least one process.

TECHNOLOGIES USED

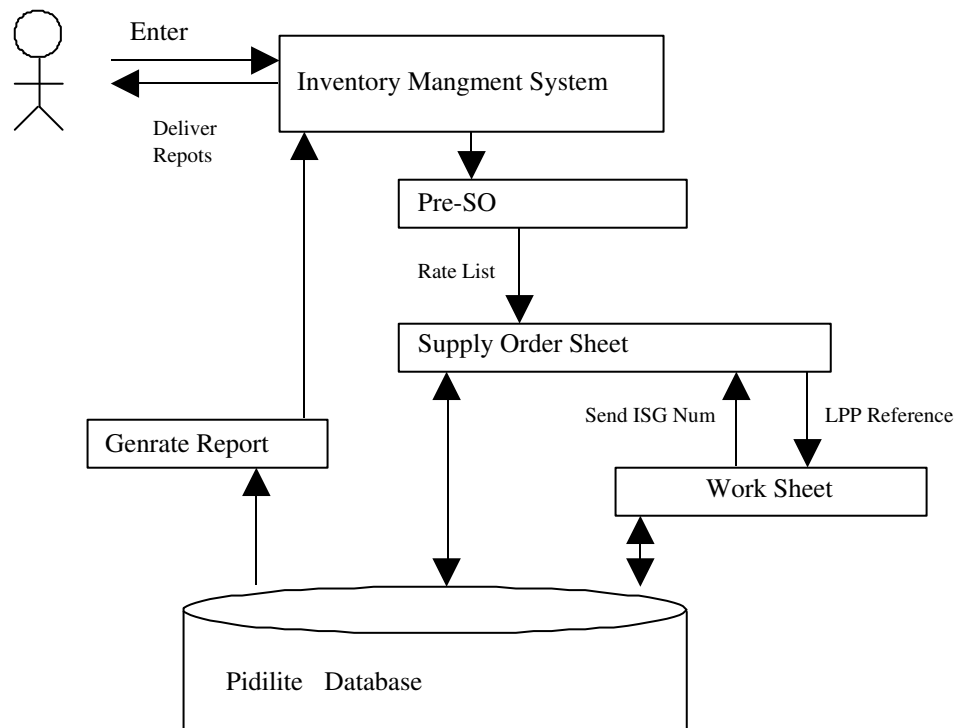
Hardware

Processor : Pentium III Processor
RAM : 256 MB
Hard Disk : 20 GB

Software

- Visual Studio .Net 2003
- Microsoft SQL Server 2000

A Microsoft SQL Server 2000



Benefits:

Post implementation, Pidilite has experienced major benefits within a short period of time.

Second, consolidated MIS reports generation which was earlier quite cumbersome is now completely streamlined. Management can now take informed and accurate decisions based on these reports. The Inventory Management System (IMS) in Pidilite offers effective sales strategies to increase the added value possibilities of your ad space. Ad space will be utilized optimally and the actual offer may differ in

price depending on the inventory availability and may be considered in the banner delivery.

Store Tinting Information Easily - Customers tinting information is stored directly into their customer record. When your customer comes back to purchase more, the information is just a few clicks away. The last sold feature displays this quickly and easily.

Barcode Support - You can count your inventory using our wireless barcode scanner software, either in real time or batched using a barcode inventory data collector.

Real Inventory and 'Virtual Warehouse' Databases - Why clog your main database with items that you might sell. Using our auxiliary database allows you to keep items you may sell out of your main database. When a customer wants you to order it, a few button clicks adds it directly to your main database.

Cost Markup Tables - Some small cost items might have a larger margin than items with a higher cost. Using Windward you can use our price adjustment routine and build a markup table to assign markups based on the cost of an item. Items less than 1.00 markup 300%. Items between 1.01 and 2.00 markup 250%, etc.

Parts and Service - Work Orders are used for work in progress. This can include repairs, but can also include sales where extra work is required before the item is delivered to the customer. The inventory is marked as allocated so that it cannot be sold to someone else, but the invoice is not posted to the general ledger until the actual sale is complete.

Contractor Sales - Support for selling large quantities to one customer, such as sales for an apartment building or hotel chains.

Contract Pricing - Negotiating a special price with a contractor is the reality of large orders. Tracking this manually can be labour intense, consuming any value received from the initial negotiations. With Windward, entering the item, the contractor and the price means the contractor gets that pricing automatically. Having the price expire at the negotiated date happens automatically.

Upselling Accompanying Accessories - When selling pipe, do your sales and service reps know - or remember - to offer the accompanying accessories? Using tag along parts and upsell warning comments can allow your staff to remember to sell accompanying inventory, and increase profits on each transaction!

Document Management by Inventory Item - Installation instructions are often required by your customer and contractors. Using our documents button on an inventory item allows you to associate images, instructions and other resources to be available for printing at the click of a button.

Operational Feasibility of the study

It is mainly related to human organizational and political aspects. The points to be considered are-

- ® What changes will be brought with the system?
- ® What organizational structures are distributed?

® What new skills will be required? Do existing staff members have these skills?

If not, can they be trained in due course of time?

Generally project will not be rejected simply because of operational infeasibility but such considerations are likely to critically affect the nature and scope of the eventual recommendations. This feasibility study is carried out by a small group of people who are familiar with information system techniques, who understand the parts of the business that are relevant to the project and are skilled in system analysis and design process.

OBJECTIVES AND SCOPE OF THE STUDY

=>TO STUDY AND UNDERSTAND AS TO WHAT EXACTLY IS
INVENTORY MANAGEMENT SYSTEM

=>TO STUDY THE OPERATIONAL FEASIBILITY AND UTILITY OF
INVENTORY MANAGEMENT SYSTEM

METHODOLOGY

A Research Methodology defines the purpose of the research, how it proceeds, how to measure progress and what constitute success with respect to the objectives determined for carrying out the research study.

® The appropriate research design formulated is detailed below.

® Exploratory research: this kind of research has the primary objective of development of insights into the problem. It studies the main area where the problem lies and also tries to evaluate some appropriate courses of action.

® The research methodology for the present study has been adopted to reflect these realities and help reach the logical conclusion in an objective and scientific manner.

® The present study contemplated an exploratory research.

DATA COLLECTION

Sources of data: 1) Primary Data which included the input received from directly the officials and employees through questionnaire and interview

Secondary data: 2) Secondary data from the books, journals and internet etc.

Method of collecting data: Questionnaire schedule & Interview method

STATISTICAL TOOL USED

The data will be shown with the help of matrix table and bar diagrams.

PRIMARY DATA ANALYSIS(Bio – Profile of the Respondents):-

1 22 percent of the officials belong to the age group of 35 and 50

2 58 percent of the officials belong to the age group of 25 to 34

3 percent of the officials belong to the age group of above 50

4 69 percent are male officials

5 31 percent are female officials

6 72 percent are graduates and above

7 12 percent are those who are having technical and professional qualifications

8 16 percent are undergraduates.

9 55 percent are those who are associated with the field

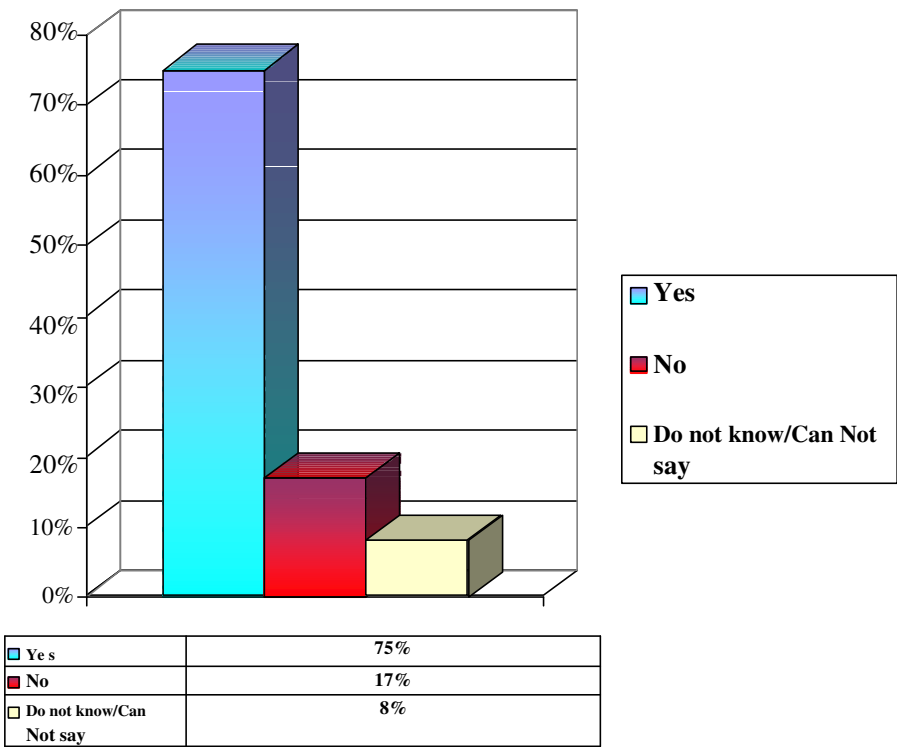
10 25 percent are those who are in the managerial and administrative posts.

11 20 percent belongs to the others category

DATA ANALYSIS

1 Are you aware about Inventory Management System?

- ☐ Yes ----- 75 per cent
- ☐ No ----- 17 per cent
- ☐ Do not know/ Can not say ----- 08 per cent

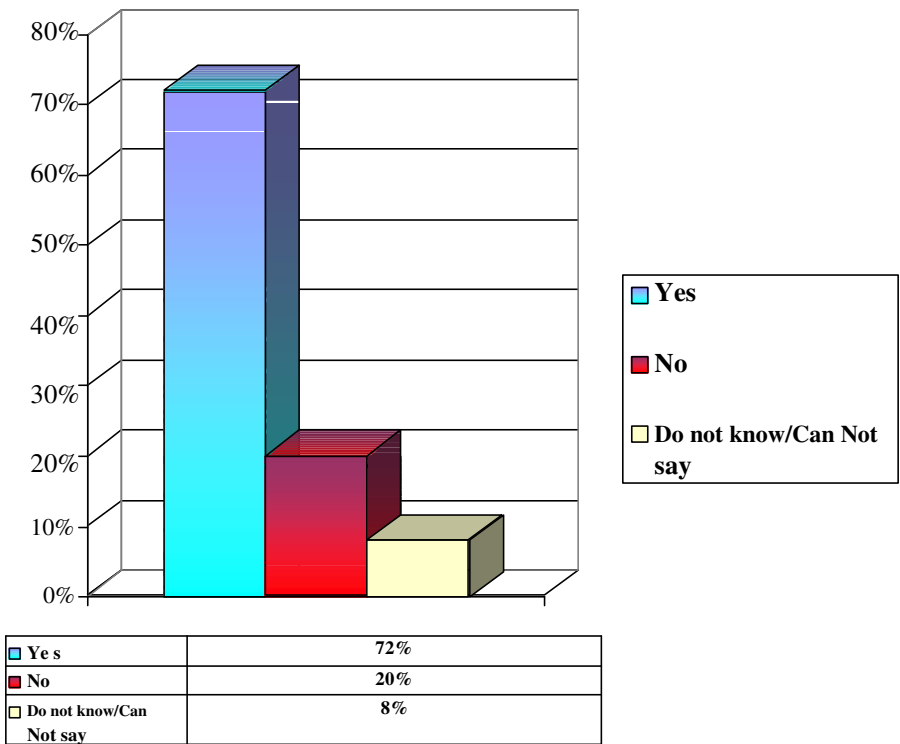


Interpretation:

The awareness level among the company officials regarding the existence, functioning and applicability of inventory management system is high that is 75 per cent, as per the result of the study.

2 Do you know that your company has an inventory management system?

- ☐ Yes ----- 72 per cent
- ☐ No ----- 20 per cent
- ☐ Do not know/ Can not say ----- 08 per cent

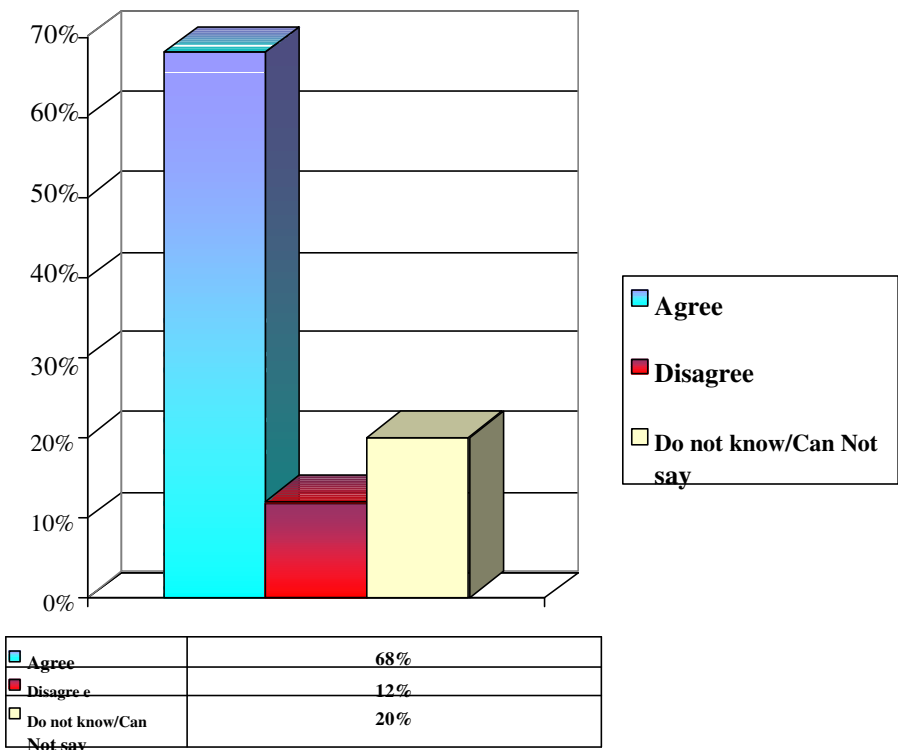


Interpretation:

The company officials are aware about their company having an inventory management system. 72 per cent of the respondents do have this awareness as against 20 per cent+08 per cent of the respondents who are either not aware or not able to provide any information in this regard.

3 Do you agree that there should be an inventory management system in place in any organisation / company?

- ☐ Agree ----- 68 per cent
- ☐ Disagree ----- 12 per cent
- ☐ Do not know/ Can not say ----- 20 per cent

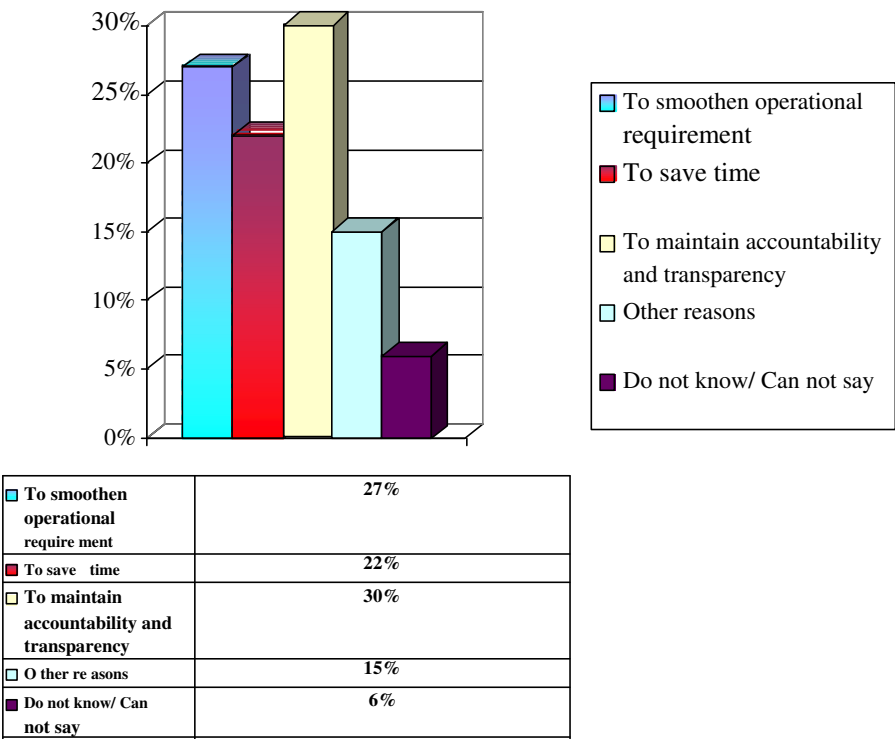


Interpretation:

According to the response to the above question, it appears that every company/organisation should have a system or mechanism in place for managing their inventory.

4 For what reasons do you feel that there should be an inventory management system?

- ☐ To smoothen operational requirement ----- 27 per cent
- ☐ To save time ----- 22 per cent
- ☐ To maintain accountability and transparency -----30 per cent
- ☐ Other reasons ----- 15 per cent
- ☐ Do not know/ Can not say ----- 06 per cent



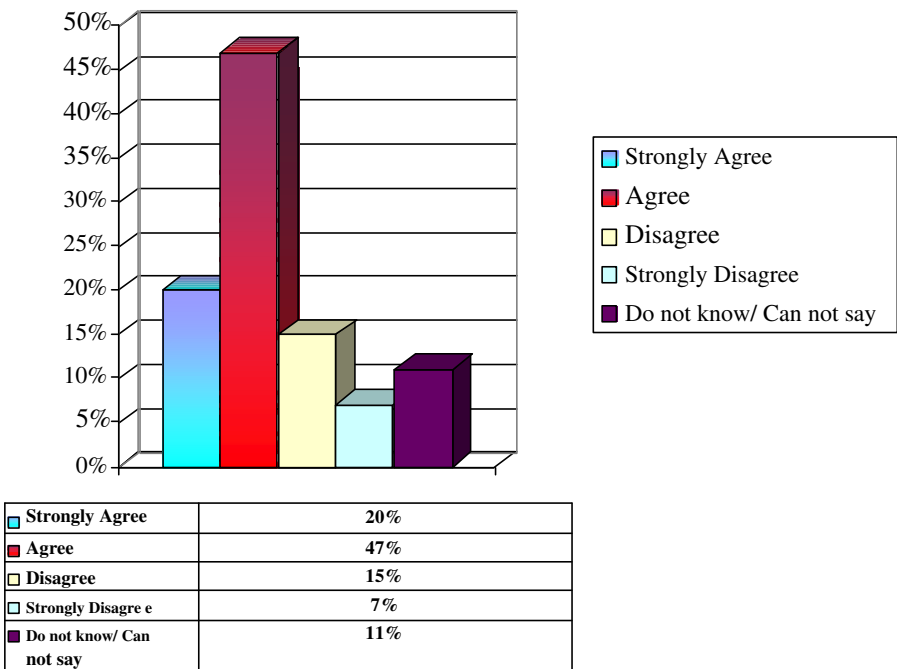
Interpretation:

To everyone’s surprise, 30 per cent of the respondents feel that it is for accoutability and transparency pupose that inventory records are maintained and hence the need

for an inventory management system. This is followed by the need for saving time and the requirement of operational smoothness.

5 Do you agree that the inventory management system in your company has fulfilled the needs for which it was evolved?

- ☐ Strongly Agree ----- 20 per cent
- ☐ Agree ----- 47 per cent
- ☐ Disagree ----- 15 per cent
- ☐ Strongly Disagree ----- 07 per cent
- ☐ Do not know/ Can not say ----- 11 per cent



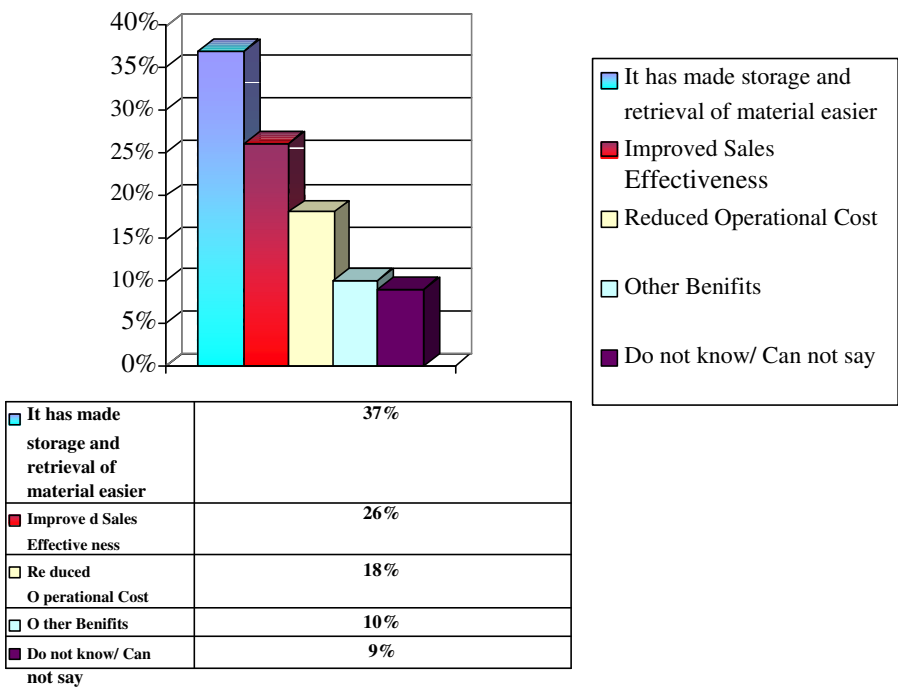
Interpretation:

From the above response, it appears that the inventory management system has more or less achieved its objectives for which it was in place. This is evident from the 67 per cent of the respondents’ opinion who have either agreed or strongly

agreed in favour of this proposition. However the response of 22 per cent of the respondents who think otherwise also speaks something.

6 What according to you is the major benefit of going for an inventory management system by your company?

- ☐ It has made storage and retrieval of material easier ----- 37 per cent
- ☐ Improved Sales Effectiveness ----- 26 per cent
- ☐ Reduced Operational Cost ----- 18 per cent
- ☐ Other Benefits ----- 10 per cent
- ☐ Do not know/ Can not say ----- 09 per cent

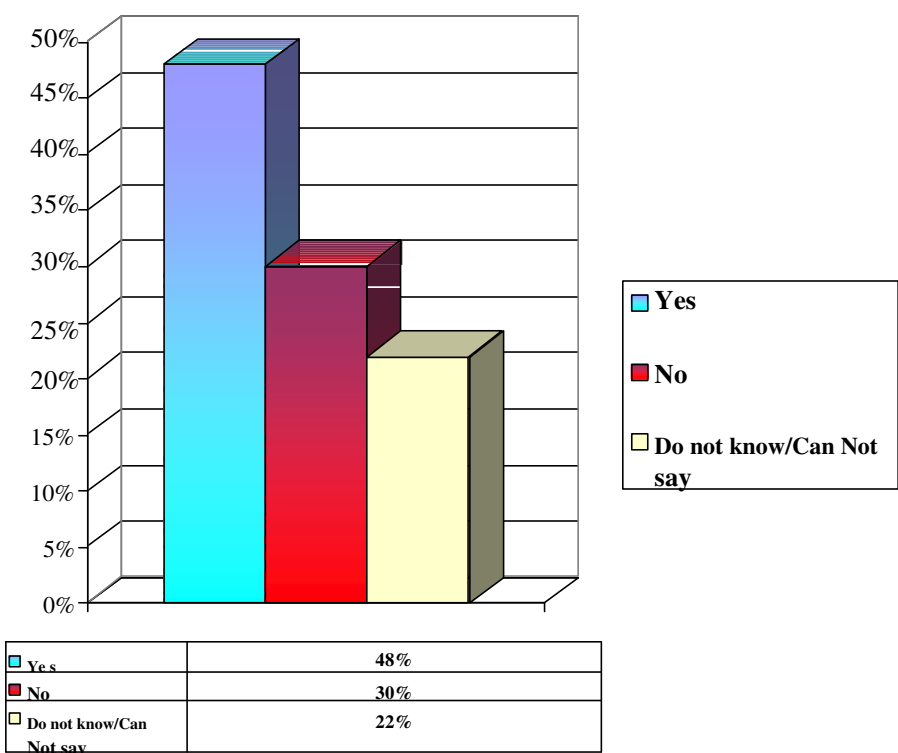


Interpretation:

As regards the benefits of having an inventory management system by the company, the respondents are of the opinion that the major benefit lies in relaxation in terms of storage and retrieval of material. This is followed by increasing sales effectiveness and reduction in operational cost. However, all these benefits are interlinked and the separation between them is more analytical than anything else.

7 Do you have skilled professionals in your company for inventory management?

- ☐ Yes ----- 48 per cent
- ☐ No ----- 30 per cent
- ☐ Do not know/ Can not say ----- 22 per cent

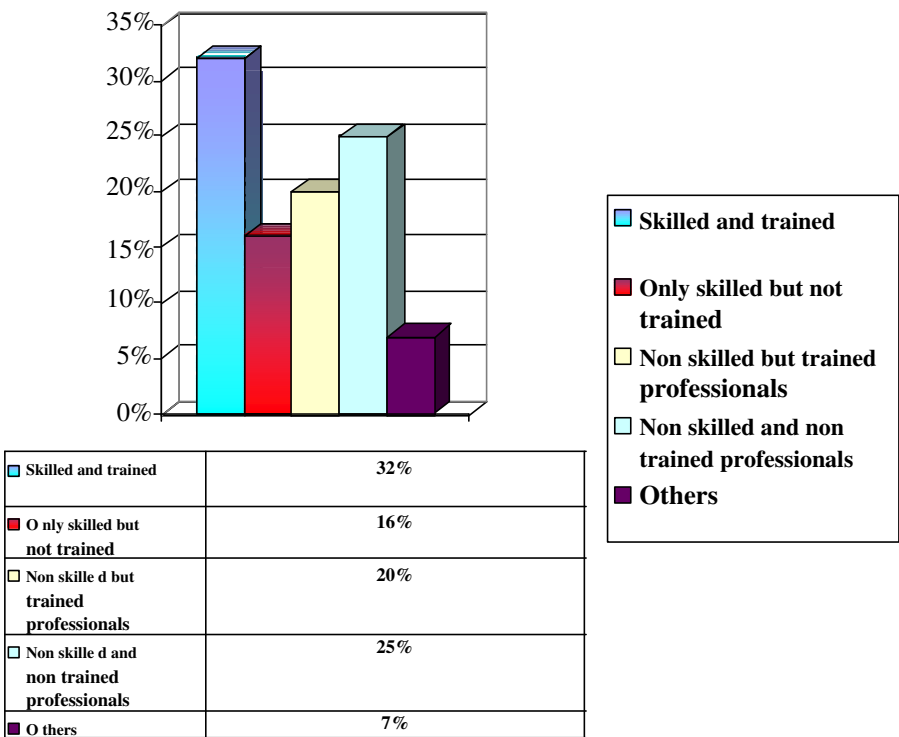


Interpretation:

Recruitment of skilled professionals well versed with latest inventory management technology, particularly in chemicals and paint industry is a concern for the company as it appears that it lacks in this domain.

8. What category of professionals are managing your company inventory?

- ☐ Skilled and trained ----- 32 per cent
- ☐ Only skilled but not trained ----- 16 per cent
- ☐ Non skilled but trained professionals ----- 20 per cent
- ☐ Non skilled and non trained professionals ----- 25 per cent
- ☐ Others ----- 07 per cent

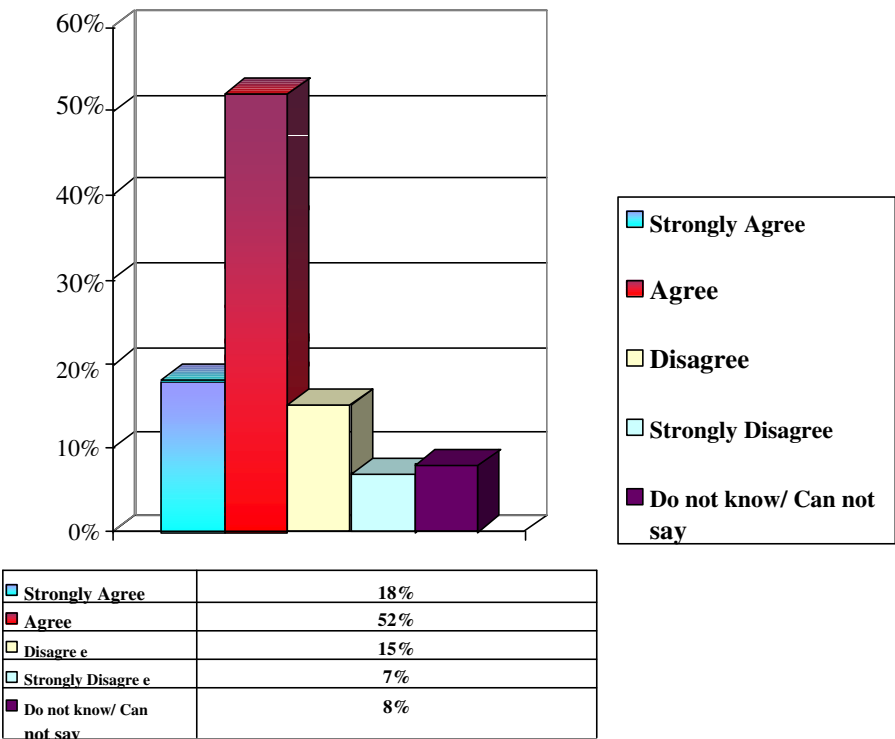


Interpretation:

As already stated above in the earlier question, availability of trained and skilled professionals for inventory management needs serious attention of the company.

9. Do you agree that your company gives more emphasis on software than skilled manpower with regard to inventory management?

- ☐ Strongly Agree ----- 18 per cent
- ☐ Agree ----- 52 per cent
- ☐ Disagree ----- 15 per cent
- ☐ Strongly Disagree ----- 07 per cent
- ☐ Do not know/ Can not say ----- 08 per cent

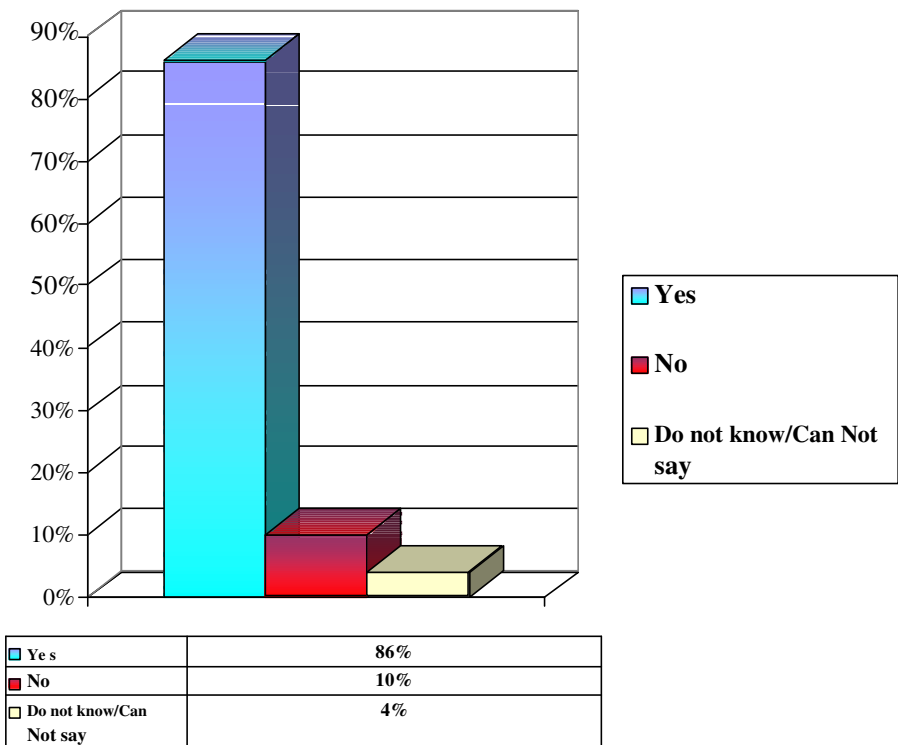


Interpretation:

The above response gives an impression that the company puts greater emphasis on software than skilled manpower for inventory details management.

10. Do you think that the software used by your company is according to the design and needs of the system?

- ☐ Yes ----- 86 per cent
- ☐ No ----- 10 per cent
- ☐ Do not know/ Can not say ----- 04 per cent

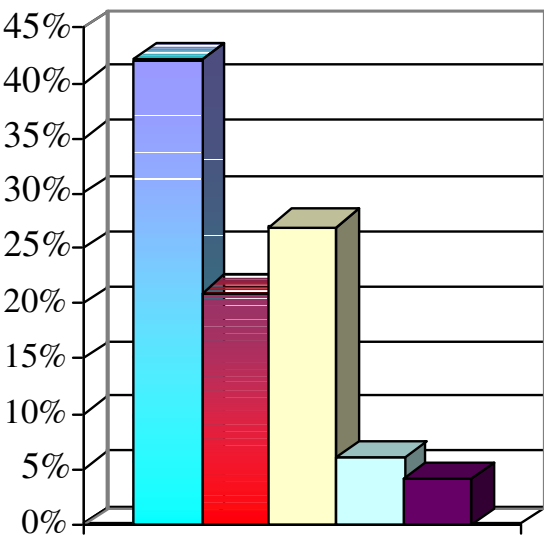


Interpretation:

The company appears to be using the software according to the system requirement and design and according to the customers’ needs.

11. What is the prime challenge before yor company with rehard to inventory management?

- ☐ Lack of trained professionls ----- 42 per cent
- ☐ Maintenance cost ----- 21 per cent
- ☐ Changing requirements of customers ----- 27 per cent
- ☐ Other problems ----- 06 per cent
- ☐ Do not know/ Can not say ----- 04 per cent



☒ Lack of trained professionls

☒ Maintenance cost

☒ Changing requirements of customers

☒ Other problems

☒ Do not know/ Can not say

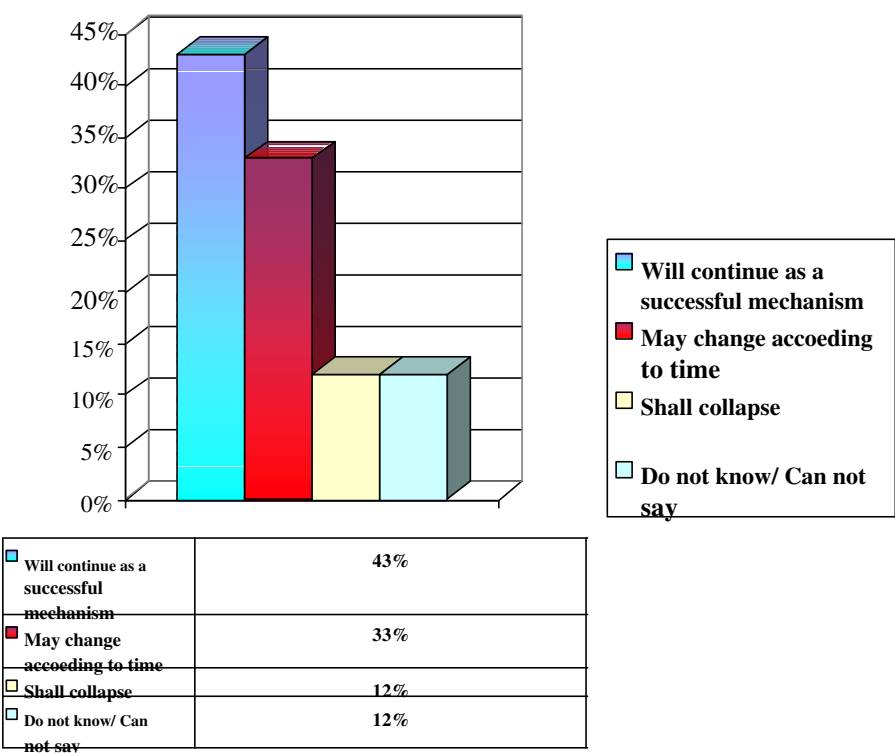
☒ Lack of trained professionls	42%
☒ Maintenance cost	21%
☒ Changing requirements of customers	27%
☒ O ther problems	6%
☒ Do not know/ Can not say	4%

Interpretation:

Lack of availability of trained professionals coupled with maintenance cost and changing needs of the customers are perceived to be the inventory challenges before the company.

12. What is the future of inventory management system in your company?

- ☐ Will continue as a successful mechanism ----- 43 per cent
- ☐ May change accoeding to time ----- 33 per cent
- ☐ Shall collapse ----- 12 per cent
- ☐ Do not know/ Can not say ----- 12 per cent



Interpretation:

The future of inventory management system at Pidilite industries appear to pretty good, going by the response of our study.

CONCLUSION

Inventory is a quantity or store of goods that is held for some purpose or use (the term may also be used as a verb, meaning to take inventory or to count all goods held in inventory). Inaccurate inventory counts can cost you sales and delay shipments past the promise date. Out-of stock items as well as overstocked items in inventory can be devastating to your business. Additionally, an overstated or understated inventory valuation can result in incorrectly reported assets within your financial statements. Inventory Management offers comprehensive reporting capabilities to keep you on top of inventory status. Centralized inventory management consolidates inventory information by tracking lot numbers, on-hand levels and expiration dates, making the re-ordering process more efficient. It also enables simultaneous tracking and documenting supplies during studies to reduce redundant data entry and increase workflow efficiency.

The biggest challenge Pidilite had to deal with was managing simultaneous implementation across global locations. While the company put together a competent internal team, they realized that not many members had first hand experience working at these locations nor did they have an understanding of the local systems in place. Pidilite looked for a solution that was universal yet locally adaptable. They evaluated a few options before deciding on SAP Business One. Pidilite felt that SAP provided them the much needed adaptability and flexibility. SAP also inherently possessed control and check features for management control which was important for Pidilite, considering their widespread offices and future global expansion plans. Also, SAP was web-enabled, had the necessary reporting

capabilities and had local product support at all the locations considered for implementation.

WHAT CONTRIBUTION WOULD THE PROJECT MAKE ?

At the feasibility stage it is desirable that two or three different configurations will be pursued that satisfy the key technical requirements but which represent different levels of ambitions and cost. Investigation of these technical alternatives can be aided by approaching a range of suppliers for preliminary discussions. Out of all types of feasibility, technical feasibility generally is the most difficult to determine.

It may be humbly submitted that the thesis shall be useful for further reserach as well as for the related industry for understanding an effective inventory management system.

ANNEXURER

QUESTIONNAIRE

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