NEAR EAST UNIVERSITY

FACULTY OF ECONOMICS AND ADMINISTRATIVE SCIENCES

INVENTORY MANAGEMENT

AND THE CASE OF EKTAM LTD IN TRNC

GRADUATION PROJECT

SUBMITTED TO : ALİ MALEK

SUBMITTED BY : TAMER YURTTAŞ

NUMBER : 980791

SEPTEMBER 2004

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ACKNOWLEDGEMENT

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ABSTRACT

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In 1981 the Pepsi Cola company was established under the "Ektam Kıbrıs Ltd." in a partnership with one of the biggest production companies in Turkey which is called "Tamek Holding A.Ş." with local partners Şemsi Kazım.

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INVENTORY MANAGEMENT AND EKTAM

I. INTRODUCTION

Inventory management is the planning, organizing, and controlling of the flow of inventories, from their initial purchase through internal operations to the distribution of finished goods.[1] Major concerns of inventory management are

(1) purchasing,

(2) transportation (incoming and outgoing),

(3) control through production and inventory management (includes receiving, storage, shipping, inventories handling, and inventory counting), and

(4) warehousing and distribution.

Inventory management is not always a clear and distinctive activity. And not all organizations have a formally designated "inventories manager." In those firms that do, the manager may have responsibility for the flow of inventories through the entire organization. He or she must then ensure that the right inventories are available at the right time and in the right place. This means avoiding an excess of inventories that would tie up unnecessary funds (and space) while at the same time precluding shortages that might cause a halt to production. By coordinating the interests of production, financial, and marketing managers, a inventories manager can make the best use of the organization's investment in inventories.

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II. WHAT IS INVENTORY MANAGEMENT

Inventory management is a neglected area of management in the local companies. In the western developed economies the inventory management is one of the most important management tasks especially at the manufacturing

businesses.[2] Most of the organizations in these countries employ a specialist manager as the vice-general manager who deals in inventory management. The inventory manager must have very good contacts with all the managers at all level. He or she needs good communication with the operational managers who are actually at the production floor. They are the people who are managing the manufacturing and they now the stock levels better than anybody else. the inventory manager should also have good relation with the top managers since these are the people who are making strategic decisions, and their decision effects the buying and stocking of the inventories.[3]

Successful inventory management means that the company buys and keeps minimum of raw materials but never runs out. As will be explained, it is not good to have excessive and unnecessary stocks of raw material since this would mean the waste of resources and also waste of area that can be used for better reasons. It is also very bad to run out of raw materials, since running out will mean loss of production time and unnecessary extra cost per unit of product.

One of the better known inventory management systems is the Just-in-time (JIT) manufacturing is used as a process towards eliminating waste to improve productivity and product quality. Just-In-Time (JIT) is an operational and managerial system developed to eliminate waste in non-value added operations by minimising inventory in the supply chain, and involving employees and suppliers in the operational strategy.

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The managerial system developed by the Japanese emphasizes organizational values, long-term strategic goals and employment, two way communication (top down and bottom up), commitment, loyalty, and understanding of the systems implemented into the manufacturing process. This management style has shown success in the areas of production and product quality.

The philosophy of JIT production is that each stage of manufacturing will be completed just in time for the next process (for example, purchasing materials just in time to be transformed into fabricated parts, finishing these fabricated parts just in time to go into subassemblies, and so on until the product is sold) and that the minimal amount of workers, equipment and materials are used in these processes. The process of frequently moving small quantities to meet immediate demands has become very effective and efficient.[4]

III. DEPENDENT AND INDEPENDENT DEMAND

Someone must decide how much to order and when a material is required. The "how much" question is largely a function of costs, and the inquiry here will extend to the concept of an economic order quantity. The "when to order" question is a function of the firm's forecast or scheduled requirements. If the item is a finished product and has a demand that is "independent" of the demand for other items, an order point (or reorder point) technique can help to answer the question.

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On the other hand, most items brought into inventory in manufacturing firms are components or subassemblies of finished products. Their demand is "dependent" upon the finished-product demand, and although the finished-product demand may be uncertain, the requirements for components vis-à-vis other components are fixed by design. There is no need to consider each component as an entity with independent demand characteristics-in fact, it is better not to do so.[5]

Dependent demand inventory consists of the raw materials, components, and subassemblies that are used in the production of parent or end items. For example, the demand for computer keyboards depends on the demand for the parent item, computers. Manufacturing inventory is largely dependent and predictable.

Independent demand inventory consists of the finished products, service parts, and other items whose demand arises more directly from the uncertain market environment. Thus, distribution inventories often have an independent and highly uncertain demand. Dependent demands can often be calculated, whereas independent demands usually require some kind of forecasting.

Production schedule is a determining factor in purchasing. Materials manager must know the plans of the production management. The production strategy may vary from time to time. there are rarely any manufacturing organization that manufacture the same quantities all the year round. There are variations due to the season and the marketing conditions. So the materials manager must be very knowledgeable about the production targets, to provide the necessary materials for production.

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1. wholesale and retail merchandise;
2. service industry inventory, such as medical supplies for hospitals, stamps and mailing labels for post offices, and office supplies for law firms;
3. end-item and replacement part inventories at manufacturing firms; and
4. maintenance, repair, and operating (MRO) supplies at manufacturing firms-that is, items that do not become part of the final product, such as employee uniforms, fuel, paint, and machine repair parts.

Managing independent demand inventory can be tricky because demand is influenced by external factors. For example, the owner of a bookstore may not be sure how many copies of the latest best-seller customers will purchase during the coming month. As a result, she may decide to stock extra copies as a safeguard. We will focus on independent demand, which is the type of demand the bookstore owner and most of the retailers face. Even though demand from any one customer is difficult to predict, low demand from some customers often is offset by high demand from others. Thus total demand for any independent demand item may

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follow a relatively smooth pattern, with some random fluctuations. Dependent demand items are those required as components or inputs to a product or service.

V. INVENTORY RECORDS

Information on the amount of on-hand inventory and scheduled receipts is needed for both inventory management and accounting purposes. A scheduled receipt, often called an open order, is an order that has been placed but not yet received. Sometimes only periodic checks are made, as when a facility is shut down once a year for several days to count all inventory. At the other extreme are perpetual inventory records, in which a transaction report is made for each withdrawal and receipt. In manual systems, this information is posted to some type of written record. In computerized systems, this information is maintained on disk or tape. Whether manual or computerized, records are updated the same way. For example, if an open order of 300 units is received, an inventory transaction must be made to increase on-hand inventory by that amount and to delete the 300-unit scheduled receipt from the record.[7]

Computerized systems often are coupled with automated identification procedures, such as bar coding. A bar code is a pattern of wide and narrow black bands and alternating white spaces printed directly on the product or on an attached label. A computer, with the aid of an optical scanner or wand, reads the pattern and automatically records the price and updates inventory records.

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5.1. ECONOMIC ORDER QUANTITY

Managers face conflicting pressures to keep inventories low enough to avoid excess inventory holding costs, but high enough to reduce the frequency of orders and setups. For example, a policy of replenishing inventory only every five months keeps ordering and setup costs low but raises the level of inventories and

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[8] Hilton, Ronald W., *Managerial Accounting*. McGraw-Hill,Inc (1994)

holding costs. A good starting point for balancing these conflicting pressures is finding the economic order quantity (EOQ), which is the lot size that minimizes total annual inventory holding and ordering costs.[9]

The approach to determining the EOQ is based on the following assumptions.

1. The demand rate for the item is constant (e.g., always 10 units per day) and known with certainty.
2. The item is produced or purchased in lots, and a complete order for the item is received at once, rather than piecemeal. There are no constraints on the size of each lot, such as truck capacity or materials handling limitations.
3. The only two relevant costs are the inventory holding cost and the fixed cost per lot for ordering or setup.
4. Decisions for one item can be made independently of decisions for other items. For example, there is no advantage in combining several orders going to the same supplier.
5. There is no uncertainty in lead time or supply. Like the demand, the lead time is constant (e.g., always 14 days) and known with certainty. The amount received is exactly what was ordered.

The economic order quantity will be optimal when the five assumptions are satisfied. In reality, few situations are so simple and well-behaved. In fact, different lot-sizing approaches are needed to reflect quantity discounts, uneven demand rates, or interactions between items. We introduce some of these approaches in Supplement H, but the EOQ often is a reasonable first

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[9] Hilton, Ronald W., *Managerial Accounting*. McGraw-Hill,Inc (1994). p. 407

approximation of average lot sizes, even when several of the assumptions don't quite apply.

5.2 Just In Time inventory

The just-in-time inventory control system was originally pioneered in Japan but has recently become a very popular control system in the United States. JIT is simply an inventory control system that schedules materials to arrive and leave, as they are needed. JIT inventory control systems are sometimes referred to as zero inventory systems, stockless systems or Kanaban systems. Actually, JIT is a philosophy used to ensure that the right items arrive and leave, as they are needed. Traditionally, incoming raw materials were ordered in very large shipments and were then stored in warehouses until they were needed for production or for providing a service. Under the JIT system, organizations make frequent smaller orders of raw materials.[10] This enables a firm to save money on storage cost and the expenses associated with it. One of the basic objectives of the JIT philosophy is to eliminate waste. In this light waste is "anything other than the minimum amount of equipment, materials, parts, space, and workers' time which are absolutely essential to add value to the product or service." (Rue & Byers, 2000) JIT also applies to the production of subassemblies or final products. The idea behind this approach is not to produce an item or a subassembly until is needed for shipment to the customer. JIT utilizes a demand pull system because items are produced or ordered only when they are needed (or pulled) by the next stage in

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[10] Rue, Leslie and Byars, Lloyd. Management Skills and Appilcations. 9th Edition, 2000.

the production process. Many American companies have successfully implemented JIT, including Hewlett-Packard, Motorola, Black & Decker, General Motors, Ford, Chrysler, General Electric, Goodyear, and IBM.[11]

JIT can benefit manufacturing but it also can benefit wholesalers like EKTAM. By tailoring JIT principles to meet their needs, wholesalers can take advantage of business opportunities. It is key for the organization to examine the benefits and the costs before making a change. There are several benefits that an organization could achieve with the adoption of a JIT inventory control system.[12]

- JIT could possible lead to business growth without relying on the traditional massive sales drives. JIT advocates a closer relationship between customers and suppliers. Instead of the traditional biding war that can occur between vendors JIT's philosophy promotes relying on fewer vendors for more business.
- JIT also enables inventory to move more efficiently. JIT can provide an efficient method of locating, pulling and moving merchandise into the warehouse. By updating the electronic data interchange (EDI) or another type of bar coding system it could possibly enable the wholesaling firm to produce other benefits. JIT enables the firm to have an accurate count on inventory on hand and can also signal to employees when an item needs to be reordered.
- Even though JIT focuses on keeping a minimal inventory, inventory turnover actually increases.

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[11] Rue, Leslie and Byars, Lloyd. Management Skills and Appilcations. 9th Edition, 2000.

[12] http://www.axptbs.com/pubs/whole/oct98/explore.htm

- JIT also provides an attraction to prospective customers. Being able to offer an efficient JIT service to customers attracts new customers and strengthens relationships with existing customers. With JIT becoming more and more popular among manufacturers it could prove to be necessary for a wholesaler to offer JIT services to remain competitive

Along with these benefits come some potential issues

- Although improved warehouse efficiently is considered a benefit of the JIT system, it could possibly require substantial capital increase. With JIT comes additional costs such as storing and tracking inventory, more warehouse space, or the implementation of new ways to streamline warehouse efficiency. It is necessary for a firm to weigh the costs and benefits of the JIT inventory control system before implementing such a program. It could turn out that such a system would not benefit the firm's financial success.
- The JIT inventory control system may also require a significant upgrade in existing computer systems. This could prove to be quite costly to an organization and could prove to be the deciding factor in adopting or denying a JIT inventory control system.
- Since the firm will be required to send out more shipments, the firm will be required to purchase more inventories. This increase in inventory can create a cash flow problem.

Manufacturing such as EKTAM firms can experience many benefits from the introduction of the JIT inventory control system. JIT enables firms to produce better quality products, a higher inventory turnover, higher productivity and lowers production costs. JIT accomplishes these benefits by using three fundamental concepts:

1. Eliminating waste. JIT accomplishes this by producing only the minimum necessary units in the smallest possible quantities at the latest possible time.
2. Employee participation. Employees are encouraged to offer suggestions for improving the current situation. By empowering employees to help make decisions in their organization they take ownership of the organizations goals. Employee empowerment is a very strong tool for organizations to utilize. Employee's who are involved in the corporation and take ownership of the company's goals could prove to be the firm's most valuable asset.
3. Integrated systems. In a JIT inventory control system each and every workstation depends on the previous workstation to produce the final product. With this new dependence on an integrated system, one can see how important each and every workstation in the JIT environment becomes. It's important for each and every workstation to produce at a constant production rate. If for some reason Workstation A has an extended shutdown period then Workstation B, C, and D will be adversely effected.

Of these concepts, elimination of waste could prove to be the key in the successful implementation of a JIT inventory control system. There are seven key factors that can be utilized to successfully eliminate waste:[13]

1. JIT relies on a focused factory. The plants in JIT are normally smaller specialized plants that make parts for a single major manufacturer. This enables a JIT factory to concentrate on what they do best, refine the production process and make the necessary changes to be more efficient and reduce waste.
2. The facility layouts can also help to eliminate waste. With JIT all parts with similar operations are produced in the same manufacturing cell, this enables the firm to eliminate waiting and moving times and also reduces the risk of damaged goods.
3. JIT focuses on "quality is built-in, not inspected-in." In other words, employees are responsible for their own work and thus takes more pride in a job well done. Employees are also given the power of being able to stop the assembly line if something goes wrong. Saturn Corporation spent millions of dollars on television ads that publicized this fact; "any employee can stop the assembly line for quality issues." Manufacturing facilities also install automated inspection devices wherever they deem appropriate.
4. JIT eliminates the inventory being the "root of all evils" philosophy that normally goes hand and hand with inventory control. JIT accomplishes this by maintaining minimum inventory levels and smaller lot sizes and

[13] http://www.usd.edu/~rlau/jit.htm

makes no exception for contingency. JIT requires that all levels of the organization stick to the schedule assigned to them.

5. JIT also produces a level production schedule. The firm's production plan with the specified output rate is frozen for the near future. Companies who adopt a JIT inventory control system produce the same mix of products everyday no matter how large the quantities of the items are.
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A JIT inventory control system will only be successful with a full circle of inventory control. It is key for a firm to understand the dynamics of ordering & receiving multiple shipments and to buy in to JIT fully.[14]

[14] http://www.mintsys.com/justintime.htm

Other ideas of inventory control have evolved from the evolution of JIT. One such system developed by John Constanza revolves around similar ideals. Constanza is the father of demand-flow manufacturing. Demand flow manufacturing does away with schedules and forecasts, inventories of finished goods and the warehouses in which the goods were stored. Demand-flow manufacturing substitutes raw in progress goods, in which a cushion of varied materials, are constantly kept on hand to meet the customers changing demands. Under demand-flow manufacturing, goods move directly from the assembly line into waiting trucks to be delivered to the customers. Sometimes the results can be unbelievable, American Standard saved $500 million in working capital during the first year it started using demand flow technology.[15]

VI. CASE OF EKTAM

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At the beginning the company started to produce 25 ml bottle, this bottle was called return bottle. By the year 1985 the company started to use a new technology. In the continuing two years the company has made an investment of around 20,000,000 USD for it's technology to build and improve its production.

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[15] http://www.library.northernlight.com/lh20000327030000012.html?cb=13&sc=0

NEAR EAST UNIVERSITY

FACULTY OF ECONOMICS AND ADMINISTRATIVE SCIENCES

INVENTORY MANAGEMENT

AND THE CASE OF EKTAM LTD IN TRNC

GRADUATION PROJECT

SUBMITTED TO : ALİ MALEK

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NUMBER : 980791

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ABSTRACT

Inventory management is the planning, organizing, and controlling of the flow of inventories, from their initial purchase through internal operations to the distribution of finished goods.

The EKTAM company is a local canning company in TRNC who produces Pepsi Colas and some other beverages that are sold throughout the country. Our study will aim to look into the inventory management system of EKTAM and try to identify whether they are using any management technology regarding the inventories. The nature of business of EKTAM is seasonal. There are variations in consumption of the EKTAM products during each year. The main variation is due to climate and temperature. The consumption increases as the temperature rises.

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INVENTORY MANAGEMENT AND EKTAM

I. INTRODUCTION

Inventory management is the planning, organizing, and controlling of the flow of inventories, from their initial purchase through internal operations to the distribution of finished goods.[1] Major concerns of inventory management are

(1) purchasing,

(2) transportation (incoming and outgoing),

(3) control through production and inventory management (includes receiving, storage, shipping, inventories handling, and inventory counting), and

(4) warehousing and distribution.

Inventory management is not always a clear and distinctive activity. And not all organizations have a formally designated "inventories manager." In those firms that do, the manager may have responsibility for the flow of inventories through the entire organization. He or she must then ensure that the right inventories are available at the right time and in the right place. This means avoiding an excess of inventories that would tie up unnecessary funds (and space) while at the same time precluding shortages that might cause a halt to production. By coordinating the interests of production, financial, and marketing managers, a inventories manager can make the best use of the organization's investment in inventories.

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[1] JAMES H. GREENE, Production and Inventory Control, rev. ed. (1974)

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Inventory management is an important issue for the EKTAM company since they are in beverage business. This business has a certain characteristics of its own. While inventory management for a normal business is a matter of raw materials purchased and the number produced, and the cost of space to stock them, there is an additional aspect such as the distribution. The beverages are distributed with large lorries. Excessive loading of the lorries means higher fuel cost. If at the end of the day the whole load is not sold the load will have to be unloaded and reloaded again. There can be damages to the beverages during transportation. Many gassed drink become useless from shaking during the transportation. Therefore the lorries need to be adequately loaded not too many to bring back unsold and not too little to run out and leave customers without drinks.

II. WHAT IS INVENTORY MANAGEMENT

Inventory management is a neglected area of management in the local companies. In the western developed economies the inventory management is one of the most important management tasks especially at the manufacturing

businesses.[2] Most of the organizations in these countries employ a specialist manager as the vice-general manager who deals in inventory management. The inventory manager must have very good contacts with all the managers at all level. He or she needs good communication with the operational managers who are actually at the production floor. They are the people who are managing the manufacturing and they now the stock levels better than anybody else. the inventory manager should also have good relation with the top managers since these are the people who are making strategic decisions, and their decision effects the buying and stocking of the inventories.[3]

Successful inventory management means that the company buys and keeps minimum of raw materials but never runs out. As will be explained, it is not good to have excessive and unnecessary stocks of raw material since this would mean the waste of resources and also waste of area that can be used for better reasons. It is also very bad to run out of raw materials, since running out will mean loss of production time and unnecessary extra cost per unit of product.

One of the better known inventory management systems is the Just-in-time (JIT) manufacturing is used as a process towards eliminating waste to improve productivity and product quality. Just-In-Time (JIT) is an operational and managerial system developed to eliminate waste in non-value added operations by minimising inventory in the supply chain, and involving employees and suppliers in the operational strategy.

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[2] Hill T, *Production/Operations Management*, Prentice Hall, 1991
[3] MARTIN K. STARR and DAVID W. MILLER, Inventory Control: Theory and Practice (1982)

The managerial system developed by the Japanese emphasizes organizational values, long-term strategic goals and employment, two way communication (top down and bottom up), commitment, loyalty, and understanding of the systems implemented into the manufacturing process. This management style has shown success in the areas of production and product quality.

The philosophy of JIT production is that each stage of manufacturing will be completed just in time for the next process (for example, purchasing materials just in time to be transformed into fabricated parts, finishing these fabricated parts just in time to go into subassemblies, and so on until the product is sold) and that the minimal amount of workers, equipment and materials are used in these processes. The process of frequently moving small quantities to meet immediate demands has become very effective and efficient.[4]

III. DEPENDENT AND INDEPENDENT DEMAND

Someone must decide how much to order and when a material is required. The "how much" question is largely a function of costs, and the inquiry here will extend to the concept of an economic order quantity. The "when to order" question is a function of the firm's forecast or scheduled requirements. If the item is a finished product and has a demand that is "independent" of the demand for other items, an order point (or reorder point) technique can help to answer the question.

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[4] ELWOOD S. BUFFA and JEFFREY G. MILLER,
Production-Inventory Systems: Planning and Control, 3rd ed. (1979)

On the other hand, most items brought into inventory in manufacturing firms are components or subassemblies of finished products. Their demand is "dependent" upon the finished-product demand, and although the finished-product demand may be uncertain, the requirements for components vis-à-vis other components are fixed by design. There is no need to consider each component as an entity with independent demand characteristics-in fact, it is better not to do so.[5]

Dependent demand inventory consists of the raw materials, components, and subassemblies that are used in the production of parent or end items. For example, the demand for computer keyboards depends on the demand for the parent item, computers. Manufacturing inventory is largely dependent and predictable.

Independent demand inventory consists of the finished products, service parts, and other items whose demand arises more directly from the uncertain market environment. Thus, distribution inventories often have an independent and highly uncertain demand. Dependent demands can often be calculated, whereas independent demands usually require some kind of forecasting.

Production schedule is a determining factor in purchasing. Materials manager must know the plans of the production management. The production strategy may vary from time to time. there are rarely any manufacturing organization that manufacture the same quantities all the year round. There are variations due to the season and the marketing conditions. So the materials manager must be very knowledgeable about the production targets, to provide the necessary materials for production.

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[5] Samuelson Mar, Managerial Economics, Second Edition, The Dryden press,1995

IV TYPES OF INVENTORY

An important distinction between types of inventory is whether an item is subject to dependent or independent demand. Retailers must manage independent demand items-that is, items for which demand is influenced by market conditions and is not related to production decisions for any other item held in stock. Independent demand inventory includes four categories:[6]

1. wholesale and retail merchandise;
2. service industry inventory, such as medical supplies for hospitals, stamps and mailing labels for post offices, and office supplies for law firms;
3. end-item and replacement part inventories at manufacturing firms; and
4. maintenance, repair, and operating (MRO) supplies at manufacturing firms-that is, items that do not become part of the final product, such as employee uniforms, fuel, paint, and machine repair parts.

Managing independent demand inventory can be tricky because demand is influenced by external factors. For example, the owner of a bookstore may not be sure how many copies of the latest best-seller customers will purchase during the coming month. As a result, she may decide to stock extra copies as a safeguard. We will focus on independent demand, which is the type of demand the bookstore owner and most of the retailers face. Even though demand from any one customer is difficult to predict, low demand from some customers often is offset by high demand from others. Thus total demand for any independent demand item may

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[6] http://hyperserver.engrg.uwo.ca/es492b/Lectures/Lect12/tsld004.htm

follow a relatively smooth pattern, with some random fluctuations. Dependent demand items are those required as components or inputs to a product or service.

V. INVENTORY RECORDS

Information on the amount of on-hand inventory and scheduled receipts is needed for both inventory management and accounting purposes. A scheduled receipt, often called an open order, is an order that has been placed but not yet received. Sometimes only periodic checks are made, as when a facility is shut down once a year for several days to count all inventory. At the other extreme are perpetual inventory records, in which a transaction report is made for each withdrawal and receipt. In manual systems, this information is posted to some type of written record. In computerized systems, this information is maintained on disk or tape. Whether manual or computerized, records are updated the same way. For example, if an open order of 300 units is received, an inventory transaction must be made to increase on-hand inventory by that amount and to delete the 300-unit scheduled receipt from the record.[7]

Computerized systems often are coupled with automated identification procedures, such as bar coding. A bar code is a pattern of wide and narrow black bands and alternating white spaces printed directly on the product or on an attached label. A computer, with the aid of an optical scanner or wand, reads the pattern and automatically records the price and updates inventory records.

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[7] Hilton, Ronald W., *Managerial Accounting*. McGraw-Hill,Inc (1994). p.13-14

One method of tracking inventory is to assign responsibility to specific employees for issuing and receiving materials and accurately reporting each transaction. A second method is to secure inventory behind locked doors or gates to prevent unauthorized or unreported withdrawals. This method also guards against storing new receipts in the wrong locations, where they can be lost for months. Cycle counting is a third method, whereby storeroom personnel physically count a small percentage of the total number of items each day, correcting errors they find. Class A items are counted most frequently. A final method, for computerized systems, is to make logic error checks on each transaction reported and fully investigate discrepancies. Examples of discrepancies are (1) actual receipts when there is no record of scheduled receipts, (2) disbursements that exceed the current on-hand balance, and (3) receipts with an inaccurate (nonexistent) part number. These four methods can keep inventory record accuracy within acceptable bounds. Accuracy pays off mainly through better customer service, although some inventory reductions can be achieved by improving accuracy. A side benefit is that auditors may not require end-of-year counts if records prove to be sufficiently accurate.[8]

5.1. ECONOMIC ORDER QUANTITY

Managers face conflicting pressures to keep inventories low enough to avoid excess inventory holding costs, but high enough to reduce the frequency of orders and setups. For example, a policy of replenishing inventory only every five months keeps ordering and setup costs low but raises the level of inventories and

[8] Hilton, Ronald W., *Managerial Accounting*. McGraw-Hill,Inc (1994)

holding costs. A good starting point for balancing these conflicting pressures is finding the economic order quantity (EOQ), which is the lot size that minimizes total annual inventory holding and ordering costs.[9]

The approach to determining the EOQ is based on the following assumptions.

1. The demand rate for the item is constant (e.g., always 10 units per day) and known with certainty.
2. The item is produced or purchased in lots, and a complete order for the item is received at once, rather than piecemeal. There are no constraints on the size of each lot, such as truck capacity or materials handling limitations.
3. The only two relevant costs are the inventory holding cost and the fixed cost per lot for ordering or setup.
4. Decisions for one item can be made independently of decisions for other items. For example, there is no advantage in combining several orders going to the same supplier.
5. There is no uncertainty in lead time or supply. Like the demand, the lead time is constant (e.g., always 14 days) and known with certainty. The amount received is exactly what was ordered.

The economic order quantity will be optimal when the five assumptions are satisfied. In reality, few situations are so simple and well-behaved. In fact, different lot-sizing approaches are needed to reflect quantity discounts, uneven demand rates, or interactions between items. We introduce some of these approaches in Supplement H, but the EOQ often is a reasonable first

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[9] Hilton, Ronald W., *Managerial Accounting*. McGraw-Hill,Inc (1994). p. 407

approximation of average lot sizes, even when several of the assumptions don't quite apply.

5.2 Just In Time inventory

The just-in-time inventory control system was originally pioneered in Japan but has recently become a very popular control system in the United States. JIT is simply an inventory control system that schedules materials to arrive and leave, as they are needed. JIT inventory control systems are sometimes referred to as zero inventory systems, stockless systems or Kanaban systems. Actually, JIT is a philosophy used to ensure that the right items arrive and leave, as they are needed. Traditionally, incoming raw materials were ordered in very large shipments and were then stored in warehouses until they were needed for production or for providing a service. Under the JIT system, organizations make frequent smaller orders of raw materials.[10] This enables a firm to save money on storage cost and the expenses associated with it. One of the basic objectives of the JIT philosophy is to eliminate waste. In this light waste is "anything other than the minimum amount of equipment, materials, parts, space, and workers' time which are absolutely essential to add value to the product or service." (Rue & Byers, 2000) JIT also applies to the production of subassemblies or final products. The idea behind this approach is not to produce an item or a subassembly until is needed for shipment to the customer. JIT utilizes a demand pull system because items are produced or ordered only when they are needed (or pulled) by the next stage in

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[10] Rue, Leslie and Byars, Lloyd. Management Skills and Appilcations. 9th Edition, 2000.

the production process. Many American companies have successfully implemented JIT, including Hewlett-Packard, Motorola, Black & Decker, General Motors, Ford, Chrysler, General Electric, Goodyear, and IBM.[11]

JIT can benefit manufacturing but it also can benefit wholesalers like EKTAM. By tailoring JIT principles to meet their needs, wholesalers can take advantage of business opportunities. It is key for the organization to examine the benefits and the costs before making a change. There are several benefits that an organization could achieve with the adoption of a JIT inventory control system.[12]

- JIT could possible lead to business growth without relying on the traditional massive sales drives. JIT advocates a closer relationship between customers and suppliers. Instead of the traditional biding war that can occur between vendors JIT's philosophy promotes relying on fewer vendors for more business.
- JIT also enables inventory to move more efficiently. JIT can provide an efficient method of locating, pulling and moving merchandise into the warehouse. By updating the electronic data interchange (EDI) or another type of bar coding system it could possibly enable the wholesaling firm to produce other benefits. JIT enables the firm to have an accurate count on inventory on hand and can also signal to employees when an item needs to be reordered.
- Even though JIT focuses on keeping a minimal inventory, inventory turnover actually increases.

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[11] Rue, Leslie and Byars, Lloyd. Management Skills and Appilcations. 9th Edition, 2000.

[12] http://www.axptbs.com/pubs/whole/oct98/explore.htm

- JIT also provides an attraction to prospective customers. Being able to offer an efficient JIT service to customers attracts new customers and strengthens relationships with existing customers. With JIT becoming more and more popular among manufacturers it could prove to be necessary for a wholesaler to offer JIT services to remain competitive

Along with these benefits come some potential issues

- Although improved warehouse efficiently is considered a benefit of the JIT system, it could possibly require substantial capital increase. With JIT comes additional costs such as storing and tracking inventory, more warehouse space, or the implementation of new ways to streamline warehouse efficiency. It is necessary for a firm to weigh the costs and benefits of the JIT inventory control system before implementing such a program. It could turn out that such a system would not benefit the firm's financial success.
- The JIT inventory control system may also require a significant upgrade in existing computer systems. This could prove to be quite costly to an organization and could prove to be the deciding factor in adopting or denying a JIT inventory control system.
- Since the firm will be required to send out more shipments, the firm will be required to purchase more inventories. This increase in inventory can create a cash flow problem.

Manufacturing such as EKTAM firms can experience many benefits from the introduction of the JIT inventory control system. JIT enables firms to produce better quality products, a higher inventory turnover, higher productivity and lowers production costs. JIT accomplishes these benefits by using three fundamental concepts:

1. Eliminating waste. JIT accomplishes this by producing only the minimum necessary units in the smallest possible quantities at the latest possible time.
2. Employee participation. Employees are encouraged to offer suggestions for improving the current situation. By empowering employees to help make decisions in their organization they take ownership of the organizations goals. Employee empowerment is a very strong tool for organizations to utilize. Employee's who are involved in the corporation and take ownership of the company's goals could prove to be the firm's most valuable asset.
3. Integrated systems. In a JIT inventory control system each and every workstation depends on the previous workstation to produce the final product. With this new dependence on an integrated system, one can see how important each and every workstation in the JIT environment becomes. It's important for each and every workstation to produce at a constant production rate. If for some reason Workstation A has an extended shutdown period then Workstation B, C, and D will be adversely effected.

Of these concepts, elimination of waste could prove to be the key in the successful implementation of a JIT inventory control system. There are seven key factors that can be utilized to successfully eliminate waste:[13]

1. JIT relies on a focused factory. The plants in JIT are normally smaller specialized plants that make parts for a single major manufacturer. This enables a JIT factory to concentrate on what they do best, refine the production process and make the necessary changes to be more efficient and reduce waste.
2. The facility layouts can also help to eliminate waste. With JIT all parts with similar operations are produced in the same manufacturing cell, this enables the firm to eliminate waiting and moving times and also reduces the risk of damaged goods.
3. JIT focuses on "quality is built-in, not inspected-in." In other words, employees are responsible for their own work and thus takes more pride in a job well done. Employees are also given the power of being able to stop the assembly line if something goes wrong. Saturn Corporation spent millions of dollars on television ads that publicized this fact; "any employee can stop the assembly line for quality issues." Manufacturing facilities also install automated inspection devices wherever they deem appropriate.
4. JIT eliminates the inventory being the "root of all evils" philosophy that normally goes hand and hand with inventory control. JIT accomplishes this by maintaining minimum inventory levels and smaller lot sizes and

[13] http://www.usd.edu/~rlau/jit.htm

makes no exception for contingency. JIT requires that all levels of the organization stick to the schedule assigned to them.

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[15] http://www.library.northernlight.com/lh20000327030000012.html?cb=13&sc=0

In 1996 the company began to use new technology system called "Reverse Osmosis". In the year 2000 a PET bottles are available and appeared in the market, such as 2.5ltr, 1ltr, 600ml, 330ml, 7up, Yedigün, Pepsi Light, soda water, tonic water, Fruko.

Today the company has 26 track in Lefkoşa which is used to distribute. The products are distributed from the Lefkoşa base to the cities and villages around Lefkoşa and Girne. The company employs nearly 200 employees. In the year 2002 the "Ektam Kıbrıs Ltd." exported 1.155.649 million dollars worth of products to Turkey. The biggest share in exports was Yedigün to cover the demand in Turkey.

Pepsi-Cola is one of the major production unit of soft drinks in TRNC. Pepsi is bottled by the first and one of the oldest bottling company in TRNC, Ektam Ltd. They enjoyed a monopoly for many years. In addition there are many other brands which are imported. Pepsi is still well distributed all over TRNC. There are people who believe this is their nostalgic traditional drink and there are some regretting that they had to drink only this for many years, and now consumes the other brands.

Products of Ektam are the soft drinks. Although the organization makes lemonade type drinks, which are concentrated, the main product is the soft drinks. These are in cola, orange and gaseous form. The products are shaped in many different ways. There are different alternatives for different consumption purposes. There are large bottles for the family and parties. There are small bottles ready for consumption and there are the canned cokes. These come in different shape and different prices.

The coke business is a seasonally effected business. There are pick seasons when the consumption is high and there are low seasons when there are hardly any consumption at all. Company has the task of producing the appropriate product in appropriate quantity in accord with the seasonal variations.

The taste and ingredients of the soft drinks hardly ever change. Specially in case of Pepsi which is well known in TRNC, the management is specially careful about the taste, since there are many consumers who are found of the taste and will not drink any other brand.

In addition to normal pricing theory the organization has to take into consideration the seasonality problem of the product. Normally organizations have to take a few points into consideration in respect of pricing. First consideration is the market situation. Along with many other similar products there are also alternative products the consumers can choose. These are beer, fruit juice etc. The second consideration is the cost. Company has to make profit so that they can carry on with their operations. A special aspect has to be also considered in TRNC in respect of pricing, and that is the inflation and devaluation of Turkish Lira. Due to high inflation the prices must be frequently adjusted. Since there is a raw material imports involved in production the currency variations must also be closely dealt with.

Seasonality aspect of the business is also important factor in pricing. Unlike other ordinary business products of Pepsi are usually sold in summer and the sales are very low in winter. But the costs of the company still goes on. There are fixed costs to take care of and also minimum amount of labor which has to be kept to have them when they are needed.

Objective organization is to distribute their products to the remotest corner of the country. They use two channels of distribution. One is for a far place where they use 26 big lorries. these lorries visit the customers every two days they going around the distribution area and distribute the product. Another channel is the distribution to the nearer places with smaller vehicles. There are 5 small "VAN" type cars for the city center and same places which are near the city. They also visit the customers in every two days. The control of these distribution is made by sales chief and those chief always control the sales person they go to the right place in right time or not and give good service to the customers and solve the problem face to face.

6.2 INVENTORY MANAGEMENT AT THE EKTAM

As part of my efforts to prepare this project a visit was paid at the manufacturing site and the distribution center near the Industrial zone in Nicosia. I was guided around the factory, introduced to certain employees and briefed about the production process. I was also taken to the warehouses and briefed about the stocking and inventory management aspects of the business.

The production activity started with the order taking. The clients placed their orders at the office, where the sales personnel are present. The order is then faxed to the factory. The order is then scheduled and production is performed at the set date.

Priority of production is for the production of the needs of the distributors. Orders taken that day, are prepared and delivered the same day if possible. In some days the production is more than enough for the orders. In such days, after

meeting the needs of the customers, the production continues and the produce is stocked for future sales.

I spent part of my time in the office to learn how the orders were taken. The process is very simple, the distributors apply to the office and place their orders. In the old times, the orders to the factory were given over the telephone. This led to many misunderstandings and wrong production.

In some cases priority is given to the production of the goods for the warehouse. Nearby villagers come and collect their orders themselves. Collection time is usually in the afternoon. So, the production in the morning is for the warehouse.

There are three types of inventories. The packages (bottles, pet bottles and cans), raw materials and products are kept in separate warehouse. The syrups are sensitive towards light and heat, so they are kept at a special insulated and ventilated building. All the inventory are recorded and accounted for. Inventory updates are carried out three times a week on Mondays, Wednesdays and Fridays.

All the different kinds of goods are stored separately. Most of the goods were palletized. Each pallet contained equal amount of goods. When the pallets were counted, the total weight of the goods could easily be found.

During the weekends overtime work may be required to receive raw material for the warehouse. It is more convenient to deliver the raw material during the weekend since there are no production and men can stiff them as well as they like.

Materials that are used as filling are the main ingredients of production. The most frequently used materials are stocked at nearer places to the production unit. This saves time and labor cost since it is easier to carry them from a nearby location.

Semiskilled workers are working at the factory, in rotation. Everybody knows what to do. The main activities are weighing, transporting the sags, cleaning and machine-operating. Workers are on rotation system and their activities are systematically changed in order to avoid boredom and increase productivity. This also reduces the complaints from the workers and claims of bias.

Management is aware that the demand is higher in the summer and low in the winter. Everything is done accordingly to meet the demand in the peak season in the winter. The management also avoids to have idol working time in the low season.

Stocktaking was made at two levels. First the computer is used to determine the stock levels. All the inventories are registered by the computer. Raw material purchases are added to the stocks and sales are subtracted from the stock. But we had two check the real stocks. After we get the stock level from the computer I went and actually checked it with the stocks at the warehouse.

Materials handling within the premises is carried out by various forklifts. Some of these are power driven and some are hand driven.

The production work is carried out at the optimum stock. The purpose is to never run out of raw material but if possible not to have any finished stock. The ideal is that the factory works full time and the whole production is sold the same day.

Safety stock method was used to determine the quantities of the reorder and lead time. When the stock levels became below the safety stocks, the management immediately faxed to the office and the new raw materials were ordered. All the stock levels were faxed to the head office three times a week.

Distribution of the products are performed in three different manners.

1. For the regions of Nicosia and the nearby towns they deliver the goods with their own tracks.
2. For orders to be collected later, they store them in the warehouse.
3. For some regions they use the services of the distribution companies (for example in Güzelyurt).
4. In some cases customers use their own tracks and transport the goods themselves.

The machinery and the equipment are inspected and serviced every 15 days. All the moving parts are greased after they had been cleaned.

Another activity at the production unit is to take random samples for quality control. The samples are taken to the labs for testing. Frequent tests are made and large orders are delivered only after tests prove that the products are okay.

There are various security issues at the factory. There is a night guard and a day guard. The night guard is for the protection against fire and theft. There are also teams of people who are trained to deal with fire. There are training from time to time to teach them how to put out a fire and also the precautions to avoid fire.

There are also technical staff to remedy any malfunction by the machinery. All the problems are reported to the technicians and they take care of any problems arising from the machinery and equipment.

The environment at Coke's bottlers and distributors today is far more complex than the old days when there were little competition. EKTAM bottles, packages and distributes 13,000 boxes soft drinks to 200,000 people throughout the whole country. Nearly all of its customers engage in frequent promotions and aggressive discounting — often with little or no notice to the bottler — that can result in dramatic swings in volume for particular products.

Table 1: Sales By Regions(lt)

Year/Region	Lefkoşa	Girne	Magusa	Güzelyurt
1995	62669	22722	42748	1566
1996	399491	165494	345481	171200
1997	450684	168943	371021	207842
1998	502713	194233	454486	232076
1999	473256	182987	423499	218468
2000	419910	160973	394338	169611

Table 2: 1995-2000 AMOUNT OF PRODUCT SOLD (TOTAL including the villages)

YEAR	AMOUNT (liters)
1995	154272
1996	1162396
1997	1278656
1998	1484193
1999	1396719
2000	1235782

Chart 1: Sales by Region

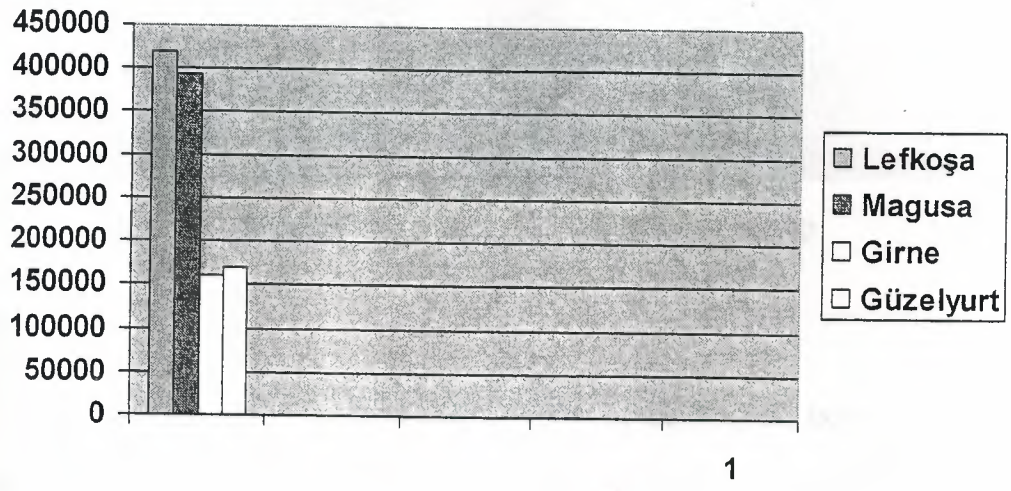
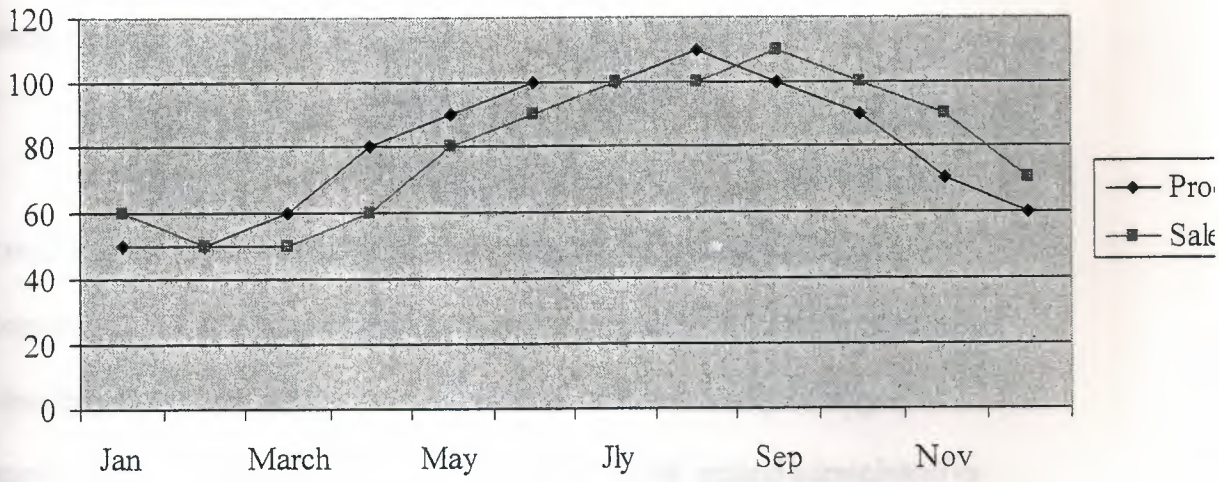


Table 3: SALES vs PRODUCTION

Monthly Production X1000 lt.

	Jan	Feb	March	April	May	June	Jly	Aug	Sep	Oct	Nov	Dec
Prod	50	50	60	80	90	100	100	110	100	90	70	60
Sales	60	50	50	60	80	90	100	100	110	100	90	70

Chart 2: Monthly production and monthly sales



As it can be seen from the above chart the sales of the company is one month back from its production. This means that the company is well prepared and produces as much as they will sell the next year. In other words one months production is

VII. SUGGESTIONS FOR IMPROVEMENTS

Inventory management can help business be more profitable by lowering their cost of goods sold and/or by increasing sales.

The following is the income statement of EKTAM for year 2003:

Sales	$	2,000,000
Cost of Goods Sold		1,100,000
Gross Profits		900,000
Gen. Administrative Expenses		402,000
Marketing Expenses		350,000
Net Income before taxes	$	148,000

Return on sales is over 7%.

Through application of sound inventory management principles, EKTAM Company can be able to reduce the cost of goods sold by 3%. And because there is less inventory, let's say that carrying costs (warehouse storage charges, insurance, finance charges, etc) is reduced by 2% of the general administrative expense. Those minimal cost reductions result in significant increase on net income:

Sales	$ 2,000,000
Cost of Goods Sold	1,067,000
Gross Profits	933,000

Gen. Administrative Expenses	394,000
Marketing Expenses	350,000
Net Income before taxes	$ 189,000

Small costs reductions due to application of sound inventory management principles resulted in very significant increase (28%) in net income!

Lower cost of goods sold is achieved by making the inventory smaller and therefore turn more often; while making sure that stocks are large enough will result in increased sales because products are available when Customers call for it. Inventory management is balancing those two opposing factors for optimum profitability.

EKTAM can further improve inventory management by adapting a inventory management system for their distribution tracks. For many years, EKTAM truck drivers guessed how much drinks they'd sell, then loaded their trucks and sold, to stores along random routes. This should not be the same any more. With a good inventory management there is a possibility for many more beverages being sold by EKTAM, including waters and juices. Separate sales efforts should be carried out from delivery, and they should use new teams of professional salespeople, not drivers, to improve marketing and deliver specific orders.

On a good day, a driver and marketer might sell close to 90 percent of the beverages he carries. But not all days are good. When the delivery estimations are wrong, the delivery men hauls his unsold cargo back to the warehouse—minus

any bottles that inevitably broke in transit. It's never too big of a deal. With the new developments in the communication systems the drivers should free from some responsibilities.

EKTAM should concentrate more on the JIT inventory management. A good JIT application should include the following aspects.[16]

1) A smooth, uniform production rate. An important goal of a JIT system is to establish a smooth production flow, beginning with the arrival of materials from suppliers and ending with the delivery of goods to customers. Widely fluctuating production rates result in delays and excess work-in-process inventories. These non-value-added costs are to be eliminated.

2) A pull method of coordinating steps in the production process. Most manufacturing processes occur in multiple stages. Under the pull method, goods are produced in each manufacturing stage only as they are needed at the next stage. This approach reduces or eliminates work-in-process inventory between production steps. The result is a reduction in waiting time and its associated non-value-added cost.

The pull method of production begins at the last stage of the manufacturing process. When additional materials and parts are needed for final assembly, a message is sent to the immediate preceding work center to send the amount of materials and parts that will be needed over the nexrt few hours. Often this message is in the form of a withdrawal Kanban, a card indicating the number and

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[16] 1.) Hilton, Ronald W., *Managerial Accounting*. McGraw-Hill,Inc (1994). p.13, p.14, p.218, p. 407

type of parts requested from the preceding work center. The receipt of withdrawal Kanban in the preceding work center triggers the release of a production Kanban, which is another card specifying the number of parts to be manufactured in that work center. Thus, the parts are "pulled" from a particular work center by a need for parts in the subsequent work center. This pull approach to production is repeated all the way up the manufacturing sequence toward the beginning. Nothing is manufactured at any stage until its need is signaled from the subsequent process via a Kanban. As a result, no parts are produced until they are needed, no inventories build up, and the manufacturing process exhibits a smooth, uniform flow of production.

3) Purchase of materials and manufacture of subassemblies and products in small lot sizes. This is an outgrowth of the pull method of production planning. Materials are purchased and goods are produced only as required, rather than for the sake of building up stocks. The result is a reduction in storage and waiting time, and the related non-value-added costs.

4) Quick and inexpensive setups of production machinery. In order to produce in small lot sizes, a manufacturer must be able to set up production runs quickly. Advanced manufacturing technology aids in this process, as more and more machines are computer-controlled.

5) High quality levels for raw material and finished products.

6) Effective preventive maintenance of equipment. If goods are to be manufactured just in time to meet customer orders, a manufacturer cannot afford

significant production delays. By strictly adhering to routine maintenance schedules, the firm can avoid costly down time from machine breakdowns.

7) An atmosphere of teamwork to improve the production system. A company can maintain a competitive edge in today's worldwide market only if it is constantly seeking ways to improve its product or service, achieve more efficient operations, and eliminate non-value-added costs.

8) Multiskilled workers and flexible facilities.

In addition to a JIT production approach, an effective business should implement JIT purchasing. Under this approach, materials and parts are purchased from outside vendors only as they are needed. This avoids the costly and wasteful buildup of raw material inventories. The following are five (5) key features of JIT purchasing.

1. Only a few suppliers. This results in less time spent on vendor relations. Only highly reliabled vendors are used, who can deliver high quality goods on time.

2. Long- term contracts negotiated with suppliers.

3. Materials and parts delivered in small lot sizes immediately before they are needed.

4. Only minimal inspection of delivered materials and parts.

5. Grouped payments to each vendor. Instead of paying for each delivery, payments are made for batches of deliveries according to the terms of the contract.

This reduces costly paperwork for both the vendor and the purchaser.

JIT is an important operational system for manufacturing and supplying companies to adopt and implement. Technically, procedurally and managerially it requires attention to:

- data, information and communication.
- assessment of requirements
- programmes to change the structure of production, materials handling, manufacturing processes and distribution facilities
- improved methods of controlling unit supply costs
- consideration of the buyer-supplier partnership and the possibility of strategic collaboration.

If change is piecemeal and management attention wanes then JIT may fail. An integrated perspective is needed with coherent strategic direction and increases in productivity/effectiveness at each operational level so that the whole supply chain has a competitive edge

CONCLUSION

Inventory management is an important aspect of the management. Manufacturing units must keep certain level of raw material inventory, work in process and

finished good inventories. The level must be such that the production will be running efficiently, and not excessive, to create unnecessary costs.

Inventories form a link between the production and sale of a product. Inventories give the firm flexibility in its purchasing, production scheduling, and servicing of customer demands.

In evaluating the level of inventories, management must balance the benefits of economies of production, purchasing, and marketing against the cost of carrying the additional inventory. Of particular concern to the financial manager is the cost of funds invested in inventory.

The optimal order quantity for a particular item of inventory depends on the item's forecasted usage, ordering cost, and carrying cost. Ordering can mean either the purchase of the item or its production. Ordering costs include the costs of placing, receiving, and checking an order. Carrying costs represent the cost of inventory storage, handling, and insurance and the required return on the investment in inventory.

The economic order quantity (EOQ) model affirms that the optimal quantity of an inventory item to order at any one time is that quantity that minimizes total inventory costs over our planning period.

Under conditions of uncertainty, the firm must usually provide for a safety stock, owing to fluctuations in demand for inventory and in lead times. By varying the point at which orders are placed, one varies the safety stock that is held.

Just-in-Time (JIT) inventory control is the result of a new emphasis by firms on continuous process improvement. The idea is that inventories are acquired and inserted in production at the exact times they are needed.

EKTAM is one of the best organized profitable organizations in TRNC. It has strength from the well known brand and a strong mother company. Pepsi is a well known product in TRNC. There were a time when the product was a monopoly. Today they have to compete with the world's giant organizations such as Cola Turca and CokaCola. They are still doing well since there are a considerable amount of public support and intelligent marketing attitude behind the product. EKTAM should not lay back and wait things happen. They should be pro-active and direct the marketing activities in their favor. Since the beverage industry is profitable there is always threat of new entries into this market. EKTAM should continue to promote its brand as the premier brand. The company should also be more active in public relations. They should particularly support the sport teams and sports activities.

But the EKTAM can benefit from non-marketing activities to improve profitability. A good inventory management is the key for successful result. A modern inventory management JIT is proposed for EKTAM.

JIT can prove to be a successful inventory control system in many industries. However for JIT to be successful several requirements should be met:

- Number of suppliers should be reduced. This helps develop a supportive relationship between the two parties.

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