# Total inventory management

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**ABSTRACT:** A business's inventory is one of its major assets and represents an investment that is tied up until the item is sold or used in the production of an item. It also costs money to store, track and insure inventory. Inventories that are mismanaged can create significant financial problems for a business, whether the mismanagement results in an inventory glut or an inventory shortage.

The scope of inventory management is effected by various elements of business operation, not only limited to raw material stock, WIP, and finish goods in stock, but relates to - replenishment lead time, carrying costs of inventory, ordering cost, asset management, inventory forecasting, inventory valuation, inventory visibility, future inventory price forecasting, physical inventory, available physical space for inventory, quality management, replenishment, returns and defective goods, and demand forecasting. Balancing these elements requirements leads to optimal inventory levels, which is an ongoing process as the business is a dynamic process.

In a small business it simple to maintain inventory but as the business grows this becomes complex and needs more scientific process to control and maintain the same. Number of nodes increases and each has much more significant impact on the total inventory management.

Inventory is never adorable in any business but considered as liability to business. Slowly and silently erodes the business profits. Quite sometime this erosion is discovered much late and damage control becomes challenging.

Total Inventory Management [TIM] a new generation, cloud-based inventory management system that enables collision repair shops to optimize material management by streamlining inventory processes, reducing cost, improving productivity, and increasing profit.

This allows for optimal balance, effortless reorder, productivity reporting, and identification of recoverable materials that previously were considered a loss. This can happen quite simply by application modern information tools and business integration. Since the control activity is spread over multi-location and it is important to have an efficient flow of information. A common server for all theselocation shall be conducive.Inventory is not limited to manufacturing organizations only, it is also important for:

 Hospitals:  admittance of emergency patients.
Hotels: arrival of some regular/important customer.
Airlines: VIP movement without notice
 And many other similar businesses, where inventory maintenance is extremely necessary. These are the results of modern inventory management.

In fact inventory is like clock, it starts ticking the moment the ownership is transferred to the new owner of the goods. It never stops whether we acknowledge it or not.

## Methodology
 At the very outset, let us address to two basic questions:
  i. Why do we need total inventory management?
  ii. What Inventory policy shall be best suited to our organization?

**Total Inventory** - management shall provide protection against following:
a. Overstocking – dead inventory at times
b. Shortages – loss of sale and opportunity
c. Inaccurate information in logical inventory – misleading action.
d. Inappropriate return on investment – loss of profit.
e. Capital blockage – shortage of working capital
f. Estimation on future inventory price – keep or sell
g. How much spate needed for inventory planned level- asset management
h. Purchase control - on moving, slow moving & non-moving articles.

i.   Time of replenishment – advance buying
j.   Disposal of defective goods – capital recovery
k.   Customer service- maintaining all time availability
l.   Efficient operation management –nonstop operation
m.  Accurate material requirement planning- MRP
n.   Protection against unforeseen demand change.
o.   Overloading at storage warehouse
p.   Application of just-in-time.
q.   Protection against obsolete and expiry.
r.    And so on.

### Inventory Policy

Inventory policy is an integral part of inventory management. It helps manage stock flow in a better manner. Inventory control systems take an accurate measure of the current assets, inventory in reserve, and provide a better idea about the financial condition. It also indicates the limits for different types of inventory. Policy describes the authority and responsibility of personnel who can over write under any abnormal situation and emergency.

It is a tangible document that educates other members of the organization about the corporate vision and goal with respect to inventory management. It inspires other  member of the organization to participate in inventory management in their work area.

A sound inventory policy will ensure a business has enough raw materials to smoothly run the manufacturing and supply of finished products.

Inventory policy states the conditions and way to liquidate the dead inventory. It provides procedures under such conditions.

Companies often implement strategies that integrate the raw material supplier, manufacturing departments of its enterprise, and logistical structure or transportation companies to minimize accumulation or waste of finished goods.

Preserving the different types of inventory, we can divide it in two sections:
i.   Physical Inventory
ii.  Logical Inventory.

**Physical inventory** is a process where a business can physically count or measure the s entire inventory. A physical inventory may be mandated by financial accounting rules or the tax regulations to place an accurate value on the inventory, or the business may need to count inventory so that component parts or raw materials can be restocked. Businesses may use several different tactics to minimize the disruption caused by physical inventory.

Logical Inventory or Logical Network Inventory is a network modeling tool that enables us to document, plan and manage tele-communications networks. It provides you with the tools to model the infrastructure of your network and to effectively manage the bandwidth within it. It is more consequential to all TV broadcasting agencies.

An inventory policy addresses both the sections of inventory.

A part from raw material, WIP and Finished goods, physical inventory also has other identification as – (i) Reuse Inventory (ii) Spare part inventory (iii) Maintenance repair and operation inventory (iv) Pipeline (in transit) inventory (v) Buffer inventory or safety stock (vi) Anticipation inventory (vii) cycle stock or lot size inventory (viii)Speculation Inventory. Realization of these unpopular types of inventory helps us in formulating strategic plans for controlling which results in **total inventory control.**

Physical inventory can be two basic types (i)**Single period inventory model-** when the life cycle of the goods/product is smaller than the replenishment lead time. This is known as Single Period Inventory model.For example – Newspaper vendor or fruit juice vendor for morning walkers. In this case replacement is not possible only anticipation inventory will work. Hence no ROP, no EOQ, and no Safety stock is required. In such cases inventory carrying cost is very short and suddenly it drops to garbage value of the goods. Product life cycle is very short.

(ii) **Multi-Period Model -** when the life cycle of the goods is much longer than the procurement lead time is known as Multi-Period Model. In this case replenishment can be by placing re-order. By using continuous or periodic model we can replenish the inventory.  In such cases we fix ROP, EOQ and Safety Stock. With the application of IT these limits are pre fixed and automatically fresh order is generate in accordance with SOB (share of business)

Today in modern Business management, importance inventory management is well recognized and accepted fact. Various management scientists have developed different scales for measuring inventory management efficiency.

**Inventory Investment -** The difference between goods produced (production) and goods sold (sales) in a given year is called **inventory investment**. The concept can be applied to the economy as a

whole or to an individual firm; however this concept is generally applied in macroeconomics (economy as a whole).

The investment in raw material, work in progress (WIP) and finished goods, in contrast to fixed investment, inventories are constantly being turned over as the production cycle repeats itself, with raw materials being purchased, converted first into work-in-progress, then finished goods, then finally being sold.

The level of inventory investment made by a firm will depend upon its forecasts about future demand and its resulting output plans, and the amount of stock it needs to allow for delivery delays on raw materials and production delays in serving customers, with appropriate buffer stocks to cover unforeseen contingencies. A firm canminimize these buffer stocks by negotiatingJust–in-time delivery arrangement with suppliers.

Frequently, a firm finds that actual levels of demand differ from its forecasts, so that the    demand is less than expected and the firm finds that stocks of unsold goods build up (unintended inventory investment); or that demand exceeds expectations so that stocks run down (unintended inventory disinvestment). Such inventory investment and disinv-estment tends to occur with downturns and upturns in the business cycle

In aggregate terms the rate at which all firms accumulate and run down their stocks influences the level of economic activity. The increase and decrease in stocks    operatesonthe same accelerator principle as fixed investment, so that widespread changes in business confidence or expectations about future levels of demand influence current stock building decisions, which inturn, having a magnified influence on levels of output and employment through the multiplier effect.

**Cash Conversion Ratio (CCR)** is a liquidity measure that compares the cash generated by a company compared to accounting profit in a given period. We also call this metric as the Cash Conversion Rate. It is often used in manufacturing type industries. We can understand the financial health of a company using CCR. These metric sounds very similar to the Cash Conversion Cycle but the two formulas are very different.

We're often looking for a healthy rate close to 1. A rate above 1 tells us that we see great liquidity. Below 1 equates to weak or poor liquidity and negative means that the company is incurring losses in the form of negative cash flows or negative net income.

Cash Conversion Ratio-    $$FCR = \frac{FCF}{NI}$$

Where: FCF  Free Cash Flow;  NI = Net Income
**Cash Conversion Cycle (CCC) -** The cash conversion cycle (CCC) is a metric that expresses the time (measured in days) it takes for a company to convert its investments in inventory and other resources into cash flows from sales. Also called the **Net Operating Cycle or simply Cash Cycle**, CCC attempts to measure how long each net input dollar is tied up in the production and sales process before it gets converted into cash received.

This metric takes into account how much time the company needs to sell its inventory, how much time it takes to collect receivables, and how much time it has to pay its bills without incurring penalties.

Since CCC involves calculating the net aggregate time involved across the three stages of the cash conversion lifecycle, the mathematical formula for CCC is represented as:

**CCC = DIO + DSO - DPO**
where:-
 DIO = Days of inventory outstanding, also known as days sales of inventory
DSO = Days sales outstanding
DPO = Days payables outstanding
DIO and DSO are associated with the company's cash inflows, while DPO is linked to cash outflow. Hence, DPO is the only negative figure in the calculation. Another way to look at the formula construction is that DIO and DSO are linked to inventory and accounts receivable, respectively, which are considered as short-term assets and are taken as positive. DPO is linked to accounts payable, which is a liability and thus taken as negative.

**Inventory productivity** at its simplest can be defined as the amount of sales and gross profit dollars an **inventory** investment generates over a given period of time, usually a year. And the most basic measures of **inventory productivity** are **inventory** turnover and gross margin return on investment (GMROI)

**Stock management** is the practice of ordering, storing, tracking, and controlling **inventory**. Stock Management software helps small businesses and freelancers keep track of company assets.

**Stock management** applies to every item a business uses to produce its products or services – from raw materials to finished goods.In large warehouse this is a very handy  tool to find locational identification.

**Consignment stock** is stock legally owned by one party, but held by another, meaning that the risk and rewards regarding to the said stock remains with the first party while the second party is responsible for distribution or retail operations.Ownership of consignment stock is passed only when the stock is used (issued or sold in the case of a retail shop). Unused stock in a warehouse may be returned to the supplier when it concerns standard manufactured products. With customer specific items, agreements concerning returning products should be negotiated.

For larger organizations, the answer to efficient and real time inventory management is automated inventory management. Imagine a chain of 25 retail stores and a central warehouse as supply source. In such case inventory is most dynamic and changing every moment at various locations. Replenishment of inventory would not be possible unless you have the real time inventory status is available. It is the best safe guard against stock out situation which will result into both sale loss and opportunity loss. This works both ways – one inventory management at retail stores and two, stock maintenance at the warehouse. For this an automated release of purchase order can be actuated.

Automated inventory management system is a software system that systematically controls your product data so that the inventory levels can be accurately tracked and provided in real time. It adds edits, deletes and transfers your product data in this regard.

Automated inventory management systems play a key role in increasing your profitability and in managing the inventory. It provides you with accurate, real time inventory levels. Whenever the necessity arises, updated inventory levels are immediately available.

In conjunction with an automated inventory management system, barcoding, mobile features, RFID systems etc. further simplifies the inventory audit. With such measures, we can have a clear picture of inner workings of your business very clearly. Also this will provide the status of – moving, slow moving and non-moving items at the retail stores. An item may be slow or non-moving at one location and may be moving at other location. This instigates us to transfer stock to other location and liquidate the blocked capital.Asset management is one area where we can (to an extent) control these unknown changes through a powerful automated inventory management system.

There are plenty of advantages for using an automated inventory management system. Some of these are:-

a. **Order-cancellations are reduced:** cancellation due to unrealistic commitment of order completion leads to financial loss as well as a serious damage of goodwill.
b. **Data accuracy and reliability is increased:** Both planning and forecasting is affected due to inaccuracy of data. At times results into serious financial losses.
c. **Immediate product updates** – in most of cases the updates are online
d. **Better management of products** - Automated inventory system groups products using different classifications including by sale, category, season etc.
e. **Efficient Inventory planning:**Since the automated inventory system tracks the inventory accurately, notifications can be set up to order products or move products according to the current status. The complex concept of a just-in-time process is highly simplified due to this.
f. **Superior management insights and forecasting:**As a direct consequence of the advantages above, demand forecasting and getting valuable insights on how your inventory is moving is made easier.
g. **Stronger capacity to compete:** Your handling costs, costs related to logistics etc. are considerably reduced when an automated inventory system is in place. Rarely in stock out situation which will boost the customer satisfaction and goodwill formation.
h. **Growth is uninhibited:**When your business grows from a smaller size to a large size, there could be some confusion with the sudden increase in the inventory. But with an automated inventory management system, a continuous and conscious development of inventor is maintained throughout.
i. **Inventory is synchronized:**This is a relevant advantage that has grown in prominence in the recent years due to the boom in digital marketing. Inventory is maintained at multiple locations and all that needs to get synchronized for sales management customer satisfaction.

**Tools an Techniques of Inventory management**

An earlier model of inventory management includes economic order quantity (EOQ) and Wangner-Whitin Procedure. Today most of the industries are using techniques like manufacturing resource planning (MRP II) just

in time or enterprise resource planning (ERP) which is next generation MRP II

I. The **Economic Order Quantity (EOQ)** is a model is the order quantity at which the combination of ordering costs an inventory carrying cost is minimize.it is a factor balanced by required lead time and consumption rate. With the applications of inventory control specific software of ERP it takes care of automatic calculation of order point and size of order.

II. The **Wagner-Whitin** Procedure assumes deterministic demand and deterministic production. It is better suited for purchasing than a production system.

III. **Enterprise Resource Planning** (ERP) combines all departmental information together into a single integrated information system so that the various departments can communicate with each other so that the inventory at various points is known and also the rate of liquidation of inventory is also estimated. It is very useful in case of inventory status at multiple points.

IV. **Just in Time** works on a real time working environment basis. It assumes zero defects, small lot size, reduced setup time and breakdown time. It affects storage cost, inventory carrying cost, handling cost and some other cost elements. A set of collaborative vendors is extremely important of this to work.

V. **Scan-Based Trading (SBT) -** SBT is mainly used by supermarkets, however the concept is growing in popularity with retailers, such as do-it-yourself (DIY) stores. Using point of sales information system allows for a perpetual inventory count; when an item is scanned at checkout or billing counter. The computer system adjusts the inventory and transmits to suppliers.

The difference in this system compare to other perpetual inventory control is that the supplier owns the inventory unit the item is scanned for purchase, ownership of the goods passes at the time of the sale to the final customer.It is like renting the space for display and the payment shall be made after 10 to 12 days of the sales of the goods. The retailer acts like warehouse for the manufacturer or wholesaler.

VI. **Radio Frequency Identification (RFID) –** this technology started to emerge to help with inventory management by use of a computer chip that reads and identifies any goods and provides information as when the item arrived and when it exit. This provides a real time inventory and also very useful for inventory audit. In many super markets it is used for billing purpose too. This helps in shortening the cycle time, more frequent and smaller lots.

**Conclusions**

▪ A strong inventory management protects company from over and under stocking. This has a strong bearing over productivity and customer satisfaction.

▪ Results of good inventory management include, but not limited to, better forecasting, improved financial returns by reducing cost, identification of crucial products, and the ability to support JIT strategies.

▪ The tools of inventory management include EOQ modeling, MRP II , ERP, ABC classification, and JIT. Sound ERP software provides much comprehensive solution to inventory management and imbedded inventory policy.

▪ Inventory control tools include EDI, VMI, CPFR, SBT, and RFID. All these tools are rapidly changing or being upgraded. We need to keep track of such advancements and achieve the benefits out of it.

▪ There is no doubt that a powerful automated inventory management system will make your business venture much more successful than the traditional methods across all platforms.

▪ Though there is an initial investment cost, in the long run it saves much more than you have spent. One should never forget that there is always a cost to achieving high-service levels.

▪ With an automated inventory management system, you are better in forecasting, tracking and managing your inventory.

▪ It provides you with insights to identify areas where improvements can be made.

▪ The right automated inventory management system can effortlessly integrate into your organization; save your time & money while increasing overall efficiency (including improving customer and employee satisfaction simultaneously) and transform you into a great decision maker.

**Recommendations**

Inventory silently erodes the profitability at various stages of our business. No doubts this can be reduced to a very large extent but can never be eliminated from the system. Controlling inventory is much simpler, accurate and effective than ever before. Today large number of tools and

technique are available, with the application of information technology this can be made very simple and effective. Among these ERP is the most impactful. Automated inventory control is almost a foolproof solution to this problem.

For the initial cost, it might emerge as an expansive proposal, but in the long run this will redeem may folds. It is beneficial at various stages of business.

Inventory management should be recognized as an important function of any organization and should be transmitted to every employee. Total inventory management comes out of every body's functioning. Not to be perceived as a function of purchase but maintained throughout the supply chain.

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