Manufacturing, storing and Delivering Goods

* Warehouse Management System (WMS)

Section One – Introduction

* Expansion of production capacity
  + Modernise factory vs building new one
  + NZ – local vs Overseas site
* Managing information effectively to improve efficiency of manufacturing, storing and delivery of goods
* How can we adopt a just in time manufacturing and delivery system?
* How do you address inadequate storage space and layout?

Stakeholders

* Inventory Director
  + Storing
  + Delivering
* Local operations director
  + Manufacturing

Role

* Evaluate suppliers
  + Maintaining good working relationships with the suppliers
  + Keep track of other available suppliers willing to provide your business with materials at a better cost
  + Quality
  + Available Supply
* Prepare Documentation
  + Accurately record
    - Quantity
    - Quality
    - Type
    - Style
  + Can avoid shrinkage due to loss or theft
* Purchase new inventory
* Track Inventory
  + See if customer needs are satisfied
  + See if delivered on time
* Design and implement an inventory tracking system to optimize inventory control procedures
* Examine levels of supplies
* Evaluate new inventory ready for shipment
* Manage staffing
  + Know how many staff you need during a particular time
* optimise DC operations and service level delivery, by applying knowledge of all integrated end to end systems and through the pro-active & effective management of site systems & inventory functions
* Provide innovative solutions to maximise efficiency and reduce costs in the supply chain, through analysis and projects\*\*
*  \*\*Effectively maintain DC product range, manage new and deleted lines, and family groups through effective systems management and inventory integrity.\*\*
*  \*\*To use knowledge of integrated end to end systems to support all key related business decisions\*\*
*  \*\*Identify, develop and manage required event planning activity and support national project activities\*\*
* Optimize facility layout

Information they need

* Supplier information
  + Current
  + Potential
* Inventory count
* Customer orders

<https://www.betterteam.com/inventory-manager-job-description>

KPI [https://selecthub.com/inventory-management/10-important-inventory-management-metrics-kpis/](https://selecthub.com/inventory-management/10-important-inventory-management-metrics-kpis/%20)

* Demand forecast accuracy
* Customer satisfaction levels
  + Online order – how fast products arrive
* Delivery – Perfect Order Performance
  + File Rate effectiveness – how many orders or requests for material from production centres are fulfiflled
* Order lead time
  + Period between order time and received time
* Pick, pack and ship accuracy
* Inventory turnover
  + Inventory is sold and replaced in a specific period

Solution

<https://www.newcastlesys.com/blog/top-five-warehouse-management-problems-and-how-to-fix-them>

**Poor Facility Layout**

Efficient use of space is a critical success factor in warehousing.  Inadequate storage space and inefficient use of available storage are common problems in warehouses with poor facility layout. Poorly configured warehouses are a major cause for worry for managers because of the inherent potential for negative impacts on profits.

The optimal layout factors both the floor space and the vertical space available for use. In addition to maximizing the use of space, a good layout maximizes the use of equipment and labor, accessibility to all items and the security of all items. Using forklifts that reach the roof of the warehouse allows for a configuration that maximizes both the horizontal and vertical space.

### ****Seasonality in Demand****

Fluctuations in demand pose serious challenges for warehouse managers. The dip in sales due to the recent global financial crisis resulted in major cost problems for warehouses due to increased inventory levels. Although it did not affect all industries alike, the problem highlights the challenge of fluctuations in demand due to forces outside the control of the warehouse.

Managing seasonality in demand requires timely and accurate information about manufacturing, retailing and the industry. Information gaps between the warehouse and other relevant entities or the industry limit the ability of the distributor to monitor and respond to changes in demand effectively. It is necessary for warehouses to use timely and accurate information in planning and forecasting demand as well as in providing supply chain visibility.

Rearranging the products to match changes in demand helps minimize the negative impacts of seasonal demand. Such a rearrangement involves correct positioning of the items by placing the products with high demand during the current season at the front of the picking aisle and at the correct height.

Dealing with seasonality in demand, however, goes beyond just layout and picking. The problem also requires proper management of transportation networks and strategic sourcing of transportation services. These long-term solutions build a lasting capability with strategic value for the distributor.

The complementary solution is to ensure that the highest-selling inventory is easily accessible by placing it at the most accessible point.

Section Three

* Software integration goes well
* WMS features
  + Can help stakeholder arrive at a decision regarding key decisions
* Rbs
  + System follows rules – simple
  + Accurate outcomes – because of pre-defined rules
  + Rbs uses actual facts
  + RBS has one definite interpretation
  + Only need small pieces of information
  + Justified outcomes
* Cbr
  + Based on past exp
    - Exp maybe limited to their own experiences
  + Experiences may not apply to current or future situations
    - Out of fashion
  + Based on prediction
* Fuzzy
* Ga
  + Make/suggest rules for RBS
  + Problems change over time and GA can adapt to them
  + Storage layout
* Naïve bayes - probability
* Ann –
* Decision trees
  + Same logic as RBS

Section Four

* ERD
* Swimlane
* Use case diagram

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Dimension | Target Solution | RBS | Decision Trees | GA |
| Accuracy | High | Yes |  | Yes |
| Response Time | Moderate | No |  | Yes |
| Scalability | Moderate | Maybe |  | Yes |
| Ease of use | Moderate | Yes |  | Yes |
| Independence from Experts | Moderate | No |  | Yes |
| Development Speed | Low | No |  | Yes |
| Accessibility | High | Yes |  | Maybe |

NBA is a solver with the main idea of probability. Naïve Bayes is best understood by example.

Example:

* You are a salesperson selling a car to a customer
* You collect data (features) from the customer
  + Price range
  + Brand
  + Model
  + Etc…
* If all the given data provided matches with a specific car, you may propose that car
* NBA works the same way, calculating the probability of an event (car matching given data) based on related events (matching price range, brand, model, etc)

What we consider when using NBA is the independence of these related events amongst each other. This may influence the final solution.

The formula used to calculate of these potential events and solution:

* P(A) is the probability of event A occurring independently
* P(B) is the probability of event B occurring independently
* P(A|B) is the probability of event A occurring given B
* P(B|A) is the probability of event B occurring given A

Advantages of NBA

* Very simple to implement
* We are using facts/prior knowledge
* If the NBA independence assumption hold, it will converge quickly
* If the NBA assumption doesn’t hold, it still works as great practise
* Not much training data required
* Handles continuous and discrete data
* Usually generates good results
* Easily handles missing feature values

Disadvantages of NBA

* NBA makes very strong assumptions
* Small data sets will have a low precision
* Potential to lose some accuracy
* Dependencies exist between variables, hence they can’t be modified
* Calculating probabilities for continuous data may be challenging - binning them into discrete classes may result in loss of precision
* Cost-Efficient
* Only requires specifying small pieces of information
* Accurate Results – this is due to the predefined rules
* Separates knowledge about the situation from the process of applying it
* Justified outcome(s)