Analysis of Indian Warehousing Sector and Warehouse Optimization and Modernisation Techniques

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***Abstract* – Driven by growth in production and organized retail, the major segment contributing towards the growing Indian logistics industry is the warehousing sector. Growing at a rate of 35-45 percent every year it is expected to grow more than USD 20 billion (Rs 5400 billion approx) by 2015. Further the rollout of Goods and Services Tax (GST) by the Indian Government will play a major role in the growth of logistics industry and its warehousing business. Currently of the total warehousing space used, most being not mechanized; the warehousing sector faces the challenge of strategic and operational planning with the use of modern day technology and automation. The paper focuses on the analysis of various warehousing techniques and automated systems which can be used to modernise and optimize the Indian warehousing sector with respect to the growing demand and global trends.**

***Index Terms – Automation, Goods and Services Tax (GST), Modernise, Optimize, and Warehousing techniques*.**

I. INTRODUCTION

Warehouses are an important part of any supply chain and logistics industry. The Indian warehousing sector is progressively getting redefined from the traditional concept of "Godowns" to modern day set-ups with automation. The demand for warehousing space is expected to grow from ~391 mn sq. ft. in 2010 to ~476 mn sq. ft. in 2013, at a CAGR of 6.8 percent. Of the total warehousing space, most of the space is not mechanized, the need for logistics industry to re-visit there warehousing approach is pressing.

The Goods and Services Tax (GST) is expected to be the next big bang fiscal reform by the Indian Government which will lead to the abolition of almost all the indirect taxes incurred by companies and customers. With the implementation of GST, companies would no longer be required to have warehouses in every state just to facilitate stock transfers and avoid indirect taxes. With the introduction of GST the key advantage for logistics companies will be merging of small warehouses to one productive warehouse. Large Productive warehouses will be able to attain benefit through technological sophistication by using state-of-the-art planning and warehouse management systems which are not feasible and used in smaller and scattered warehouses. Large productive warehouses will be able to attain and master massive multidimensionality.

On the demand and supply side of the warehousing sector, recognizing the need for better services and mass customization, logistic companies look towards modern techniques and data management systems to attain more efficiency and smarter fulfilment. The functioning of large and productive warehouses will be optimized by investing in technologies that will enable visibility, visualization and virtualization. Use of advanced technology, warehouse management systems, material handling equipments, automated pallet racking, forklift trucks; efficient storage systems etc. will determine the modernisation and functioning level of a warehouse in the near future. Modernization of large and key warehouses is highly recommended on the account of:

a) Large sizes with high throughputs and more complex operations.

b) Increasing level of services required by organised retail.

c) Increasing scarcity of skilled labour and real estate requiring mechanised warehouses.

II. INDIAN WAREHOUSING SECTOR

2.1 Current State

The current dual governance structure makes the Indian taxing system very complex. There are Central level taxes in the form of Central Sales Tax (CST), Customs duty, Service tax, and Excise duty, and then comes the State level taxes in the form of Value Added Tax (VAT), Stamp duty, Land revenue, luxury tax, State excise etc. This type of tax structure has forced the logistics companies to locate small warehouses in all the states where they do business. The planning of locating small warehouses is more driven by logic of saving taxes than achieving efficiency. Due to the taxing systems and locating of small warehouses, most logistics companies have stayed away from modern warehousing techniques and use of modern technology. Of the total warehousing space currently used in India, approximately 82 percent is not mechanized. Those which are mechanized or are semi automated have just forklifts and hydraulic pallet trucks. This clearly shows the need for an organized, large scale, good quality and automated warehousing infrastructure in the country.

2.2 Goods and Services Tax (GST)

Good and Services Tax (GS) is a tax on goods and services, which is liveable at each point of sale or provision of service, in which at the time of sale of goods or providing the services the seller or service provider can claim the input credit of tax which he has paid while purchasing the goods or procuring the service. In the Budget speech of 2007-08, the implementation of GST from April 1, 2010 was announced. But due to delay the second deadline for GST of April 2012 was given. Now, it is expected that the GST regime will come into effect by 1 April 2014. GST is supposed to be the biggest tax reform undertaken by the Indian Government since independence. It is aimed at creating a single and unified market that will benefit both companies and customers. Implementation of GST will be the transformation of a disturbed and complex taxing structure into a largely unified value added system of taxation. It is expected to replace most of the current applicable indirect taxes incurred by the companies at central and state level. The current rate of indirect taxes amounts to approximately 20 percent, whereas the highest rate of taxation under the first year of GST rollout will be around 15 percent and will eventually come down to 12 percent in the second year.

Table (1) Taxes Included under GST

Central Taxes	**State Taxes**
Central Excise Duty	VAT/Sales Tax
Service Tax	Entry Tax
Additional Customs Duty	State Excise
Surcharges and cesses	Other taxes and duties (Luxury tax, Stamp duty, Land revenue etc.)

2.3 Future State

GST rollout will offer great opportunities for logistic companies to revisit their supply chain and warehousing strategy. Organizations will be able to explore various new modern warehouse set-ups to increase their efficiency. The share of modern warehousing in India is anticipated to grow from 15 percent (62 million sq. ft.) in 2010 to 30 percent (178 million sq. ft.) by 2015. New and enlarged warehouses will have to be designed or redesigned and with the increasing demand for products and warehousing services, the demand for planning and product management at new constructed and redesigned warehouses will have to be re-evaluated. The increasing demand for modern assets, rising share of organized retail and over production and consumption growth are influencing the logistics industry to set-up large warehouses with more efficient system. Firms will have to look for new optimization techniques with respect to the growing warehousing sector. Small warehouses will have to be replaced with large facilities or warehouses equipped with modern systems to attain modernised warehouse functioning. To maintain the current lead time, firms will have to redesign the warehousing system by factoring in the best warehouse practice to get the most from there warehouse or distribution centre. A new and interactive approach towards the set-up of the warehouse system will have to be kept in mind. From the traditional set-up of warehouses with limited machinery, the set-up has to be changed into a more modern outlook to meet the global market and demands. The new optimization techniques which can be used to optimize the work flow and management of the system will vary from storage systems to packaging systems, warehouse trucks to forklift trucks, loading/unloading bays to pallet racking systems and from supply chain management to warehouse management system.

III. WAREHOUSE OPTIMIZATION AND MODERNISATION TECHNIQUES

Smart logistic companies see technology as a way to continually increase productivity and operating efficiency. A well tuned and modern warehouse can help reduce space allocation, inventory management, labour costs and increase work flow and customer satisfaction. The various techniques and systems which can be used to modernise as well as optimize the Indian warehousing sector are:

3.1 Smart and Efficient Lighting

Warehouse requires sufficient amount of lighting on horizontal surfaces such as barcode scanners and fork lift controls. A good coverage is also needed on vertical surfaces, particularly while reading identification marks and searching through storage racks. For products stored at ground level, it is additionally important to avoid shadows during work.

Smart and efficient lighting such as LED can be used at warehouses and storage environments to deliver high performance lighting and reduce human error due to inefficient lighting. Also the use of efficient lighting significantly reduces power consumption costs. To maximise the return on investments by companies, control measures such as daylight linking, presence/absence control or timed off can be used.

3.2 Storage Systems

Warehouse management and efficiency is all about careful use of space and product storage. There are mainly two main strategies which can be used in storing products. The simplest is dedicated storage, in which each location is reserved for an assigned product making order picking more efficient. A warehouse can have thousands of storage locations and while using dedicated storage, each will have an assigned product. With different replenishment cycle of each product, one may find many storage locations that are empty or half-empty. This system of dedicated storage results in an in-efficient use of storage space.

To improve this, a firm can use the strategy of shared storage. The idea is to assign a product to more than one location. When one location gets empty, it can be available for reassignment to a different product. The empty space can be filled again instead of waiting for the original product to be replenished. More the number of storage locations over which a product can be stored and sooner the one of those locations are emptied, sooner the space is recycled. Use of shared storage provides better utilization of space. But unfortunately shared system has some disadvantages. Most importantly the location of products will change with time as locations are emptied and replenished with new and other products, which means workers cannot learn locations to reach directly. Another disadvantage is that it becomes time consuming to put away and pick products from new locations. Overall shared storage is a complicated system and requires great warehouse management software with a disciplined warehouse processes.

3.3 Automated Shuttle Racking

Automated shuttle racking system is an innovative method for storing and collecting goods that can transform high density storage areas and improve storage efficiency. Shuttle racking systems are well suited for warehouses that share a large number of pallets per SKU. With shuttle racking, operator can stack pallets weighing up to 1500Kg, and get better accessibility to densely packed storage making them feasible for even cold storage systems. For warehouse system and operator flexibility, an operator can switch from First In - First Out (FIFO) to Last In – First Out (FIFO) inventory valuation systems. Shuttle system allows the operator to individually access each storage tunnel lane without the need for removing pallets from higher and lower positions. While the shuttle transports pallets to and from the face of racking, the operator is free to work elsewhere, increasing productivity. Shuttles can be sent into the tunnel to count or take out the pallets and move them closer to the loading/unloading points. It can easily manage pallets, minimizing the risk of damage due to human error, reducing product damage, safety issues and truck down time. They can be connected with the Warehouse Management System (WMS) to increase efficiency and provide flexibility.

3.4 Automated Handling Equipment

With the continuing rise of e-commerce, most firms and retailers wish to maintain their presence felt in the market with an efficient multi-channel logistics. Here efficiency is about lowest handling cost with greatest flexibility given the high cost of returns and high accuracy. Now days with the retail being conducted via email, internet and telecommunication (e-tail), the need for automated material handling equipment is pressing due to large number of orders with small quantity of items per order and the pick windows being compressed as online ordering deadline becomes later.

Automated handling equipments which are controlled by efficient software system connected with warehouse management system, allows the retailer to achieve better efficiency and flexibility through batch picking of orders and same time fulfil individual orders through synchronise flow of merchandise. Batch picking of orders will minimise the time required for retrieval of goods from storage area and their processing at the pick stations. For sequencing of goods after picking, one solution is to use ergonomically designed pick stations with automated shuttle storage systems controlled by a smart software system.

3.5 Fashion Sense (Pick-it-Easy Pocket)

Many 3PL's maintaining warehouses and supply chain systems for multi-channel retailers handle flat-packed clothing as well as hanging garments and other packaged products. This adds up another layer of complexity for logistic companies. Use of system

integrator with garment-handling technology in-house will boot up the process and make it more efficient.

Pick-it-Easy Pocket, a system designed by KNAPP, UK, is ideal for such environments. Using a matrix sorter it enables batch-picked products to be sequenced properly, such that the products arrive at the packing stations in the correct sequence to combine each customer's order properly. The hanging-pocket design is suitable for items such as shoes, accessories, flat packed clothes, books or toys, but also allows hanging garments to be handled simultaneously on the same system.

3.6 Voice Picking

Voice picking system opens a dialogue between the Warehouse Management System (WMS) and order pickers. Instead of using paper for instructions or handled devices, the picker uses the most natural way of communication – Voice – while they go ahead with their everyday tasks. Utilizing voice picking system can result in great productivity through increased focus and less picking errors. It can also improve workspace safety and have a reduced training time as required with handling of handled devices.

3.7 Bucket - Brigades

In manufacturing based companies or some 3PL companies, products continuously move down the assembly line, where work is passed on from worker to worker in a sequence. The challenge in assembly lines is to balance the work and order picking in such a way that there are no bottlenecks in the flow. This is hard to do since it requires knowing of how much work is there and then dividing it appropriately among the workers.

For such an environment we can use Bucket – Brigades. Bucket - Brigades are an effective way of organizing workers on an assembly line. In bucket – brigades less planning and management is required since, it makes flow line self balancing and tune the work-flow, making production and order picking more flexible and agile. In this process, every worker on the assembly line carried a product towards completion, and when the last worker is done with his work he walks back up to take over his predecessors work, who walks back up to take work of his predecessor, and so on, until the first worker walks back to start a new product. This system is called bucket-brigade when worker are arranged from slowest to fastest.

3.8 Labour Management System

Labour is mostly the main cost in a warehouse. A Labour Management System (LMS) is a system that can work in concert with the Warehouse Management System (WMS). Labour Management System enables one to measure labour performance and helps take measures to improve labour utilization. The system can provide optimum data to identify those who perform up to the standards and even those who need assistance. If tied with incentives and personal performance, the system will enable employees to attain greater ownership of their work and improve their performance. In connection with WMS it helps calculate time and resources required for labour management.

IV. CONCLUSION

With the coming upswing in the warehousing sector the need for Indian logistics companies to modernise and optimize their warehouses is approaching. The companies should start from basic modernisation and optimization techniques to make a stand in the global market and trends followed with a more futuristic and modern outlook. The growing Indian economy provides the suitable platform for the companies to grow and expand, making a mark and stand among the other major countries and international companies.

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