HAL ROBOTICS

PERISHABLE GOODS WASTAGE ANALSYSIS IN INDIA

Shortcomings and Solutions to Cold Chain Network Structures

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EXECUTIVE SUMMARY

The report revolves around the wastage prevailing in the supply chain of the food industry in India. The cold chain network structure is briefly explained in order to gain a deeper understanding of reasons contributing to tremendous wastage of perishable goods. Although India ranks second to China in total food production, the supply chain prohibits the products from reaching consumers due to a series of reasons covered in this report. It also contains the technological ways to improve the wastage reduction in different part of the supply chain and throws light on government initiatives to boost the sector.

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INTRODUCTION

The primary factor contributing to wastage of food products and perishables in India is the lack of integration between different players of the industry. The fragmentation in the food industry has lead to involvement of different players to play small roles in the supply chain, eventually widening the gap in communication and transportation of products. In an attempt to highlight the shortcomings of cold chain management in India contributing to mass wastage of perishables, this report additionally presents potential steps and solutions to manage and in the near future alleviate wastage.

FOOD INDUSTRY AT PRESENT

India at present ranks second to China in food production, yet the consumption rate indicates severe wastage of fruits and vegetables in its current inadequate supply chain process. The ensuing effect has a direct impact on nutrition, dietary habits and even environmental impact of greenhouse gas emissions. Most of the products after harvest undergo a lot of transitions such as food processing, ripening chambers, change of forms etc. Interestingly the processing percentage of perishable goods is only 2% whereas the remaining is exported for processing outside India and the outstanding percentage are wasted in non-transparent network. Fragmented supply chain dominated by the small and medium scale unsynchronized players in the industry has subsequently affected the entry of top firms in the perishable goods sector. Around 104 MMT (Million Metric Tonnes) of perishable produce is transported between cities in India. Out of 104 MMT, only 4 MMT is transported through refrigerated trucks (Reefer containers). While there are around 250 transport operators, less than 30,000 reefer trucks are on the run because most of them are small and medium scale operators leading to an obvious problem of decreasing investment. Transporting with reefer containers means that the cost of transportation of goods will be high [1].

Another reason for wastage is that most of the reefer containers are used for milk and dairy products leaving the fruits and vegetables with no choice but to be transported only with non-refrigerated containers.

The recommended temperature for various range of products are listed below.

Recommended Temperature	Food produce
>18 0°C	Processed food, cooking oil, onions
10-18 0°C	Sub-tropical fruits
0-10 0°C	Fresh fruits and vegetables, flowers, eggs, Milk and dairy products
<0 0°C	Meat and poultry, fish, frozen foods

Table 1. Recommended Temperature range [1]

As evident in Table 1, fresh fruits and vegetables should be transported between the temperature ranges of 0-10 degree centigrade which explains the need for safety measures. However in actual practice they are transported with non-refrigerated containers opening the gate for wastage of products. The annual food production in the Indian industry is shown in the figure below.

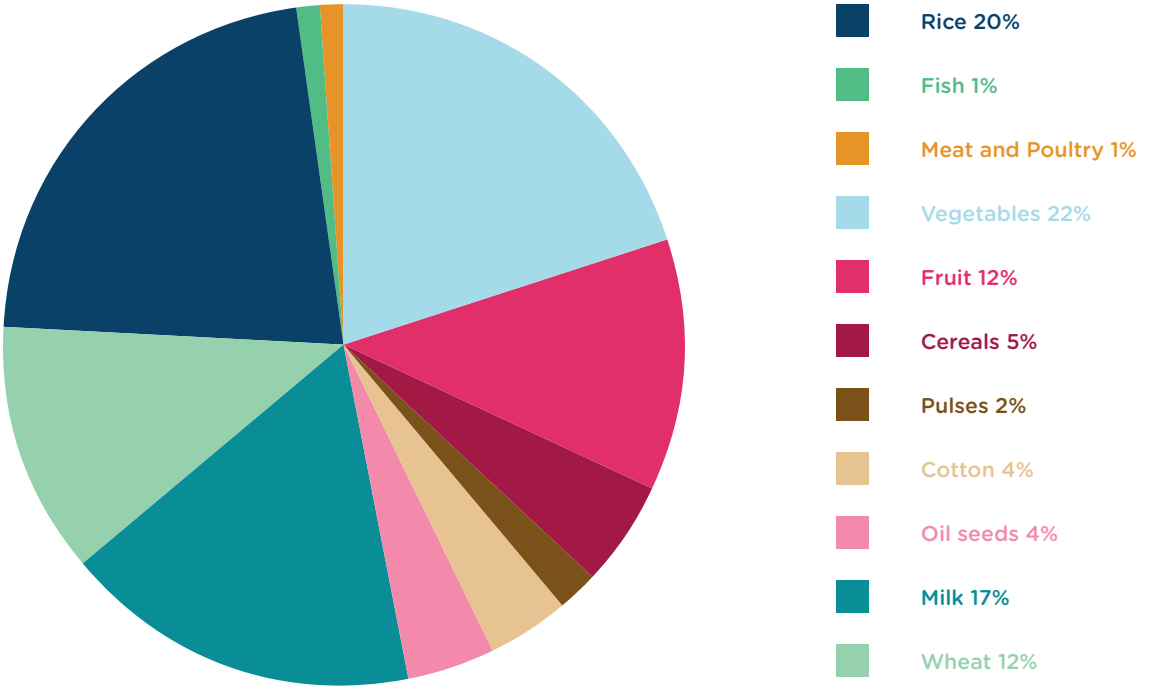

Figure 1. Annual Food production in Cold storage (88%) and Transit (12%) [2]

Among the food produced by the 263 million Indian farmers, 40% of the food is wasted due to lack of facilities and the gap involved in meeting the final customer needs [5]. In the huge perishable goods network, only 30% of the industry operates under an organized platform while the rest is run by unsynchronized private small and medium scale players. This means that there could be lack of facilities for processing food, given the high margin of the food produced. Considering the ratio of organized to unorganized players, the amount of food wastage is unimaginable in the Asian sub-continent.

The figure below shows the wastage of products in the Indian perishable goods industry.

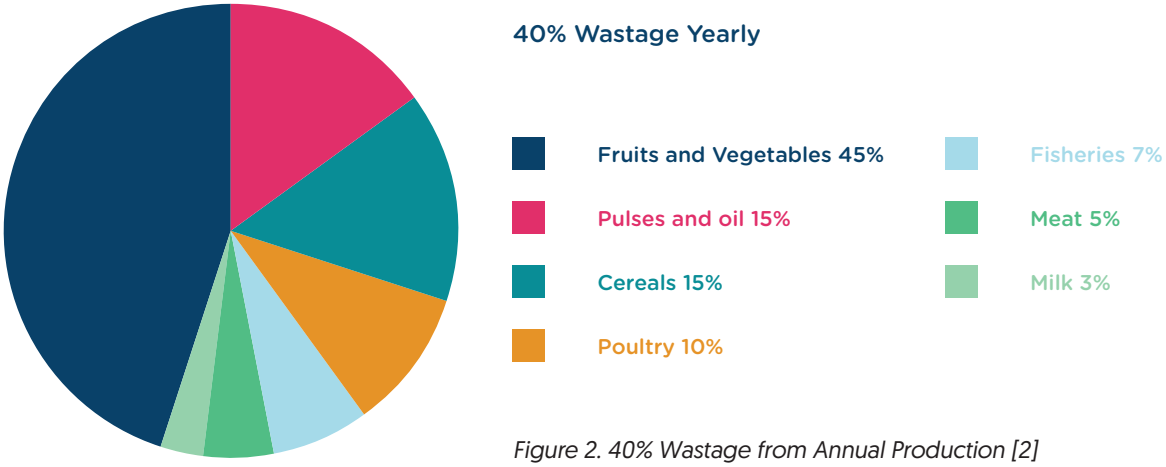

Figure 2. 40% Wastage from Annual Production [2]

Most of the wastage in the industry is contributed by the decay and damage of fruits & vegetables leading to reduction in the shelf life as well as resulting in unhygienic products. Although the other products have a fair amount of wastage percentage, fruits and vegetables are of primary concern owing to their rate of frequent consumption. The typical cold chain structure in India with different stakeholders is described in the figure I.

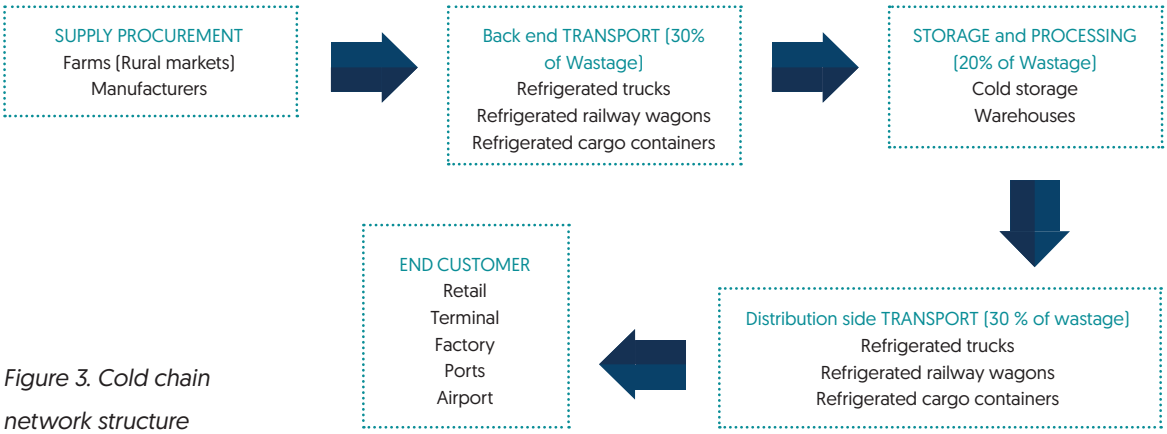

Figure 3. Cold chain network structure

As evident from the structure, supply chain starts with the farmers harvesting the food grains and producing the milk. Then the harvested food is transported through different intermediaries to the processing center. Once the food undergoes its various processing stages, it is then transported to the packing center and enters the distribution side of the supply chain. The intermediaries involved in the supply chain are Carrier and freight forwarding agents, small distributors and the stockists. The products are then shipped through the different warehouses in parts and then to the retailers. Thereafter, they are sorted to move to different consumer shops.

PROBLEMS IN THE SUPPLY CHAIN LEADING TO WASTAGE

LACK OF FACILITIES

Processing centers: Countries performing at optimal capacity have a processing ability to cover 70-80% of their products. In India however, only a shocking 2% of the products produced undergo processing, the reason being fewer processing centers to make the food products shippable across the supply chain. Even with 6400 cold storage facilities in the country, the capacity processed does not match the capacity produced from the farmers. Only 10% of the farm products are able to procure cold storage facilities in India.

Cold storage warehouse: Apart from the low number of facilities, the existing cold storages are not utilized properly due to lack of professional personnel and unprecedented processing stages. The cold

storage facilities do not follow precise environmental conditions for products which require monitoring and control.

Transport services: The transportation of cold chain products are done under a single temperature inside of the containers while most products need varying temperatures to sustain their shelf life. The industry needs different multi-commodity containers from cold chain logistic providers. RK Foodland was the first company to do a multi commodity transportation of products with 3 different compartments in the container to manage different temperature in the compartments. Most of the products which need continuous refrigeration are transported through non-refrigerated trucks.

LACK OF COORDINATION IN THE SUPPLY CHAIN

Since the industry is vastly fragmented with different players having their small role to play, the food products move with lot of hands. This extends the processing time and invariably leads to the reduction of the shelf life. As the food products stay in an uncontrolled temperature setting, the decaying process starts even before the goods are sent for processing. Sometimes just laying the products on the floor leads also to damage of the products as the vendors will try to filter the lot. Series of transactions like these lead to increased decay and damage of products. It is not just with the different players but the lack of technological support that food wastage soars.

The lack of transparency and visibility in the supply chain leads to huge margin from the farmer's price to the customer price in the case of fruits, vegetables and products which need less processing activities. Since food products go through different processing stages in different locations, as much as 88% remain preserved in cold storages while only 12% stay in the transit.

POOR CAPACITY UTILIZATION

Improper planning and poor capacity utilization leads to excess storage and poor temperature control measures. For the most part, cold storage rooms inside warehouses are used for storing single commodity products while only very few players have had a transition to multi commodity products. This is because there is a lack of temperature and humidity monitoring, a practice which needs investment. If there are sensors used by the companies, then they do not provide real-time alert and monitoring for analysis which leads to decay and damage of the products inside the cold storage room. This calls for a regular and frequent maintenance of the rooms which again incur a lot of cost and labour. As a result of unsynchronized and many small players in the system, utilization has become a major concern in the wastage of food products.

PROBLEMS IN THE SUPPLY CHAIN LEADING TO WASTAGE

There are numerous theoretical ways to solve the food wastage problem in the Indian industry. France has passed a law making it mandatory for supermarkets to give away unsold food items to charity or hand them back to farmers who can turn them into fertilizers. The Canadian government has made a mark on delivering food ingredients to over 22,000 meals every day. With the international bodies taking measures to tackle food wastage, India is yet to witness profound improvement in its cold chain operations to reduce food wastage. There are some immediate measures that could potentially pave the way for a permanent solution:

Innovation is Key: It is always possible to try out the innovative methods as done by the other governments. A group of engineering students have come up with a solution to increase the shelf life of products by using solar energy to dry food. This helps the farmers to preserve the product and retain its nutritional value thereby increasing shelf life.

Use of Multi-Commodity Vehicles: Cold chain logistics is driven by small scale transporters located all over the country. The supply chain is not put forward by a single body which is the immediate cause of fragmentation and food wastage. With improved technological advancements, use of multicommodity vehicles to transport the food products will be a solution to reduce the wastage.

Product Specific Cold Storage: Instead of storing the products in single fixed temperature storage, the products can be moved to storage sites which have products with same temperature range for cold storage. Increasing the number of cross docking stations is a potential solution to the problem of storage.

Shared Economy: Shared economy is now more popular than ever owing to the serious thread that capacity utilization poses in big cities. If there can be Uber for car sharing and Zomato for connecting the restaurant chains, there should be shared economy prospects in the B2B world to have maximum capacity utilization. Hence, utilizing the assets from other companies such as sharing the trucks and cold storage facilities would save a lot of time and money. Improving the milk run operations (a single supplier collecting all the products from other suppliers and delivering it to the common customer) with small players could be put into practice.

Government Incentives: Apart from the innovations to improve the supply chain, the government is keen on improving the industry standards and sees opportunities to gain proceeds owing to the market forecast and changing lifestyle. Providing incentives in the form of 100% income tax deductions, service tax exemptions, reduction in the excise duty and basic custom duties, the Government of India is braced for change in the current supply chain model.

Transparency and Visibility: Due to more players in the systems, providing transparency and visibility about the products is near impossible with the current infrastructure. Deciphering whether products are in processing stage, in cold storage warehouse, or in transit is still a difficult practice. However, this can be achieved by monitoring the consignments and doing data analysis about the procurement, processing and distribution of the products. If the products are anticipated in advance, the capacity and the utilization of the facilities will be maximum. To anticipate the products, real time monitoring and tracking of the products is vital for companies. Apart

from monitoring the products, firms should also try to control the temperature and make sure that the products remain the same from destination till unloading.

There has been observable improvement in the asset monitoring innovations in the industry. Many companies have used technology as a platform to enhance the supply solutions. This has become a call to action for big players in the industry to adopt these inventions and improve the supply chain by having visibility on their products. Since these wireless devices are user friendly and portable, it is easy to adopt in the existing operational activities. The customers of these asset monitoring technologies can be end user companies, 3pl companies, small transport providers, warehousing companies, suppliers, consumers who are concerned about the safety of the products. The following are some of the supply chain solutions offered by the companies in the asset monitoring sector to bridge the gap in the supply chain. Their salient features of the asset monitoring devices are listed below:

- GPS/GSM based tracking of the assets
- Real-time monitoring temperature and humidity
- Providing SOS alerts whenever the products face any uncertainty in transit and storage
- Track multiple assets in one shot using computer maps
- Alert drivers and owners of assets as per the need through SMS and web portal/Apps

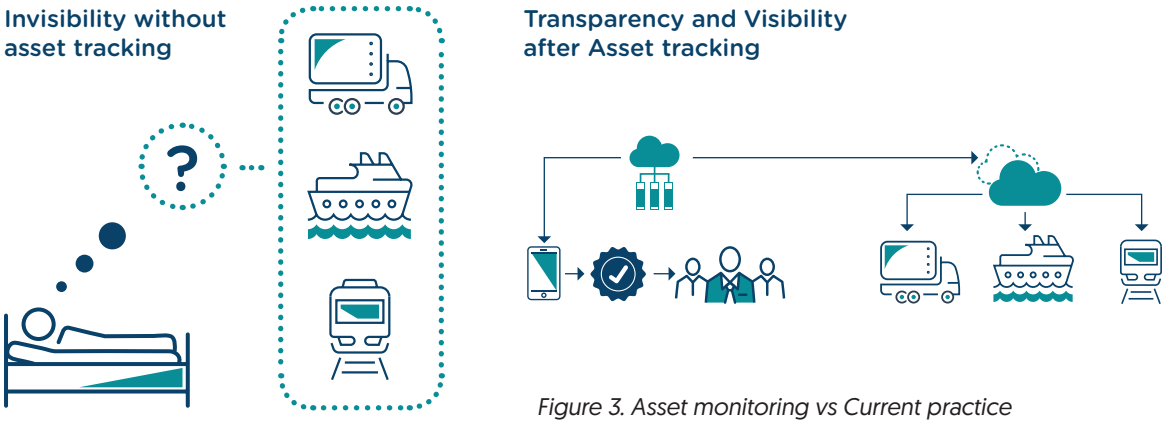

Figure 3. Asset monitoring vs Current practice

The above figure pictorially represents the advantages of asset tracking providing visibility to the stakeholders. Before implementation of real-time asset monitoring in the supply chain, the stakeholders were always under pressure on the unpredictable nature of the industry. Once these tiny devices came into play, people started being more responsible as it clearly logs all the activities and the people concerned during transit. There are handful of companies working on the in-depth monitoring of assets. These companies are from the asset monitoring domain and they do not track the vehicles, which any GPS tracking device can provide. Each company has its own USP and projects its value through sustainable solutions for the industry. Real-time Asset monitoring industry has the potential to start a supply chain revolution to solve the untraceable glitches in the Indian market.

CONCLUSION

The colossal amount of food wastage and decay of perishable goods in transit has pushed the industry to evolve and has paved way for innovations and startups to solve the prevailing issues. Since the gap between the organized and unorganized sector in the perishable goods sector is very wide, there are a lot of opportunities for the big players in the industry to improve the revenue. Given the unique production landscape and makeup of the Indian industries, the solutions to its supply chain problems must also be uniquely tailored. Innovation in technology going hand in hand with policy would prove to be most optimal to bring about visible change to India's food supply practices. With the real time asset monitoring innovations proving that efficiency and visibility is possible in the fragmented market, the early adopters of these visionary solutions have got great opportunity for an exponential growth in the Indian market.

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