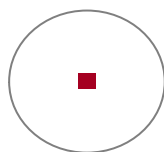


The Sun Rises on the Cold Chain Industry: The Impact of Organized Retail



AVALON CONSULTING

New Delhi Mumbai Chennai

1.0 Raison d'être

In the backdrop of the modernization of Indian retail and the existing structure of the cold chain industry in India, this paper attempts to answer two questions – one, to what extent will the demand for cold chains rise in India; second, will this demand be met captively by retailers or will it be an opportunity for independent service providers to flourish?

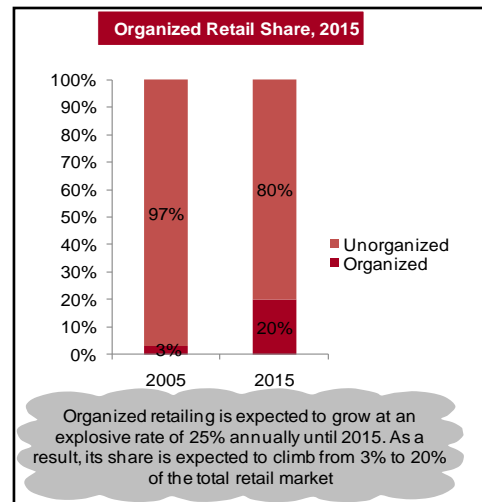
This paper brings together studied opinions, field research, published inputs, expert views and indigenous analysis on the subject.

2.0 Will the demand for cold chains in India rise to be significant?

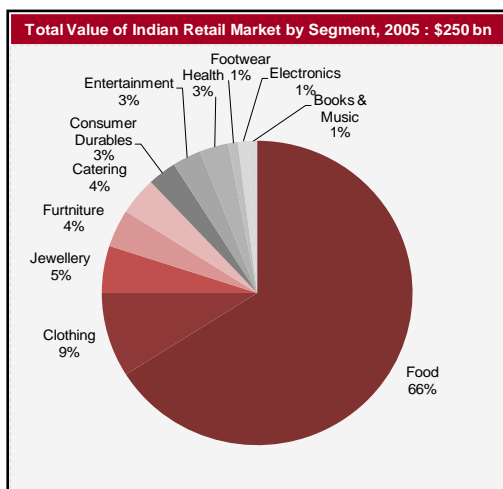
2.1 The key driver of cold chain demand: the growth of organized retail

India is one of the fastest growing economies in the world. This rapid growth is expected to continue, and India has been predicted to emerge as the third largest economy by 2050. Economic boom has also led to rise in the prosperity level of its populace; disposable incomes have gone up. India today has a billion plus population which is richer, younger and more aspirational.

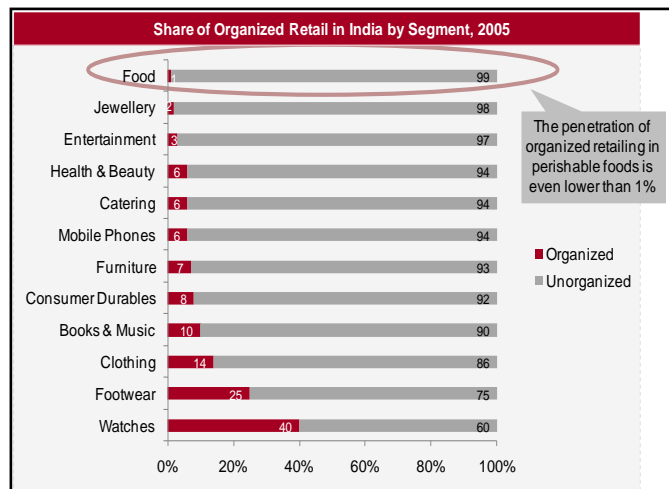
Winds of change blowing across this fast growth land are heralding many more changes. The retailing scene in India is poised for some significant structural shifts. Traditionally, India has had a very large and fragmented retail market, with only 3% of the market being organized in 2005; however, this is set to change. Numerous organized players such as Reliance, Bharti, Godrej, Aditya Birla Group, are joining the incumbent retailers - Future Group, Trent, Shoppers Stop etc. The who's who of international retailing is also in various stages of rolling out their India strategies. The Indian organized retail market is poised to explode with growth. This segment is expected to grow at 25% annually for the next 8 years and take its market share to 20% by 2015.



Food is by far the largest segment in the retail market (66% of the total market), and the least penetrated by organized retail (1%). It is hence but natural that organized players wanting to establish themselves in the \$250 bn Indian retail market will target this segment.



Source: Images Yearbook, CII Report



Source: Images Yearbook, CII Report

Modern retailers would also need to stock food produce, especially Fruits & Vegetables (F&V), in their stores with a strategic intent. F&V is a relatively low value high purchase

frequency category. It is used strategically by retailers to attract high footfalls in a store, which in turn leads to various high-margin “impulse buys” by the customer. However, for this to occur, the F&V must be of good quality and must appeal to the customer.

The quality level of F&V can be directly correlated with its supply chain, since quality is impacted significantly by the type of sorting & grading of the produce, packaging of the produce and level of freshness of the produce at the time of sale. The question then arises - what kind of a supply chain is required to deliver ‘quality’ F&V from modern retail shelves?

2.2 What is a modern supply chain?

A modern supply chain uses climate control technology and modern packaging and handling, from the time of harvest of the produce to the point of sale (see figure below).



In such a supply chain, the produce is maintained in a controlled climate environment from the stage of harvest till the point of purchase (read retail stores). The controlled climate environment reduces the rate of metabolism in harvested F&V hence extending the shelf life of the produce. Whilst the degree of life extension due to controlled environment varies from one fruit/vegetable to another, the impact is significant across. Any break in the environment across the chain accelerates the rate of metabolism (read rate of decomposition).

Thus modern cold chains are designed to start right from the farms. The produce is pre-cooled within an hour of harvest to suck out the farm heat from the produce and retard decay. Transportation is in reefer trucks, storage is in controlled climate warehouses, and retailing is through refrigerated shelves.

Such a supply chain not only reduces value loss and damages across the chain it also enhances the life of the produce. Life extension allows the stakeholders a couple of significant arbitrage opportunities – temporal arbitrage and geographic arbitrage. Temporal arbitrage is the buying of the produce **when** the prices are low, and selling when the prices are high. Geographic arbitrage, however, is buying the produce **where** the prices are low and selling where the prices are high. With short shelf lives, both the opportunities cannot be tapped - however life extension opens windows to these opportunities.

Fruit / Vegetable	Post Harvest Life without Cold Storage	Post Harvest Life with Cold Storage
Banana	12	28
Mango	12	21
Apple	21	180
Orange	21	84
Mosambi	21	84
Papaya	12	21
Grapes	10	56
Brinjal	10	14
Cauliflower	10	28
Cabbage	18	180
Okra	5	10
Onion	180	N/A
Potato	120	210
Tomato	7	21

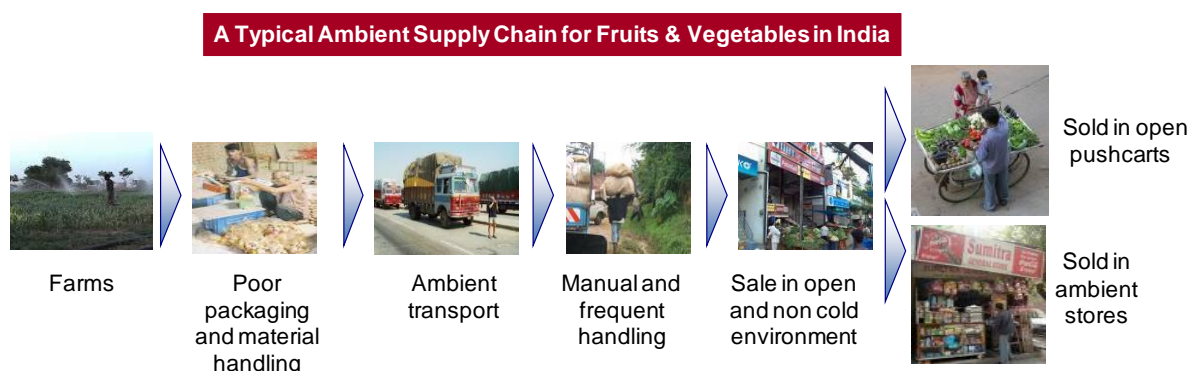
Source: Marita Castwell de Trejo, UC Davis Post Harvest Technology Research & Info Centre & Ingersoll Range

Technology deployment obviously comes at a cost. It is viable only if the benefits that accrue outweigh the costs. Given the fact that pricing of the produce in the developed world is significantly higher than that in India whilst the cost of technology is not, the cost-benefit

equation for India will not be the same as in the developed world. Having said this, there is no doubt that the modern retailers will be looking at developing and deploying India specific cold chain to attract those 'footfalls'.

2.3 Can modern retailers source from existing supply chains?

Let's continue with our focus on F&V, since this is the most significant product category within the food segment (India has an annual production of F&V of 140 mn T, making it is the second largest producer in the world). However, despite the large volumes, the supply chains currently used for sourcing F&V are primitive and have low technology intervention.



Source: Avalon Consulting Research

F&V are harvested usually late at night or early hours in farms. These are then packaged in gunny bags and transported through ambient transportation to mandis in nearby towns / cities. Through the day, the produce from these mandis changes many hands – through various commission agents and wholesalers, and finally finds its way to the various fragmented and small retail channels (small stores / open pushcarts).

Such ambient supply chains are characterized by:

- **Negligible temperature / humidity control:** The food products travelling through this supply chain are subject to ambient temperatures and humidity from the time of harvest to the time of sale. The food products travel in ambient transport and are sold in open and non-cold environments.
- **Improper packaging & handling:** Fruits and vegetables are filled into and packed in jute / gunny bags. In such packages, there is greater chance of mechanical damage which reduces the value as well as the shelf-life of the produce.
- **High velocity:** Ambient supply chains have a high velocity of throughput in case of most fruits and vegetables, except potato and apples (where cold storages are being used). In such cases, there is very little time delay* (put footnote explaining 'decay') from the time of harvest to the time of sale, generally ranging from 6 – 72 hours. This is done to minimize the loss of produce due to decay.

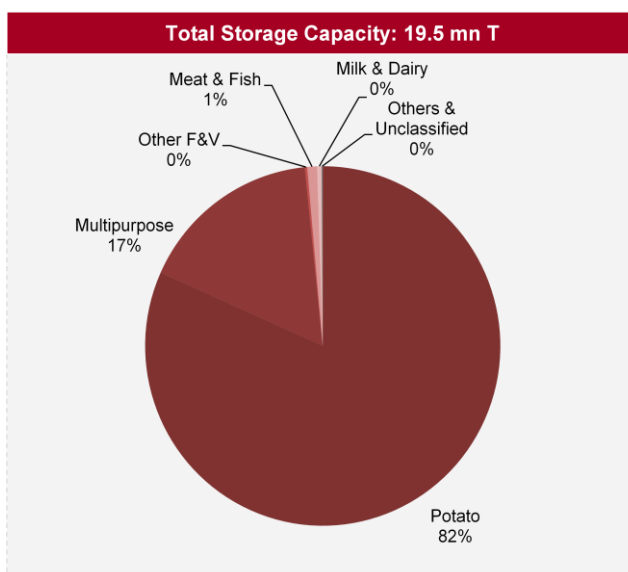
Consequently, these supply chains result in high value losses

We have, until now, talked only about the prevalence of ambient supply chains in India and the near non-existence of a 'cold chain' in India. However, India has a total cold storage capacity of 20 mn T, which is by no means negligible. How then can 'cold chains' be non-existent?

If we delve deeper and analyse the current cold storage capacity in India, an interesting observation emerges. We find that most of this capacity is dedicated to the storage of potato, despite potato accounting for only a fifth of the total F&V production. Apple is the only other significant contender for the existing cold storage space.

These cold storages (total 4700) are quite small, with only 30 being large (> 8000 T) and 70 being of medium size. Further, most of these storages maintain suspect standards with utilizations varying between 20 – 60%.

Despite the abundance of cold storages, there is negligible presence of a cold chain. This is because a cold chain comprises the use of two other major equipments – pre-coolers & reefer trucks (*refrigeration equipment used at the front end retail not included*)



Source: Ministry of Agriculture

Pre-coolers are used to cool the produce immediately post-harvest, whereas reefer trucks are used to transport the produce while maintaining climate control. However, the usage of both these equipment in the country is negligible. In fact, the entire fleet of reefer trucks in India is estimate to be less than 1000 vehicles, the ownership of which is quite fragmented. Further, integrated service providers (cold chain service providers offering warehousing and transportation) are non-existent.

Consequently, cold chain integrity cannot be maintained since the efficacy of each element in the cold chain depends heavily on the treatment received in the previous one. For example, the impact of cold storage on the life extension and product quality is limited in the absence of pre-cooling.

With such inefficiencies in the current supply chains and non-existent cold chain service providers, players looking to enter the food retailing business will need to evaluate setting up cold chains from scratch.

Setting up of modern supply chains will translate into tangible advantages that will accrue to the various stakeholders in the chain i.e. the customer, retailer and producer, thereby making it a win-win situation for all.

- **Customer:** Receives better quality produce. Produce also available in 'off-season'
- **Retailer:** Avails advantages of temporal and geographical arbitrage. Also reduced loss of produce (in transit)
- **Producer:** Receives better margin for his produce due to elimination of middle-men & trickle-down of temporal and geographical arbitrage

2.4 What other opportunity will the cold chain open up?

Currently India exports only 2% of its F&V produce. Given that India is the second largest producer of F&V in the world, and accounts for 10% of the world's total production, exports is definitely an opportunity that India can tap

However, the most significant obstacle in exporting higher quantities of F&V is the lack of proper cold chains from the production centers to the ports/ airports. Well managed cold chains will eliminate this hurdle and allow players to export F&V (*exports of F&V however will also be dependent largely upon government policies*).

The presence of such cold chains has also been observed to be a key driver of exports in major exporting countries (Thailand, Brazil, France, etc) (Thailand has been discussed in detail later).

2.5 The Size Of The Prize

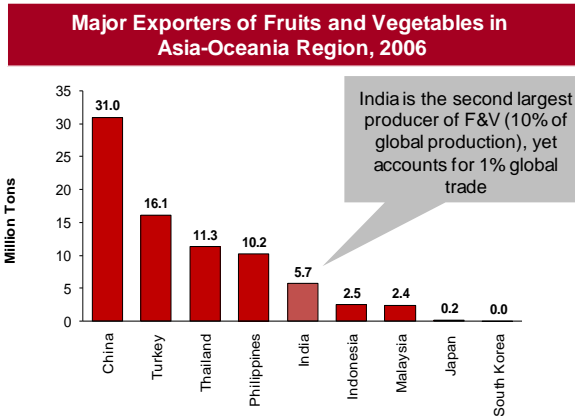
A first-cut research done by Avalon Consulting towards the size of the cold chain industry in the Fruits & Vegetables (F&V) segment alone has revealed some interesting numbers.

We expect a quarter of the total F&V production in India to be flowing through the organized retail cold chain between 2015 and 2020. This quantum of F&V will be sourced by organized players for catering to domestic demand as well as exports.

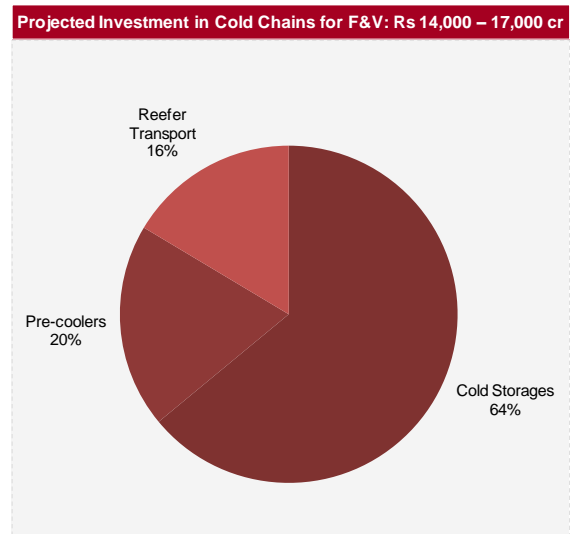
Our research shows that a cumulative investment in the range of Rs 14,000 – Rs 17,000 cr* will be required for setting up cold chains that will be able to support such throughput, with most of the investment required in the form of cold storages.

Further, our research shows that such an investment can result in a potential annual turnover in the range of Rs 16,000 – Rs 22,000 cr*. Such high levels of capital infusion and industry turnover will make the cold chain industry amongst the most vibrant in the country.

**Note: These tremendous levels of investments and annual turnover are only for the F&V category within the food market. Similar high levels are also expected for cold chains for other perishable food categories, such as meat, fish, dairy, etc.*



Source: FAOSTAT



Note: Front-end refrigeration equipment has not been included in this analysis

Source: Avalon Consulting Research

3.0 Who will own the chain – the users or independent providers?

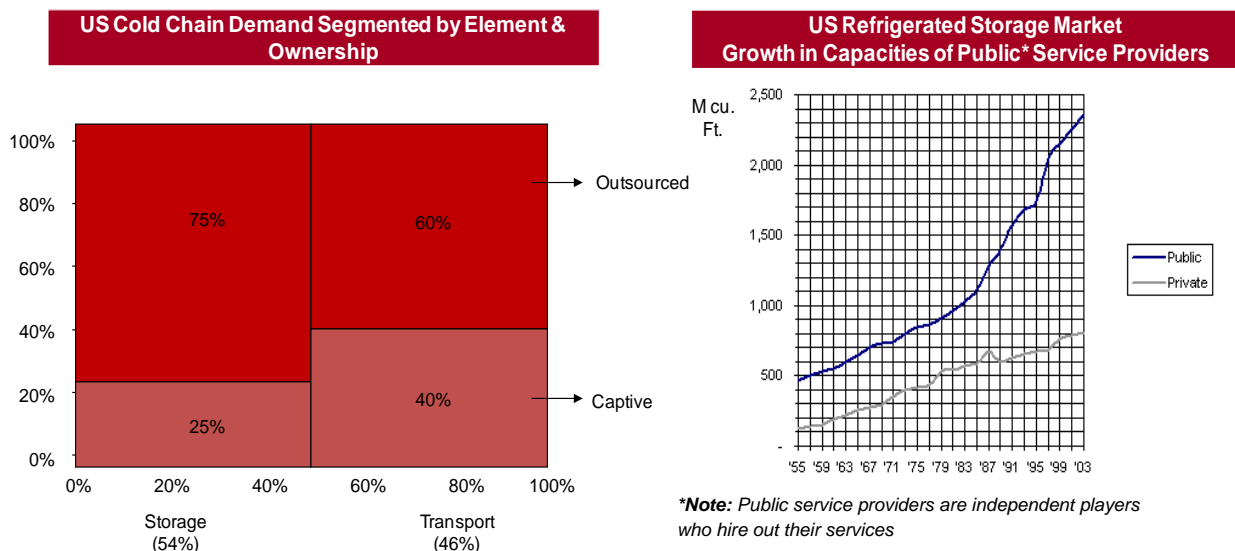
Based on the status of the existing supply chains in India, we have determined in the previous section that modern retailers will need to create new cold chains. However, the next logical question is regarding the ownership of these cold chains – will these be owned by independent service providers to whom retailers will outsource their cold chain requirements to, or will they be owned by retailers?

Two important issues surface when deciding who will create these cold chains – that of Competence and Control.

The retailers will own the cold chain if they believe in their competence to efficiently manage the cold chain, or if they believe that control of the cold chain will be of prime importance to their business models, or both. Since there are no clear answers to these issues, let us search for pointers in the experience of cold chain industries in other countries.

3.1 The Cold Chain Industry In USA

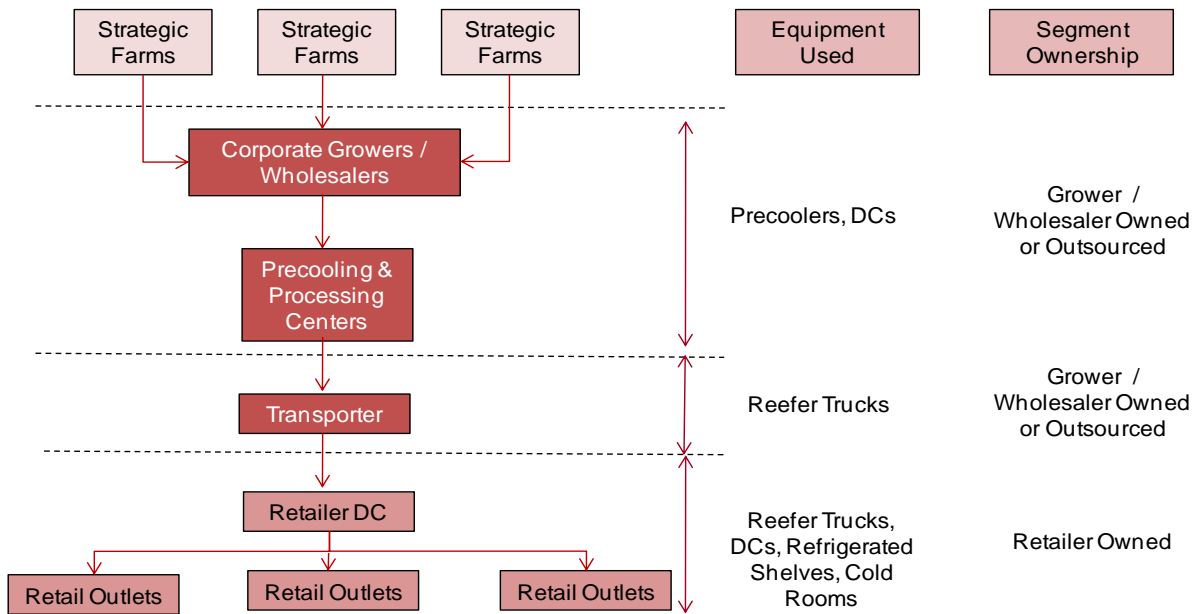
The clear trend that emerges from the experience of the cold chain industry in the US is that customers prefer to outsource their cold chain requirements



Source: IARW Productivity and Benchmarking Survey 2006, Avalon Consulting Research

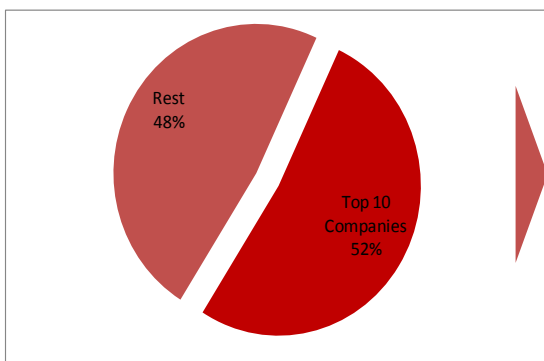
In a typical cold chain for fruits & vegetables in the US, the retailer outsources the transport and warehousing processes required to bring the produce from the farm to the retailer's distribution centre (DC). Wholesalers / independent service providers invest in the pre-DC processes (and in cold chain equipment such as pre-coolers and reefer trucks). The cold chain customer (in this case, the retailer) can now concentrate on his core competency (in this case, retailing).

A Typical Fruits & Vegetables Cold Chain in the US



This has led to the emergence of large independent cold chain service providers in the US. They control the majority of the market and provide integrated services (warehousing and transportation).

Share of Top 10 Players in the US Public Refrigerated Warehousing Capacities



Source: IARW Productivity and Benchmarking Survey 2006, Avalon Consulting Research

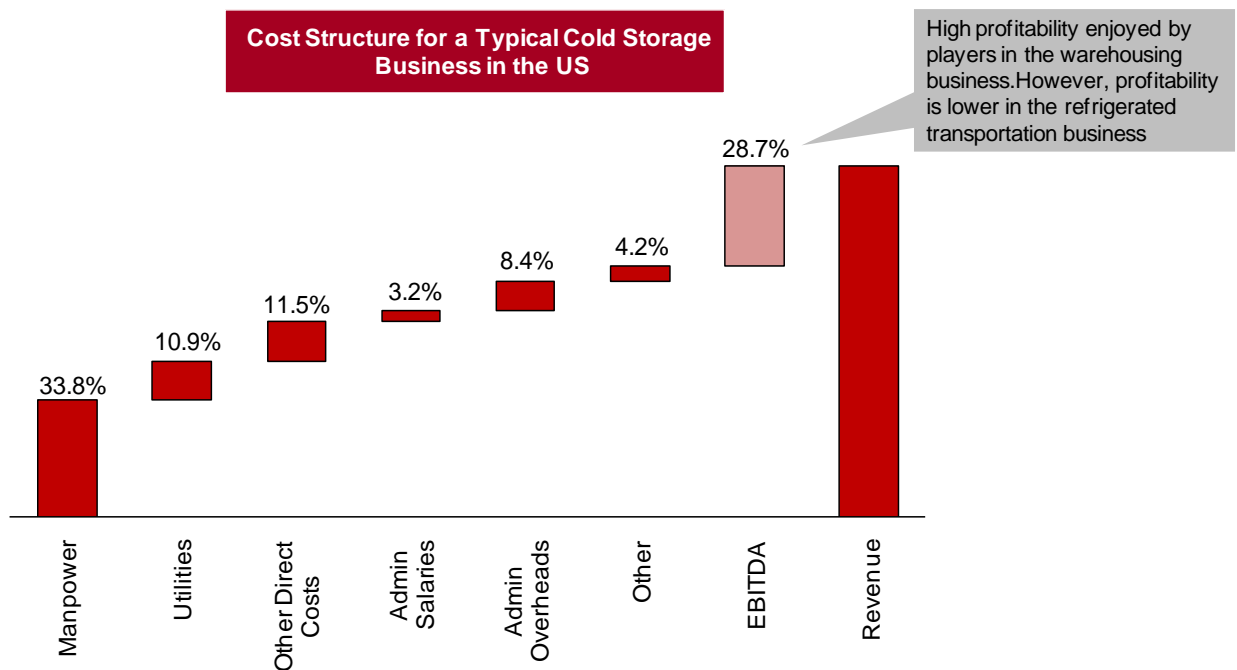
Key Players	Storage Capacity (m. cu. Ft)	Transportation
Atlas Cold Storage	212.7	Alliance
Versacold Group	194.3	Owned
United States Cold Storage	130.5	Owned
Preferred Freezer Services	99.0	Owned
Total Logistic Control	71.9	Owned
Interstate Warehousing	63.6	None
Burris Refrigerated Logistics	60.1	Owned
Cloverleaf Cold Storage	48.9	Owned (short haul)
Nordic Cold Storage, LLC	48.7	Owned
Columbia Colstor, Inc.	43.1	None

These key players provide cold chain services to producers, processors, wholesalers and food service companies, apart from retailers (refer side table).

Player Name	Verticals Served
Atlas Cold Storage	Processors, Wholesalers, Retailers, Food Producers
Versacold Group	Processors, Wholesalers, Retailers, Food Producers
United States Cold Storage	Bulk Commodities, Retail, Food Service, FMCG
Total Logistic Control	Retail, Pharma, FMCG, Health & Beauty, Perishables, Food Service, Fresh Produce
Burris Refrigerated Logistics	Packaged Food, Food Service, Retail

Source: IARW Productivity and Benchmarking Survey 2006, Avalon Consulting Research

An interesting fact that emerges is that the large cold chain service providers enjoy handsome profitability in their cold storage business. Profitability is however lower in the refrigerated transportation business. Transportation is offered by companies to offer the customer an integrated service. Many warehouse companies, like Atlas Cold storage, in fact do not invest in transportation assets.



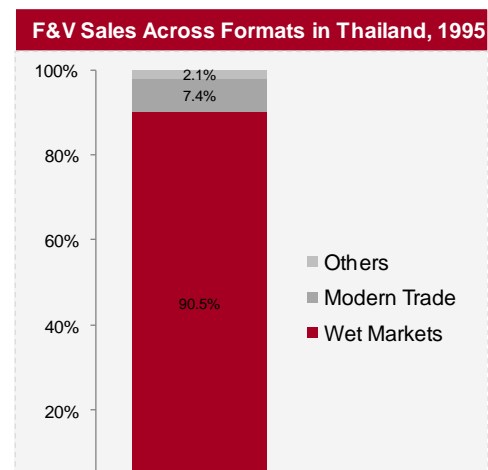
Source: IARW Productivity and Benchmarking Survey 2006, Avalon Consulting Analysis

3.2 The Cold Chain Industry In Thailand

Now let's look at Thailand, a country which is closer home to learn what shape the Indian cold chain industry might take in the years to come. Thailand has several general and specific similarities with India and its cold chain industry has experienced an amazing degree of success in developing cold chain infrastructure from nought to cater to the demands of organized retail in the past decade.

Thailand shares the following similarities with India:

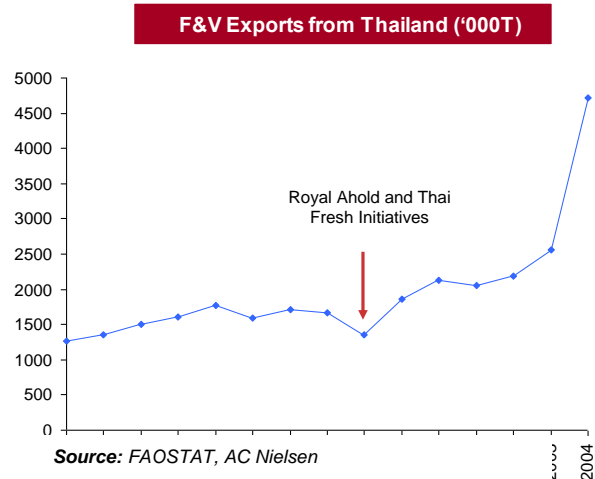
- Though today there is presence of a strong organized market, the "wet markets" (as unorganized or traditional markets in Thailand are traditionally known) still dominate
- As in India, Thailand has a strong dichotomy between the rural and urban populace and the social ecosystem
- The tropical climate and geographical topology of Thailand are very similar to Indian conditions
- There are also cultural similarities in eating and culinary habits



Source: AC Nielsen

Traditionally, Thailand's retail trade was largely through unorganized channels (as shown in the figure above), much like the case in India. However, the inflexion point occurred in 1996 when the Dutch retailer, Royal Ahold started a JV with the Central Retail Corporation and setup up the TOPS chain of stores in Thailand. The World Fresh distribution centre was then established and flow of produce from this centre to retail outlets was streamlined.






Other pilot projects started mushrooming around the country in response to the growing acceptance and demand for modern retail formats. In 1999, the Thai Fresh project was initiated by a consortium of Golden Exotics, Holland and KLM Cargo. This established the first integrated supply chain to ensure an unbroken cold supply chain and modern farm practices. The result of all these initiatives was the distinct escalation in exports of fresh produce from Thailand post 1998 as indicated in the figure.



As with any new venture, there were initial teething problems. However, these were countered by various forms of public private partnerships (in the form of fiscal benefits, developing guidelines for cold chain management, etc).

Consequently, Thailand today sees the presence of many large cold chain operators who have a pan-Thailand presence and who have strong interests in fresh produce cold chains. Players like Linfox and Havi have now had a presence in the country for well over a decade. The list also includes global players like Linfox, DHL as well as regional players like Siam Food Services. Many of these operators have also extended their cold chain operations to other products like dairy, FMCG, processed foods, etc.

In summary, Thailand till a decade ago had its majority retail sales happening through the

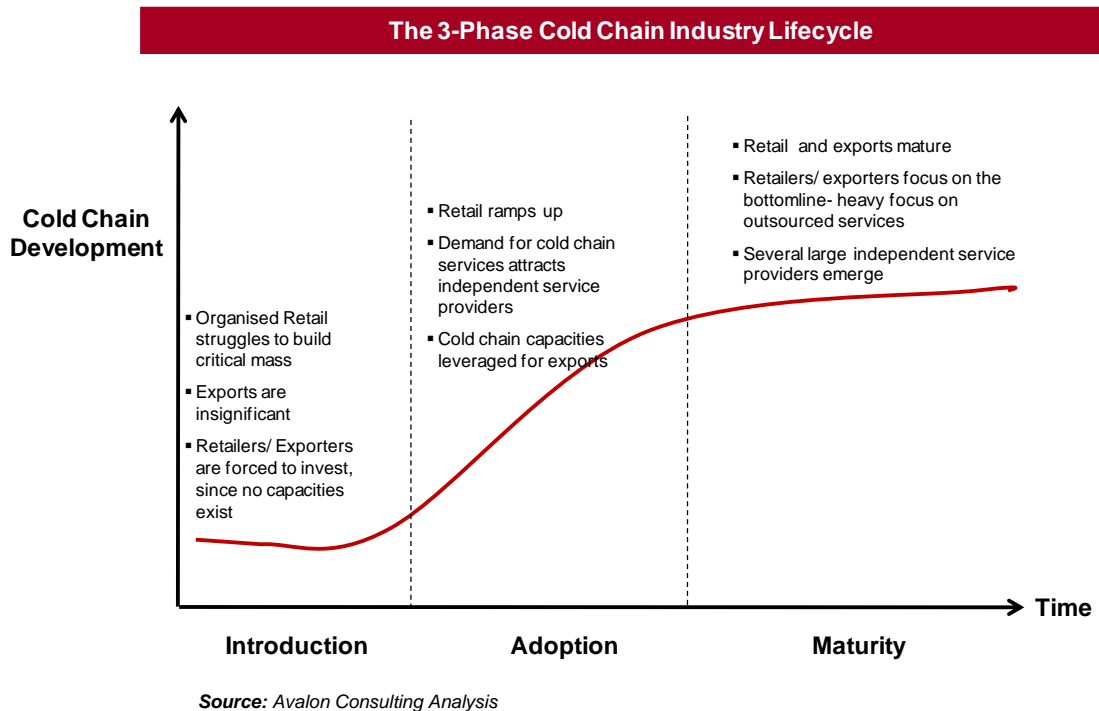
	<ul style="list-style-type: none"> Established in Thailand in 1993, allied with FMCG, Fresh Foods and retail industries Offers expertise in cold warehousing and distribution; has fleet of over 250 vehicles
	<ul style="list-style-type: none"> Integrated Distribution Services offers services in Manufacturing, Logistics and Marketing
	<ul style="list-style-type: none"> Leading provider of dry logistics to the country's food service industry Specialises in delivering value-added and highly specified meat, seafood, ethnic foods, etc. to major hotels, restaurants and caterers
	<ul style="list-style-type: none"> Integrated Distribution Services offers services in Manufacturing, Logistics and Marketing
	<ul style="list-style-type: none"> Established in 1991 with facilities for frozen, chilled and dry storage Boasts modern handling and nationwide transportation network

unorganized or “wet” markets (like in India today). However, with the growth of organized retail, the cold chain industry was able to ramp up and create a cold chain infrastructure from nought with the assistance of the government. This cold chain has also been leveraged for exports in Thailand. Today, the industry in Thailand sees the presence of many large cold chain operators.

4.0 Conclusion & key learnings for India

Based on the experiences of the cold chain industries in countries such as the US, Thailand and India, we believe that the cold chain industry in India is poised for exciting developments and growth within the next few years.

The industry will grow in three phases, namely Introduction, Adoption and Maturity.



In the **Introduction** phase, organized retailers will drive the creation of a new cold chain in the backdrop of a fragmented and nearly non-existent cold chain infrastructure and a largely unorganized retail market. They will struggle to build critical mass. Further, exports at this stage will be negligible.

In the **Adoption** phase, organized retail will ramp up in market size, thus further increasing the demand for cold chain services. Independent cold chain service providers will emerge. It is in this stage that cold chain capacities will also start to be leveraged for exports.

In the **Maturity** phase, organized retailing as well as exports will mature and demand will be stable. With the increased focus on bottom-line, retailers will look to reduce costs and hence there will be an increased impetus on outsourcing non-core activities. Consequently, the independent cold chain service providers will gain scale resulting in the emergence of several large players.

Hence, to sum up, the sun is rising on the cold chain industry in India. This industry is poised for vibrant growth in the next few years. Given that much will be created from scratch, this will throw open several interesting opportunities for new entrants as well as incumbents. Now is the time for interested players to strategize and plan their positions! Action beckons!

About Avalon Consulting

Avalon Consulting is a premier management and strategy consulting firm. The firm was set up in 1989 and it specializes in providing solutions to business problems in the areas of Strategy Development and Performance Improvement for clients in India and abroad. The firm has offices in Mumbai, Delhi and Chennai.

About the Authors

Jaldeep Sodhi is a Vice President in the Mumbai office. He is computer engineer and has completed his management from NMIMS, Mumbai. He has been with Avalon Consulting for the past nine years, during which he has advised clients in various industries such as food, agribusiness, consumer goods, engineering, etc.

Shishir Saxena is a Consultant in the Mumbai office. He is a physics graduate and has completed his management from NMIMS, Mumbai. He has been with Avalon Consulting for the past one year, and has advised clients in industries such as telecom, steel, entertainment and outsourcing.