Challenges Associated With Cool Chain Management System!

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Abstract

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Supply chain management system (SCMS) is a relatively new concept, practically unavailable in the business scenarios roughly two decades ago. Though cool chain management system is defined as a specialized logistic solution usually for perishable goods and products, in which temperature sensitive shipment ought to maintain the credibility and integrity through multi-stages movement and kept in ambient facilities to ensure the product's 100% quality, originality, freshness as well as the achievement of maximum customer satisfaction. The paper discusses the obstacles and challenges which are present in the global business market in the scenario of cool chain management system. In addition, the paper analyze in detail that how the cargo firms are trying to cope up with these pressures to make a stronger business network among the business players to achieve maximum customer satisfaction, timely goods supply.

Keywords
Supply chain management system, cool chain management, environmental factors, customer satisfaction.

1. Introduction
Supply chain management system (SCMS) is a relatively new concept, practically unavailable in the business scenarios roughly two decades ago. It is a mix of various processes including order schedules, product management and inventory control, sales support procurement, customer relations management etc. In SCMS all components combine to help a product's transportation process completed, till its final destination in a fresh or original condition. supply chain system management (SCSM) is a wider concept where the supplies of all types of items are included but the cool chain supply management system (CCSMS) is more specialized and focused towards the supply management processes involving perishable Items e.g., perishable food or edibles, groceries, delicacies, plants, flowers, medicines so much so that the list includes the transportation solution of livestock including cattle till pets etc. Cool chain management system is defined as a logistic solution usually for perishable goods and products, in which temperature sensitive shipment or cargo ought to maintain the credibility and integrity through multi-stages movement and kept in ambient facilities to ensure the product's 100% quality, originality, freshness as well as the achievement of maximum ´customer satisfaction´.

The Model for Cool-Chain for Perishable Goods:

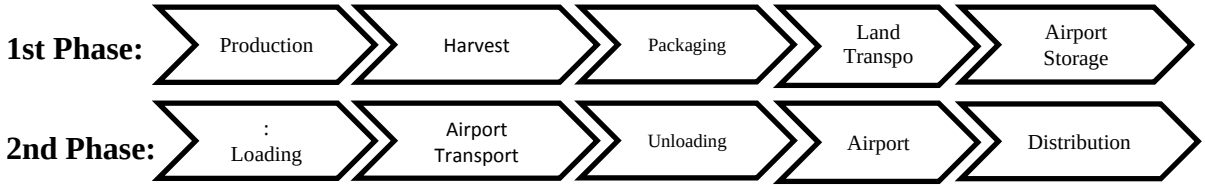

Figure 1: Reflects the Cool-Chain Model for Perishable Goods

The definition agreed upon by the researchers of cool chain management system is as follows:
"Export cold chain logistics is the seamless movement of perishable products:

- requiring temperature and/or environment controls to maintain product quality, integrity, suitability and [often] safety,
- from supplier to customer and consumer
- accounting for all the functions including meeting regulatory requirements, preparing the product for export, packaging, packing, transport, handling, cold storage, distribution, delivery and placement at point of sale".

The cool chain management system takes the help of so many aligned quantitative methods to work efficiently in its networking system, trying to connect the manufacturers to their clients (i.e., suppliers and customers and end users of their products etc.), to achieve the final value of customer satisfaction. The chain or networking included in the overall cool chain system is extremely fragile, where in, the logistic companies have to critically manage the highly delicate and complex linkages among every loop of their overall chain. The mathematical tools or strategies that are used in the cool chain management system" are mainly ERP, CRM, RFID, SCM, i2 technologies etc that help the logistic firms, that are involved in the cool chain management System" to improve their effectiveness and efficiency, to gain not only the financial returns and profits but most importantly the customers' focus and satisfaction. Cool chain management system uses the same framework which is involved in the overall the supply chain management framework-

The supply chain management (SCM) is a functional model also adaptable for the cool chain model. This framework is actually a method or a tool that assists the management of the organization to establish a well-connected or integrated logistic supply system.

This model includes various elements that represent the main operations, processes and recommended practices.

The 04 key components of the logistic management systems (i.e., SCM or CCM), reflects the recommended business practices and process, which are as follows:

- Leadership – This is an area that is associated with the provision of guidance and direction in the overall supply/ cool chain management system. It includes the managers and the team leaders from various operational areas/ functions. The performance of the supply management system is directly dependent on the successful interaction among these executives of the organization.
- Strategy – The strategy here is directly related to inventory supply operations in accordance with the production and marketing plans of the company.
- Operational Planning – This area is specifically related to the operational targets and requirements for adopting a suitable supply chain, in accordance with the tasks, resource requirements and measurements.
- Business Relationship Management – Companies share strong relationships with their Logistic Supply Chain Partners. Their relationships are highly interdependent.

Having a favorable relationship is beneficial as well as profitable for both sides. This environment helps in achieving excellent communication and negotiation facilities between the company and their supply chain partners. This relationship or network improves more in the wake of long term contract.

When one starts to break down the supply chain, accuracy in execution it becomes critical. Any lack of accurate information and processes creates costly bottlenecks in the flow of goods and materials." (- Bruce Richmond, Global head, Andersen Consulting)

2. The Challenges of Cool Chain Management System While Striving for Customer Satisfaction

2.1 Active temperature control-

The first and foremost challenge of cool chain management system is to transport the product of the manufacturer to the required location in a manner that its ambient condition has to be achieved 100%. To achieving this aim require the extensive efforts from the transporters as either the product will be shipped through air cargo or by highly advanced and well equipped sea carriers, the process is long and involve various stages. The real challenge is to achieve the required level of temperature (0-25°C) at each stage. The breakdown of the process that is involved in AIRCARGO:

- Pallet temporary storage until flight's actual departure,
- Product Transported from warehouse to ramp – (In open Air),
- Product loading process to the Aircraft – (In open Air),
- In-flight temperature setting – (The Temperature here is not the one as of a refrigerator.),
- At destination- Off-loading of the products from the air craft – (In open Air),
- Product transportation through airport cargo to the airport warehouse – (In open Air),

• Temporary storage of the product in the airport warehouse till the final pickup from the airport warehouse.

The stages involved in the loading and off-loading of the product at the airport showed that not much can be done to safeguard the product from exposing to the environment where the temperatures cannot be maintained at a maximum lower level to protect its ambient condition or quality. All the players involved in the cool chain management system, (i.e., growers, exporter, importers, and retailers etc.) can reap maximum profits from improving and protecting the products original condition and quality as it can boost their sales and associated profits.

Following are the two solutions for reliable cool chain products, and both suggest the maintenance of required temperature:

• On the basis of dry ice refrigeration.

• On the basis of compressor cooling and electrical heating

The logistic or Cargo Companies have provided the solution for that, to achieve customer satisfaction By offering highly technical logistic arrangement and sophisticated facilities of product handling. New equipment and services are provided which are multi-facet, with a control temperature system assuring the required levels of temperatures for over 72 hours. The improved and most modern facility is now available at the right locations (Airport Cargo venues etc.) and at the right time, for all the parties involved in the "Cool Chain Management Systems". So similar operating options are standard procedures are available for assuring the product's life and quality at the maximum level. (AirSea: International Relocation and Freight Services-2007). Up to 30% of fresh produce is wastage through poor logistics. Temperature has the biggest impact on quality" (David May - Technical Manager, Tesco).Temperature Abuse is the single most important issue to tackle for the future (Cool Chain Association- Feb, 2003).

2.2 Controlled Oxygen & CO2 Levels –

During the packaging and transportation process of perishable goods like fruits, grocery, meat, flowers etc. it is a challenge to maintain the required levels of Oxygen and CO2, while product packaging and in some cases during through the transportation of the product. It guarantees the high quality and original condition of the product throughout the journey till its final destination. That is also regarded as highly targeted achievement by not only the packaging teams but also the cargo service (Airline or Sea Shippers), as it is directly linked with the achievement of greater gaining on the areas like "more profits, less product wastage, excessive customer satisfaction and increased credibility of the forwarding company as well as market recognition and finally the increased market share and profits for the manufacturer or producer it-self. To achieve all the benefits mentioned earlier, the manufactures and producers , packaging teams and the forwarding or transportation companies are competing extremely hard now-a-days, by coming up in the market with the highly sophisticated solutions like controlled areas for product packaging and mechanically operated insulators for the product storage, assuring controlled oxygen and CO2 levels during all the stages that starts from the factory to through the long journey till the final destination. This is a breakthrough in the history of collaborative linkage or networking among the business players like producers, packaging teams and the logistic(s) or cargo services. This effort is not only to make good financial profits but to earn customer satisfaction and stronger business networks among all the players (e.g., producers or manufactures, retailers, transporters, customers and ultimate users etc.) involved in the business activity, involving cool chain management system as the logistic solution.

2.3 Controlling ethylene production and its removal as well as reduction of production of Grey mold –

This is another challenge faced by the producers/ manufacturers, the packaging team and cargo services in their effort to supply the product to the geographically distant locations in the ambient and original quality. controlling ethylene production and its removal is necessary to preserve the original condition and quality of the product not till its final destination but it also helps in increasing the shelf life of the product. The longer life of the product in the original condition guarantees the best profits and the longer and stronger business networking among all the players (e.g., grower, manufacturer, producer, retailer, supplier as well as the customer and ultimate consumer.) involved in the business activity involving cool chain management system. These efforts of controlling ethylene production and its removal as well as reduction of production of "Grey mold" helps in achieving the less wastage of the products so high profits and more customer satisfaction is linked with as the biggest advantage.

2.4 Killing in quarantine insects-

This is another very critical challenge to be achieved to attain the target of maximum customer focus and satisfaction by the business companies to maintain their reputation as the producers and suppliers of best quality products. To save the product from insects and the other elements that speed up the decaying process of the product is highly sensitive target. The business relationships among the business parties like growers, producers/ manufacturers, suppliers, retailers and customers etc. are extremely case sensitive. The low graded product at any stage can cause the permanent breakage in this whole value chain of business relationship. The cool chain management system also faces the challenge of providing the best possible facilities during the whole logistic process of the product to the final destination. To counter this challenge the cargo facilities have come up with improved facilities of "insect free" transportation solutions now-a-days, just to achieve the target of customer satisfaction.

2.5 Prevention of chilling injury –

A highly challenging task of transportation the perishable goods for one location (from manufacturing or producers) to the destination i.e., either any location within the same country or a locations thousands miles away, might be in another continent. The task does not stops here but it further adds a conditional requirement that say throughout the journey, it should be assured that the transported perishable items be prevented from the chilling injury'. It is a mammoth task. It is a straight forward requirement from the cool chain management systems for the achievement of maximum customer satisfaction and building stronger business ties among the players involved in the business activity.

The cool chain management system is focusing more on achieving the challenge as this will ensures better and longer term value based relationships among the business players (i.e., growers, producers, manufacturers, retailers, and customers etc.), more profits, less product wastage, better reputation, good and credible brand naming etc.

2.6 Maintaining high quality "Shelf life" –

The target of transporting the perishable goods, through cool chain management system, from location to the other long distant location, in a way that the original and ambient condition of the product will be achieved 100%, due to maintaining the extremely low temperatures (0-25°C) throughout the journey is a challenge. Meeting this challenge means the achievement of the product's enhanced Shelf life. This gives the opportunity to the customers to buy the product for longer time duration (i.e., till the Product is available on the store's shelves), hence maintaining a longer customer contact. This results in a perfect opportunity for the growers, manufacturers, producers, retailers and the suppliers to make a stronger and longer appearance in the business scenario and stronger business chain loops. Though this challenge is highly sensitive and in some cases un-maintainable but with the efficient cool chain management systems efforts are being done by combining research methods, hi-tech mathematical models and technical support procedures, to achieve the customer satisfaction.

2.7 Best Possible Product for the Customer at the Right Cost, and the right Time –

This is another challenge faced by the players involved in the cool chain management System. To supply the perishable goods, ranging from simple food items to highly sensitive products like "lifesaving drugs or a human organ it-self", in a 100% safe and original condition, to far flung locations (i.e., might be in a different continent), for the customers, at affordable price(s) and exactly at the specific time of desire and requirement is something magical. But to achieve the customer satisfaction and maintaining stronger business relationship among all the players in the business network is a requirement of the current times. Although, the task sounds difficult but with better communicational solutions, most modern and highly technical facilities, methods and procedures available with the air and sea cargo service providers, now it is possible. The better written agreements and long term contract awards can help in managing and achieving this challenge, to build better and stronger business relationships among the various components and players of the overall business network(s).

2.8 Capacity Constraints –

This is a challenge, faced by the players involved in the overall cool chain management system, while the product supply process, from the location to the Final destination. The real capacity shortage in the cargo carries travelling with perishable goods (i.e., either through land, air or sea), sometimes cause huge losses ranging from product damage, product wastage to the extent of heavy losses in financial profits, permanent discontinuation of long term business networks or relationships among the cargo company and the growers,

producers, manufacturers, retailers and the customers. This can also become the key factor in the loss of credibility and positioning attached with the brand name not only of the cargo firms involved in the process but of the product manufacturers also. So this is another extremely important challenge in the to counter for while the cool chain management system, to safe guard the customer satisfaction and better and stronger business relationships among the various business player involved in the business activity.

2.9 Incompatible Communicational and Information Systems –

Another challenge being faced in the overall process of cool chain management system is the matching and striving for achieving a compatible environment, where all the relevant business players (i.e., grower, producer, manufacturer, retailer, suppler, transporter, customer as well as the ultimate consumer etc.) can work together for the achievement of better links, throughout the product transportation process (i.e., from the location(s) till the final location(s). This is extremely important as every element in the business process, has its own working preferences and the corporate communicational and Informational systems so when they combines in a network for working jointly, especially in the situation of cargo or product transportation process, all the parties strive for the compatibility to achieve accurate results, like they try to supplying the products in right quantitative, at right places and at the most accurate time. Hence, the stronger effective communicational support and better informational system compatibility among the relevant business parties, helps in achieving this target of displaying the required products at the shelves of shopping stores, at the right time, to achieve maximum customer satisfaction and loyalty with the specific brand name.

2.10 Quality Problems –

To tackle the issues like quality and consistency, in logistic system with focusing more on temperature control, is a real challenge but it is significantly controlled with the help of the effective planning of end-to-end custodial control, en-route electronic and satellite monitoring and a capacity for timely and effective contingency planning. Well planned pre-shipment strategy, in addition to a mutual discussion and arrangements of solution options between carrier and transporter gives an assurance of improved quality and economy for pharmaceutical suppliers:

- Pre-shipment planning
- Risk Management and Contingency planning
- Availability of an efficient en-route tracking and monitoring System,
- Research and evaluation before selection of carriers' (i.e., with specially focusing on the quality systems it offers)
- Proper negotiation and well documented mutual agreement.

The Aim will be to create an environment where, if the cool chain management system is utilized for exporting the much higher quality products like lifesaving medicines, even then the patients may feel safer because the product quality is assured and fully maintained, the health authorities can also feel confident that the high quality will be maintained till the final destination and the fear of wastage of the product and the associated wastage cost will be eliminated.

2.11 Security and real-time tracking –

This is another challenging tack in the overall cool chain management system. The continuous information regarding where the product actually is (location wise), during the transportation process is very important not only for the cargo companies, involved its shipment but to the producer, and sometimes for the customers as well, to when they will arrive exactly. As the process involves the transportation of perishable products so this information is more important and critical. The cargo services are doing much for achieving the target of security and real-time tracking, which is important not only for the security of product quality and its ambient condition, till its final placement on the market shelves but to achieve the maximum customer satisfaction by placing the product on the market shelves at the most suitable time.

New temperature control containers are being developed that allow customers to view the location and condition of the container in real-time. With this new technology, GPS receivers and radio modems operating on different frequencies will enable the continuous monitoring of a container's location to within 15 meters anywhere in the world. Sensors monitor conditions such as internal and external temperature, humidity, shock and opening of the container door. This system will raise an alarm when different threshold levels for temperature or shock are exceeded, or if someone is trying to break into the container. With security of products being just as important to pharmaceutical customers as quality, this system represents another

important step forward. It also reduces insurance costs. (AirSea: International Relocation and Freight Services-2007)

The ultimate advantage here is to achieve maximum customer satisfaction and stronger business networking among the business parties involved in the business activity, with the help of cool chain management system.

2.12 Connecting the values like safety, security and sustainability to the cool chain management system –

The air carrier limitations, in association to the mishandling of the products, while confronting with the transportation security administration challenges. This poses a real threat to the cool chain management solutions as the transporters find it difficult to clearly protect their packages from damage at this stage.

The following research analysis related to the subject area is as follows:

"Almost 90% of Air Cargo carried globally depends upon uneasy alliance among a network of Airlines, freight forwarders, ground handlers and other parties. Each participant depends upon the other for its operation, growth and survival, but also competes with them for profit. Because each optimizes its own operations, no one optimizes the system, decreasing the value of Air transport to shippers and consignees" (Cool Chain Association- Feb, 2003).

2.13 Global pressure for maintaining high quality logistic system –

This challenge faced by the players involved in the overall process of cool chain management system is getting intense day by day, due the new advancements in the field of technology and formation of formal bodies enforcing laws and procedures for the maintenance of product's high quality and specific acceptable standards. The recent example of Chinese milk supply being suspended, by many Asian and European Countries, on the wake of the evidences which confirmed the contamination and extremely poor quality of the product. The shipments of the product were cancelled and few that were already reached to the destinations, remained on the docks and Airport ware houses, as the retailers and the companies refused to accept them. That situation not only brought bad name to the Chinese producers' and manufacturers of diary products but became the reason for the breakage of valuable chain links among the parties involved in that business activity. The negative results attached to this example are the loss of customer trust, business image of the Company, huge financial losses to the Company, the blockage of the cargo ships on the decks for offloading the products more than the expected time and caused more financial loss to the transporters as well as the producers etc. Hence the companies are trying more to cope up with such kind of issues. The following passage will throw more light on the target areas: The rapid development of temperature-controlled air transport units is stimulated by higher industry awareness of the value of an unbroken cool chain and increasingly stringent controls over transportation practices from national health organizations and regulatory authorities like the United States Pharmacopoeia (USP), the US FDA and the Medicines Control Agency in the UK. (Cargp Partners Network-2008).

2.14 Working and Surviving while countering with the Local and global regulations, during product supply process, that involves different countries –

The examples are supply of products from Europe to different locations across the world or vice versa.

2.15 High maintenance running costs –

The examples of this the payment and expenses, borne by the business players and especially by the cargo companies for the highly sophisticated temperature controlled Infrastructure, rents of warehouses, fuel cost etc. to provide excellent services to the customer for achieving the maximum customer Satisfaction". Here we should also borne in mind the effects of fluctuating fuel costs, issues of security and its related cost etc. imposing more burden on the overall cool chain management system.

2.16 The risks associated with outsourcing underscore the importance of supplier selection and supplier development –

The example of this challenge can be evaluated on the wake of the situation when the business company, wants to supply its product to any off shore location, at a targeted time, and mistakenly selects a cargo company that delays its product or mishandle it to an extent that the quality of the product gets affected. The simple results would not be compensated through filling damages suites against the transporters. Actually it is much more than that. The production company will find it more difficult to again achieve the high position in the eyes of its customers who were disappointed by remaining unable to get the product either in the good condition or to get it at all.

2.17 Training costs (For the employees and other involved parties in the cool chain system.) –

The cool chain management system is an extremely new field. So, it involves extensive training costs, not only for their own staff, that are responsible for running the cargo systems accordingly but also for the local growers, producers, manufactures, retailer, supplier and customers (in specific situations), to encourage the adoption of cool chain management system for gaining maximum customer satisfaction and stronger links among various key players in the business network.

2.18 Unpredictable Cycle Times –

This is another critical challenge faced during the cool chain management System. The example of this can be when the business companies and their authorized cargo companies remain unable to have a control on the management process of product supply to support the process of replenishing the market shelves with their products in time. This critical task to have a control on unpredictable cycle times to achieve the customer satisfaction.

2.19 Sudden changes in the requirements of Product Volume and Mix –

The cool chain management system finds it hard to make sudden changes in their systems in line with the sudden changes of the perishable product's volumes and mix. The Cargo Companies usually focus on having long term contracts with the Growers, Producers manufactures etc. But sometimes they face pressure from the producers etc. to accommodate their changed volume of supplies on short notices. These types of requirement sometimes create tension among the players of the business network and cause customer dissatisfaction". So, countering this situation in a peaceful manner is really important to build stronger and long lasting business networks and achieving customer satisfaction.

2.20 Standardized door-to-door solutions –

The cool change management system involves the supply of perishable products. It mostly includes the items like flowers, vegetables etc. For provide support facilities to their customers and business clients many cargo companies" tries to reach out for their clients till their door steps. This service is extremely beneficial to cultivate and nourish the stronger relationships among the clients but on the other hand this kind of support facilities sometimes demands pains taking efforts from the players involved in the Business activity. (AirSea: International Relocation and Freight Services-2007).

2.21 Consumer's Taste, behavior and requirements –

To continuously have an eye on the customer's tastes, behavior and requirements is extremely beneficial to build and maintain stronger business ties among the business clients, to achieve maximum customer focus but it is a big challenge in the cool chain management system". However, the cargo companies are striving hard for achieving the maximum customer focus and building stronger business ties with the help of having continuous watch on the customer's tastes, behavior and requirements and modifying their services according to that.

2.22 Competition –

Now- a-days, the competition is extensive and the Darwinian theory applies to the business market that says Only the fittest will survive". Hence, all the business entities are trying to make a lead over the other and coming up with most modern, customer friendly procedures, services and facilities to achieve the customer satisfaction and stronger and long-term business networks .To survive in the highly competitive business world is extremely challenging but the cargo companies and the other players in the business activity are making efforts to build stronger business ties and achieve maximum customer satisfaction. The invention of latest temperature controlled equipments, huge road, sea, and airline carriers with the most modern facilities to transport the extremely delicate and perishable items, across the continents, at the required times are the few examples of the efforts, to achieve customer satisfaction and long term business ties among the various business players involved in the cool chain management system.

3. Conclusion

Cool chain management system is quite an advanced logistic solution for the business companies involved in the production and dealing with products having perishable nature. Today's intense business completion has compelled even the cargo companies and transporter to develop new and more sophisticated methods , introduce innovation in

their operations and services for the achievement of maximum customer satisfaction and for development of stronger and long term business networking among all the players(i.e., growers, produces, manufacturers, retailers, customers etc.) involved in the business activity. In the paper, the authors tried to discuss the obstacles and challenges which are present in the global business market in the scenario of cool chain management system and that how the cargo firms are trying to cope up with these pressures to make a stronger business network among the business players to achieve maximum customer satisfaction, timely goods supply.

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Biography

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