A CASE OF LOGISTICS OPTIMIZATION FOR A LARGE PROCESS INDUSTRY: A SAP-LAP FRAMEWORK

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Abstract:

Logistics plays a strategic role for any organization. It is imperative to ensure seamless integration of logistics activities. In this work, a case study related to outbound logistics of a large process organization 'X' is presented. A situation-actors-process (SAP)-learning-action-performance (LAP) model has been applied to understand and analyze the logistics issues of the case organization.

The outbound logistics operations of X for transportation of metal from its manufacturing base to the stockyards as well as customer sites are studied. The relative strengths and weaknesses of the present logistics system were assessed. It was found that the current logistics system was hampered due to High dependence on road transport, Variable delivery time, Lack of 'stock-in-transit' monitoring system and inadequate communication system. To address these key concern areas, the logistical solutions were suggested. The suggestions were based on Establishing an Inland Container Depot (ICD), Use of higher capacity trucks, Strengthening the MIS system and Deploying RFID, GPS for stock tracking. The case findings can provide managers insights into the outbound transportation issues for large process industries and possible solutions. The findings also suggests for environment friendly solutions for a sustainable development.

BIO NOTE:

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1. INTRODUCTION

In an integrated supply chain transport plays a vital role and it is important to realize its role and responsibilities (Stank and Goldsby, 2000). In fact transport connects companies to their customers. An effective transport operation can enable the delivery of customer value. Many researchers have developed supply chain models focusing mainly on manufacturing. Transport has traditionally been considered as a marginal activity within supply chains (Stank and Goldsby, 2000) and it has not been explicitly taken into account in those frameworks. It is necessary to assess the details of transport operations, as this will define the performance of logistics operations.

The paper proceeds by presenting a synthesis of the problem faced by the case organization in transport operations. After that, the case study is presented in a SAP LAP framework where the logistics problem faced and the possible remedies are highlighted.

2. ORGANISATION DESCRIPTION

The case organization X is Asia's largest integrated aluminium complex, encompassing bauxite mining, alumina refining, aluminum smelting and casting, power generation, rail and port operations. X’s product portfolio includes calcined alumina, aluminium ingots, sow ingots and wire rods. X has also entered into value-added products such as aluminium-rolled products, special grade alumina, special hydrate, and zeolite. X has emerged as a leading player in the production and export of alumina and aluminium, and more significantly, in propelling self-sustained growth.

Currently, about 350,000 tonne of aluminium is transported by rail, road and sea. This figure is expected to increase to 460,000 mt approximately (with 160,000 mt for export and balance for domestic sale including sale from stockyards) after the second phase of expansion.

In January 2010, a logistics study for the transportation of aluminium metal by multi-modal transport (road/rail/sea) from its smelter plant to the existing and proposed stockyards as well as export of metal from various existing & proposed port locations was carried out.

3. OBJECTIVE OF THE STUDY

The purpose of the logistics study is to:

- Assess the strength and weakness of the present system of transportation of aluminum metal by road / rail to the existing stockyards from the smelter plant

- Provide solutions for the logistic needs of any dimension and bring about stability in the distribution system.
- Provide logistical solutions for movement of metal by multi-modal system (road/ rail)

4. SAP-LAP ANALYSIS

In this section, we analyze the X case using SAP-LAP framework. The analysis is conducted in the context of the supply chain performance initiatives in the organization.

A mode of inquiry using situation-actor-process (SAP)-learning-action-performance (LAP) models of flexible systems management is proposed by Sushil (2000). The ''situation'' represents the present status, environment of an organization and the driving forces for good performance of an organization. The ''actors'' are the individual participants, or group of members, which influence the situation and define an organization culture to evolve business procedure. The ''process'' is an overall transformation process that converts a set of inputs into outputs to recreate the situation (Sushil, 2001a). A situation is to be dealt with by an actor or a set of actors via a process or a set of processes. The interplay and synthesis of SAP leads to LAP in which various learning issues are brought out regarding SAP.

4.1 Situation

This section aims to highlight the current capabilities, efficiencies of X's logistics operation and its current resources utilisation. It captures the critical factors affecting the logistics flow inside the smelter plant, i.e., infrastructure, resources, handling capacity, product flow, stacking, current information flow and processes and the factors affecting the outbound logistics flow of aluminium metal from the plant to the stockyards/customers.

As per the scope of work for the assignment, the main emphasis has been on analyzing the current logistics structure and infrastructure for transportation of X's aluminium products to the stockyards at different places from the smelter plant through rail and road for domestic consumption as well as exports. The focus has been on bringing out the strengths and weaknesses of the current logistics network so as to identify areas of concerns and consolidation which may further lead to the reduction in the supply chain cost and its inefficiencies and increase competitiveness, thereby benefiting X's customers and stakeholders.

Assessment of the outbound logistics for the transportation of aluminium products from the smelter plant to the stockyards and for exports through road and rail forms the core of the present study. Our As-is analysis of outbound logistics system takes into account the available infrastructure, sales execution processes, product distribution mechanism, product dispatch processes and information dynamics in order to map the critical processes.

The "As-Is" analysis of X's logistics system assists in attaining the following outcome:

• Mapping of the current strength and weakness of the transportation system

• Identification of gaps in the current logistics process

4.2 Actor

To carry out an "As-Is" analysis, our team conducted a site visit and carried out discussions and interviews with officials involved in the process of transportation, right from the planning levels; railway officials; customers; transporters; the Truck Owners' Association; and other industry stakeholders.

4.3 Process

4.3.1 Sales Execution process

The officials receive dispatch instructions on a day-to-day basis from the Marketing Department providing details and quantity of the product to be dispatched by road or rail. In the initial three weeks of the month, these details involve rail and road distribution, while in the last week, it only involves road distribution.

The smelter plant has three open yards/ dispatch areas. The majority of company's customers have entered into a Memorandum of Understanding (MOU) with the company, specifying their annual off-take and approximate monthly off take. MOU enables the customer to avail of certain discounts as well as earn a priority status whereas the company X is ensured of its sales and demand pattern. As of today almost 99% of X's customers are MOU customers. These customers place aluminium requirement orders with the Regional Office (RO) primarily on the basis of:

• Material requirement plan of the month

• Secondly, aluminium metal prices vis-à-vis the London Metal Exchange (LME). As X's primary aluminium prices are linked to LME prices, customers wait for an opportune time to place orders.

- Thirdly, to avoid penalty on account of defaulting on the monthly offtake commitment.

4.3.2 Dispatch for Ex-Work Customer

An MOU customer, who wishes to take delivery ex-works, has to make an advance payment or furnish a letter of credit (LC) according to its stock requirement (quantity committed in MoU) and inform the RO about the payment details and the preferred point of delivery through fax/post/mail. The preferred point of delivery is however subject to the availability of material at the preferred location; by and large it is the nearest stockyard. A loading programme is made in the evening prior to the day of dispatch containing information on location, stack numbers, etc. As per the procedure, the loading programme is provided to the transporters in the evening itself, to enable them to arrange trucks for the next day. The next morning, transporters queue up their trucks at the plant gate.

4.3.3 Product Allocation

As per current practice, the finished product for the first three weeks, i.e., till approximately the 21st of every month, about 50% of the daily production is primarily apportioned for rake build-up, for exports. The remaining is allocated for domestic sales (ex-stockyard and ex-work) by road, i.e., about 500 MT of metal is available for dispatch by road per day. Of this 500 MT, the ratio of ex-stockyard to ex-work sales allocation during the first three weeks of every month is largely 2:3. This leads to a maximum allocation of ex-work sales in the last week of every month, i.e., about 1,000 mt to be dispatched by road every day.

The company X seems to have lost out on a few customers due to higher lead time for metal delivery as the final landed price of metal at the customer site is more or less constant irrespective of the supplier. Secondly, the competitors have their stock either in the same stockyard or in close vicinity at majority of the stockyard locations which makes it easy for a customer to exercise the option of alternate source for the metal in case of its unavailability with X’s stockyard at the required time. However, with ever growing competition, a long-term sustainability of such an operating model could be a matter of concern.

4.4 Learning

4.4.1 Strengths and Weaknesses of the X transportation system

After detail study and discussion with relevant people, the relative strengths and weaknesses of the present logistics system as perceived by company officials, transporters and customers were determined as follows:

4.4.1.1 The following table represents strengths as perceived by company officials, transporters and customers

Table I: Perceived strengths of X's logistics system

Company Officials	*Transporters*	*Customers*
MIS system interface between RO, CO and the Plant Management Information System (MIS) architecture facilitates information integration between RO, CO and the plant. It assists in faster information processing, better control and management of database.	***1. Huge fleet of trucks availability to meet transportation needs via road*** X has access to large fleet of trucks for meeting its road transport requirements.	***1. Low incidence of stock damage / pilferage*** Reported incidents of stock damage or pilferage have been low.
2. Rail connectivity with 9 rail lines & 13 locomotive X has it own rail sidings within the smelter plant, which is connected with the rail station. X also owns 13 diesel locomotives	***2. Adequate equipment Availability*** X owns and hires a variety of equipment including overhead cranes, hydra etc. which are adequate for material handling within the plant.	***2. Quality of packaging is better than its competitors*** X's quality of packaging, especially for wire rods, is an USP as it protects the cargo during transit. Nylon or metal strip wrapping around ingots reduces movement and damage during shipment and gives X an advantage over its competitors.
3. Regular and assured supply of raw materials Captive bauxite mines, power plant and refinery ensure continuous supply of raw material at economical cost.		***3. Timely delivery through stockyards***
4. Quick loading / unloading as per programme		

4.4.1.2 The following table represents weakness as perceived by company officials, transporters and customers

Table II: Perceived weakness of X's logistics system

Company Officials	***Transporters***	***Customers***
1. Lack of 'stock-in-transit' monitoring X presently does not have a stock-in-transit tracking and monitoring system in place.	***1. Non-uniform demand of trucks throughout the month***	***1. High cost of road transportation*** Transportation cost is about 30% more than the prevalent market rate
2. Difficulty in achieving optimum balance between rake build-up and stockyard allocation Rake planning is done keeping a buffer of about seven-ten days so that export shipment does not miss the destined vessel at loading port.	***2. High turnaround time of the truck inside the plant***	***2. Poor visibility of cargo in-transit***
3. Inadequate infrastructure for unloading of wagons at smelter plants.		***3. Variable lead times for the product delivery.***
4. Inadequate infrastructure for unloading of container rake at stockyard.		***4. Few Instances of the cargo damage in recent past***
5. Under-utilization of some of the stockyard facility		

4.5 Action and Performance

The As-Is analysis in the previous section assists in attaining the following outcomes:

- Identification of strengths and weaknesses of the transportation system
- Identification of gaps in the current process
- Estimation of gaps between the As-is and To-be processes

The gaps identified in the previous section assists in the development of a logistics solution to address the identified gaps and achieve the "to be" state. To achieve the "to be" state, the key areas of concern and consolidation that need to be addressed so as to enhance customer satisfaction while lowering transportation cost are detailed below:

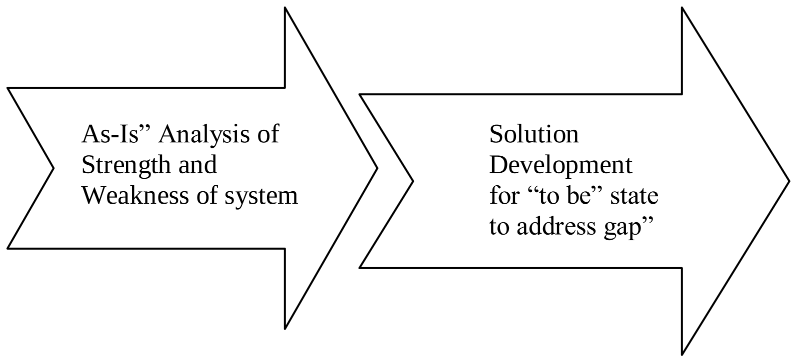

Figure I: As-Is to To-Be stage

4.5.1 Areas of Concern, proposed measures and expected performance

4.5.1.1 High dependence on a single mode of transport

X's outbound transport logistics for aluminium metal through road and rail is skewed. There exists a high degree of dependence on road transportation as against other modes. During 2010-11, the quantum of aluminium transported by rail was approx 36% of total metal sales and that transported through road was 64% of total metal sales. The ratio between road and rail movement is approximately 7:3. It was observed that the preferred mode of transportation for more than 500 km is road. The preferential treatment for road is a paradox to what is being practised in the Indian logistics/transportation sector. As per the industry standards, for the movement of products/commodity over 500km, rail is the preferred mode of transportation, while the reverse is being practiced by X.

Due to the following key reasons our team strongly suggests increased usage of rail transportation over road transportation. Following reasons further corroborates our stand.

- Lack of availability of adequate high carrying capacity vehicles
- Current road infrastructure, specifically national highway network is approaching its maximum capacity, which further indicates the delayed delivery of metal via road transportation.
- Spiraling fuel cost will further lead to an increase in freight rates and eventually to an increase in the road and rail haulage cost differential.

The increased usage of rail transportation can be considered with the movement of metal in container rail. For which the services of private container train operators is suggested after detailed due diligence. However, to achieve the average advantage of about 40% of rail usage over road, X needs a minimum volume of about 3,200 tons per train for non-container train or about 2,000 tons per train in case of container train. Hence this indicates an average inventory holding of about six-seven days of metal production for a normal train and inventory holding of about three-four days for container train. The salient feature of rail, road and container train operation mentioned below further highlights the key characteristics of all the mode of operations.

TABLE III: Comparison of Rail, Road and Container Operations

	RAIL	ROAD	CONTAINER	Comments
Cost	Medium	High	Medium	
Variability in lead time	High	High	Medium	The CTO are allowed to use the Railways network for carrying the cargo from one location to another.
Safety	Medium	Medium	High	The container movement of cargo is safer than the other two options
Accessibility	Poor	Complex	One stop interaction	The CTO becomes a one stop solution for the cargo movement as the cargo is moved on end to end logistic pattern. It involves interaction with CTO only
Inventory Level	3200 MT	9 to 15 M T	2000 to 2200 MT	The movement of cargo using container train is advisable because the inventory holding level and cost is less than Railways & more than Road.
Flexibility	Low	High	High	With Railways there are number of interaction points/channels whereas in Road and containers the human interaction is only with one identity thereby increasing flexibility
Tracking	Difficult Very	Most Difficult without GPS	Easy	In Container movement the interaction with the CTO provides the clear visibility of Cargo at any point of time
Service Level	Medium	Medium	High	Service levels are higher in case of Containerized movement as all the CTOs are trying to create their niche market leading to healthy competition and in turn leading to better service levels.

4.5.1.2 Inconsistent Product Dispatch Schedule

The prime objective of all supply chains is to provide clients with what they want and when they want it. Thus in X's case, the product distribution mechanism plays a central role in meeting the needs of its customers.

X maintains the complex task of product allocation between stockyard deliveries, ex-work deliveries and to the ports for exports. X's major share of the produce during the first three weeks of a month is typically allocated for rake build-up, which is to be sent to ports for exports clubbing it with domestic cargo to meet the rake requirement and the remaining is dispatched by road to stockyards and customers' sites. This indicates that the truckload requirement in the initial three weeks of every month is in the range of 300-600 trucks per week, i.e., an average of about 65 trucks per day. While fourth week onwards, there is a sudden increase in product allocation for ex-plant deliveries, by as much as 200% leading to a truck load requirement of about 800–1000 trucks per week, i.e., an average of about 150 trucks per day. This increase in demand from 65 trucks per day to 150 trucks per day in the fourth week puts the transporters in a position where they are not able to serve X's demand and eventually the entire chain gets impacted leading to inadvertent delay and ultimately discontent among ex-plant customers. The constraint at the transporters' level is the limited availability of national permit trucks.

The prime reason for the increased demand for truckload in the fourth week is uneven product distribution, which however can be addressed by:

- Considering containerisation of finished cargo as an alternative mode. This would help reduce the huge allocation for rake build-up of 3500 mt for a non-container train to about 2000 mt for movement on container train. The usage of containers will not only help in the better inventory management but also in significant improvement in the customer service period.
- Restructuring of the entire product distribution methodology, i.e., classifying its customer in say A, B, and C categories based on the monthly aluminium metal requirement by its customers. On the basis of this truckload classification, we have categorised existing X's customers into A, B and C categories, which will ultimately help in developing the optimum logistics solution for X to serve its customers efficiently. It was observed that 14% of "A" category customers contribute to about 77% of X's domestic sales, 15 % of "B" category customers contribute to about 13% of X's domestic sales and the remaining 71% of "C" category customers

contribute to about 10% of X's domestic sales. It was observed that if X serves its "B" & "C" category customers from its existing stockyard network, then the utilization can be increased by about 20%. Adopting this strategy will not only assist X in better utilisation of its existing assets, but also to serve it's "A" category customers efficiently through its ex-plant deliveries. In order to ascertain the actual truckload requirement for product dispatch from the smelter plant to customers and the stockyard, entire production is being converted in truckload, by dividing the volumes by the factor of 9.5 tonnes (average weight of truckload). It was observed that truckload requirement of product dispatch from smelter plants to "A" category customers can be effectively managed within the range of 50-70 truckloads in a calendar month. Similarly, in order to serve its "B" & "C" category customers, product dispatch from the smelter plants to the stockyards can be managed within the range of 12-28 truckloads. This will result in following benefits for customers and transporters.

For Customers

- Serve category "A" category customers from ex-plant currently and later on from the Hub when developed.
- Serve category "B" & "C" category customers from ex-stockyard only.
- Enable stock in transit tracking as it provides the necessary information to the customers, which will further enable him to make appropriate decisions and prepare for unloading at destination.
- Provide credit facilities
- Reduce variability of transit time for road delivery

For Transporters

- Once the maximum truckload is defined for any given day in a month, transporters can accordingly arrange the trucks and serve X efficiently without any inadvertent delay.
- A regular and planned dispatch schedule, initially from the plant and subsequently from/to the Hub stockyard will further smoothen out the process and eventually enhance transporters' satisfaction.

4.5.2 Areas of Consolidation

4.5.2.1 Containerisation of the cargo

In addition to the focused delivery logistics solution discussed in the previous section, all "A" category customers should be served from the plant. We strongly suggest that X should gradually shift to the multimodal transportation system, i.e. increased usage of containers for metal movement both domestics as well as foreign market. For which following two ways are suggested:

1. X may consider setting up an Inland Container Depot (ICD) at an appropriate location identified after a detailed feasibility study. Capital expenditure and cost-benefit analysis for the proposed ICD is carried out. Setting up of such a facility will help X in the following ways:

- Firstly, with the containerisation of the cargo, the transporters will have to upgrade their fleet and shift to better carrying capacity vehicles, which eventually may lead to reduction in the per unit cost of transportation because of better carrying capacity carriers.
- Secondly, as handling of loaded containers is complicated and requires sophisticated equipment, incidence of transhipment will be eliminated or reduced to a great extent.
- Tracking devices can be deployed on containers to assist tracking the cargo and ultimately address the problem in the current transportation system of X where no in-transit tracking is possible.

2. By using side-access containers and adopting on-chassis loading, the dispatch of metal by container rail can be done from within the plant premises. ICD at X is not suggested as an ICD is a common usage facility therefore it cannot be setup inside the X's Plant, however it can be setup at a suitable location outside X Plant with a dedicated handling and operation area for X.

4.5.2.2 Develop 'Hub & Spoke' Structure

Another step towards containerisation is the development of the hub and spoke concept, which X may consider at a suitable locations (existing /new) to service its existing stockyards' network by providing end-to-end logistics solutions, combining multiple modes of transportations. However, X shall not participate in the day-to-day operations and shall outsource these to third party logistics (3PL) service providers. The identified hub will then act like a central feeder point to various stockyards. This concept will lead to high-volume and high-speed shipments from the hub to the stockyards. This arrangement optimises the number of stockyards in the network and ensures reduction in inventory and improvement in customer service. X today is handling the dispatch metal from within its plant premises, while with the current expansion plan on the anvil; it would have to think on these lines in the coming future. The metal will be primarily transported to the proposed hub through a rail or existing transporters truck. We propose that this hub should have direct rail connectivity with the plant and the stockyards. Direct rail connectivity is crucial to leverage the benefits of multimodal transportation.

4.5.2.3 Automated 'stock-in-transit' monitoring

X presently lacks a 'stock-in-transit' tracking system, which forms a critical link in the value chain of outbound logistics. Logistics is an integral part of X's operations and cargo tracking assumes strategic significance due to the high value of the product as well as the need to meet customers' requirement of timely delivery. Cargo and vehicle tracking is the ability to trace goods, their containers, and their conveyances from the point of origin to their destination. Tracking is increasingly associated with information transfer using smarter tools such as radio frequency identification devices (RFID) and global positioning systems (GPS).Tracking offers benefits of real-time visibility of goods and the ability to receive advanced information regarding cargo and security status and eventually improving customer satisfaction by controlling delays and providing reliable delivery.

4.5.2.4 ICD Model Proposed for X

An Inland Container Model has been developed and is proposed for X to leverage on multi-modal transport activity, thereby reducing the high degree of dependence on road transport and associated complexities. The model has been designed to be setup at 50-100 kms away from the smelter plant at X. The model is conceptualised as below:

An ICD is proposed within a radial distance of 50-100 kms of the smelter plant. The ICD can be setup either on 100% owned or leased basis or through a joint-venture partnership with X having strategic equity stake of about 26%. However, the operations of ICD shall be done by a 3 PL service providers. This ICD will act as a 'Hub' for receiving all the long-haul (> 500 kms) outbound cargo from the smelter through road and distributing it further through rake in containers. As already discussed earlier, containerised cargo would also help optimising inventory carrying cost. This arrangement would ensure continued business and profitability for the long associated road transporters while they would also have increased availability of trucks to cater to transport demand outside X as well.

It is further proposed that strategic locations have to be identified based on existing customer base and potential customer clusters as mapped. These locations should be having a 3rd party owned & managed ICD or a similar facility having rail siding, container handling capability and stock storage for receipt of containerised cargo.

An ICD is a common user facility with public authority status equipped with fixed installations and offering services for handling and temporary storage of export-import (exim) laden and empty containers carried under customs control and with Customs and other agencies competent to clear goods for home use, warehousing, temporary admissions, re-export, temporary storage for onward transit and outright export. ICD can also handle domestic containers along with exim containers.

The design and layout should be the most modern state-of-art equipped with mechanical/electrical facilities of international standards. Key to a good lay-out is the smooth flow of containers, cargo and vehicles through the ICD. The design and layout should take into account initial volume of business, estimated volume in 10 years' horizon and the type of facilities required.

6. SUMMARY

To summarise, the outbound logistics operations of X for transportation of metal from its manufacturing base to the stockyards as well as customer sites are currently hampered due to:

High dependence on road transport, Variable delivery time, Lack of 'stock-in-transit' monitoring system and inadequate communication system.
To address these key concern areas, following logistical solutions are suggested;

6.1 Establishing an Inland Container Depot (ICD):

X can consider establishing an Inland Container Depot in the hinterland which would operate as a hub for further movement of stock on rake in containers over long haul (> 500kms) distances to benefit from low cost of rail transportation and more precise delivery schedules. All transportation from the smelter to locations within a radial distance of about 50-150 kms as well as to the ICD (hub) can be done by the transporters at a premium, which would help them in maintaining their profitability and also act as an incentive.

The analysis reveals that such an arrangement would lead to Improving customer satisfaction, Reducing transportation cost and Optimizing inventory carrying cost from the X's perspective, getting better margin for the short haul from the transporter's perspective, Increased stability in the metal availability and efficient planning of production cycle from the customer' perspective.

6.2 Use of higher capacity trucks

The transporters should be educated and encouraged to gradually switch over to higher capacity trucks (12T and more) which would increase efficiency and reduce transportation cost per unit.

6.3 Strengthening the MIS system

An IT integrated Dispatch Model has been suggested that proposes to bring down the turnaround time for trucks entering the plant and coming out, substantially by storage of correct information and its real time electronic transmission. This facilitates availability of information at all points in the value chain and faster processing. X is in the process of implementing an Enterprise Resource Planning (ERP) system coupled with MIS system which can strengthen in-plant flow of outbound trucks.

6.4 Deploying RFID, GPS for stock tracking

RFID (Radio Frequency Identification) tags and GPS (Global Positioning System) are being progressively used for tracking and monitoring 'stock-in-transit' by most logistics operators. Tracking is increasingly associated with information transfer using smarter tools such as RFID devices and GPS. Deploying such technology becomes especially relevant for X owing to the high value of product being transported and incidence of transhipment leading to delays. It is suggested that X initiates a dialogue with the transporters, making them aware of the need and benefits of adopting such technology while also facilitating installation of the chosen cargo tracking technology.

7. CONCLUSIONS

In the project undertaken the main work was providing advisory services for transportation of aluminium metal by road /rail from the company's smelter plant to stockyards/ports, i.e., limited to the outbound logistics of finished aluminium products. The scope of the work was related to the Study of the existing outbound movements, Identification of strengths and weaknesses of the system as perceived by transporters/customers and Identification of areas for improvement and areas of consolidation. A detailed logistics audit was carried out to assess the current capabilities, efficiencies of the company's logistics operation and its current resources utilisation. The study was focused to understand the critical factors affecting the logistics flow i.e., infrastructure, resources, handling capacity, product flow, stacking, current information flow and processes and the factors affecting the outbound logistics flow of aluminium metal from the plant to the stockyards/customers.After detailed study, recommendations for improvement of transporters /customer satisfaction were done along with specific or notable areas / points which require immediate attention of the case organization. The result is expected to provide for a network to monitor supply chain logistics management for optimization of outbound logistics with safety, reliability and customer-friendly policies. The case findings can provide managers insights into the outbound transportation issues for large process industries and possible solutions.

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