



## Risks associated due to complexity in chemical transportation in India

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One issue that sets chemical logistics apart from many other logistics disciplines is the potential danger posed by the cargo. Transporting chemicals presents unique logistics requirements because of the inherent dangers involved and potential impact on health, safety, security, and the environment (HSSE). Though India is the 3<sup>rd</sup> largest producer of agrochemicals globally, the 6<sup>th</sup> largest producer of chemicals in the world and produces 16% of the world's dyes, safe transportation of chemicals remains one of its biggest challenges.

Challenges in transportation of chemicals in India stem from ignorance, lack of education and inadequate training of personnel, poor condition of roads as well as warehouses and related infrastructure. Another fact is the lack of proper safety precautions followed either by the consignor /consignee as well as on part of the transportation safety authorities. In addition, pilferage, high levels of fragmentation of the industry and poor storage structure also contribute greatly towards compounding the situation even further.

To rectify the problems of the chemical transportation industry a serious re-appraisal of the basic eight guiding principles of the industry is the need of the hour.

These are:

- 1) Training
- 2) Legal requirements
- 3) Planned risk management
- 4) Ongoing improvements
- 5) Community interactions
- 6) Policy documentation
- 7) Provision of information and
- 8) Emergency response capacity building

Safety is a serious business for the chemicals industry. Because of the nature of its products, the industry needs to be more vigilant than most to ensure that goods do not spill or are tampered with during transit. Over the past decade, various legislations, actions, and initiatives have helped to improve the industry's safety and security practices.

Continuous efforts to improve safety during the transport and the associated handling of chemicals have become a part of the aim to improve safety performance of both the chemical and transport industry. The estimated size of the chemical market is USD 144 billion in India.

The chemical industry has witnessed significant changes post-liberalization. Changing demand profiles & trade patterns, increasing logistics costs, rising competitive intensity and the focus on quality, safety, health and the environment have resulted in pressure on product



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margins and overall profitability. The need of the hour for chemical companies is to figure out how to best serve their most profitable customers at the lowest cost.

### Tank containers

Chemical logistics requires a mix of means such as trucks, trains, ships, barges, tankers, and the like. Bulk movement of chemicals occurs in huge volumes, involving very large crude carriers (VLCCs) and a variety of multiparcel chemical tankers. A new concept for movement of liquid bulk chemical is taking shape in India- ISO tanktainers. The concept is well used in foreign countries but yet to get full acceptance in India. An ISO tanktainer container is simply a cylindrical tank set inside a frame of the standard dry container so that the machinery used for the dry containers can also handle the entire apparatus. This allows the tank containers to be stacked one atop another on ships, loaded on trucks, rail, and the like. A tank container offers several advantages over the conventional modes of shipping chemicals such as drums:

1. It is environment-friendly because it minimizes the spillage dur-





logistics as freight traffic has increased sharply. An increase in the number of untrained staff to handle packaging and transportation of hazardous chemicals and lack of awareness about the new and emerging trends and technologies are some of the issues that challenge the transportation of hazardous chemicals in India.



ing filling/unloading and leakage during transport. It permits the transport of dangerous chemicals in a safe manner.

2. It is more cost-effective because it permits a higher payload compared to use of drums stowed in conventional dry containers (43% more volume). Its modular construction, ease of portability, and mechanized modes of handling all contribute to the cost savings.
3. It allows multimodal transport.
4. It is reliable, secure, and designed to last for 20–30 years.
5. It is cleanable, reusable, and can be placed into alternate commodity service with minimum downtime.
6. Customers who have limited space or wish to avoid the high cost of permanent storage can use it for temporary storage.

The risk of danger is what makes chemical logistics different from most other branches of supply chain management. Anyone who transports or stores a chemical must thoroughly understand how to handle that product.

Challenges in the chemical logistics industry:

- **Safe transportation of hazardous chemicals:** A boom in the chemical industry has also led to an increase in the safety concerns of chemical

- **Poor transportation infrastructure:** Poor quality Indian roads and traffic infrastructure increases the risks of road accidents and wastage.
- **Crossing check points:** Multiple stoppages increase the risks of accidents increasing contact with human ecosystems.
- **Pilferage:** Pilferage is another major concern. Most chemicals are costly and are replaced by some other low value substance; moreover truck drivers are the major pilferers. This means that the raw material quality is compromised.
- **High levels of fragmentation of the industry:** A large share of the pie goes to small truck operators for bulk delivery of non hazmats wherein no such handling precautions need to be taken so they work for low value as compared to the service providers with standards set for all types of carriage handling, who suffer in this case.
- **MSDS:** MSDS (Material Safety Data Sheet) are not properly followed which result in various chemical disasters of warehouses with huge resultant losses to property and productivity.
- **Poor storage infrastructure:** Most warehouses are not adequately leak-proof, or equipped with security systems, pallet racking and other facilities.
- **Lack of warehouse management expertise.**





- Obstacles in using intermodal transportation.
- Increased competition among service providers.
- Difficulty in obtaining permits for logistics infrastructure.
- Increase in transport costs, e.g. fuel and other cost escalations.
- Increasing (local) restrictions on transportation of hazardous goods on certain parts of transport infrastructure.
- No wonder chemical companies prefer to partner with logistics providers with proven safety and security procedures and record. This makes it essential for logistics companies to continuously monitor all safety parameters. The consequence of any error can be grave.
- **Safety training:** Because of the potential danger involved, employees and drivers, at companies that move and store chemicals require special training. It focuses on training employees on the use of PPEs (Personal Protection Equipments), train driver on how to handle the entire movement and what to do in case of any accident.
- **ISO certified tanks:** Tank containers are extremely safe, secure, cost-effective as well as a feasible mode of transportation. Because they are versatile and customizable, ISO tankers have become an indispensable part of transportation of hazardous and non-hazardous liquid chemicals.
- **Green transportation:** Shift to greener modes of transportation e.g. intermodal transportation saves fuel and reduces CO<sub>2</sub> emissions as well.

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- Increase in R&D investment in chemical logistics as many more operational sectors to have cost advantages with boost as demand.

- Potential for high domestic demand with increasing industrial consumption.

- **PCPIR Policy:** PCPIR Policy is expected to attract major investments, both domestic and foreign in the petroleum, chemical and petrochemical sectors. A PCPIR would comprise of production units, public utilities, logistics and facilities for environmental compliances, residential areas and administrative services. India has identified 6 PCPIR's, Haldia, Dahej, Vizag, Paradip, Cuddalore and Mangalore.

Important role that IT enabled-services can play to mitigate the risks associated with specialty chemical logistics:

**Enterprise risk management:** End-to-end risk management solutions to combat market risk, credit risk, and operational risk areas.

**Risk analysis:** Analysis of contract risk, profitability, and credit and market risk, enabling better decision making.

Strong IT support can help supply chain management to grow exponentially with the help of:

- **Inventory optimization:** Helps chemical companies reduce working capital and carry out salvaging
- **Logistics analytics:** Enhances visibility and optimization across the logistics network, including design, distribution centers, carrier sourcing, and metrics rationalization
- **Procurement:** Offers end-to-end solutions across both indirect and direct procurement materials, focusing on measurable improvements in compliance, total cost of ownership (TCO), working capital, material and services availability, and user satisfaction.

## Conclusion

For any logistics player handling chemical products the motto should be "**Know Safety – No Accidents**". This will ensure a win-win business model for all stakeholders.

