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A review on supply chain optimization (Inbound & Outbound)

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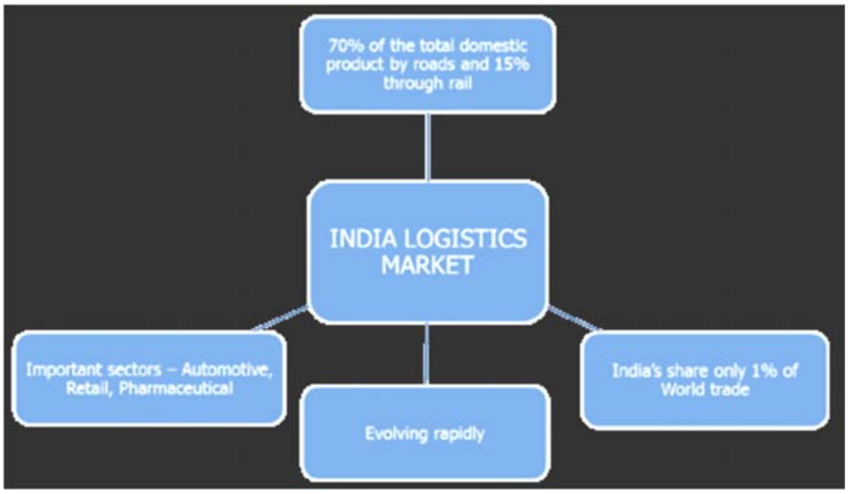
Abstract

Today companies are undergoing major changes to cope with the new challenges of the modern economy. The globalization of the business, the diversity and complexity of products, the increasing tightness of capital, and the diminishing protection provided by patents are some of the factors driving these changes. All stages of the business value chain are affected: from the development of new products to the management of the manufacturing and marketing networks. This paper describes an optimization-based approach to selecting both a product development and introduction strategy and a capacity planning and investment strategy. In this study, Lead Logistics Provider (LLP), multimodal logistics, Vendor Managed Inventory (VMI) & Third-Party Logistics (3PL) model is proposed to address this multi-objective problem with the integration of non-relaxable constraints and relaxable constraints. An illustrative example is presented to demonstrate the applicability of the proposed model.

Keywords: Supply Chain Optimization, Lead Logistics Provider (LLP), multimodal logistics, Third-Party Logistics (3PL), Vendor Managed Inventory (VMI)

1. Introduction

This paper examines the challenges that companies are facing, and the capabilities they have in place, to tie logistics costs with inbound-to-outbound events a critical need in order to effectively segment their costs by product/customer for accurate ROI intelligence on inbound-to-outbound across a multi-channel customer environment. In recent reports, Supply Chain Visibility and Segmentation: Control Tower Approach identified that 85% of survey respondents indicate that they plan to increase their current level of end-to-end supply chain visibility. There are some keys underlying reasons to increase visibility, besides the obvious issues of eliminating surprises and disruptions. With better insights, companies can begin to tie logistics costs with events in order to better segment costs, and more accurately allocate them to products and customers across inbound and outbound activities.



2. Understanding Supply Chain Dynamics

All businesses are interested in unlocking the strategic value in their supply chain. However, those that acknowledge the supply chain as a strategic asset achieve 70% higher performance on average, according to a global supply chain survey from PricewaterhouseCoopers (PwC).

The same survey also found that companies that focus on improving their supply chain consistently outperform their peers financially. These businesses are more efficient, achieve higher customer satisfaction and are better prepared for the many supply chain challenges organizations face today.

As businesses are facing a challenging environment they increasingly focus on creating competitive advantage through an optimized supply chain.

3. Key Supply Chain Challenges

Controlling and reducing total supply chain cost

Higher fuel prices and escalating costs of raw materials mean companies are under even more pressure to do more with less and get the goods to market even faster. Against a background of rising costs and volatile markets, supply chain executives are under pressure to reduce total supply chain costs, and provide highly resilient and improved service levels for customers – but 'hidden' costs associated with excess or redundant capacity in a supply chain are not always easy to identify or measure. Getting visibility and control of your supply chain costs is vital to help release more value and move it to the next level.

Offering a customized service

Not only do businesses today have to do more with less, consumers expect more. That means your customers want a service tailored to their needs, so you are constantly juggling complexity, whilst aiming for simplicity. It is vital to share what can be shared and tailor where it is needed, striking the right balance between economies of scale and segmentation.

Need for resilience and a dynamic supply chain

The only thing most people can predict with certainty in business today is constant change. The global economy no longer operates in cycles or geographical silos. Top companies need to have agile supply chains that drive industry leadership. You need to demonstrate the commercial flexibility to meet these changing market conditions, satisfy challenging consumer requirements and meet them on-demand.

Keeping up with technology

Harnessed properly, new technology can be a great asset to a supply chain. However, choosing the wrong supply chain management system or implementing it incorrectly can be a very expensive mistake. Companies need common technology platforms that are tailored to their requirements, cover their entire supply chain and bring control and visibility to each stage of their logistics.

More visibility on the environmental impact

Increasing consumer and industry concerns about global warming have put the environment firmly on the agenda of all forward-thinking companies. Growing demand for sustainable products and increasing regulations on businesses mean it's vital to plan ahead to gain transparency on carbon emissions and the overall environmental impact of your supply chain.

Right-shoring, near-shoring or outsourcing

For many years it has been accepted best practice to put manufacturing plants in the lowest cost countries. However, low cost does not always equal 'best cost', as having production facilities closer to the end consumers can reduce lead times to market and cut inventory levels. Leading companies are moving away from centralized models, towards a 'multilocal' design of their sourcing and production network. This helps to manage the balance between global economies of scale and the demand for local responsiveness. Careful thought and planning is required to decide which processes to outsource which to keep local and how to keep strategies flexible and open to change.

4. Supply Chain Optimization

Supply chain optimization is the application of processes and tools to ensure the optimal operation of a manufacturing and distribution supply chain.

Why we need to optimize?

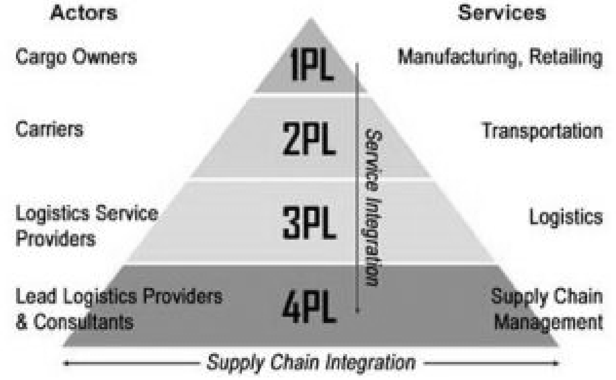
Where we were till where we want to go.

Applying the information you get by using the right supply chain modeling tool can help squeeze cost and inventory out of your supply chain while improving service to customers. Yet, while some companies do an excellent job of modeling their supply chains, others have barely tapped the potential for improvement.

5. How to optimize the supply chain

We can optimize the supply chain with the following methods and processes:

- Harmonization of standards for the equipment process and the loss
- Optimization of In-bound logistic
- Multimodal logistics
- Third-Party Logistics (3PL)
- Lead Logistics Provider (LLP)



6. Harmonization of standards for the equipment process and the loss

What is Harmonization?

It is nothing but establishing common standards or process across the industries. i.e. GST, system code for the commodity, import export transaction codification etc.

Example of harmonization of equipment is the production of Fiat & TATA cars on the same assembly line.

7. GST

GST is harmonisations of taxes to pay. There are number of states in India and every state has their own federal structure and what Government is trying to do is harmonisation. Once GST is gets into place it will help us to optimize the supply chain.

GST: Impact on the Logistics Industry

The logistics industry in India was estimated to be worth USD 130 billion in 2013 and has been growing rapidly. While the logistics sector could be among the primary bottlenecks in driving economic growth, it will also act as a catalyst to realising India's 'manufacturing dream' over the next decade.

Logistics companies in India have evolved over the years from being mere first-party logistics providers (1PL) to second-party logistics providers (2PL) to integrated fourth-party logistics providers (4PL) by providing a complete package of logistics services, including transportation, warehousing, pool distribution, management consulting, logistics optimisation, etc. and complementing them with advanced supply chain facilities. Alongside, the government has made considerable inroads into ensuring a favourable business climate. In one

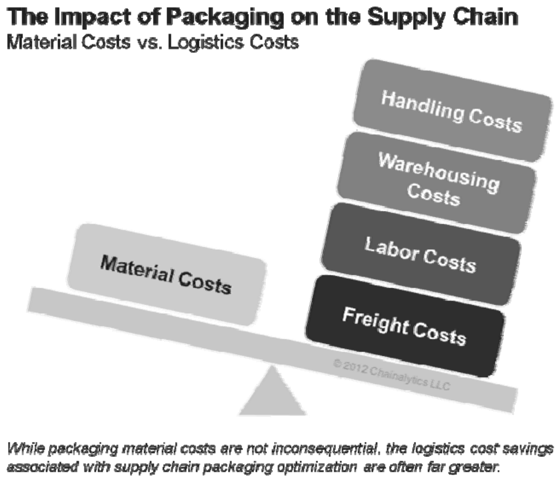
such initiative, the government has proposed to implement the Goods and Services Tax (GST), which promises to integrate India's multi-layered indirect tax system into a single unified one, unshackling India from its bureaucratic web and improving the ease of doing business. The changes in the proposed indirect tax system could reduce transportation cycle times, enhance supply chain decisions; lead to consolidation of warehouses, etc. which could help the logistics industry reach its potential in terms of service and growth.
In this article, we look at the various aspects of the logistics industry that may be affected by GST and how industry dynamics are likely to change once GST is implemented.

Warehouse Engineering
Warehouses and logistics are an integral part of an organisation's strategic business plan and operations. A multiple warehouse strategy works well for inter-state sales as organisations in India usually operate warehouses in multiple states (one in each state). The organisation then declares the transfer of goods as a stock transfer to negate the Central Sales Tax (CST) incidence on inter-state sales as a sale to one's own warehouse, under the aegis of declaration form F, is not a taxable event under the Central Sales Tax Act, 1956. Such stock transfers are completed through intra-state sales from the state warehouse to the customer. However, once GST is implemented, India will become a common market without any differentiation between inter-state and intra-state sales, thus ensuring a cumulative tax incidence with both the transactions being taxed equally (barring the temporary additional 1% tax on inter-state sales). Thus, the multiple warehouse strategy will be ineffective in reducing the inter-state tax incidence.
Thus, this tax reform could initiate a shift from multiple small warehouses to a large central warehouse in order to mitigate the additional administration cost of operating multiple warehouses. Over time, logistics companies may have to adapt to this evolved warehousing pattern followed by manufacturers/traders and re-engineer their services to be concentrated around major metropolises/areas such as Mumbai, National Capital Region (NCR), Kolkata and Chennai, where the central warehouses of the majority of companies may be situated. This will also shift the pattern of supply assignments, supplier channels and lead to a change in transport routes for logistics companies, accordingly.

Hassle-free Supply of Goods and Reduced Transit Times
State-border checkpoints, which are tasked with material scrutiny and location-based tax compliance, negatively impact the overall production and logistics time and account for roughly 60% of a truck's transit time. These unproductive transit hours coupled with regulatory impediments reduce the efficiency of Indian manufacturers compared to their international counterparts. Having a unified market under the new GST regime would assist the smooth flow of goods within the country. Although border checkpoints may not be done away with immediately (as suggested in the First Discussion Paper on GST in 2009), reduced compliance scrutiny at these checkpoints will reduce transport hassles. This change will enable logistics companies to deliver goods more efficiently and optimise delivery times as compared to the present. The reduction in delivery time would also lead to a reduction in distribution costs by 10-15%, thereby lowering the final price of the goods.

Supply Chain Packaging Optimization
The packaging value chain is strategic in nature and optimized packaging directly affects logistics costs. Bottom line impacts include:

- Reduced Freight Costs
- Increased Warehouse Efficiencies
- Improved Product Handling
- Reduced Labor Costs



Optimization of Inbound logistics
The path to localisation
The mantra for purchasing should be simple: localise and keep the cost as low as possible. Do anything and everything legally possible to achieve that goal. As well as dealing directly with suppliers, and also go for hedging in foreign currency (if you dealing in foreign currency). Localisation of suppliers and components has been an important part of supply chain development over the past decade or more, not least to avoid exposure to currency shifts and higher logistics costs.
It also need to targeted reductions in weight i.e. strategy 1-1-1 on the raw material side. The goal is to reduce the weight of every component by one gram. Costing is based on weight, so every single gram of weight reduction is a positive.

Example
Maruti has led to this technique saved Rs120m ($1.9m) in each year.

Partnering with suppliers
While a relentless focus on cost masks, not looking to beat up on suppliers. "If we keep squeezing suppliers in protecting your interest only, then in the long run you cannot sustain.
One should implemented measures designed to help suppliers, buys raw material for suppliers in bulk to help companies get a better price; it arranges low-cost funding for suppliers. For a small fee, payments should be fast-tracked, from the date of invoice submission.
Sometimes suppliers unable to meet cost targets will struggle. It needs to introduce shared savings programmes with suppliers, called 'value analysis value engineering'; "If suppliers are going for localisation of child parts instead of importing.
Vendor relationships should be improved. "It is not a buyer-seller relationship, but a partnership"

Improving inventory through the tiers

Logistics has played a particularly important role in keeping overall supply chain costs as low as possible, particularly in reducing inventory.

By reducing schedule of your material requirement (from tier 1 supplier) from a month to 15 days, inventory levels inside the plant will fell by a whopping 70%. If possible implement more JIT processes among tier two and three suppliers.

Vendor Managed Inventory (VMI)

The goal of Vendor Managed Inventory is to provide a mutually beneficial relationship where both sides will be able to more smoothly and accurately control the availability and flow of goods.

In VMI a manufacturer or distributor assumes the role of inventory planning for the customer. Extensive information sharing is required so that the manufacturer/distributor can maintain a high degree of visibility of its goods at the customer's location. Instead of the customer reordering when its supply has been exhausted, the supplier is responsible for replenishing and stocking the customer at appropriate levels.

Example: Maruti Suzuki spends about 2.5% of net sales on inbound logistics, as it relies mainly on vendor-managed inventory. According to Sudam Maitra, senior managing executive officer for supply chain at Maruti Suzuki; "Our experience has been that when the vendor manages his supply, the cost is lowest when compared to the 3PL route."

8. Multimodal logistics in India: An Assessment

India has experienced fast-paced growth over the last decade. Though the growth has primarily come from the services sector, manufacturing and exports have also risen reasonably. Logistics as a function is being increasingly outsourced by manufacturers. However, the Indian logistics sector in many ways still lags behind the global standards of performance. This is evident from the fact that we are ranked as low as 46th among 155 countries in the World Bank International Logistics Performance Index.

India is one of the largest economies in the world and a major emerging market that has a young population, rising investment rates, large domestic demand and globally competitive firm. Even though, the unexpected global crisis has taken its toll on the economy, it is predicted that India will become the third largest economy by the year 2025 after China and the USA and has awakened the interest of significant investors. The transport and logistics sector are fundamental to the development of a country, especially so in India where it is estimated to provide employment for 45 million people. Multimodal logistics serves to interconnect different modes of transport – road, rail, air, water – and therefore improve efficiency and speed of goods movement. The economic growth in India has increased the demand for practically all transport services and further underlines the importance of providing an efficient multimodal logistics infrastructure in India. The Planning Commission of India has stressed that focus needs to be given to 'integrated transport solutions' in preference to individual 'transportation' and 'distribution' services.

What is Multimodal Logistic?

Multimodal transport refers to the transport of good from one point to another via more than one mode of transport. Multimodal Logistics can be viewed as "the chain that interconnects different links or modes of transport – air, sea, and land into one complete process that ensures an efficient and cost-effective door-to-door movement of goods under the responsibility of a single transport operator, known as a Multimodal Transport Operator (MTO), on one transport document"

Key Issues in Multimodal Logistics

Road Freight

- Poor quality of roads and network connectivity
- Stoppage of vehicles at State border check posts are a major cause of delays. It is estimated that 40% of the time lost are due to these stoppages.
- No stringent requirement or regulations for starting a trucking business
- Large number of small and unorganized players, with no industry consolidation and intense competition.

Rail Freight

- Freight tariffs in India are among the highest in the world.
- Rail freight lacks reliability and traceability
- It is deficient in terms of quality of operations, speed, and customer orientation.

Air Freight

- There is absence of integrated cargo infrastructure;
- There are inadequacies in gateway and hinterland connectivity through rail and road;
- There is a need for streamlining of Customs procedures in air cargo;
- There is a need of technological up-gradation of cargo handling processes;
- There is a need to formulate a performance based service

Port Freight

- There are inefficiencies in berthing, and delays in loading and unloading. i.e. high turnaround time of vessels
- There are delays in co-ordination between ports and the Customs authorities
- There is poor hinterland connectivity and poor port- and land-side infrastructure and outdated equipment
- Navigation channel restrictions do not allow bigger vessels to be berthed

Keeping these key issues in mind, some of the areas of multimodal logistics that gain importance in Indian market include costs, cold chain, containerisation, ancillaries like ICDs, CFSs and dry ports and integrators like logistics parks.

Costs

The Indian logistics market suffers from higher costs due to poor infrastructure, mentioned in the previous section. Analysis suggests that poor logistics infrastructure costs the economy an extra USD 45 billion or 4.3 per cent of GDP each year. Two-thirds of these costs are hidden i.e., not generally regarded as logistics costs. These hidden costs include theft and damage, higher inventory holding costs, facilitation and transaction costs.

Containerization

Containerization is the use of standardized intermodal containers for freight transport and is the single most important development in the evolution of multimodal logistics.

In India, the Container Corporation of India Limited (CONCOR) was initially the sole operator of ICDs as well as Container train operator, and currently operating about 59 terminals in the country, and includes, international, domestic, rail linked as well as road fed ICDs/ CFS. Currently the market share of CONCOR is about 85%. Ministry of Commerce is the nodal agency and Addl. Secy/Infrastructure is the chairman of the Inter Ministerial Committee (IMC).

Containerized tonnage aggregated about 105.11 million MT and constituted 14.32 per cent of the total traffic handled (732.76 million MT) in 2008–09 by the Indian ports. For the major ports, this ratio is higher at around 13 per cent.

Container Traffic Handled by Indian Ports: (Both EXIM and Domestic)

- 2009- 6585 (in 000 TEUs, twenty-foot equivalent units)
- 2010- 6865 (in 000 TEUs)

Container Traffic handled by Indian Railways (IR) (Both EXIM and Domestic)

- 2008- 2.8 million TEUS
- 2009- 2.9 million TEUS
- 2010- 3.2 million TEUs

Cold Chain

Cold Chain is a critical component of the logistics chain in order to preserve perishable items and normally consists of pre-cooling facilities, cold storages, refrigerated carriers, and warehousing. A streamlined, well maintained cold chain helps to reduce costs, improve product integrity, increase customer satisfaction, and reduce wastage and returns of expired stock. The total cold chain market in India is worth Rs. 21,375 million, which is equivalent to USD 475 million, of which the biggest chunks are emerging segments including ready-to-cook, ready-to-eat and ready-to-serve foods, followed by the ice-cream industry

Dry Ports/ICDs

An Inland Container Depot (ICD) also referred to as Dry Ports are an effective way for handling and temporary storage of containerized cargo as well as empty containers. They are usually located where different modes of transport networks intersect; thereby reducing transport costs and transit time, and spurring investment in the surrounding areas. ICDs facilitate connectivity to the hinterland by making port services closer to them.

There are 133 functioning ICDs/CFSs against 230 letters of intent issued since 1991 by the Department of Commerce. Out of these, 61 are privately owned, 15 are owned by the state governments, 30 by CWC, and 27 by CONCOR.

Logistics Parks

Multimodal Logistics Park provide all types of transportation facilities at a palace for the end user or defined as a rail, road based inter-modal traffic handling facilitation complex comprising container terminals, bulk/break- bulk cargo terminals, warehouses, banking and office space and facilities for mechanized handling, inter-modal transfers, sorting/grading, cold chain, aggregation / desegregations etc. to handle freight traffic. The key components of a Multimodal Logistics Park are warehousing, transport and value-added services. The concept of multimodal logistics parks is relatively new in the country.

Benefits of Multimodal Logistics Parks include

- MMLPs can help in saving of cost in transportation. In other words these services help in the reduction of costs which are incurred in the transportation of goods. This is possible because of use of right modal choice for the movement.
- One of the main features of MMLP is that it reduces the transit time of the goods. Thus reducing the inventory cost both for logistics operators as well as for the ultimate user of the transport mode.
- It helps in the proper utilization of the assets as the transit time is less and the goods vehicles and the other hardware are free to use for the other business. Thus the per unit cost of the transportation of goods can be reduced considerably.
- Helps in the balanced growth of all the modes of transport
- Helps in optimal modal choice
- Helps in proper utilization of assets like railways or other modes of transport

9. Third-Party Logistics (3PL)

In logistics, considerable quantities of materials are required to be transported and stored at various locations. Raw materials and components are to be moved over long distances from vendor supply points to production centres. These materials have to be stored for some time as raw materials and later as finished goods. Finished goods need to be transported to the point of consumption. With so much to be done, the critical reasons why companies outsource logistics activities are:

- Better focus on core competencies
- Cost saving resulting from better management of supply chain
- Cross pollination of better available practices
- Wider and better geographical coverage by access to specialist world class capabilities
- Improved re-engineering benefits
- Lesser internal resources

The third party logistics market is still in its nascent stages in India, facing issues such as lack of infrastructure (viz, warehouses and cold storage chains), lack of economies of scale due to unorganized private truck operators, and lack of efficient processes and automated, technologically advanced monitoring systems.

10. Lead Logistics Provider (LLP)

The term LLP, or lead logistics provider, is probably the most transparent of the three. As the name suggests, a lead logistics provider "takes the lead" in providing some functions and subcontracting for others while providing one central control point.

An LLP (lead logistics provider) serves as the client's primary supply chain management provider, defining processes and managing the provision and integration of logistics services through its own organization and those of its subcontractors.

A lead logistics provider is a company that takes the full responsibility for organizing the whole transport chain from producer to their customers, and it is sometimes also called as door-to-door logistics. If both the producer and the customer are located at the sea side and have their own terminals, only the sea transport mode needs to be involved, but this is rather the exception than the rule.

In general, sea transport will be a part of an Intermodal transport chain which will involve at least truck, inland waterways, or rail.

Among the existing lead logistics providers we find companies that originally were shipping companies, rail companies, air freight and road haulage based. Today these companies independently upon their starting mode will all use a combination of these modes, but none of them own the transport means to operate all four modes. Typically, they are sea-, rail-, air-, or truck-based, and then buy the other transport services from operators of the other modes, even if certain companies claim that they control transport means for all four modes. All these lead logistics providers tend to prefer, when several options are available, the transport mode they own themselves. This means that a key success factor and increased Short Sea Shipping volumes will be the shipping line's ability to operate as lead logistics provider.

Explaining Lead Logistics Partner in reference with DHL

As a Lead Logistics Partner DHL design, manage, operate, continuously improve and deliver supply chain transformation.

DHL have developed a comprehensive service offering that covers the entire supply chain needs. And it will work closely with the team to tailor an integrated service offering that creates a real change and adds new value to the business.

Technology supports each element of the LLP offering. It enables the transformation and will be integrated in total Enterprise Resource Planning (ERP) in order to provide end-to-end visibility and control.

Benefits in DHL as a partner

A Lead Logistics Partnership with DHL Supply Chain brings actionable insights, tailored business solutions and cross-industry expertise that will set you apart from the competition. By creating and optimizing a supply chain customized to your needs, it can deliver the improved speed, efficiency, flexibility and service that will make a real difference for your business. And, with that behind you, it won't be long before you're in front of everyone else.

Strategic value

- DHL act as an agent for change within your organization
- Enhanced visibility and control of your supply chain will enable performance improvements across your business
- Your supply chain is transformed and will be better prepared to meet your ever-changing business needs
- Global requirements are balanced with local demands for a more responsive supply chain
- You will have flexible access to DHL skilled and experienced supply chain professionals
- Service levels are improved (On Time In Full (OTIF), on-shelf availability)

Financial value

- Your logistics costs are controlled as your operating costs in warehousing, transport, procurement and labor are reduced
- Order cycles are shortened, inventory is reduced and your working capital is lowered
- Your fixed capital costs are cut as your assets are used more effectively and your network becomes more flexible and productive

Commercial value

- DHL relationship will be based upon a long term partnership
- As an LLP partner, DHL will share both the risk and the rewards through clear incentives and target agreements
- Complete cost visibility leads to more accurate financial logistics planning and accountability across the entire supply chain.

Meeting your challenges

There are many complex supply chain challenges facing businesses today. As a Lead Logistics Partner, we give our customers solutions to these challenges. To meet big challenges, most companies need to do something smarter with their supply chain to bring about change that takes them to the next level, gets them to new markets and delivers better customer service.

Global reach, local knowledge

DHL is the number one in global contract logistics. They have 2,400 terminals, warehouses and offices across the world. Their global network employs 275,000 people and covers 120,000 destinations. They are a large and stable company and that delivers simple solutions to complex issues. DHL LLP team leverages this experience to help you decide when to go global and when to stay local with your supply chain.

Understanding and meeting your needs

As your LLP partner, DHL focus on what is most beneficial to you. They work with their customers to choose the best suppliers and distributors for you. They offer a balanced, win-win partnership based on sharing the risks and the rewards of their work, as well as a wide range of value-added services that can be tailored to fit your needs.

Agent for change in your organization

Doing more of the same only gets you the same, diminishing returns. There is an element of risk with doing anything differently, but starting an LLP relationship doesn't need to be daunting. DHL will work closely with you to guide you through the process, which is typically a systematic evolution, rather than an immediate big impact. The result is a step-change in how you view your supply chain and your organization will see the benefits for many years to come.

11. Conclusion

A country's economic growth depends on the availability of a robust and seamless logistics infrastructure. Transportation, warehousing, handling of material, inventory management and order processing are the major logistics activities, which impact the customer cost and operation. India is known for its high cost logistics. In spite of high cost logistics, it is possible to offer our products at a competitive price in global market. India has the geographical advantage of being well positioned to emerge as a hub for a variety of products. An integrated approach to logistics helps in reducing costs and enhancing the customer service level.

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