

Knowledge Series

SMART LOGISTICS (LOGISTICS 4.0)



Our Clients



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Foreword

India's spend on logistics activities- equivalent to 13 percent of its GDP is higher than that of the developed nations. The key reason for this is the relatively higher level of inefficiencies in the system. In an increasingly real-time economy data, speed and timing are key.

Smart Logistics (Logistics 4.0) is a technological approach that seeks to optimize the operation and performance of all phases involved in the product distribution process. It concerns the various aspects of end-to-end logistics in the context of Industry 4.0. Digitalization is one of the megatrends of the 21st century and has the potential to radically transform logistics.

Digital is about unlocking growth now. Being digital is about using data to make better and faster decisions, digital initiatives to deliver annual growth and cost efficiencies of 5 to 10.

In the logistics industry, the use of sensors, big data, and analytics has enabled companies to improve the efficiency of their supply-chain operations. Digital is a new way of connecting with customers or new way of doing business. Digital innovation enables logistics firms to drive efficiency and lower costs, yet legacy logistics companies risk being held back by the weight of their past, old IT systems, and complex processes preventing them from competing.

Data has always been at the heart of logistics, and new advances in data collection and analysis offer the opportunity for companies to better meet their goals:

- Strategically, such as by optimizing their route networks
- Tactically, such as by optimizing the number of trucks and drivers required each day
- Operationally, such as by tracking deliveries in realtime.

Thanks are due to our members who provided their input in preparing this paper.

Krishan K. Batra
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USA)




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Smart Logistics (Logistics 4.0)

Introduction:

There is a lot of confusion about the term -Logistics. Some consider it as transportation activity and other call it Supply Chain. Broadly it covers the following activities as shown in the following figure.



Dimension	Transportation	Distribution	Import/Export
Planning	<ul style="list-style-type: none"> • Network design • Carrier contracting • Shipment optimization 	<ul style="list-style-type: none"> • Facility design • Project management 	<ul style="list-style-type: none"> • Coordination of global freight movements
Execution	<ul style="list-style-type: none"> • Carrier selection/tendering • Shipment tracking • Freight payment 	<ul style="list-style-type: none"> • Core warehouse activities • Value added services 	<ul style="list-style-type: none"> • Customs clearance • Freight forwarding

Source: DocPlayer

In view of above activities, Logistics can be defined as the art of managing the supply chain and science of managing and controlling the flow of goods, information and other resources like energy and people between the point of origin and the point of consumption in order to meet customers' requirements. It involves the integration of information, transportation, inventory, warehousing, material handling, and packaging.

In the context of Industry 4.0 (4th Industrial Revolution), the focus is on digitalization of all key activities including SCM 4.0 and Logistics 4.0. This makes the difference in gaining competitive benefits but also in surviving in a hyper-connected age where the need for speed is high and regardless of the supply chain, performance and speed are crucial but so is quality.

Logistics 4.0 or smart Logistics concern the various aspects of end-to-end logistics in the context of Industry 4.0. It calls for digitalization of all activities by making use of various technologies such as Internet of Things, cyber-physical systems, blockchain, advanced data analytics and (semi-)autonomous decisions enabled by AI.

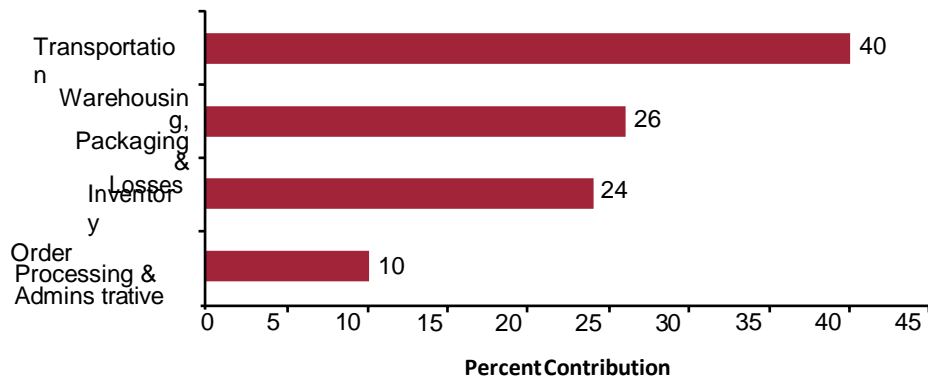
Efficiency, optimization, speed and timing have always been crucial in logistics and transportation. Today, amidst a range of accelerating evolutions and in an increasingly digital environment where digital transformation is affecting the next revolution of logistics, known as Logistics 4.0.

—In a wide way, Logistics 4.0 makes use of smart technology derived containers, vehicles, pallets, and transport systems. This ensures in creating a fully networked supply stream chain that offers supply chain managers, shippers, freight forwarders, and others the necessary transparency and visibility to route transport and performs other logistics tasks in an optimal way.

Status of Logistics in India:

Broadly speaking, the Indian logistics sector, as elsewhere, comprises the entire inbound and outbound segments of the manufacturing and service supply chains. Of late, the logistics infrastructure has received a lot of attention both from business and industry as well as policy makers.

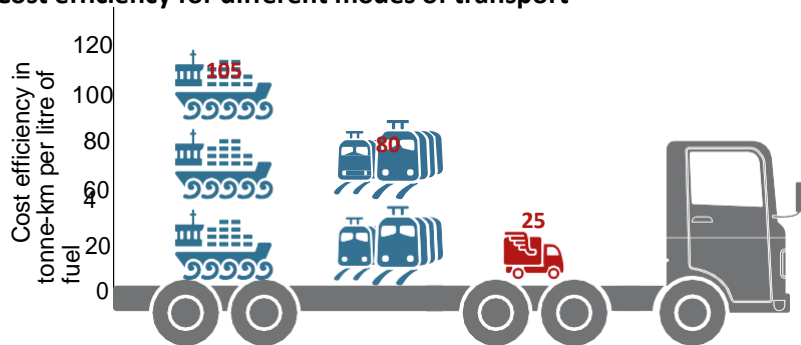
Logistics costs (i.e., inventory holding, transportation, warehousing, packaging, losses and related administrative costs) have been estimated at 13-14 per cent of Indian GDP which is higher than the 8 per cent of USA's and other developed countries. Service reliability of the logistics industry in emerging markets, like India, has been referred to as slow and requiring high engagement time of the customers, thereby, incurring high indirect variable costs. Cost of logistics component is as follows:



Source: ISM-INDIA

The Indian logistics sector has typically been driven by the objective of reducing transportation costs that were (and often continue to be) inordinately high due to regional concentration of manufacturing and geographically diversified distribution activities as well as inefficiencies in infrastructure and accompanying technology.

Cost efficiency for different modes of transport



Source: ISM-INDIA

Most of the firms have a contract with trucking companies for making dispatches and only 10 per cent own their own fleet of trucks. While 39 per cent of these firms use third party logistics (3PL) service providers for making dispatches, about 30 per cent use 3PL service providers for procuring their material from their suppliers. Somehow, transport planning has remained an unglamorous area within operations despite the fact that about 10 per cent of the cost of sales comes through physical distribution. Transport planning (e.g., optimal dispatch quantities & frequency of dispatch, vehicle routing, loading pattern in the trucks etc.) does not appear to have received the required attention.

The logistics industry in India is evolving rapidly and it is the interplay of infrastructure, technology and new types of service providers that will define whether the industry is able to help its customers reduce their logistics costs and provide effective services. Changing government policies on taxation and regulation of service providers are going to play an important role in this process. At the firm level, the logistics focus is moving towards reducing cycle times in order to add value to their customers. Consequently, better tools and strategies are being sought by firms in order to enhance their decision making.

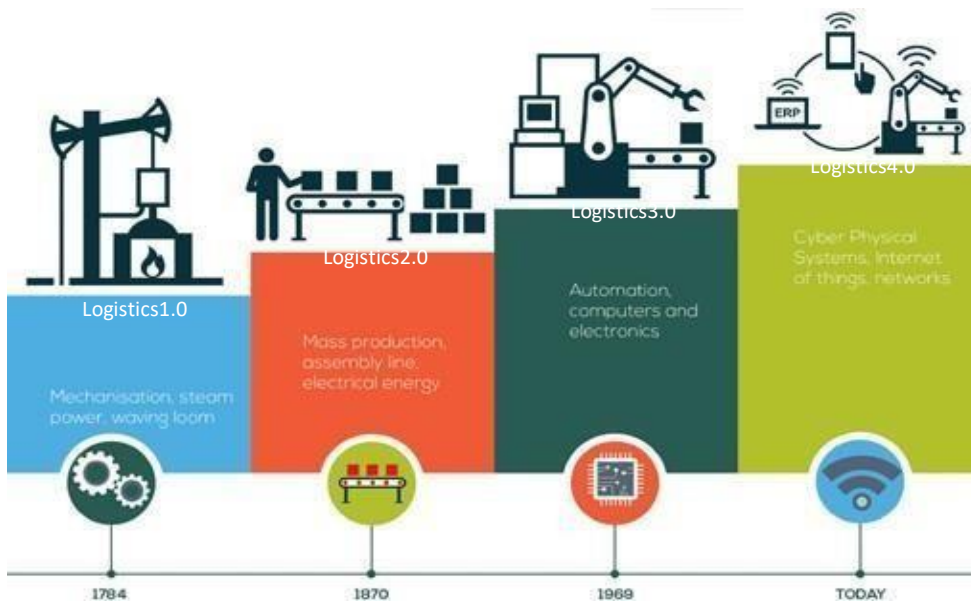
Understanding Smart Logistics (Logistics 4.0):

Traditionally we see logistics as essentially getting things from A to Z with the many intermediary steps and the components of the supply chain. But as the modern factory is adding new, intelligent technologies in order to create connected, interoperable workflows, the modern supply chain is rapidly becoming smarter, more networked, and more technologically advanced. Though the so-called fourth industrial revolution gets most of the attention, there is another revolution occurring simultaneously within the world of logistics, and it's changing the way that products make their way from production facilities to customers. In the spirit of Industry 4.0, some have taken to referring to this new logistics paradigm as Logistics 4.0.

This calls for a shift from the traditional approach to digital supply chain making it smarter, widely networked, and technologically advanced. This has eventually evolved the complex world of logistics. It has automatically transformed the way products make their way from production to end-user – customers.

The logistics entry into the logistics phase 4.0 as shown below triggered changes in the perception of the supply chain. This caused that the basic attributes of the supply chains are not only flexibility and agility, but also digitization, which becomes their determinant.

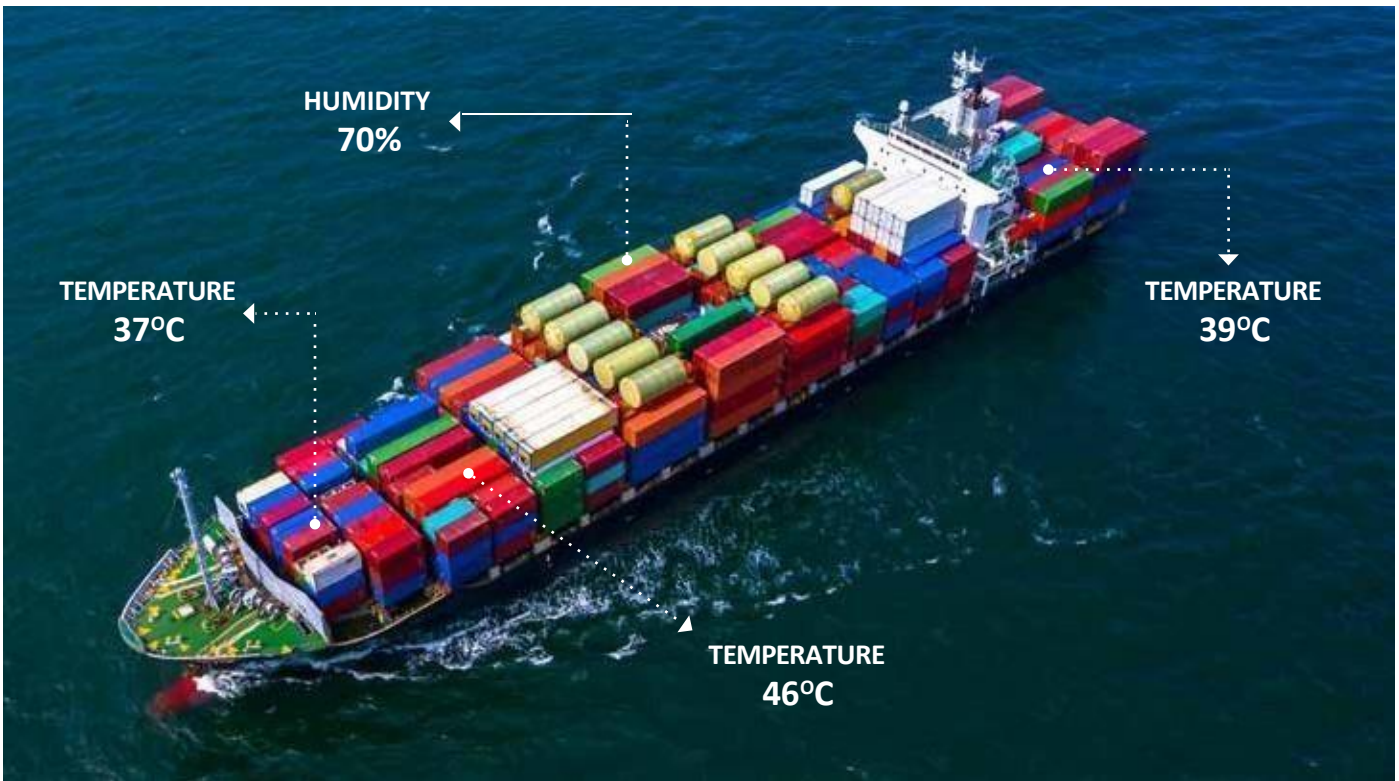
The emergence of a -digital clientll (-connected customerll) causes more pressure on suppliers, demanding a better adaptation of products to customers' demands and preferences, quick and trouble-free delivery. Digitization in the supply chain undoubtedly inspires, but also forces the creativity in the operational and tactical areas, making customer relations on the one hand more real, on the other hand more effective.



Source: Research Gate

As shown above, Logistics 4.0 makes use of Cyber Physical Systems, Internet of Things (IOT), Networks in all its activities.

For instance, in an IOT enabled warehouse or during transportation, a supply chain manager who has access to the product would easily detect damaged product or group of products on the basis of heat and light conditions. Even if the realization of damaged products is too late, just by knowing the issue would enable the supply chain manager of the warehouse to restock the damaged products so that there is no hamper in providing customers in what they need at any time.



Source: Vessel Finder

In a technologically advanced warehouse aligned with high-end technologies, the sensors alone could intimate an alert to the supplier illuminating that a restock order was necessary without requiring any human intervention at all.

It is Logistics 4.0 that has made integration and coordination possible across corporate boundaries. With technology involvement, the logistical issues related to both inbound and outbound material flows are easily and instantly streamlined in a significant manner. Companies are favouring Logistics 4.0 to network all warehouses with product lines and processes.

The technology drive of Logistics 4.0 enables companies to work more effectively than ever before with customers and partners, e.g. suppliers, manufacturers, wholesalers, retailers and logistics providers.

You can imagine that there are several other components in the supply chain and that without a digital supply chain Logistics 4.0 simply isn't possible. You can also imagine that, just as is the case in Industry 4.0 the Industrial IoT plays a key role, as does a thorough understanding of all data and insights and actionable intelligence for supply chain management.

Intelligent and efficient movement across all these different steps in a holistic way and add the aspect of autonomy to it, we quickly see what types of applications we really talk about: from driverless transportation to intelligent containers, smart warehousing, smart ports, smart shelves to the human and information exchange in all possible logistical chains and contexts. A major game-changer in this regard is also blockchain as we'll see further with myriad use cases for the distributed ledger technology in transportation, smart ports, cross-border maritime shipping, retail, the list is long.

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Digital Transformation:

The transport and logistics operators are currently starting to manage the changes required to introduce digital transformation inside their daily processes, a phenomenon similar to the electrification of economy. Digitalization is a general-purpose technology that helps enhancing competitiveness and reducing costs in any industry. In the transportation and logistics sector, this transformation is known as -Logistics 4.0, namely Big Data, Analytics, implementation of the Internet in more and more devices of the chain (IoT), Open Data, real-time connectivity (5G Mobile networks, Urban Wi-Fi, home and industrial fiber, new Bluetooth standard), Augmented reality, Drones, Virtual reality, etc.

The various stages of this digital transformation are as follows:

THE SIX STAGES OF DIGITAL TRANSFORMATION



Source: Hyvemyanmar

7R of Logistics accelerated:

Logistics 4.0 plays a key role in accelerating the following 7 Rights.

1. Right Product

A Company who offers this kind of service must first know the kind of products that they are going to handle and transport. Having the right knowledge will give you an advantage to properly and efficiently manage both your time and resources.

2. Right Place

The right product must be delivered to the right place. Courier services provided by an LMS company must have knowledgeable drivers as well as a systematic delivery system and tracking. Both customer and the provider must have a synchronized location tracking to ensure that the products are delivered to the right place.

3. Right Price

Pricing is very essential and all products and services. They must have an appropriate price value in order to track the company income and expenses. A good system for storing and updating the right prices ensures success in LMS.

4. Right Customer

Every LMS Provider must know their target market to identify the right customers. If they will offer their services to the right market, they have more chances of gaining leads and customers that will most likely to avail them.

Some uses the traditional marketing while others use digital marketing to reach more customers around the globe.

5. Right Condition

Every product or goods that are to be entrusted by the customers to LMS providers must be stored and delivered with the right condition. This is where the specifications must be referred to in order to place it on required facilities to maintain its quality.

6. Right Time

Time is very important when it comes to logistics; clients are more concern on the time of delivery. That is why every service provider must know the right time to deliver the products and in a very efficient way. Every system has a tracking functionality to monitor all deliveries and making sure that they arrive on time.

7. Right Quantity

Knowing and specifying the right quantity is also one of the key in a successful LMS. Since most of the providers are third party, companies that rely on their service must be careful in sending the right amount or quantity of goods to be delivered. Thanks to our modern technological developments that 3PLs can now manage all quantities of goods to ship/deliver.

Five Elements of Logistics 4.0:

When we discuss Industry 4.0, we often mention the origins of its name, i.e. the concept of the fourth industrial revolution defined by machine-to-machine communication and autonomous processes. With Logistics 4.0, on the other hand, there is typically no such history lesson involved, perhaps because we think of the new logistics paradigm as fundamentally an outgrowth of Industry 4.0. Whether or not that's the case, it's becoming increasingly clear that this new era in logistics is very much its own entity—and it's already changing the way that shippers and freight forwarders (to say nothing of their customers) do business.

This all leads to the question, what are the distinct elements that define Logistics 4.0 systems? How do these elements incorporate the logic of Industry 4.0, and how do they build on the logistics paradigms of the past?

1. End-to-End Visibility

One of the most important elements of technology-driven logistics is the increase in transparency and visibility from digitization across the complete supply chain system. Visibility has encouraged to build a smarter value stream system; also, it has proved to be a necessary prerequisite that has made logistics transparent and intra-operational much more efficient and comprehensive than its earlier manifestations.

For instance: Smart ports like Abu Dhabi's are already implementing solutions that make possible not just real-time tracking, but real-time viewing of documents and other mission-critical information for freight forwarders and their customers.

2. Smart Utilities

There has been the introduction of various smart versions of traditional logistics components. This has already transformed the way shipments circulate from suppliers to end users. Involvement of technology in logistics utilities like smart containers and smart pallets are transforming traditional shipping workflows already and incorporating fresh prospects that collect data and perform judgements based on the crucial information.

3. IoT Adoption

With the introduction of Industry 4.0 in the market, many IoT development companies have come up with digital devices that can be deployed and embedded on factory floors of warehouses. Such enhancements of IoT inclusion are all technical and very critical. However, the end result of deployment enhances technology like smart containers and utilities by connecting them to the cloud. This not only evolves the entire supply chain management but also increases profits in gaining granular insights.

4. Industry 4.0 Integration

The modern technology-driven logistics paradigm is closely related to Industry 4.0. The most important factor of Logistics 4.0 is its power to collaborate integration with Industry 4.0 systems and procedures. This usually creates an environment that builds a synergy and communal relationship between manufacturers, shippers and end users. There is a constant security of safety from external threats, storage of important and crucial data and meeting the needs of end users. The transparency is clear than that of traditional approach ever followed.

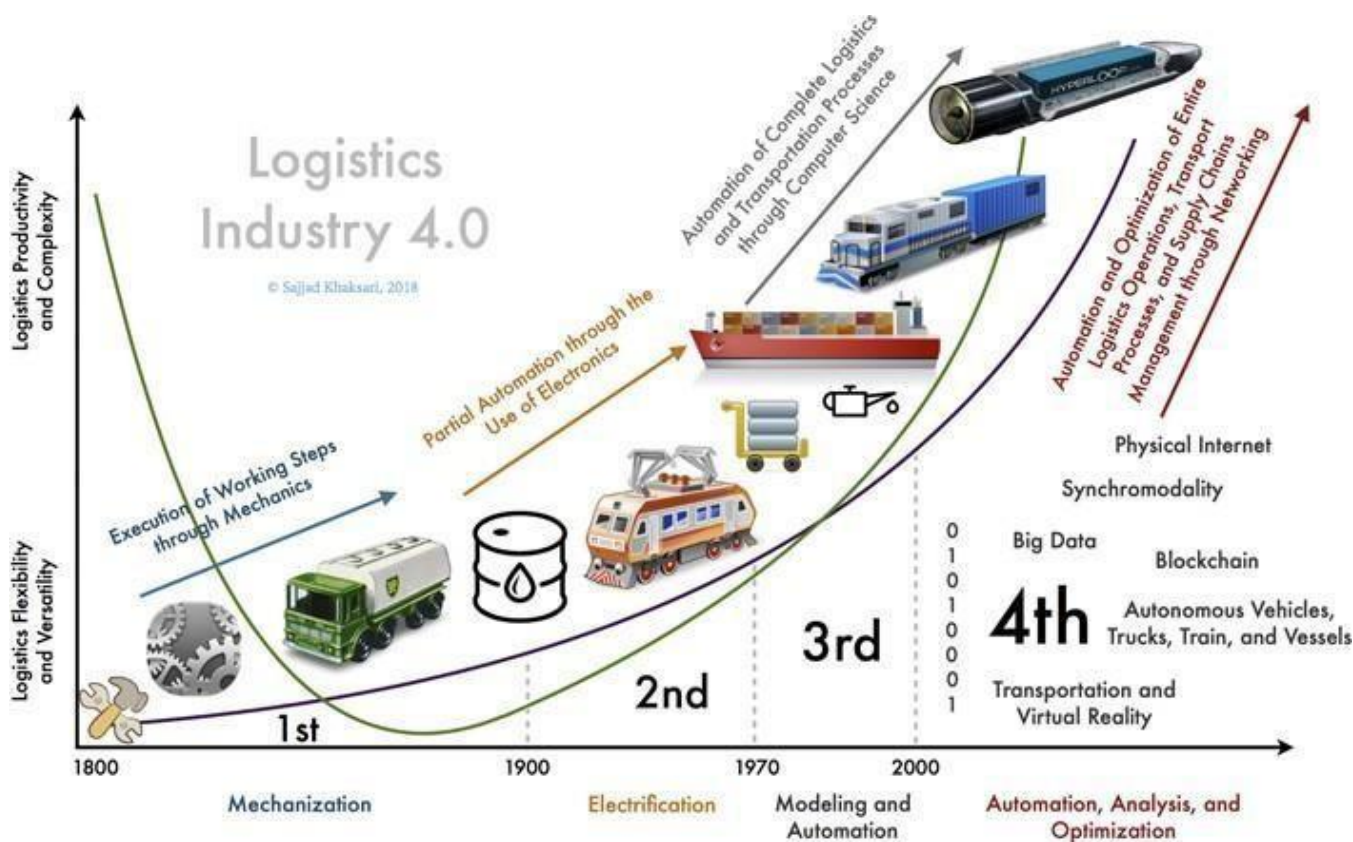
5. Better Living through Analytics

Much has been made so far of the importance of collecting data in these new logistics frameworks, but the real value of that data isn't limited to making manual planning efforts more cohesive. Rather, the endgame of advances in transparency, visibility, and data collection through sensors and RFID chips is utilization in advanced analytics processes. By feeding large quantities of information into predictive and prescriptive algorithms, modern logistics providers can improve their demand and shipping forecasts while uncovering potential areas of waste or possible improvement in their value streams.

This is helping to lay the foundations for a smoother version of supply chain management, one that is less susceptible to risk, disruptions, and opacity, but it's also paving the way for the rise of anticipatory logistics, i.e. logistics processes that predict and act on customer needs before they arise. This is one of the new frontiers available to modern, digitized shippers & freight forwarders.

Technologies Enabling Logistics 4.0:

Logistics plays a key role in boosting the economy of a country. In the context of the 4.0 technology revolution, technology is vital to a logistics business.



Source: BlogSpot

Technology Trends:

The potential of logistics, especially e-logistics (logistics in e-commerce), is enormous and has high growth, in the context of e-commerce strong growth (which in turn has the major impact on logistics), the high proportion of smartphone users & internet penetration in India, as well as policy support from the government.

Apart from the important factor, which is people, technology is the key competitive advantage in the logistics market, which is full of potential but packed with competition. As the table below, we will look at technologies such as IoT (with AI, large data), robots and automation, and enhanced real-world (AR). This will explore some of the key technologies in the forthcoming 4th Industrial Revolution having the impact on logistics over the next five years; business technology & trends.



Source: Seeking Alpha

This 4.0 technology trend will be fundamental for logistics to take off in the next 5 years. In the future there will be many scenarios; large companies will make a big impact on logistics. However, not only large companies are involved in solving logistics problems, but also start-ups that offer breakthrough solutions in each stage of the supply chain in general and logistics in particular.

Road Ahead for Logistics 4.0:

In the end the traditional pyramids we are used to see in supply chain management and logistics are poised to be disrupted. While we aren't fully in that stage yet and most organizations start to explore the possibilities of smart logistics and supply chain management, others are taking the lead or forced to move faster to meet demands of the stakeholders in their ecosystems (including internal stakeholders).

The road ahead is one of more autonomy across various logistics components such as supply chain logistics, inbound logistics, warehouse management, intralogistics or line feeding, outbound logistics and logistics routing.

One of the best images depicting the evolutions towards more autonomy across all these areas is the roadmap image from Unity Consulting and Innovation which you see below. In that roadmap a highly autonomous, flexible and predictive picture is painted in later stages, even up to the point that there are no more warehouses in the supply chain.

Logistics					
Supply Chain Logistics	Local Operating Structure	Global Operations Structure	Partial Global Resource Planning / Controlling	Complete Global Resource Planning / Controlling	Open and Flexible Operations Footprint
Inbound Logistics	Push Delivery Process	Pull Delivery Process / JIS	Vendor Managed Inventory	Autonomous Inventory Management	Predictive Inbound Logistics Management (Big Data)
Warehouse Management	No Automation	Automatic Warehouse System	Automatic Warehouse Network	Supply Chain Warehouse Network	No Warehouse in Supply Chain
Intralogistics / Line Feeding	Manually steered rack, trolley	Manually steered train	Autonomous FTS on fixed routes	Autonomous FTS on open area	Autonomous FTS on open area steered by production machine
Outbound Logistics	Push Delivery Process	Order-Based Delivery Management	Active Delivery Management	Automatic Delivery Management	Predictive Delivery Management
Logistics Routing	Decentralized Vehicle / Equipment Fleet	Centralized Vehicle / Equipment Fleet	Pre-planned and Centralized Fleet	Real-Time Routing and Connected Navigation	Autonomous Transportation Vehicle / Equipment

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Source: Unity Seminar

Challenges:

While Logistics 4.0 represents a significant value-added proposition for those trying to navigate the complexity of the global supply chain, reaping all of the potential benefits of these technologies can present some hurdles for businesses. Three of the most significant challenges that these businesses face are:

- Reducing Shadow IT and information silos
- Breaking free from past-oriented planning
- Ditching the spreadsheet

Of these hurdles, perhaps the most important is -ditching the spreadsheet. Not only do planners wall themselves off and actually contribute to information silos by producing plans in Excel, they also counteract the mindset of open, transparent workflows that is crucial to success in the modern supply chain. Indeed, this type of workflow is emblematic of the organizational structures that result in things like Shadow IT and siloed decision-making processes, both of which make a forward-facing and future-oriented supply chain virtually impossible. Under these conditions, businesses often wind up caught in a cycle of planning based on past events and then scrambling to adjust to unforeseen breakdowns.

Knowledge Series



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