Reimagining India's supply chain

A bold vision for 2030

December 2020

CII

Confederation of Indian Industry
125 Years - Since 1895

Arthur D Little

Contents

Authors and contributors:

Barnik Chitran Maitra
Managing Partner
maitra.barnik@adlittle.com

Thomas Kuruvilla
Managing Partner
kuruvilla.thomas@adlittle.com

Bernd Schreiber
Partner
schreiber.bernd@adlittle.com

Lokesh Dadhich
Principal
dadhich.lokesh@adlittle.com

Harinarayanan S
Supply Chain expert
Facilitator - CII SNP Forum
chairman.ip@cii.in

Arunabh Podder
Summer Analyst
podder.arunabh@adlittle.com

Radhikaa Shah
Business Analyst
shah.radhikaa@adlittle.com

Foreword

India's supply chain and logistics sector is one of the largest globally. The sector has the potential to grow multifold.

India needs to effectively bridge the competitiveness gap of USD 180 billion vis-à-vis the supply chains of advanced nations and become a leading player globally.

At the CII Supply Chain Leadership Conclave held on September 11, 2020, supply chain experts from the CPG and Pharmaceuticals presented their insights on the theme, "Supply Chain Transformation for Efficiency and Capability". The conclave had the participation of over 270 delegates from the supply chain and logistics sector, including CEOs, Directors, experts and senior leadership of various organizations.

Deliberating on the scenario of India's current supply chain, the Conclave discussed the need to build a technology-enabled, integrated supply chain that ensured visibility and efficiency and would create a flexible and agile process with seamless experience for customers.

To help achieve this goal, the report outlines a Vision 2030 for the Indian Supply Chain with focus on logistics costs, optimizing the logistics modal mix, digitizing 80-90% of supply chain operations, developing omni-channels and moving towards green supply chains. Enhancing skill development is also a key imperative.

The report has been developed by Confederation of Indian Industry (CII) and Arthur D. Little to set a bold 'Vision 2030' for the Indian supply chain and identify collaborative opportunities between Industry and State & Central Governments in achieving this vision.

We are certain that this report will help stakeholders build a globally competitive supply chain, thereby facilitating the transition for India's evolution as a leading economy in the world.

Mr CK Ranganathan
Deputy Chairman
CII Southern Region &
Chairman & Managing Director
CavinKare Pvt. Ltd.

Preface and acknowledgements

The CII Supply Chain Leadership Conclave (CPG & Pharma), held on September 11, 2020, marked the beginning of an initiative to transform India's supply chain in line with a bold vision for 2030. Arthur D. Little is pleased to be a part of this effort, starting with its role as CII's technical partner for the conference.

This report describes the perspective gained through presentations by top supply chain experts and discussions with leaders in the industry. It aims to set the aspirations for the industry and lay down a roadmap to achieve Vision 2030.

We would like to acknowledge the insights and support provided by many in developing this report.

First of all, we are grateful for the unconditional support of CII Southern-Region for its help with coordinating and conducting the conference. We thank Jeanne Subramaniam for her editorial support.

Finally, we thank all the conference speakers for their expertise, commitment and generosity with time and information.

Barnik Chitran Maitra
Managing Partner, India and South Asia
Arthur D. Little

Executive summary

It is hard to understate the importance of supply chain efficiency for large and growing economies, particularly India. An efficient and sustainable supply chain management system is one of the key factors for economic growth. An effective supply chain directly translates into competitiveness across economic sectors through lowered input costs.

India's supply chain and logistics sector is one of the largest globally, with a logistics industry of USD 215 billion and growing at a CAGR of 10.5 percent. However, despite its size and criticality to economic growth, India's supply chain is marred by an unbalanced logistics modal mix, high indirect costs, poor infrastructure, fragmented networks, and lack of technology adoption.

The COVID-19 pandemic has accentuated supply chain weaknesses, with nearly 75 percent of companies worldwide experiencing disruptions. Worse still, most companies have reported lack of any contingency plan to deal with a problem of this magnitude.

One of the biggest revelations of the pandemic for this sector is the urgent need to leverage disruptive technologies for greater resilience. In India, the pandemic has accelerated digital adoption on the demand side. This stemmed from the unprecedented demand faced by online grocery providers, which forced them to limit access for existing consumers in April and May 2020. These disruptive events pushed decision-makers to reimagine the country's supply chain management.

This is the moment for the Indian supply chain and logistics sector to reconfigure and redesign supply chains with greater thought to disruptive technologies and risk management, especially considering the resilience required in the consumer-packaged goods (CPG) and pharmaceuticals sectors.

With this background, this report describes the key issues discussed at the CII Supply Chain Leadership Conclave held on September 11, 2020, and the steps needed to achieve Vision 2030 for the Indian supply chain. They can be summarized as follows:

- The logistics cost in India stands at 14 percent of GDP, compared to the global average of approximately 8 percent. This creates a competitiveness gap of USD 180 billion for India, which will increase to USD 500 billion by 2030.

- Supply chains are transforming globally by adopting Industry 4.0 trends. Organizations are building agile networks, using disruptive technologies, ensuring end-to-end visibility, and moving from risk mitigation to risk management.

- Several emerging technologies are available to enhance supply chain resilience. In mature economies, the use of artificial intelligence, blockchain, and the Internet of Things (IoT) has proved valuable.

- To make India's supply chain competitive, efficient, and resilient, we propose a Vision 2030 that aims to pare logistics cost to 7-8 percent of GDP, optimize the logistics modal mix, digitalize 90 percent of supply chain operations, develop omni-channels, move towards green supply chains and enhance skill development.

1. An uncompetitive supply chain

The CII Supply Chain Leadership Conclave opened up a plethora of themes and ideas raised by supply chain experts in the CPG and pharmaceutical industries. The initiatives identified in their addresses match the imperatives for India in building a globally competitive supply chain.

Logistics costs in the Indian supply chain amount to almost USD 400 billion, or 14 percent of GDP.[1] A comparison with global peers shows that logistics costs amount to 8-10 percent of GDP in the US and Europe, and 9 percent in China. The global average is close to 8 percent of GDP, which reveals a competitiveness gap of USD 180 billion for India. India ranked 44 in the World Bank Logistics Performance Index, last released in 2018, far behind the US at 14 and China at 26. Other South-Asian countries, such as Thailand and Vietnam, also have high logistics costs. These countries' costs reach 14 and 16-17 percent of GDP, respectively. However, they fare slightly better than India on the logistics performance index, with Thailand at 32 and Vietnam at 39.

Any improvement of India's performance will hinge on how well we tackle barriers to competitiveness that impede the supply chain's operation and growth.

Barriers to competitiveness

India's supply chain has remained well below global standards because of the drawbacks and certain inefficiencies that plague it. These can be summarized as follows:

- **An unbalanced logistics modal mix**
  A modal mix heavily skewed towards transportation by road is at the root of the unwarranted logistics costs. Transportation represents approximately 40 percent of logistics costs, which amount to 6 percent of GDP. Transportation by road makes up the lion's share of this cost, at about 64 percent, followed by rail at 30 percent and waterway and air transport at 5 and 1 percent, respectively. This heavy dependence on the road networks,

Figure 1:   India's ranking in the Logistics Performance Index (2018)

Country	LPI rank	LPI score	Customs	Infrastructure	International shipments	Logistics competence	Tracking & tracing	Timeliness
Germany	1	4.20	4.09	4.37	3.86	4.31	4.24	4.39
Sweden	2	4.05	4.05	4.24	3.92	3.98	3.88	4.28
Belgium	3	4.04	3.66	3.98	3.99	4.13	4.05	4.41
Austria	4	4.03	3.71	4.18	3.88	4.08	4.09	4.25
Japan	5	4.03	3.99	4.25	3.59	4.09	4.05	4.25
Netherlands	6	4.02	3.92	4.21	3.68	4.09	4.02	4.25
Singapore	7	4.00	3.89	4.06	3.58	4.10	4.08	4.32
Denmark	8	3.99	3.92	3.96	3.53	4.01	4.18	4.41
UK	9	3.99	3.77	4.03	3.67	4.05	4.11	4.33
Finland	10	3.97	3.82	4.00	3.56	3.89	4.32	4.28
US	14	3.89	3.78	4.05	3.51	3.87	4.09	4.08
China	26	3.61	3.29	3.75	3.54	3.59	3.65	3.84
India	44	3.18	2.96	2.91	3.21	3.13	3.32	3.50

Source: World Bank

---

1   This is based on the expenditure method of GDP calculation

combined with poor transportation infrastructure, makes transportation costs balloon. Currently, the per-ton-km cost of transportation via the road network is almost double that of rail and waterways, at Rs 2.58/ton-km, compared to Rs 1.41/ton-km for rail and Rs 1.06/ton-km for waterways. India's rail and sea network are highly under-utilized due to lack of supporting infrastructure.

Figure 2: Percentage breakdown of the total logistics cost of the Indian supply chain
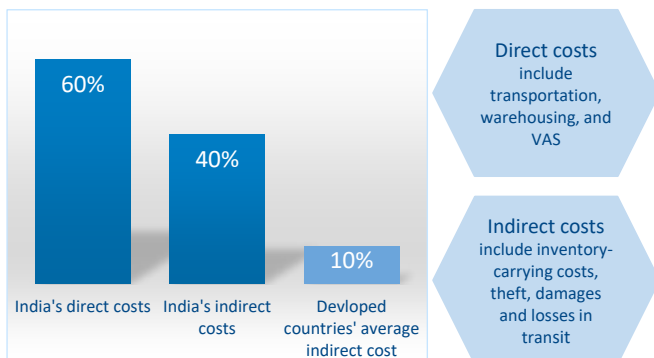

Transportation	Warehousing	Inventory	Order processing/admin
40%	26%	24%	10%
6% of GDP	4% of GDP	3% of GDP	1% of GDP
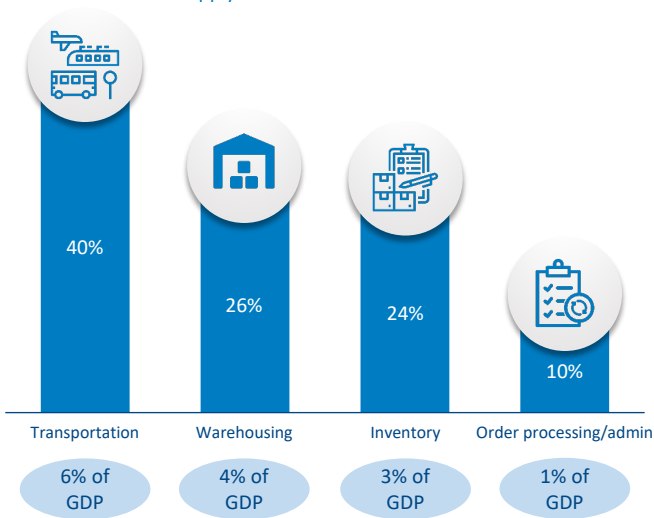
Source: Arthur D. Little analysis

High indirect or "hidden" costs

Indirect logistics costs in India are four times the average of those in developed countries. The main reasons are excessive layers in distribution channels and inventory mismanagement. Inadequate demand forecasting due to lack of technology adoption leads to inventory mismanagement. It also leads to high inventory carrying costs, which include costs for holding and storing unsold goods. These costs alone amount to 15-25 percent of inventory costs (4-6 percent of total logistics costs), which amounts to USD 120 to 180 billion.

Figure 3: Percentage break-up of logistics cost

India's direct costs	India's indirect costs	Devploped countries' average indirect cost
60%	40%	10%

Direct costs include transportation, warehousing, and VAS

Indirect costs include inventory-carrying costs, theft, damages and losses in transit

Source: Arthur D. Little analysis

Poor-quality infrastructure

India has the second-largest road network globally, which totals 5.5 million kilometers, yet national highways account for less than 2.7 percent of the total network. This puts a severe strain on the national highway network, which carries about 40 percent of the road traffic.

India also has one of the largest rail networks in the world, spread over 1.2 lakh kilometers. However, the average speed of freight trains in India is 24-25 kmph, compared to 38-40 kmph for those in the US and China.

Furthermore, India has a shortage of warehousing space. Storing of drugs and perishable consumer goods requires cold-storage facilities. As of 2019, India had a total cold-storage capacity of 226.7 lakh tons (lt), against the required capacity of 350 lt. According to the Indian Council of Food and Agriculture, 30 percent of agricultural produce goes to waste every year due to lack of cold chain infrastructure.

Limited adoption of the latest technology

The slow adoption of supply chain technology, such as artificial intelligence, blockchain and the IoT, remains a major shortcoming. Organizations globally have adopted the latest technologies to ensure full visibility and real-time information on processes in the supply chain. Lack of digitization, inventory mismanagement and inaccurate demand predictions in the absence of technology contribute in large part to the competitiveness gap between India and its global peers.

Fragmented logistics (trucking) network

Despite its centrality to economic growth, India's logistics sector has remained fragmented and unregulated, comprising many local players and no national or regional players that can create end-to-end platforms. The trucking industry is especially unorganized, and marked by non-standard equipment such as pallets and truck dimensions. Only 10 percent of Indian truck operators own fleets above 25 trucks; most others are drivers with single trucks who rely on third parties to handle their orders. With no big players to control the market, businesses at entry level are at a cost disadvantage. The turnaround time for trucks in India is low, at less than 300 kilometers per day compared, to more than 700 kilometers per day in Europe and the US.

Uneven channel mix for domestic retail and FMCG sales

India's retail market is dominated by unorganized retail, which amounts to a massive 90 percent of total retail, comprising nearly 12 million *kirana* stores. Digital/e-commerce platforms account for a minuscule 2 percent of sales, and organized retail just 8 percent. In comparison, countries such as China and the US have much higher

shares of organized retail and online sales. These shares reach 56 and 21 percent, respectively, for China, and 76 and 14 percent, respectively, for the US.

With so many micro- and small-scale sellers and scattered, barely integrated pathways for moving products, the supply chain has become convoluted.

At the conclave, leaders and experts detailed the improvements needed to make India's supply chain more competitive. These can be summarized as follows:

- **Technology-enabled supply chain architecture:** The discussion revolved around making supply chain channels technologically driven. In today's world, digitization is not an option, but a necessity. We need end-to-end, real-time visibility to enable quick action in case of disruption. The entire supply chain needs to be connected by integrating physical networks with digital technology. The latest technology, such as geo-tagging, auto-capture, and big data, enables collaboration, better forecasting, and traceability along the network, which helps to monitor supply chains. Technology-enabled forecasting helps reduce wastage along the supply chain by allowing organizations to manage demand- and supply-side shocks.

  Artificial intelligence, blockchain technology, and the IoT will bring breakthrough productivity gains in the supply chain network. Industry stakeholders have already made vigorous attempts at full use of these technologies. Automation in packaging has helped industries reduce the workforce by 20-30 percent, which has curtailed losses due to labor migration. The push due to the pandemic has led to faster adoption of technology.

- **Integrating the supply chain network:** Building a flexible and agile supply chain requires platforms that integrate the processes involved. The panelists recommended a move towards omni-channel supply chains to provide a seamless experience for consumers, irrespective of the channels used. Simplifying the supply chain will also make it feasible for organizations to function with low inventory.

  The panelists also suggested a need to integrate supply chain planning with execution to ensure quick response to any disruptions. Organizations will gain from building partnerships of shared assets and services. This will help them reduce costs and create an ecosystem by developing collaborative platforms such as online B2B marketplaces. The norm is not start-ups versus incumbents anymore, but start-ups and incumbents.

Kirana shops are a unique feature of the Indian supply chain. Integrating *kirana* stores digitally has massive savings potential in terms of both costs and time. Orders through *e-kiranas* can save up to 120 minutes of retailers' ordering time, which can be used more productively in serving customers.

- **Building logistics infrastructure:** A major theme at the conclave was improving India's logistics infrastructure by benchmarking the logistics modal mix and emphasizing the use of electric vehicles (EVs) for last-mile deliveries. Optimizing routes, delivery points, and networks can reduce product damage, which will lead to green supply chains.

- **Advocating for enabling policy:** The panelists proposed a push for advocating supply chain-friendly policies. Appropriate policy will help improve India's logistics network and make it globally competitive. The panelists raised the issues of standardization of truck size, reduction in turnaround time, development of last-mile city logistics, and development of logistics parks, for example, by leasing land from government PSUs through the proposed new logistics policy.

  Panelists also discussed other policy initiatives, including faster approval for licenses, swifter permissions related to logistics, and ease in documentation.

Failing to address India's competitiveness gap of USD 180 billion could expand it to USD 500 billion by 2030. Greenfield manufacturing will remain unviable because high logistics costs are a barrier to entry. High logistics costs will continue to impede local manufacturing and reduce demand for Indian products in the global markets. As the observations of leaders and experts show, India has no choice but to transform its supply chain if it aims to become one of the leading economies of the world. The next chapter describes the preferred approach to doing so.
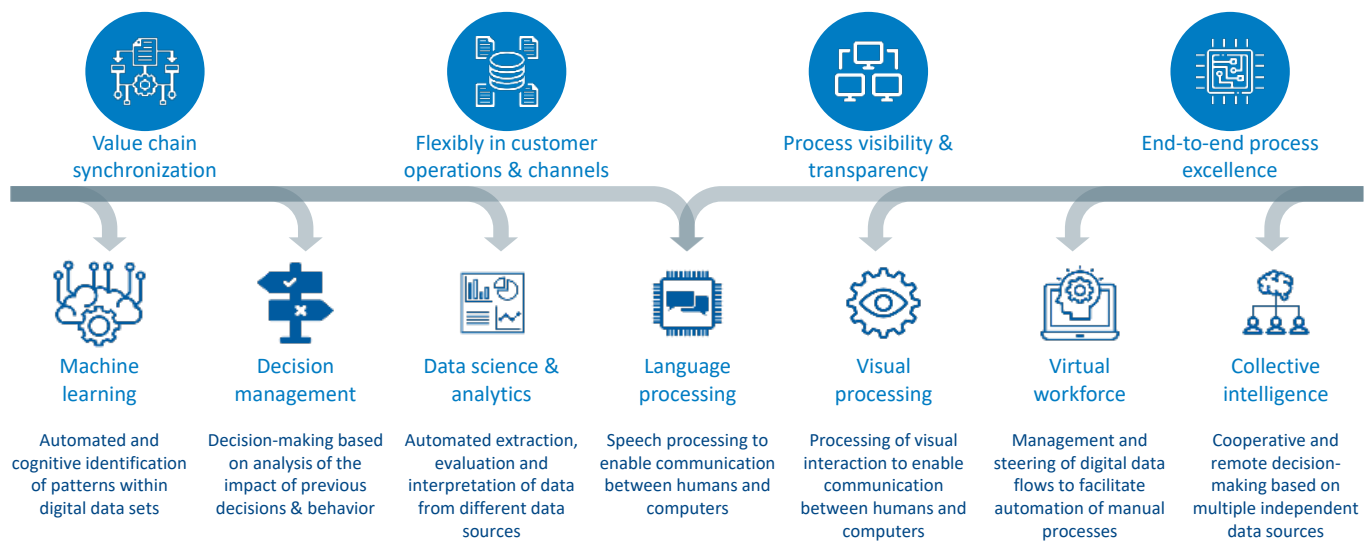
2. International learnings and next steps to build a 21st century supply chain

Applications and technology of the Fourth Industrial Revolution, particularly big data, augmented reality, the IoT, and blockchain technology, have created the means to transform supply chains, including configuration, planning, processing, and logistics. Effectively applying these approaches can reduce operating costs by 40 percent, while building more resilient and flexible supply chain networks.

supply chain ecosystem with production spread across manufacturers. Organizations will have to build systems that can optimize costs, accelerate reaction times, and diversify channels. For networks to adapt quickly and function smoothly, it is also important to build agile teams willing to change and adapt rapidly to the external environment. Swift reaction to disruptions can hasten change and minimize damage. (See Figure 5 for details.)

Figure 4:   Trends in SCM & purchasing

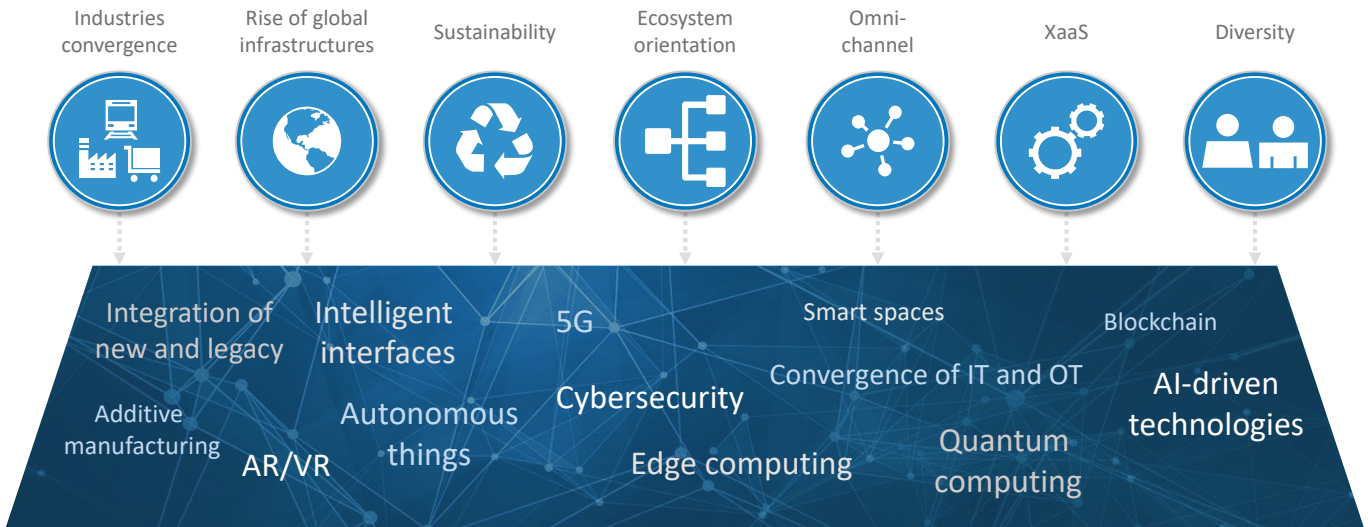| Value chain synchronization		Flexibly in customer operations & channels		Process visibility & transparency		End-to-end process excellence
Machine learning	Decision management	Data science & analytics	Language processing	Visual processing	Virtual workforce	Collective intelligence
Automated and cognitive identification of patterns within digital data sets	Decision-making based on analysis of the impact of previous decisions & behavior	Automated extraction, evaluation and interpretation of data from different data sources	Speech processing to enable communication between humans and computers	Processing of visual interaction to enable communication between humans and computers	Management and steering of digital data flows to facilitate automation of manual processes	Cooperative and remote decision-making based on multiple independent data sources

Source: Arthur D. Little analysis

In light of these trends and of recent supply-and-demand shocks in the supply chain, decision-makers are considering **new ways of doing businesses** and **bringing innovation into their planning and operations** to build a sustainable and resilient supply chain.

Building **a resilient 21st century supply chain** requires bold steps on four main fronts:

- **Building agile networks:** The ongoing pandemic has forced industries to step back and review their strategies, operations, and processes. Organizations have realized that they need to build networks and/or channels that will allow them to navigate quickly and easily in a changing environment. Building agile networks will require a flexible

Recently, French and Italian production of disinfectants and medical gear proved insufficient to meet the needs of those combating COVID-19. Within 72 hours, LVMH's perfume factories started producing hand sanitizers. Designer clothing factories of Giorgio Armani, Gucci, and Prada were producing medical overalls, and the trench-coat plant of Burberry began to make face masks and nonsurgical gowns. The supply chains' flexibility to rapidly source raw materials and design, develop and test products and distribution played a key role in this switch.

Arthur D Little

Figure 5:   Building an agile network using the latest technology

| Industries convergence | Rise of global infrastructures | Sustainability | Ecosystem orientation | Omni-channel | XaaS | Diversity |

Integration of new and legacy • Intelligent interfaces • 5G • Smart spaces • Blockchain • Additive manufacturing • Autonomous things • Cybersecurity • Convergence of IT and OT • AI-driven technologies • AR/VR • Edge computing • Quantum computing

Source: World Economic Forum, Gartner, Arthur D. Little research

■ **Digitization and use of disruptive technologies:** Increased demand for e-commerce with a surge in online ordering has forced manufacturers and retailers to optimize their supply chain operations to deliver high volumes of packages directly to customers. A robust technological system such as blockchain technology for swift tracing of perishable items can boost the productivity of supply chains. The use of data analytics can ensure just-in-time deliveries. Digitizing the supply chain provides a collaborative platform for sharing information with stakeholders and managers at each point. This also raises the quality and speed of decision-making. There is a plethora of technologies that supply chains can use to their advantage. For example, Amazon uses drones for faster delivery and robots in its warehouses for inventory management. (See Figure 6 for more details, along with use cases.)

Figure 6:   Future of operations building blocks

Cognitive	Connected	Virtual	Human centered	Value add
Big data/advanced analytics	**Connected things**	**Augmented reality**	**Collective intelligence/ crowdsourcing**	**Blockchain**
Telefónica — Personalized marketing, (cross-selling) offers	Sensors delivering environment & technical health information for network nodes & cabling	tw telecom — AR for customer experience in stores	telenor group — Open-innovation portal for product innovation	du — Distributed ledger system
T·Mobile — Real-time network fault detection and prediction	GE — Real-time and online monitoring of machines	AR in network maintenance & warehousing	T··· — Crowdsourced product development	
Cognitive, self-learning systems/bots	**Collaborative, smart machines and robots**	**Cyber-physical systems/ virtualized networks**	**Virtual workplace/ workplace 4.0**	**Integrated ecosystems/ decentralized (mobile) value add**
sky — Automated security threat detection and resolution	amazon — Robot-aided movement of inventory racks	TELECOM — Software-defined networking, network functions virtualization	orange — Online platform for remote product & material testing	vodafone — Omnichannel platform for buying experience
SaskTel — Automated measures for detected network irregularities to avoid faults	SoftBank — Robot-staffed store	BT — Cloud platform to enhance internal IT operations' efficiency	Alcatel·Lucent — Mixed-reality solutions for video conversations	
Autonomous transport systems	**Smart energy systems**	**Virtual modeling/simulation**	**eLearning/MooC[1]**	du — Smart city platform serving multiple verticals
Autonomous material supply for network rollouts & maintenance	Solar farm to provide corporate facilities with green energy	Telefónica — Networks simulation to optimize network build & maintenance	Platform for educational audio and video content	
amazon — Delivery of packages with drones	SONY — Increasing use of green power certification system	Alcatel·Lucent — Consumer-choice simulation to identify rollout technologies	SIEMENS — Virtual reality training simulator	ERICSSON — Smart city platform to scale smart city business and exploit opportunities

Source: Arthur D. Little analysis
Note: 1) Massive open online course

14

Among these, the trifecta of artificial intelligence, blockchain and the IoT is set to revolutionize the industry, with applications ranging from self-learning algorithms, data-based decision-making, real-time monitoring powered by the IoT, and sensor-based technologies. Blockchain also has a wide range of applications, from data management and secure transactions to traceability.

Toyota has created a database to visualize the supply networks for each of its components. Thus, if a disaster strikes, the company knows precisely which parts are at risk. The database also identifies components that are provided by only one manufacturer and, hence, difficult to replace. This helps reduce dependency and arrange alternative suppliers.

Figure 7:   Integrated end-to-end use of new technologies
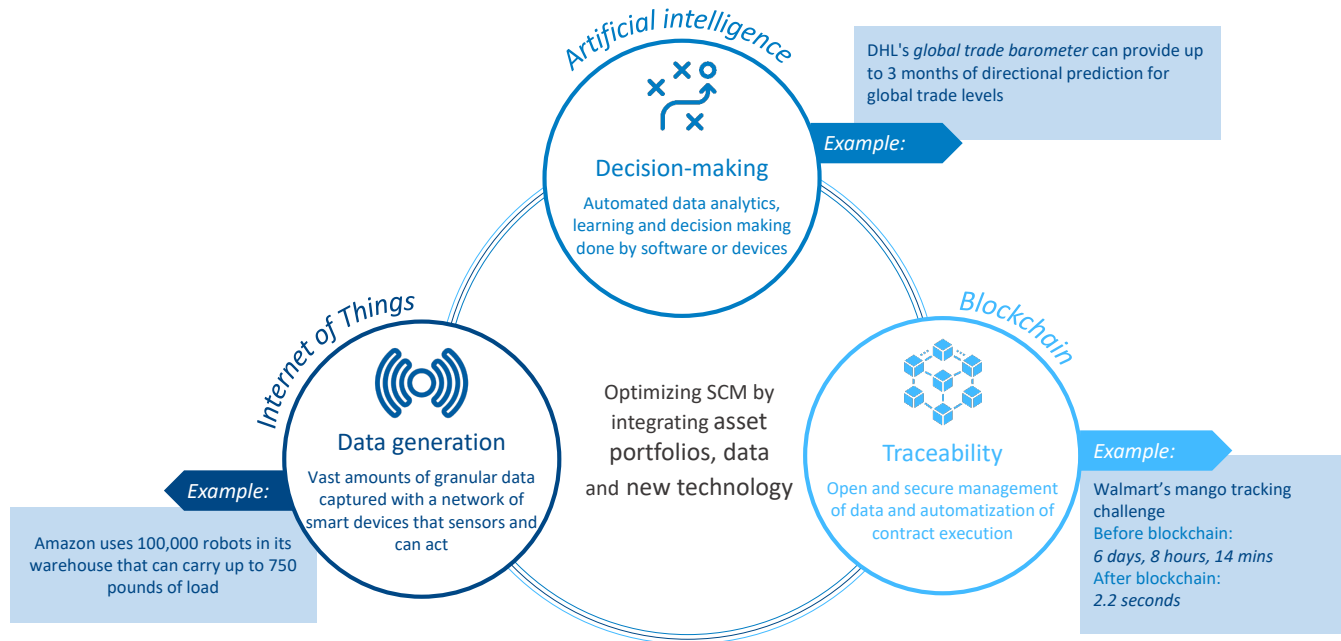
Source: Arthur D. Little analysis

Procter & Gamble's strategy to deploy a cloud-based platform for real-time information on production and external demand helped minimize the fallout when Hurricane Sandy hit New Jersey in 2012. The hurricane disrupted production in the P&G factory that made 91 percent of its perfumes. The use of advanced analytics and quick decision-making limited the plant's downtime to two-and-a-half days. Further, in 2017, P&G used digital tools to predict which suppliers, plants and distribution centers were likely to suffer damage from Hurricane Irma in Florida. This allowed the company to prepare for contingencies and avoid disruption and financial loss.

■ **Ensuring end-to-end visibility:** Visibility is an important factor in determining the supply chain system's response rate. It enables manufacturers, distribution centers and retailers to respond quickly to the ebbs and flows of consumer demand, without the need for additional labor or resource allocation. For example, the panic-hoarding of toilet paper could have been avoided, had consumers been able to see the toilet-paper inventory level. Digitization of goods through radio frequency identification or barcodes will provide visibility at each step of the supply chain and help forecast demand and hence availability.

■ **Moving from risk mitigation to risk management:** Organizations were vulnerable to supply chain risks and disruptions much before the current crisis, to the point of losing millions of dollars. In a survey, approximately two-thirds of executives described their risks from supply chain disruptions and acknowledged that these continued to rise. The reasons ranged from lack of transparency in the supply chain to data restrictions, which made it difficult to ascertain the probability and severity of risks.

Organizations should now take proactive roles in tackling these issues by structuring, cataloguing, and addressing known risks, and creating resilient systems to tackle unknown risks. As an example of managing known risks, they could mitigate supplier bankruptcy by maintaining supplier records and anticipating the disruptions that this could cause. Unknown risks can be managed by building strong defences, risk-aware cultures with speedy response teams, and systems that can help sustain shocks and provide competitive advantage. Moving from a reactive, experience-based system to a preventive analytical-based risk management system is important. It means using a range of mitigation measures that involve demand planning, supplier analytics, sourcing models, and partnerships.

Figure 8:   Supply chain risk mitigation
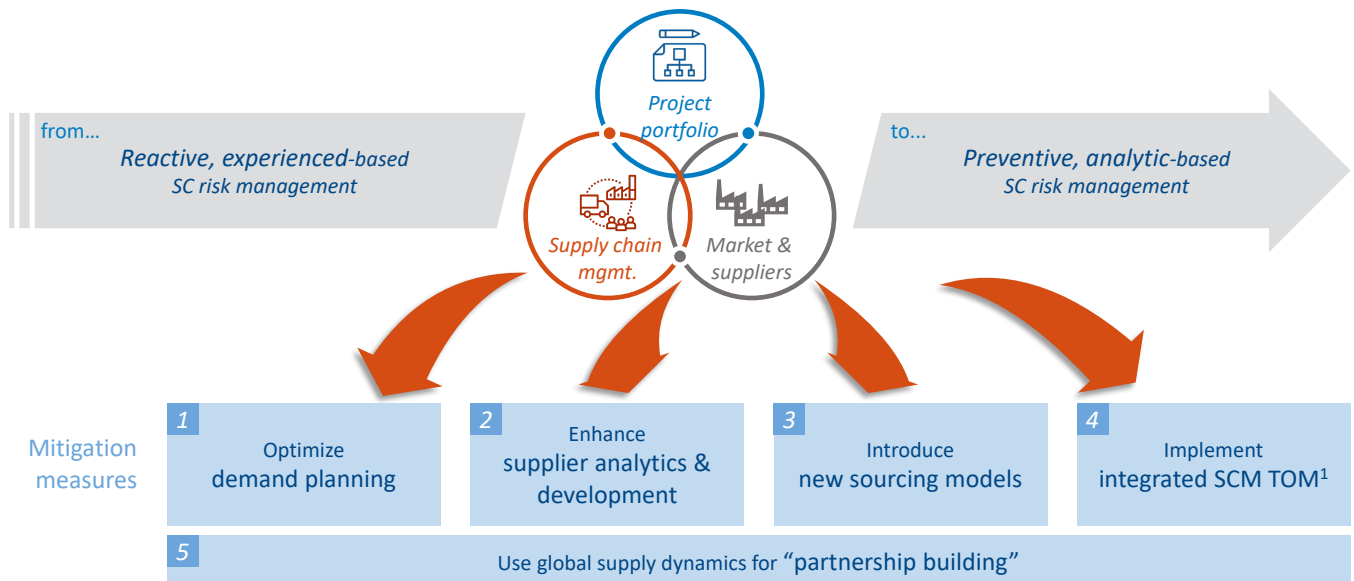
Source: Arthur D. Little analysis
Note: 1) SCM = Supply Chain Management; TOM = Target Operating Model

The common thread in these best practices is cutting-edge technology in the supply chain network, which can reduce operating expenditure to 30 percent. Further examples of technologically driven supply chains, provided below, prove the need for quick technology adoption in supply chain networks at all levels.

Amazon tests have shown that collaborative robotics can optimize costs by more than 25 percent by minimizing cycle times and building more efficient inventory management systems. Another example is the introduction of smart drone delivery services, which has reduced one-way delivery time and costs by up to 80 percent.

A few more examples across industries illustrate the tangible increase in competitiveness through the application of cutting-edge technology.

Figure 9:   Technological impact on how logistics companies operate
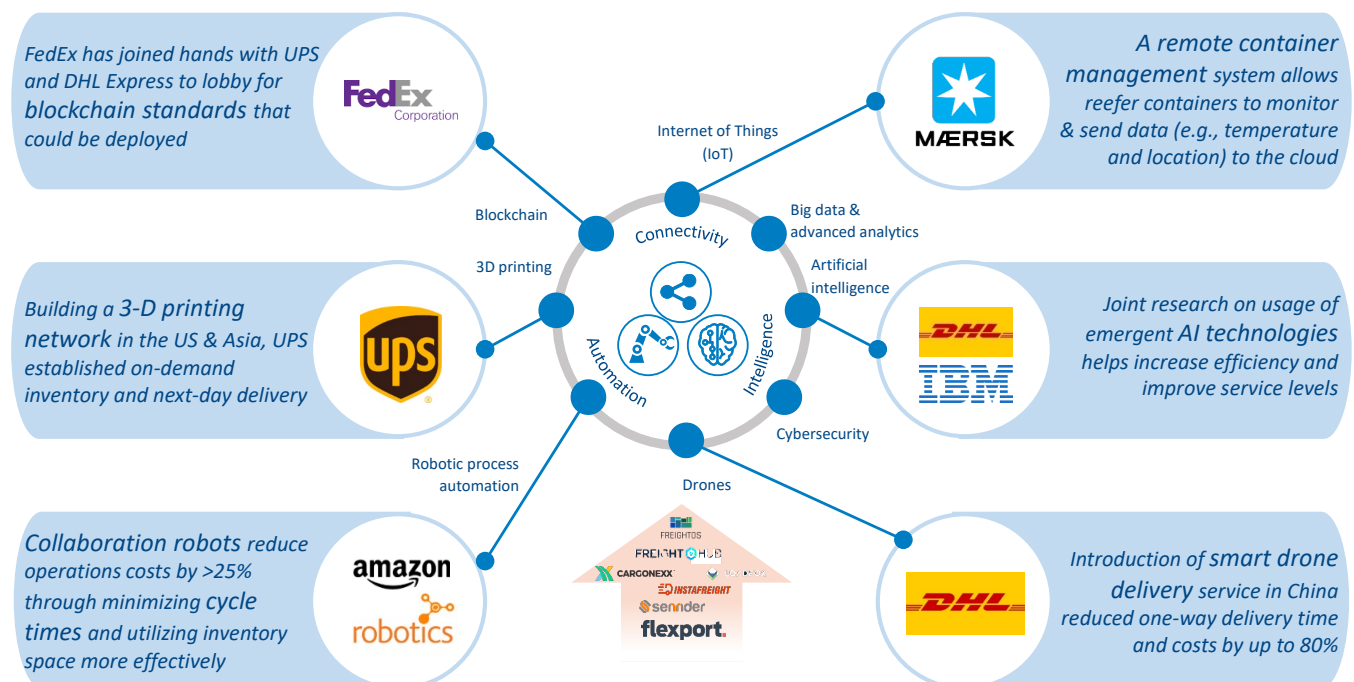
Source: Arthur D. Little analysis

Figure 10: Examples of organizations using cutting-edge technology to improve supply chain operations

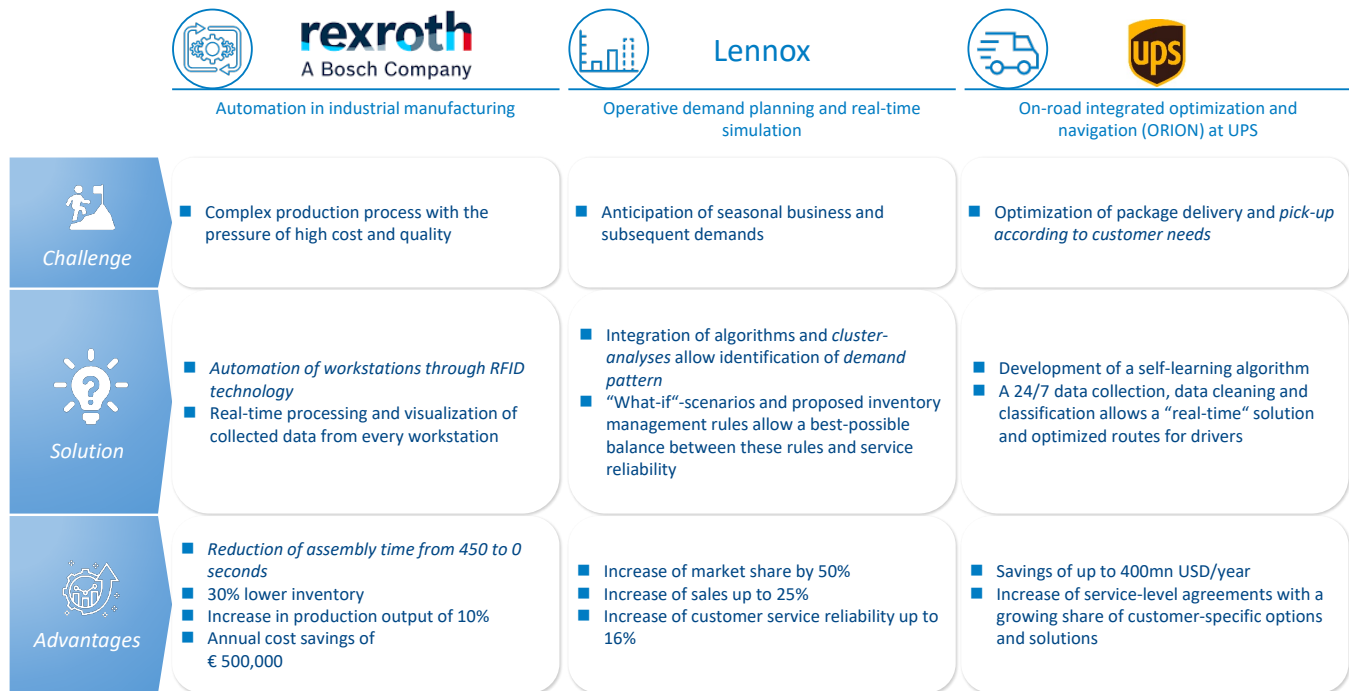|	**rexroth** A Bosch Company Automation in industrial manufacturing	**Lennox** Operative demand planning and real-time simulation	**UPS** On-road integrated optimization and navigation (ORION) at UPS
Challenge	■ Complex production process with the pressure of high cost and quality	■ Anticipation of seasonal business and subsequent demands	■ Optimization of package delivery and *pick-up according to customer needs*
Solution	■ *Automation of workstations through RFID technology* ■ Real-time processing and visualization of collected data from every workstation	■ Integration of algorithms and *cluster-analyses* allow identification of *demand pattern* ■ "What-if"-scenarios and proposed inventory management rules allow a best-possible balance between these rules and service reliability	■ Development of a self-learning algorithm ■ A 24/7 data collection, data cleaning and classification allows a "real-time" solution and optimized routes for drivers
Advantages	■ *Reduction of assembly time from 450 to 0 seconds* ■ 30% lower inventory ■ Increase in production output of 10% ■ Annual cost savings of € 500,000	■ Increase of market share by 50% ■ Increase of sales up to 25% ■ Increase of customer service reliability up to 16%	■ Savings of up to 400mn USD/year ■ Increase of service-level agreements with a growing share of customer-specific options and solutions

Source: Arthur D. Little analysis

Rexroth, an industrial manufacturer with a product range of six different mobile hydraulics products at its plant in Homburg, had a very complex production line, which involved over 250 variations using more than 2,000 individual components. The demand required production in small batch sizes, which traditionally incurred a huge production and quality cost. Rexroth implemented RFID technology-based automation and collected, processed, and visualized real-time data from every workstation. This significantly shortened assembly time, reduced inventory by 30 percent, increased production output by 10 percent, and saved costs of up to 500,000 euros annually.

Lennox International Inc. is an intercontinental provider of climate-control products for the heating, ventilation, air conditioning, and refrigeration markets. The firm wanted to anticipate season-based demand patterns. Lennox implemented artificial intelligence-based operative demand planning, which used the integration of algorithms and cluster analysis to identify the demand patterns. This ensured high reliability and visible real-time availability of data, which improved the average forecast by 11 percent. This, in turn, increased sales by 25 percent and market share by 50 percent.

United Parcel Service (UPS), an American multinational package delivery and supply chain management company, implemented deep learning and machine learning for optimized transportation planning and navigation solutions. This involved a self-learning algorithm fed by traffic analysis data and customer-specific data, including other data like staff locations and weather information. The algorithm produced real-time smart and optimized routes for delivery and pick-up. Implementation of this technology saves approximately USD 400 million every year and enables a higher rate of meeting SLAs (service level agreements) and increased customer satisfaction.

Finally, Dubai's Road and Transport Authority (RTA) is showcasing the "Future of Mobility 2030 and 2071," which conveys that adoption of even driverless cargo transport might not be far away. RTA has created a plan for mobility/transport in the city for 2030 and beyond. According to the plan, transport and logistics will be very different from what we know today. Autonomous and connected transport will soon be common. Future vehicles will run on alternative fuels, reducing carbon emissions. Dubai has estimated a 50 percent reduction in the road/parking infrastructure in the next 10-15 years and a tripling of current road throughput.

These practices and applications have strategic implications for the supply chain in India, notably:

- **Moving towards omni-channels, integrating general trade, including *kirana* stores:** Omni-channels provide one-touch integration across all distribution channels, which leads to a seamless shopping experience. It efficiently addresses the gap between virtual sales (e.g., e-commerce websites and third-party channels such as Amazon) and in-store sales (e.g., *kirana* stores and retail chains), enabling customers to order from any channels of their choice. According to e-commerce players, a big shift towards virtual sales could increase India's e-commerce market to around USD 85 billion by 2024. The e-commerce industry is projected to grow at 30 percent over the next five years. This will increase the gap between virtual and in-store sales.

- **Building agile networks by simplifying the supply chain:** Simplifying the supply chain and sourcing directly from manufacturers will reduce costs. Devising a plan and conducting pilots to supplement this change could help transform supply chains. Redesigning the supply chain will help adapt to newer ways of building a flexible system that will respond quickly to change. The just-in-time delivery system will need a robust supply chain well equipped with technology and automation. Incorporating these models requires agility in supply chain structures to ensure timely deliveries.

- **Using the latest technology, particularly artificial intelligence, blockchain, and the IoT:** Integrating physical networks with technology is the key to making supply chains sustainable. For example, the physical infrastructure in Amazon's warehouse is designed according to the paths of the robots. For such transitions in the supply chain network, it is also important to focus on skill development at all levels of staff and leadership.

- **Creating 21st-century multimodal logistics and warehousing:** India should build the next-generation multimodal logistics system with a consolidated supply chain network using technology to ensure end-to-end visibility. This will require creating widespread availability of high-quality warehousing and cold-storage facilities to ensure smooth movement along the supply chain. The next-generation supply chain structure should be enabled by technology at all points.

- **Shaping regulatory and policy support at the center and the state level:** Government intervention will be required to ensure both widespread physical connectivity by building multimodal logistics and broadband connectivity to reach rural areas. Regulation can play a huge role in changing the manufacturing landscape through GST consolidation, supply chain clusters, and other such initiatives. The government's support in creating a supply base through micro, small and medium enterprises (MSMEs) would ensure equitable economic growth and skill building.

COVID-19 has made us all aware of how vulnerable we are to disruptions in the supply chain. Transforming the system so it can contain risks and weather the crises of tomorrow is one of the main tasks before industry and government today.

3. Setting aspirations for transforming the supply chain: Vision 2030 for India

Making the Indian supply chain globally competitive requires nothing short of reimagining the entire system. This is a big opportunity for several sectors in India, including pharmaceuticals and consumer products. Sectors and organizations can decide their entry strategies, i.e., where in the business cycle it is more profitable and less risky to start or strengthen. The supply chain function will be required to play a more central and strategic decision-making role. As organizations get risk management strategies in place, the additional investment entailed will require a re-look at all elements of business processes and markers for profitable growth.

We propose the following Vision 2030 for the Indian supply chain:

"India will be one of the top 20 countries in the World Bank Logistics Performance Index by 2030. The supply chain industry will be an optimized and automated logistics ecosystem, with a simplified distribution system and a sustainable, green, resilient, and flexible supply chain. It will be powered by next-gen technologies such as big data, AI, blockchain, and Internet of Things, backed by 21st-century infrastructure. It will be aligned with best practices across the world and stand on par with global standards. The reimagined supply chain will make India "Atmanirbhar" and strongly complement Make in India and Startup India, building a globally competitive supply chain."

To take concrete steps towards a sustained transformation of the supply chain system, we need to shape aspirations and catalyze holistic interventions as follows:

■ **Optimize the logistics and warehousing network**
India will aim to reduce its logistics cost to 7-8 percent of GDP, closing the USD 500 billion competitiveness gap with best-practice countries.

To this end, we will optimize the logistics modal mix to global benchmarks, with roads constituting 25-30 percent, railways comprising 50-55 percent, and waterways accounting for 20-25 percent of transportation modes. Transportation infrastructure will be efficient and fully utilized. We will also reduce indirect or "hidden" costs to 20-25 percent through efficient inventory management and monitoring. In addition, we will optimize turnaround time to 700-800 kilometers per day, with the target of increasing truck trips by 50 percent. We will also aim to increase the throughput of the road network by improving the quality of roads and increasing the proportion of national highways in the total road network. India will aim to increase the average speed of freight trains to 50 kmph and increase loading capacity and connectivity to industry.

In warehousing, we will work to expand cold chain storage infrastructure to bridge the gap between required and available capacity and aim to reduce agricultural produce wastage to less than 10 percent.

We will also seek to encourage private-public partnership (PPP) models to ensure faster progress in optimizing the logistics and warehousing networks.

■ **Faster adoption of cutting-edge technology**
The Indian supply chain must be powered by next-gen technology and widespread Industry 4.0 applications to build technology-enabled smart supply chain networks. India will work towards digitization of more than 90 percent of data and strategic implementation of technologies such as artificial intelligence, blockchain, and the IoT. The supply chain will look towards machine learning and algorithm development for optimized demand planning and forecasting, to minimize inventory costs and eliminate wastage. Data-based decision-making will be the focus. Sensor-based monitoring, remote-controlled operations, and automation will be the most significant contributors to slashing costs and increasing operational efficiency, with the potential to reduce expenditure by 30-40 percent.

Technology adoption will complement logistics efficiency by developing logistics maps with smart routing and ETA features for route optimization.

- **Restructuring the supply chain**
  Indian supply chains will move towards building omni-channels as a one-stop solution that will reduce inventory levels and give customers a seamless shopping experience. We will also aspire to build an advanced platform that will facilitate collaborative planning. To ensure visibility, organizations will introduce harmonized product labels across the supply chain.

  Indian retail stores will adopt technology to leverage the potential of simplified supply chains. Brands will adopt new business models such as subscription schemes to predict demand patterns and click-and-collect to merge offline and online shopping experiences. Adidas, Reebok, and Max recently equipped their stores with "endless aisle" technology, which features iPads with which shoppers can browse and order items that are not in stock at the physical stores.

- **Enhance skill development and talent management**
  With the rapidly changing times, senior management in organizations will aim to become more comfortable with digital transformation, data analytics, and AI. Organizations will bring in new talent and train existing staff to help them adopt changing technologies and faster decision-making. The focus will be on building skills for automation, the IoT, and data-driven decision-making to facilitate the transition to a technology-enabled supply chain. Organizations will also aspire to develop cross-functional teams to facilitate supply chain decision-making.

- **Moving towards a green supply chain**
  Organizations will move towards greener modes of transportation to reduce carbon footprints by 50 percent. With e-commerce taking a significant share of the market, we will move towards using electric vehicles for deliveries and target a 50 percent electric fleet. Further optimizing transportation routes will create cleaner and more efficient supply chains.

  We will also work towards building an eco-friendly supply chain by using biodegradable or recyclable materials for deliveries and eliminating plastic to avoid environmental damage. In addition, we will reduce supply chain wastage (agricultural produce, food products, damages) by 50 percent. Organizations will practice the mantra of reduce, reuse, and recycle to build sustainable supply chains.

The goals and aspirations set out may seem unrealistic today, but with the right actions by industry and with enabling policy, India can achieve them. The CII Supply Chain Leadership Conclave laid the foundation for this discussion; the roadmap and the next steps to achieve Vision 2030, as described in the next chapter, will help realize these aspirations.

4. Roadmap and next steps for collaboration

This Vision 2030 report is the first step in achieving Vision 2030 for the Indian supply chain. In the next year, CII and Arthur D. Little will create a national supply chain task force comprising five working groups. These groups will interact regularly to discuss, plan, and execute initiatives that will help realize Vision 2030. CII will advocate for favorable policies with the state and central governments, and Arthur D. Little will provide technical expertise to scale up the initiatives undertaken by the groups. In 2021, we will also aim to unveil an action plan to achieve the set aspirations by 2030.

The supply chain leadership conclave highlighted the need to work on several fronts. First, we need to reduce logistics cost to 7-8 percent of GDP from the current 14 percent by bringing the logistics cost structure on par with global standards. (See Figure 12.) Logistics cost comprises transportation, warehousing, inventory, and order processing/admin, with indirect costs of yield losses, shrinkages, theft and damages, packaging costs, and more spread across these four cost divisions. Second, we need to de-layer the supply chain and move towards omni-channels, build a multimodal logistics system, and introduce the latest technology, including digitization, to move towards a 21st century supply chain.

CII proposes creating five working groups, which will promote the execution of these measures across sectors. The groups will work in coordination with each other and industry members to truly realize the prime minister's vision of "Atmanirbhar Bharat" by building a competitive supply chain network.

Figure 11:   Proposed supply chain roadmap to achieve Vision 2030

3 Pilots launched and scaled up
New 2030 policy framework

CII supply chain leadership conclave 2021

2 Integrated action plan, stakeholder syndication, and policy advocacy

March 2021

1 2030 vision document

Creation of a national supply chain task force with five working groups

December 2020
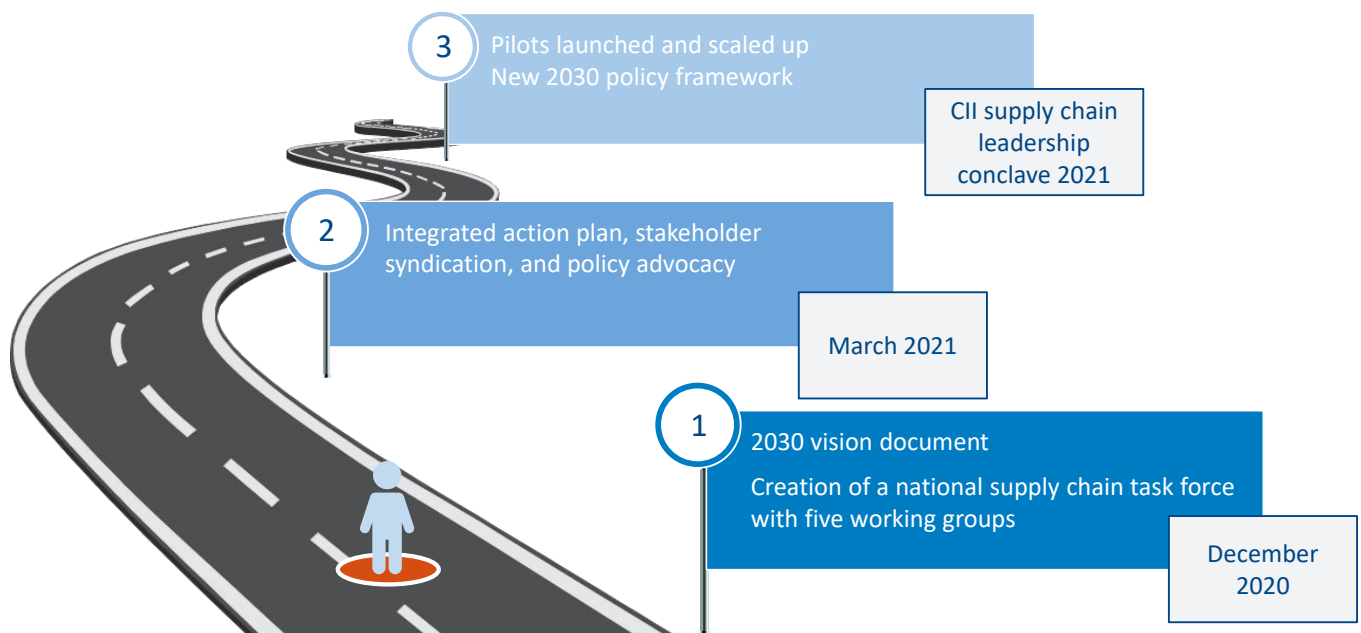
Source: Arthur D. Little analysis

Figure 12: Changing India's underlying logistics cost structure

Logistics cost – 14% of the GDP

Logistics cost – 8% of the GDP

- Transportation
- Warehousing
- Inventory
- Order processing/admin
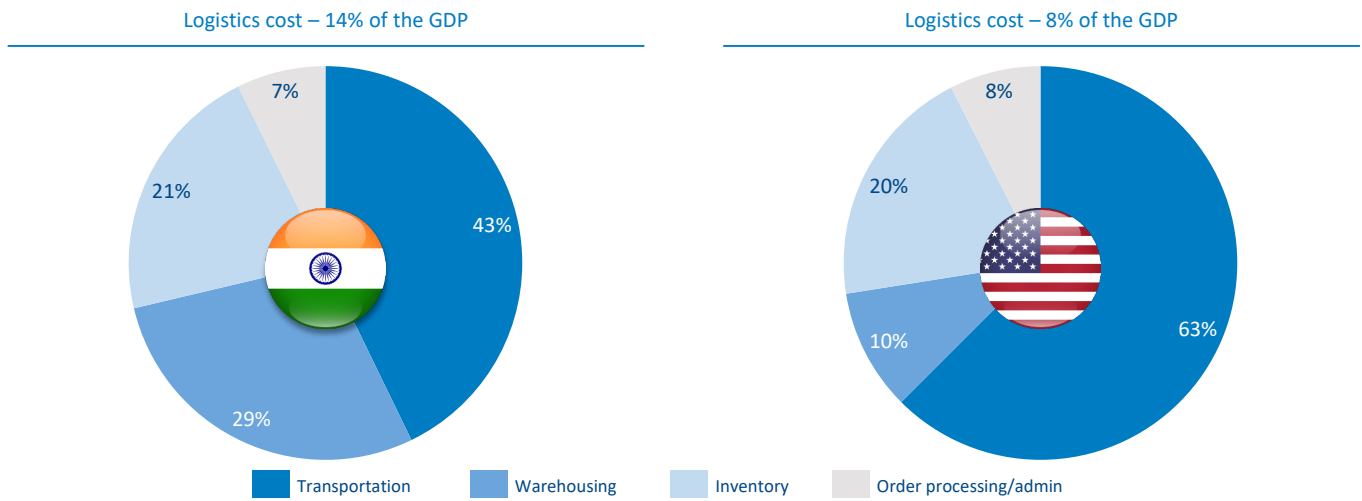
> India will not only have to reduce its logistics cost by 50%, but also change the underlying cost structure to make its logistics globally competitive

Source: Arthur D. Little analysis
Note: Yield losses, shrinkages, theft and damages, and packaging cost break-up is spread across transportation, warehousing, inventory, and order processing/admin

We propose three immediate steps:

1. **Setting up the national task force:** CII will work on convening the national-level task force, which will be further divided into five working groups. These groups will comprise industry experts and work across sectors to gather suggested improvements in supply chain operations. CII will also help align supply chain priorities with the government and create access for working groups to exchange ideas. A supply chain expert from Arthur D. Little will be onboarded to help manage the initiative and facilitate interaction between working groups.

2. **Convening working groups:** The working groups will be formed in keeping with various dimensions of supply chain excellence. They will work towards identifying relevant sectors of focus for a favorable policy push with the government. The working groups will also focus on the key actions needed to develop a competitive supply chain, as depicted in Figure 13.

Figure 13: Key action points for working groups

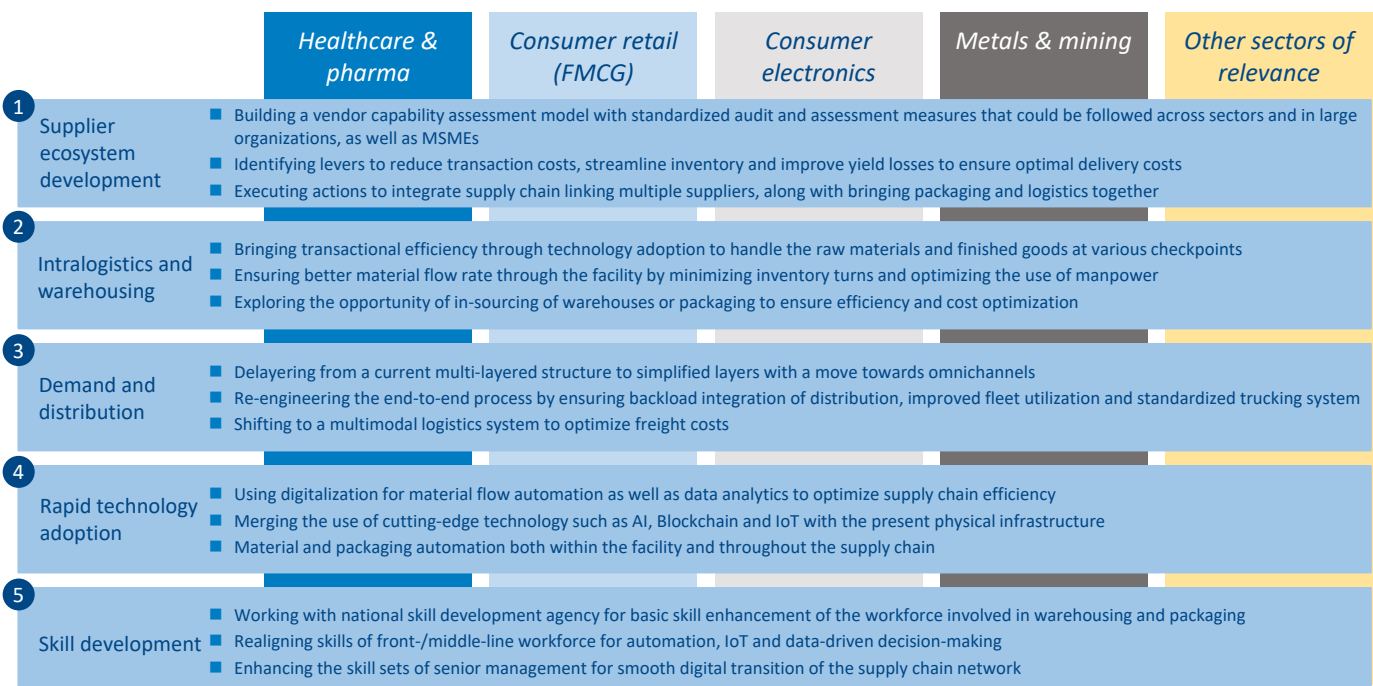|	Healthcare & pharma	Consumer retail (FMCG)	Consumer electronics	Metals & mining	Other sectors of relevance
1 Supplier ecosystem development	■ Building a vendor capability assessment model with standardized audit and assessment measures that could be followed across sectors and in large organizations, as well as MSMEs ■ Identifying levers to reduce transaction costs, streamline inventory and improve yield losses to ensure optimal delivery costs ■ Executing actions to integrate supply chain linking multiple suppliers, along with bringing packaging and logistics together				
2 Intralogistics and warehousing	■ Bringing transactional efficiency through technology adoption to handle the raw materials and finished goods at various checkpoints ■ Ensuring better material flow rate through the facility by minimizing inventory turns and optimizing the use of manpower ■ Exploring the opportunity of in-sourcing of warehouses or packaging to ensure efficiency and cost optimization				
3 Demand and distribution	■ Delayering from a current multi-layered structure to simplified layers with a move towards omnichannels ■ Re-engineering the end-to-end process by ensuring backload integration of distribution, improved fleet utilization and standardized trucking system ■ Shifting to a multimodal logistics system to optimize freight costs				
4 Rapid technology adoption	■ Using digitalization for material flow automation as well as data analytics to optimize supply chain efficiency ■ Merging the use of cutting-edge technology such as AI, Blockchain and IoT with the present physical infrastructure ■ Material and packaging automation both within the facility and throughout the supply chain				
5 Skill development	■ Working with national skill development agency for basic skill enhancement of the workforce involved in warehousing and packaging ■ Realigning skills of front-/middle-line workforce for automation, IoT and data-driven decision-making ■ Enhancing the skill sets of senior management for smooth digital transition of the supply chain network				

Source: Arthur D. Little analysis

These groups will also work across relevant sectors, striving for policy advocacy and building sector-focused initiatives. (See Figure 14.)

Figure 14:   Working groups and challenges across focus sectors

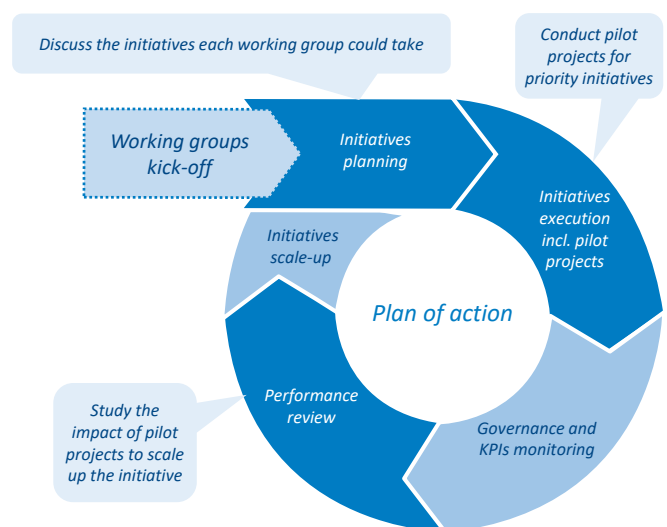|	Healthcare & pharma	Consumer retail (FMCG)	Consumer electronics	Metals & mining	Other sectors of relevance
1 Supplier ecosystem development 2 Intralogistics and warehousing 3 Demand and distribution 4 Rapid technology adoption 5 Skill development	■ Vaccination load of COVID-19 will pose pressure on the pharma supply chain ■ Unavailability of cold chain storage, especially for medicines ■ Issue of managing different healthcare requirements of medical supplies, medical equipment, medicines, and blood	■ Disjointed channels for delivery leads to inefficiencies ■ Inventory management across the channel becomes difficult due to lack of visibility and interaction ■ Consumer demands seamless experience from all mediums – online and offline	■ Short product life cycles with multiple changes throughout lead to higher inventory costs ■ Multiple partners across a global supply chain network, e.g., ASEAN cluster for components manufacturing ■ Fast-changing consumer preferences and interests	■ Bulky raw materials make physical transportation difficult and unviable ■ Railway infrastructure constraints increase freight cost considerably ■ Multimodal logistics infrastructure required for efficient transportation	■ Supply chains are unable to adapt to quick changes due to rigid set-ups and lack of visibility ■ Lack of use of technology makes the process unviable ■ Skill enhancement among the present and new workforce will lead to faster adoption of changes required

Source: Arthur D. Little analysis

Hence, the working groups will follow an integrated vertical and horizontal structure. These groups will consist of six members each. They will meet regularly (monthly or quarterly) to plan initiatives, discuss execution, define governance and KPI monitoring systems, and review performance to scale up the initiatives. (See Figure 15.) The CII team will aid this process by engaging with the government on the points discussed in the groups.

3. **Developing an integrated plan of action:** The aim is to develop a plan of action based on the findings, discussions, and suggestions of the working groups within one year of the groups' formation. These plans should be actionable and have the potential for a quantifiable impact. The working groups can also consider a phase-wise plan. Ideally, the committees will launch pilot projects and eventually scale them based on success and experimentation.

We hope that this report will provide the initial stepping-stone to achieving our aspirations for the Indian supply chain. Following the roadmap outlined above will give us the means and momentum to realize Vision 2030.

Figure 15:   Working groups – Execution approach

Discuss the initiatives each working group could take

Conduct pilot projects for priority initiatives

Working groups kick-off

Initiatives planning

Initiatives execution incl. pilot projects

Initiatives scale-up

Plan of action

Governance and KPIs monitoring

Performance review

Study the impact of pilot projects to scale up the initiative

Source: Arthur D. Little analysis

27

About the authors

Barnik Chitran Maitra
Managing Partner, Arthur D. Little India & South Asia

Barnik Chitran Maitra is the Managing Partner of Arthur D. Little, India & South Asia. He counsels CEOs of Fortune 500 companies, principal investors and government leaders on strategy, innovation, and supply chain operations. He is also a technology expert, Silicon Valley investor, start-up & non-profit Board member, bestselling author (Reimagining India: Unlocking the potential of Asia's next superpower, published by Simon & Schuster in 2014) and a renowned speaker.

Thomas Kuruvilla
Managing Partner, Arthur D. Little Middle East

Thomas Kuruvilla is the Managing Partner of Arthur D. Little Middle East and Member of the Global Board of Arthur D. Little. He has more than 20 years of consulting experience supporting governments and enterprises in the Middle East, Europe and South East Asia. He has supported many Ministries with policy making and topics of national strategic importance.

Lokesh Dadhich
Principal, Arthur D. Little Middle East

Lokesh Dadhich is a Principal with Arthur D. Little Middle East. He has more than 14 years of experience in advising governments on national strategies and the private sector on corporate strategy development and company transformation, customer experience, big data, organization design projects with expertise in supply chain operations.

Harinarayanan S
Supply chain expert, Facilitator - CII SNP Forum

Supply chain professional with over 25 years of experience - from contract logistics P&L roles, supply chain consultancy, automation & digitalization, sustainability projects across manufacturing verticals, developing inorganic business growth platforms, corporate development and strategic planning in a regional role. He also coordinates as a facilitator for CII SNP forum.

Radhikaa Shah
Business Analyst

Radhikaa Shah is a Business Analyst with Arthur D. Little India. She has a diverse experience in the fields of financial services, energy & utilities, and supply chain operations. She takes keen interest in the start-up ecosystem driven by technology and digitalization.

Arunabh Podder
Summer Analyst

Arunabh Podder is a summer analyst with Arthur D. Little India. He is pursuing his Masters in Management from ESCP Business School. Prior to that, he has worked with Accenture for 2 years. His fields of interest are strategy and operations.

About CII SNP Forum

CII – Supply Network & Procurement (SNP) forum is an alliance of supply chain leadership professionals, collectively working on supply chain efficiency and capability in an integrated supply chain network, towards building sustainable competitive advantage for India.

Confederation of Indian Industry
125 Years - Since 1895

About CII

The Confederation of Indian Industry (CII) works to create and sustain an environment conducive to the development of India, partnering industry, government and civil society through advisory and consultative processes.

For 125 years, CII has been working on shaping India's development journey and, this year, more than ever before, it will continue to proactively transform Indian industry's engagement in national development.

CII is a non-government, not-for-profit, industry-led and industry-managed organization, with about 9,100 members from the private as well as public sectors, including SMEs and MNCs, and an indirect membership of over 300,000 enterprises from 288 national and regional sectoral industry bodies.

CII charts change by working closely with government on policy issues, interfacing with thought leaders, and enhancing efficiency, competitiveness and business opportunities for industry through a range of specialized services and strategic global linkages. It also provides a platform for consensus building and networking on key issues.

Extending its agenda beyond business, CII assists industry in identifying and executing corporate citizenship programs. Partnerships with civil society organizations carry forward corporate initiatives for integrated and inclusive development across diverse domains, including affirmative action, livelihoods, diversity management, skill development, empowerment of women, and sustainable development, to name a few.

With the theme for 2020–21 of "Building India for a New World: Lives, Livelihood, Growth", CII will work with government and industry to bring back growth to the economy and mitigate the enormous human cost of the pandemic by protecting jobs and livelihoods.

With 68 offices, including 10 Centers of Excellence, in India, and eight overseas offices in Australia, Egypt, Germany, Indonesia, Singapore, the UAE, the UK, and the US, as well as institutional partnerships with 394 counterpart organizations in 133 countries, CII serves as a reference point for Indian industry and the international business community.

Confederation of Indian Industry
The Mantosh Sondhi Centre
23, Institutional Area, Lodi Road, New Delhi - 110 003 (India)
T: 91 11 45771000 / 24629994-7
E: info@cii.in * **W:** www.cii.in

Contacts

If you would like more information or to arrange an informal discussion on the issues raised here and how they affect your business, please contact:

Austria
Bela Virag
virag.bela@adlittle.com

Japan
Yusuke Harada
harada.yusuke@adlittle.com

Singapore
Yuma Ito
ito.yuma@adlittle.com

Belgium
Gregory Pankert
pankert.gregory@adlittle.com

Korea
Kevin Lee
lee.kevin@adlittle.com

Spain
Carlos Mira
mira.carlos@adlittle.com

China
Yusuke Harada
harada.yusuke@adlittle.com

Latin America
Daniel Monzon
monzon.daniel@adlittle.com

Sweden
Johan Treutiger
treutiger.johan@adlittle.com

Czech Republic
Lukas Vylupek
vylupek.lukas@adlittle.com

Middle East
Thomas Kuruvilla
kuruvilla.thomas@adlittle.com

Switzerland
Wilhelm Lerner
lerner.wilhelm@adlittle.com

France
Vincent Bamberger
bamberger.vincent@adlittle.com

The Netherlands
Martijn Eikelenboom
eikelenboom.martijn@adlittle.com

Turkey
Coskun Baban
baban.coskun@adlittle.com

Germany
Wilhelm Lerner
lerner.wilhelm@adlittle.com

Norway
Lars Thurmann-Moe
thurmann-moe.lars@adlittle.com

UK
Nick White
white.nick@adlittle.com

India
Barnik Maitra
maitra.barnik@adlittle.com

Poland
Piotr Baranowski
baranowski.piotr@adlittle.com

USA
Sean McDevitt
mcdevitt.sean@adlittle.com

Italy
Francesco Marsella
marsella.francesco@adlittle.com

Russian Federation
Alexander Ovanesov
ovanesov.alexander@adlittle.com

Reimagining India's supply chain

A bold vision for 2030

Arthur D. Little

Arthur D. Little has been at the forefront of innovation since 1886. We are an acknowledged thought leader in linking strategy, innovation and transformation in technology-intensive and converging industries. We navigate our clients through changing business ecosystems to uncover new growth opportunities. We enable our clients to build innovation capabilities and transform their organizations.

Our consultants have strong practical industry experience combined with excellent knowledge of key trends and dynamics. ADL is present in the most important business centers around the world. We are proud to serve most of the Fortune 1000 companies, in addition to other leading firms and public sector organizations.

For further information please visit **www.adlittle.com** or **www.adl.com**.

www.adl.com/IndiasBoldVision2030