Industry 4.0 Digitalization in Transport and Logistics for a Sustainable eCommerce

Table of Contents

INTRODUCTION **2**

TECHNOLOGIES DRIVING INDUSTRY 4.0 ..... **2**

LOGISTICS 4.0 FOR INDUSTRY 4.0 ..... **4**

SUSTAINABILITY IN ECOMMERCE **4**

SUSTAINABLE ECOMMERCE WITH SMARTER LOGISTICS 4.0 ..... **5**

Reduce delivery and return frequency *5*

Last mile delivery route optimization *6*

Accuracy *6*

Reduce Packaging Waste *6*

CONCLUSION **7**

Introduction

With the unprecedented shift towards online channels, the exponential increase in packaging waste, and carbon emissions in logistics has become matter of grave concern for all organizations engaged in any form of online business. In a bid to conserve the natural resources of our planet, organizations are exploring ways to adopt sustainable models for their ecommerce business.

Sustainability focuses on adopting processes, tools materials, methodologies and technologies that reduces the adverse impact on our climate and ecological balance. A more humane point of view is to adopt lifestyle changes to meet our current needs without compromising the needs of future generations to meet theirs. Initiatives like reducing carbon footprint, minimizing waste, and practicing fair trade are often associated with the adoption of sustainable practices.

Most research shows that in eCommerce, packaging and shipping are the topmost contributors to GHG emissions and wasteful utilization of our natural resources. Industry 4.0 technologies and digitalization provide new opportunities and disruptive innovations to make eCommerce more sustainable.

With increase in competition, eRetailers are trying out all means to shorten the delivery time to meet the ever increasing customer expectation of “right-now” delivery, and many even promising delivery in a few hours. This is increasing the GHG emitting traffic substantially, especially for the last-mile delivery. Last-mile delivery, or the final step of delivering an item to the customers doorstep has a several direct implications on many aspects of the online business – it relates to customer satisfaction, cost efficiency of logistics operations, and public and often statutory sustainability expectations in urban logistics.

This article will focus on the role of Industry 4.0 technologies and Digitalization in the Transport and Logistics industry to make online businesses more sustainable.

Technologies Driving Industry 4.0

Technologies driving Industry 4.0 are continuously impacting and changing the transport and logistics industry, like any other business across all industries. Recent strides in digitalization of business processes and the rapid growth of new technologies such as the blockchain, the Internet of Things (IoT), augmented reality (AR), machine learning (ML) and artificial intelligence (AI) have tremendous potential across all industries. Some of the key technologies driving the 4th industrial revolution are:

Augmented Reality. Organizations are leveraging augmented reality (AR) to speed up the decision making process with real time flow of information to the key stakeholders.

AR is being effectively used in remote processes like pickups and loading. For example, it can help in quickly checking for defects or completeness of the cargo; or a wearable AR devices can determine the volume of cargo and calculate space for optimal loading.

Automation. Interconnected and networked autonomous robots can now interact with one another for better collaboration with humans to drive efficiencies in warehouses and loading / unloading points.

Blockchain. It enables companies to increase efficiency, transparency and traceability, while also making supply chains more secure as the origin and authenticity of products is known, proven and shared. Blockchain Reduces the amount of physical documentation.

Artificial Intelligence (AI) and Machine Learning (ML). Widespread adoption of AI and ML across value chains is creating a smarter, agile and a more collaborative enterprise that is able to react to dynamic markets and disruptions more seamlessly.
AI can drive accuracy and agility in logistics by analysing and optimizing routing, capacity planning, inventory management, and other key processes to improve efficiency in warehouse and logistics operations.

Big Data and Analytics. Comprehensive collection and analysis of structured and unstructured data in large scale from various sources is enabling businesses to understand customer expectations and to quickly adapt their operations to meet them to deliver an enhanced customer experience.
Big Data is helping supply chain activities ranging from improvement in delivery times to reduction in communication gap between manufacturers and suppliers by enabling decision-makers with real time data

The Cloud. Cloud technologies continue to make enterprise more intelligent and agile to meet the business demand like never before.
The cloud allows seamless flow of data and information in real time, allowing the logistics professionals like drivers, delivery/ pickup agents, repair and customer service agents, and other field agents to access information quickly and efficiently while feeding back to the control centres for quick and easy decision making.

Cybersecurity. With an exponential increase in demand for connectivity and interoperability, security and business continuity expectations are throwing up new challenges and opportunities.
As in all industries, any breach in security in the transport and logistics value chain can lead to major setbacks. With bots and automated systems interconnected and data flowing across geographies, cybersecurity takes a very critical role.

Interoperability and Integration. The ever evolving network technologies allows data flow between enterprises, departments, machines and devices across value chains for better cohesiveness and collaboration.
With multiple systems and applications running across different data centres and cloud, the interoperability and integration is key to deliver an intelligent solution for Logistics 4.0

Internet of Things. Connected devices with embedded computing is allowing real time control and flow of critical information for a real time response.
IOT devices are already playing a critical role in transport and logistics. From detecting faults to alerting overloading, sending alerts of any cargo tamper or schedule inconsistencies, to automating warehouse processes, the use of IOT is now becoming ubiquitous.

Simulation. Enhanced simulation techniques are enabling businesses for a rapid GTM (go-to-market) strategy armed with near physical world data to test and optimize their business models and decisions even before implementation.
Simulation is helping in efficient loading and route planning, with dynamic parameters which are typically not in the company's control.

Logistics 4.0 for Industry 4.0

While the 4th Industrial revolution has put enormous demands on the logistics and transport industry, it has also provided with tools and technologies to meet the growing expectations of companies wanting to compete successfully in the dynamic market conditions.

In the 'Real-time Economy' of today, speed and timing are key and the criticality of supply chains, logistics and the transportation are huge. During the Covid-19 pandemic, we all witnessed how disruptions in the supply chains had a huge impact on the entire global economy. The pandemic has also propelled ecommerce business exponentially, creating huge demands and expectations on transportation, logistics and supply chain.

Logistics 4.0 makes effective use of smart technology to provide disruption proof future ready supply chain services. It drives operational efficiency by using technologies like edge computing & the Internet of Things (IoT) to automate processes based on real-time data and feedback. Logistics 4.0 leverages a fully networked supply chain to provide logistics managers, shippers, freight forwarders, with the tools and data to support processes ranging from real time shipment tracking, end-to-end route planning, scheduling preventive maintenance, optimized loading, alerting schedule deviations, to data analytics to support a fast decision making process. Digitalization in transport and logistics industry has been driving automation & optimization of material flows, and the utilization of resources in inbound & outbound logistics enabling companies to work more efficiently with customers & business partners.

Sustainability in eCommerce

Sustainable products and business practices help businesses stand out, create customer loyalty, and appeal to conscious consumers. A key differentiator in today's sustainability-minded scenario is how well a business is perceived as taking appropriate steps towards sustainability and how well it appeals to its customers on factors that they care about with regards to the conservation of the natural resources of our planet.

Many eCommerce businesses are adopting carbon labelling of their products, which is essentially, the amount of carbon emitted to produce a particular product. It also includes the carbon emissions to deliver the product from production site to warehouse to the customer's doorstep. Carbon emissions by organization are usually calculated as per 3 key 'Scopes':

1. First - Scope 1 emissions are all direct GHG emissions which are well under the control of the organization. Examples include -company operations – boilers, furnaces, vehicles; fuel consumption, amount of packaging used, etc
2. Second – Scope 2 emissions are indirect, though they are in the company's control to a large extent. Examples include – type of energy source - electricity, type of material used for packaging, outsourced logistics, etc. They are also accounted for as they are the result of the organization's use
3. Third – Scope 3 include all other indirect emissions associated with the company's up-stream and down-stream value chain which are not under direct control of the organization. Examples include – raw materials mining processes, operations of its suppliers and service providers, usage and disposal of its products by the customers, employee commute, business travel, etc

Packaging and logistics are the 2 biggest GHG (green-house gas) contributors in the online business and any attempt to make ecommerce more sustainable has to start here. Logistics 4.0 technologies combined with satellite and machine learning capabilities, has made the cost of carbon tracking in transport and logistics affordable even for small and medium businesses. Such tools and calculations can be data intensive but not too complex anymore.

Sustainable eCommerce with Smarter Logistics 4.0

As mentioned earlier, any endeavour to making eCommerce a more sustainable business model, needs to include innovative ideas for reducing waste in packaging and optimizing logistics. This will not only make ecommerce sustainable, but also have a huge impact in controlling operational costs, so it's a win-win for online businesses.

Reduce delivery and return frequency

Many ecommerce businesses are encouraging customers to opt for shipments combining multiple products and orders. The same applies to reverse logistics or order returns. This not only reduces the transport trips, but also reduces packaging wastage very effectively.

While this may sound like a no-brainer from the consumer point of view, the backend and logistics systems need to be able to provide these services seamlessly. From selecting orders and products to be clubbed for delivery to optimizing the package size for the multiple orders, and above all, ensuring high standards of customer experience, logistics services need to factor in several parameters and data points to arrive at an optimal solution. Such advanced analytics and computing is made available and affordable only with Logistics 4.0

Last mile delivery route optimization

Logistics 4.0 technologies and innovations have made the last mile delivery more transparent and responsive. The last mile delivery is the culmination of a more comprehensive and complex end-to-end transportation management process that picks up the thread from order management and goes through appointment scheduling, picking and packing, transportation planning, long haul routing, cross dock operations, vehicle tracking, dynamic local routing, customer communications, package tracing and tracking and many others to finally enabling an efficient doorstep delivery / pickup (depending on if its delivery or return pickup). All this to deliver a great customer experience and to live up to their expectations.

Accuracy

The importance of getting it right all the time in the ecommerce logistics (or logistics in any other industry for that matter) can never be overstated. For a good customer experience, it is absolutely necessary to deliver (or pickup)

1. The right product
2. In correct quantity
3. To the right customer
4. At the correct / desired time
5. At the correct place /location / address
6. In perfect condition
7. At lowest cost

The stakes are so high that even a tiny mistake in any of the above increases wastage carbon footprint and in turn cost to business. In addition, it creates a bad customer experience which impacts customer loyalty. The good news is, that with the adoption of logistics 4.0 technologies the degree of accuracy in these services has gone up exponentially while scaling up to exponential volumes.

Reduce Packaging Waste

A simple yet a very effective feature is to give the option to customers to eliminate additional packaging on top of the original OEM packaging. Most OEMs (original equipment manufacturers) deliver their products in their own packages to the resellers - retailers / distributers /wholesalers / etc. Most of the time these OEM packages are robust and safe enough to go through the rigors of a typical delivery process. So adding additional packaging on top of the OEM packets is essentially a waste which can be eliminated easily.

Conclusion

As in any other business process today, in Logistics too, there are many parties involved. The networked global business requires all parts and processes to move in sync and accurately at all times. A mistake or delay can have huge implications not only on the business but also in the overall brand value and reputation. The importance of supply chain management, transportation, and logistics in industry 4.0 is next to none.

Just because it's important, it does not necessarily imply businesses must implement whatever it takes to adopt the latest and greatest technologies. A through assessment of the IT landscape and business processes, is the key to defining a proper roadmap to move towards Logistics 4.0

The primary objective of Transport and Logistics is to ensure right items get delivered at the right time and place in best condition, as there is there is always someone waiting for something.