

# THE IMPACT OF TECHNOLOGY ON LOGISTICS

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### INTRODUCTION

The current economic environment, technological advancements, and changes in international trade policies have forced global companies to reevaluate their competitive advantages.

2020 has been a prime example of what we define in innovation research as a VUCA environment. We live in an environment full of Volatility, Uncertainty, Complexity, and Ambiguity, and managing these fluctuations is more critical today than ever.

Previously, the formulation, implementation, and evaluation of strategic planning were enough for companies and individuals to face these challenges.

Today, we see how strategic planning moves from a planning concept to a constant adaptation concept; therefore, companies and organizations must adapt quickly and fit systematically to this new reality. Today's talk will focus on one alternative companies are exploring to further their competitiveness and efficiency: Logistics 4.0.





#### Total Trade through the Laredo Port of Entry





---- Exports ----- Imports ----- Total

Compiled by: Texas Center for Border conomic and Enterprise Development

Source: U.S. Census

**TEXAS A&M INTERNATIONAL UNIVERSITY** 

#### Total Trade through the Laredo Port of Entry



Source: U.S. Census

Compiled by: Texas Center for Border conomic and Enterprise Development

#### 2020 % Share of Trade through Port of Laredo

	Manufactured goods cla chiefly by materia 11.7%	assified I	Chemicals produ 8	s and related cts, n.e.s. 5.7%
Machinery and transport equipment	Miscellaneous manufactured articles 8 0%	Food and li 7.1 Mineral fuels, lubricants and related materials	ve animals % Crude mater inedi except fuels 1 3%	Beverages and tobacco 1.2% Commodit



#### Total Southbound Truck Crossings through Port of Laredo



----- Colombia ------ World Trade ----- TOTAL Trucks

Source: City of Laredo Bridge System Compiled by: Texas Center for Border conomic and Enterprise Development



#### Total Southbound Truck Crossings through Port of Laredo



----- Colombia ------ World Trade ------ TOTAL Trucks

Source: City of Laredo Bridge System Compiled by: Texas Center for Border conomic and Enterprise Development



#### 100% 9.6% 12.3% 11.1% 10.9% 10.0% 14.3% 14.0% 90% 80% 70% 60% 50% 90.4% 90.0% 88.9% 89.1% 87.7% 85.7% 86.0% 40% 30% 20% 10% 0% 2015 2019 2020 2021 (Jan-Jul) 2016 2017 2018

#### % Share of Total Truck Crossings by Laredo Bridge



World Trade Colombia

Source: U.S. Census

Compiled by: Texas Center for Border conomic and Enterprise Development

### **CIRCLE OF INFLUENCE**



### **REGIONAL STRENGTHS**

Houston-The Woodlands-Sugar Land, TX Metro Area 5,920,416

#### Texas Medical Center

(TMC) with 21 More than 3.5 million foreign travelers came to Houston in 2017, the most recent year for which data exists. The recent year for which data exists. The Center, the No. 1 vast majority of those travelers came cancer hospital in the from Mexico. supports more than one-third of all jobs in the Houston metropolitan area. institutions, six nursing programs, three public health organizations, three medical schools, two universities, two nharmacy schools and

The Great area has 1 institution learning a than 60 de granting ( universiti technical Houston (I University birthplace nanotechr

### **STRATEGIC INITIATIVES**

2008 Smart Manufacturing (USA) Universities

2011 Advanced Manufacturing (USA) Government

> **2012 Industrial Internet (USA)** GE & Other Private Companies



2003 Manufuture (EU) Technology & R+D

**2008 Factories of the Future (EU)** EU Commission & Private Sector

**2011 Industry 4.0 (Germany)** Universities & R+D









Source: Asgard Human Venture Capital for Artificial Intelligence

### FOURTH INDUSTRIAL REVOULUTION



The McKinsey Digital Compass maps Industry 4.0 levers to the 8 main value drivers.





<sup>1</sup>Maintenance, repair, and operations.

Source: "Industry 4.0: How to navigate digitization of the manufacturing sector," McKinsey Digital, 2015 McKinsey&Company



#### **INDUSTRY 4.0 – CHANGE OF MODEL**



### **TECHNOLOGIES**

Industry 4.0 is a revolutionary trend, brought about thanks to the use of Information and Communication Technology (ICT) services to optimize, monitor, automate, and adapt manufacturing processes within companies, making them more productive and efficient.



The applications of Industry 4.0 are in almost all areas of a company, such as operations, quality control, management, maintenance, HR, logistics, and IT.





#### **ACCELERATED CONVERGENCE**



### **AUTOMATIZATION BY SECTORS**

Impact of automation by industry in the United States FTE weighted % of technically automatable activities by industry in the United States

Manufacturing	64
Accommodation and food services	58
Transportation and warehousing	55
Mining	53
Retail trade	53
Wholesale trade	48
Agriculture, forestry, fishing, and hunting	47
Construction	44
Finance and insurance	44
Utilities	44
Real estate, rental, and leasing	43
Other services	41
Information	40
Arts, entertainment, and recreation	40
Administrative, support, and waste management	39
Professional, scientific, and technical services	38
Healthcare and social assistance	37
Management of companies and enterprises	36
Educational services	31

1 We define automation potential by the work activities that can be automated by adapting currently demonstrated technology.

SOURCE: MGI Global Automation Impact Model; IMF; WTO; OECD; UNCTAD; McKinsey Global Institute analysis

#### **LOGISTICS 4.0**



Source: Unity Logistics

#### **LOGISTICS 4.0 - ROADMAP**

Industry 4.0					istry 4.0			
Logistics								
Supply Chain Logistics			E C					
	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	Storage	Stock			S⊾ rage			
	No Automation	Automatic Warehouse System	Automatic Warehouse Network	Supply Chain Warehouse Network	No Warehouse in Supply Chain			
Intralogistics / Line Feeding	î.							
	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		⇒ 🐐		6° D				
	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			

Source: Unity Logistics

#### **LOGISTICS 4.0 – CHANGE IN MODEL**

Today, as supply chains become increasingly complex with more and more actors participating in them, there are endless documents to verify and lengthy processes to follow. This is where exponential technologies are applied within Logistics 4.0.

Companies are working with blockchain technology to accelerate the verification processes within the logistics sector, where each part of a supply chain is connected. It is expected to bring a paradigm shift by reducing the human errors that used to occur during long logistics processes and ensure reliability at every step of the supply chain.

IoT devices and big data analytics will help vendors and customers determine inventories spread across the world. Robots will be implemented to perform simple and repetitive warehouse work. With VWS (Virtual Warehouse Systems), warehouse managers will know the current status of their warehouse remotely. Additionally, autonomous trucks, drone delivery, and other advanced technologies and services will significantly impact Logistics 4.0.







### PROCESS FLOW OF SUPPLYCHAIN USING BLOCKCHAIN

A product is produced for international market and shipment info. is added to blockchain.

Blockchain

TEXAS A&M

INTERNATIONAL

UNIVERSITY

Container loaded on ship.

Official approve

transfer to port

and Blockchain

executes smart

contract

realeasing the

shipment.

All peers have end-to-end visibility of the ledger containing supplychain information.

¥

Retailers receives the product and information is relayed back to blockchain.

www.blockchain-council.org



#### **LOGISTICS 4.0 - TRENDS**

#### Intelligent Supply Chain

- Figuring out demand of each customer by analyzing purchase data
- Securing/recommending items customers might need in advance
- A virtuous cycle of manufacturing, retail, and logistics

#### Cargo Control/Instant Delivery

- Real-time cargo tracking & control
- Integrated management of orders and deliveries on a single platform
- Instant delivery in which delivery begins right after an order comes in.

#### **Cost Reduction**

- Operating cost reduction through tech-driven innovations
- Automation facilities/robots to replace simple manual work
- Innovation leads to lower prices, ultimately benefiting customers

Source: Samsung SDS





#### CONCLUSIONS

1.- Smart supply chains are currently being developed. Using big data analytics and artificial intelligence, companies analyze their customers' past purchase history, forecast highly accurate demand, and adjust their inventories accordingly from the start of the manufacturing process to avoid stockouts or overstocking of stocks of your final products.

2.- It is increasingly essential for businesses to provide global shipment visibility, manage cargo with the best quality, and offer instant delivery. They should be able to inform customers about the location and status of the shipment through real-time monitoring and supervision, using their integrated logistics platform that covers the entire logistics process. Additionally, companies should aim to provide instant delivery where the current three-day shipment is converted to a 24-hour delivery or instant delivery.

3.- Companies will continue to lower product prices and reduce costs by driving innovations with exponential technologies. Robots, autonomous vehicles, and paperwork and verification processes automation will eliminate simple and repetitive work scattered throughout logistics processes, leading to lower costs and higher quality of service.







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