

World Economic Forum White Paper
Digital Transformation of Industries:
In collaboration with Accenture

Logistics Industry

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Table of Contents

1. Foreword	3
2. Executive Summary	4
3. Industry Context	6
a. Market trends	6
b. Technology trends	7
c. Value creation and disruption in logistics	8
4. Future Horizons	11
a. Information services	11
b. Logistics services	14
c. Delivery capabilities	17
d. Circular economy	19
e. Shared logistics capabilities	21
f. Logistics digital roadmap	22
g. Digital initiatives: Value at stake	23
5. Recommendations	25
6. Acknowledgements	27
7. Endnotes	28

1. Foreword

There is widespread recognition among leaders in most industries that the role of digital technology is rapidly shifting, from being a driver of marginal efficiency to an enabler of fundamental innovation and disruption.

Digitalization is the cause of large-scale and sweeping transformations across multiple aspects of business, providing unparalleled opportunities for value creation and capture, while also representing a major source of risk. Business leaders across all sectors are grappling with the strategic implications of these transformations for their organizations, industry ecosystems, and society. The economic and societal implications of digitalization are contested and raising serious questions about the wider impact of digital transformation.

While it is clear that digital technology will transform most industries, there are a number of challenges that need to be understood. These include factors such as the pace of changing customer expectations, cultural transformation, outdated regulation, and identifying and accessing the right skills – to name just a few. These challenges need to be addressed by industry and government leaders to unlock the substantial benefits digital offers society and industry.

Digital Transformation of Industries (DTI) is a project launched by the World Economic Forum in 2015 as part of the Future of the Internet Global Challenge Initiative. It is an ongoing initiative that serves as the focal point for new opportunities and themes arising from latest developments and trends from the digitalization of business and society. It supports the Forum's broader activity around the theme of the Fourth Industrial Revolution.

A key component of the DTI project in 2015 has been the quantification of the value at stake for both business and society over the next decade from the digital transformation of six industries. The 'compass' for these industry sectors is being set and it is imperative that all stakeholders collaborate to maximize benefits for both society and industry. Digitalization is one of the most fundamental drivers of transformation ever and, at the same time, a unique chance to shape our future. The World Economic Forum is committed to helping leaders understand these implications and supporting them on the journey to shape better opportunities for business and society.

In 2016, the DTI initiative will focus on the impact of digital transformation on an additional 10 industries, further deep-dives into industries from this year's project, as well as examine a number of cross-industry topics such as platform governance, societal impact, and policy and regulation.

The report was prepared in collaboration with Accenture, whom we would like to thank for their support. We would also like to thank the Steering Committee, the Working Group members, as well as the more than 200 experts from business, government and academia and over 100 industry partners who were involved in shaping the insights and recommendations of this project. We are confident that the findings will contribute to improving the state of the world through digital transformation, both for business and society.

Bruce Weinelt
Head of Digital Transformation
World Economic Forum

2. Executive Summary

Our analysis indicates that there is \$1.5 trillion¹ of value at stake for logistics players and a further \$2.4 trillion worth of societal benefits as a result of digital transformation of the industry up until 2025. In other words, industry stakeholders should take notice and come together to prioritize digital transformation initiatives given the potential for significantly higher value to be created for society than for industry.

Over the past two decades, as the Internet revolution swept the world, our day-to-day lives have become increasingly digital. With email eclipsing 'snail mail' and digital downloads replacing physical products, this could well have dealt a devastating blow to the logistics industry. In fact, something remarkable has happened: more packages than ever before are now being shipped. On any single day, a staggering 85 million packages and documents are delivered around the world.

But logistics businesses cannot afford to rest easy and enjoy the fruits of this global boom in shipments. Logistics has introduced digital innovations at a slower pace than some other industries. This slower rate of digital adoption brings enormous risks that, if ignored, could be potentially catastrophic for even the biggest established players in the business. As other industries with close links to logistics, such as retail, are revolutionized by digital technology, the chances of digital disruption engulfing the logistics industry increase – for instance, the rise of e-commerce has led to new digital entrants in the last-mile delivery market.

More significantly, digital platforms will become increasingly important in the logistics industry, allowing small companies to have a global reach and compete with the sector's established giants. Over the next few years, the race to build a dominant global platform will transform the customer's experience of logistics and will be the central issue in determining which enterprises will be the winners and losers in a truly digital logistics industry.

With the logistics industry suffering from some very significant inefficiencies – for instance, 50% of trucks travel empty on their return journey after making a delivery – digital transformation can also bring important social and environmental benefits, by increasing efficiency and cutting down energy consumption and emissions.

This report identifies five themes that are central to the digital transformation of the logistics industry over the next decade:

- Digitally enabled **information services** will put data at the heart of a logistics business through initiatives such as logistics control towers and analytics as a service, and help in reducing operating costs while improving efficiency of operations.
- Digitally enabled **logistics services** will help in trade growth through the creation of digitally enhanced cross-border platforms. It will also allow logistics companies to satisfy the growing need of customers for faster same-day deliveries, and promote the concept of city logistics, which will allow firms to operate in 'megacities'.
- New **delivery capabilities** will allow logistics to harness technologies such as autonomous trucks and drones to find more efficient ways to deliver shipments, while 3D printing and crowdsourcing offer new ways to think of manufacturing and logistics processes.
- **Circular economy** will foster a more sustainable product life cycle, helping to lessen the logistics industry's environmental footprint by reducing carbon dioxide (CO₂) emissions, air pollution and waste material.
- **Shared logistics capabilities**, through shared warehouse and shared transport capabilities, are expected to increase asset utilization in the near future.

The time and complexity required for these initiatives to reach scale across the market vary significantly. This analysis has, however, identified certain underlying requirements that are the building blocks for the digital transformation of the logistics industry. Two of the most important 'no regret' capabilities are:

- Companies should improve their collection of data from all along their value chain.
- Enterprises should ensure they have the capability to analyze big data streams to derive insights that improve operational efficiency and enable the launch of new services, such as last-mile delivery.

Lastly, this report raises a few key questions for logistics leaders and policymakers to consider and address:

- Should the larger industry players continue to invest in scaling their existing closed platforms or should they be adding new business models such as crowdsourced platforms and analytics as a service?
- How can logistics stakeholders incentivize faster implementation of shared warehouse and transportation capacity to reap significant societal and customer benefits?
- Logistics contributes 13% of all emissions globally. In light of the 21st UN Conference of the Parties (COP21) Agreement in Paris, how can industry stakeholders quickly agree on developing safe and trustworthy approaches to more environmentally friendly technologies such as autonomous trucks and drones?

3. Industry Context

From an orphaned polar bear cub to half a million bottles of vintage French wine to organs for life-saving transplant operations, the logistics industry transports almost anything imaginable to almost anywhere on earth.² The industry itself is also very diverse, encompassing everything from air freight to container shipping, and courier companies to port operators.

The industry recovered strongly from the financial crisis of 2008, growing at an average of 15% a year during the six years until 2014.³ Over the same period, the combined market capitalization of the leading companies in the industry more than doubled, from around \$414 billion to approximately \$960 billion.

This analysis has identified several major market trends that have contributed to the growing demand for logistics. These trends chart changes in who consumers are, how they live and what they expect from logistics services. The fundamental political and economic developments making an impact on the logistics industry are also considered.

To understand how the logistics industry has evolved – and will continue to change in the future – in response to these market trends, this report pinpoints the most relevant technological innovations. These advances in technology provide the building blocks for the digital transformation of the logistics industry.

a. Market trends

A growing customer base

The world's population is growing and expected to reach 9 billion people in 2050.⁴ Accompanying that population growth has been an increase in the number of people in emerging markets who are now able to access global markets. The number of smartphone subscriptions is predicted to almost double to 4 billion by 2025, with nearly all of that growth coming from emerging markets.⁵ With a growing global middle class and expanded Internet access, increased demand for e-commerce will require logistics providers to deliver to remote locations in emerging economies for the first time – especially in Asia where many rural communities are not connected to the rail network.⁶ Air freight in emerging markets is predicted to increase by more than 1 million metric tons by 2018, with the fastest growth on routes between the Middle East and Asia.⁷

The logistics industry will also be affected by another demographic shift. According to projections by the United Nations, two-thirds of the world population will be living in cities by 2050, up from just more than half at present.⁸ By 2030, it has been predicted that there will be 41 megacities with populations of more than 10 million people. These megacities will provide a stiff challenge for logistics firms tasked with making deliveries swiftly in a polluted and gridlocked metropolis.

Rise of the digital consumer

The advent of e-commerce has empowered consumers, who can now source products from anywhere in the world or compare prices with just the swipe of a smartphone screen. The fact that shoppers are buying an ever-greater quantity of goods online has had an impact on the parcel industry, with the proportion of trade accounted for by the business-to-consumer (B2C) sector expected to rise from 29% in 2013 to 36% in 2018.⁹

As consumers become more used to digital services, including e-commerce or apps such as Uber, they expect to receive the same quality and flexibility of service in other industries. This new consumer attitude, which has been termed 'liquid expectations', has implications for the logistics industry. No longer is it enough for firms to deliver a consignment on time; they now also need to offer a multiplatform service to both personal and business customers. They may also need to invest in specific services, such as a 'cool supply chain' for temperature-sensitive goods, or more personalized 'logistics of me' offerings for consumers who value convenience.^{10, 11}

Political and economic developments

Like any industry with operations based all over the world, the logistics industry is affected by geopolitical and economic developments. The three most significant are the price of oil, trade harmonization and environmental awareness.

The recent slump in the price of oil has improved profit margins for logistics businesses, although this effect is likely to be only temporary. The logistics industry remains vulnerable to increases in the price of oil, which are expected when the Organization of Petroleum-Exporting Countries (OPEC) decides to regulate production more strictly in the future.^{12,13}

Economic unions – such as the North American Free Trade Agreement (NAFTA), the European Union (EU) and the Association of Southeast Asian Nations (ASEAN) – have made progress toward trade harmonization within their boundaries. This has reduced the costs and time spent processing the documentation required to trade between countries within these zones. These benefits have to be weighed against the increased cost and effort of complying with the growing body of regulations relevant to these free trade areas (such as the EU's REACH regulation relating to the manufacture, transport and use of chemicals).¹⁴

Finally, the growing attention that governments (and their citizens) are paying to environmental concerns is having an effect on the logistics industry. Companies will have to look at ways to use greener methods of transportation, reduce their overall CO₂ emissions and cut down on waste from packaging to ensure that they can offer sustainable logistics operations.¹⁵

b. Technology trends

The third age of the Internet

Over the past two decades, our lives have been transformed by the Internet. The Web revolution has happened in three waves: first the desktop Internet in the 1990s, then the mobile Web in the 2000s, and now the third age of the Internet. This new era has seen several technological advances fuse, creating powerful new digital tools that will be used to dramatically reshape industries, including logistics, over the next few years.

First among these technology trends has been the Internet of Things, a network of smart devices, sensors and the cloud that allow the physical world and computer systems to interact directly. The Internet of Things already consists of 7 billion devices – from fridges to thermostats to street lights – and is expected to grow to almost 50 billion objects by 2020.¹⁶

Coupled with the proliferation of mobile sensors, the Internet of Things has the potential to improve the efficiency and reliability of the logistics industry. Mobile sensors with 3D load-optimization software could be used to automatically arrange freight on trucks and ships in as efficient a configuration as possible. Another application could be in autonomously routed business-to-business (B2B) logistics streams that would allow smart fridges, for instance, to be restocked automatically.¹⁷

The Internet of Things has been underpinned by recent advances in cloud computing. Cheaper data storage and increased computational power mean that big data streams can be collected, stored and analyzed much more efficiently. This is enabling logistics providers and customers to conduct a real-time analysis of supply chain data. Insights from this analysis allow logistics firms or their customers to predict events more accurately and react more quickly if they do happen.^{18, 19}

Rise of the platforms

One of the biggest digital trends of recent years has been the emergence of giant Internet platforms such as eBay, Amazon and Alibaba. These companies connect consumers around the world to firms of varying size. As a consequence, startups and small businesses can now operate in a global market from their first day of business. Customers, whether they are businesses or consumers, benefit from having a broad range of alternative suppliers to choose from.

3D printing and driverless vehicles

Two other technologies have the potential to revolutionize logistics. Potential applications for 3D printing, such as the printing of replacement parts or products on the spot, could have an impact on the logistics industry by reducing the need for parts and goods to be shipped. Considerable uncertainty, though, about the implications and applications of 3D printing still remains, and there may also be opportunities for logistics players that specialize in printing and delivering these products quickly and cheaply.²⁰

Autonomous vehicles are another technology that could be transformational for logistics providers, by reducing operating costs while improving the reliability of deliveries. Mercedes-Benz is already pioneering autonomous trucks²¹ and Amazon is testing delivery drones.²² In parallel with efforts to develop autonomous vehicles, similar innovations are being tested for support services, such as the introduction of automated port operations in Hamburg.²³

c. Value creation and disruption in logistics

Performance of the logistics industry since the 2008 financial crisis

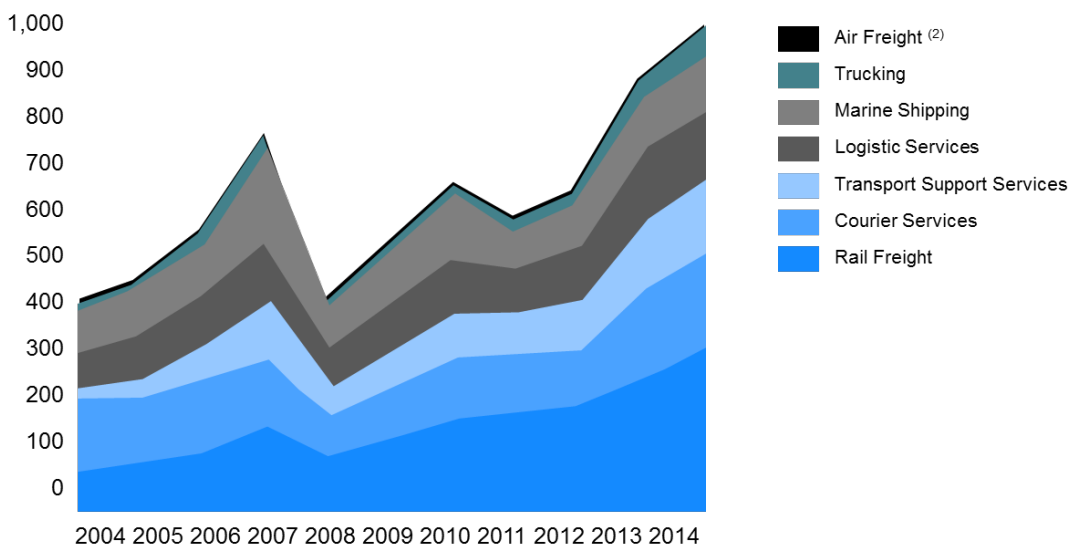
The financial crisis of 2008 had a negative impact on the profitability on the logistics industry, with the market capitalization of the biggest players falling from around \$700 billion to approximately \$400 billion – the same level it had been in 2004.

But the sector has recovered since 2008, with the market capitalization of the top logistics companies growing at an average of 15% annually over the six years to 2014. However, that growth rate masks significant differences between how different segments²⁴ have performed over that period, as can be seen in Figure 1. The market capitalization of the big players in transport support services, which includes activities such as operating airports, ports and bridges or maintaining aircraft, increased sixfold during the 10 years to 2014. Rail freight companies saw their market capitalization increase fivefold, while air freight, trucking and logistics services companies (for instance, truck brokerage and freight forwarding services) managed to double their market capitalization. Marine shippers and courier services achieved the least growth, but still saw an increase of approximately 30% in their market capitalization.

Figure 1: Market capitalization of top logistics companies by segment

Logistics Industry Segments – Profit Pool Analysis⁽¹⁾

December 2004 – December 2014, US\$ billion



Notes:

⁽¹⁾ Market capitalization is based on segment peers

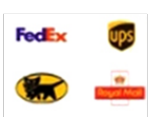




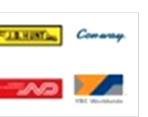

⁽²⁾ Market capitalization is based on companies with the primary business of air freight

Source: Bloomberg, Accenture Value Lab Analysis

The picture for revenues, profit²⁵ margins and return on invested capital across the different segments of the industry is similarly mixed (see Figure 2). Boosted by an increase in demand for all forms of transport, transport support services recorded the highest average annual growth in revenues (6.5%) between 2008 and 2014. Rail freight also performed strongly, with annual revenue growth of 5.2%, thanks in part to the demand for rail from the shale gas and oil sands industries in North America.²⁶ Trucking revenues expanded at 2.5% a year, with this growth driven by an increase in freight volumes in emerging economies²⁷ – the Indian e-commerce industry, for instance, has grown by 34% a year for the past five years.²⁸ At the other end of the scale, marine shipping – the part of the logistics industry that was worst affected by the financial crisis – has seen its revenues continue to decline by an average of 1.6% each year.

Rail freight and transport support services also had the highest profit margins in the logistics industry, increasing from 25.7% in 2008 to 32% in 2014 and from 13.7% to 16.8%, respectively. Rail freight has seen improved performance, thanks to investments in infrastructure (particularly in China) and technology, the sale of less heavily used lines and the outsourcing of railcar and intermodal container operations.²⁹ Logistic services firms managed to increase profitability from 2.1% to 3.5%, partly due to expanded demand for the logistics coordination that complex omni-channel retailing and increased product differentiation requires. Trucking profit margins increased from 3.6% to 6.1%, in part due to the low price of oil, better fuel economy and better backhaul utilization. Some industries, though, saw a decline in profitability: courier services from 6.9% to 6.5% and, more drastically, marine shipping from 9.3% to 5.8%, where profits were put under pressure by container capacity being shared.

Figure 2: Profit pool analysis

	Courier Services	Logistic Services	Marine Shipping	Air Freight	Rail Freight	Trucking	Transport Support Services
Traditional Peers							
Revenue CAGR 2008-2014	1.7%	4.1%	(1.6%)	1.7%	5.2%	2.5%	6.5%
Revenue CAGR 2014-2018FF	3.0%	1.8%	1.7%	3.6%	3.5%	4.2%	6.4%
ROIC 2008	11.9%	6.9%	7.5%	5.0%	8.0%	5.2%	6.6%
ROIC 2014	19.6%	2.1%	10.2%	2.8%	25.7%	3.6%	13.7%
EBIT Margin ⁽²⁾ 2008	6.9%	2.1%	9.3%	2.8%	25.7%	3.6%	13.7%
EBIT Margin ⁽²⁾ 2014	6.5%	3.5%	5.8%	3.8%	32.0%	6.1%	16.8%

Notes: ⁽¹⁾ Revenue, ROIC and EBIT are based only on companies included in the segment peer group and does not represent the total market size of the industry. ⁽²⁾ EBIT Margin has been calculated using the following formula: Total EBIT of selected peer companies/Total Revenue of selected peer companies. Source: Bloomberg, Accenture Value Lab Analysis

Future prospects for value creation

The analysis in this white paper suggests that revenues across all segments of the logistics industry will grow during the four years from 2014 to 2018. Transport support services revenues are expected to grow fastest, at 6.4% a year, while marine shipping revenues are only forecast to grow at an average annual rate of 1.7%, which is broadly in line with the expected 3 to 5% growth in seaborne container transportation over the next few years. As a consequence, marine

shippers are likely to try to optimize their fleets and reduce operational costs to stabilize profit margins. Courier services revenues are expected to grow gradually at 3% a year and will be particularly sensitive to consumer expectations relating to reduced lead times for last-mile delivery and precisely timed delivery windows, coupled with a shift from offline to online B2C procurement. Revenues in air freight are forecast to grow by 3.6% but the segment is likely to face strong competition from rail and sea freight. It is also particularly sensitive to geopolitical concerns, the volatility of oil prices and protectionism by trade zones. In response, air freight firms are expected to cut down on transit times, invest in new fleets, use belly loads on passenger flights more effectively, and move forward with the e-freight project of paperless air cargo shipments.³⁰

Potential for disruption

Over the past couple of years, the logistics industry has seen an increase in consolidation and partnering. One of the largest mergers was announced in April 2015 when FedEx outlined its plan to take over its competitor TNT for \$4.8 billion.³¹ A month later, Panalpina announced the takeover of its Egyptian agent Afifi.³²

Despite this consolidation, the potential still remains for new entrants to the market to challenge existing logistics companies. One new arrival is Coyote, which has an innovative business model of crowdsourcing logistics. Essentially asset-free, it threatens traditional companies by using digital platforms to play these firms against each other by revealing transport prices, routes and service level. In addition, the interest in logistics software startups has increased in recent years, with funding from venture capital firms and private equity specialists rising from \$40 million in 2010 to almost \$200 million in 2015.³³

4. Future Horizons

This white paper explores new sources of value in the logistics sector by identifying the digital themes that are most important and relevant to the industry. Based on an analysis of the powerful macro and technological trends shaping the sector, interviews with key stakeholders inside and outside the logistics industry, and discussions with members of the World Economic Forum Global Agenda Council on the Future of Logistics & Supply Chains, the following themes will define the evolution of the logistics industry over the next decade.

Digital themes and initiatives

The five themes selected are information services, logistics services, delivery capabilities, circular economy and shared logistics capabilities. Within each theme, a number of digital initiatives have been identified (see Figure 3). Each initiative clearly illustrates, with real-world examples, how these digital themes are relevant to the logistics industry as it evolves over the next few years.

Figure 3: Digital themes and initiatives

Digital Themes	Digital Initiatives
Information Services Utilizing data to make informed decisions	<ul style="list-style-type: none"> Logistics Control Towers Analytics as a Service
Logistics Services New market offerings for additional revenue streams	<ul style="list-style-type: none"> Digitally Enhanced Cross Border Platform City Logistics Same-Day Delivery
Delivery Capabilities New methods of physical transportation	<ul style="list-style-type: none"> Drones Autonomous Trucks 3D Printing Crowdsourcing
Circular Economy Reverse logistics for product after sales	<ul style="list-style-type: none"> Circular Economy
Shared Logistics Capabilities Sharing of physical assets in logistics	<ul style="list-style-type: none"> Shared Transport Capacity Shared Warehouse Capacity

Note: City Logistics and Circular economy are outside the scope of the Value at Stake Assessment; Source: Accenture, World Economic Forum

a. Information services

This theme focuses on the flow of data through the logistics value chain. Data in the 21st century is like oil in the 18th century: an immensely valuable but largely untapped asset.³⁴ To extract the value from crude data, it must be put into context. Individual pieces of data are rarely useful in isolation but when analyzed properly, they can coalesce into a source of insights for further action. Data can thus be the basis from which businesses make informed decisions, instead of, say, relying on personal opinions. For this reason, companies should understand data sources – in particular, the logistics control towers and analytics described below – not as cost centers, but as future profit centers.

Logistics control towers

Augmented by the Internet of Things, the Web enables the continuous automated monitoring of logistical elements, from shipments and transportation assets to infrastructure, workers and customer requirements. It also enables communication between control operations and these elements. The question becomes how to organize monitoring and control operations to take best advantage of the huge amounts of data this technology produces.

Technology can decentralize monitoring and control: for example, trucks with adaptive cruise control can monitor the positions of other trucks in front and behind them, and can take corrective action to maintain safe headways.³⁵ To date, however, the best examples of technology adding value to monitoring and control functions involve the centralization of those functions into 'control towers'.

Typically, a control tower has three levels:

1. **Process execution:** functions include transport planning, tracking and tracing, billing, auditing and payments.
2. **Analytics:** functions include assessment and value targeting, sourcing and optimization, compliance management and performance analytics.
3. **Visibility and data integration:** functions include dashboard control and alarm generation.

Control towers of this type have several advantages. The data they gather can be organized in the cloud for monitoring and automation purposes. Cloud-based technology can then analyze the data to detect and predict problems and to optimize decision making. Finally, they encourage the development of skilled personnel who can manage new technologies and continuously improve their value.

Control towers can deliver unmatched levels of transparency throughout the value chain, helping optimize logistical operations and thereby reduce emissions. They can also increase levels of customer satisfaction by helping logistics providers react more flexibly to unexpected situations.

Case study

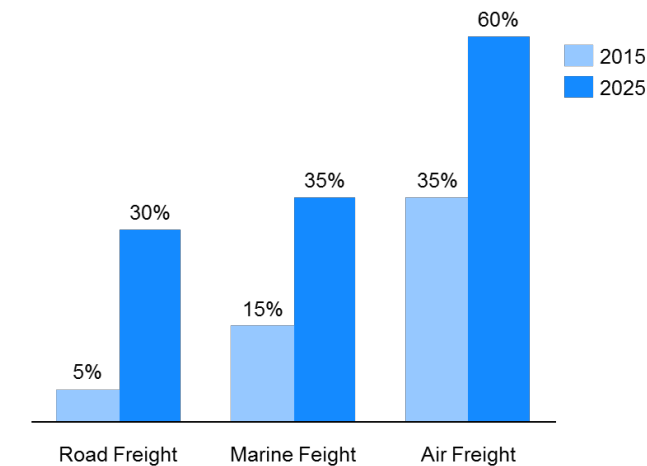
Kuehne + Nagel uses a logistics control tower to maximize cost efficiencies, while adhering to time constraints and complying with standards in security and document accuracy.³⁶ The Germany-based logistics giant has in excess of 1,000 offices across more than 100 countries.³⁷ With more than 63,000 employees, it oversees networks that use many service providers and demand complex levels of organization covering border crossings, multiple regions and modes, and merge-in-transit and divert-in-transit operations. Its tower uses order and transportation management software to exchange data between carriers, service providers, and senders and receivers of goods.

Similar projects involving Unilever, P&G, Pfizer and Dell have reduced inventories in excess of \$500 million by 25 to 40%, lowered delivery costs by 10 to 20%, cut warranty costs by 12 to 25% and shrunk labor costs by 20 to 30%.³⁸

Digital value at stake

Control towers are built on a layer of analytics and offer substantial benefits. While analytics help in better planning and positioning of the logistics assets and drive efficiency gains, control towers provide a real-time visibility of the entire supply chain and help companies better react to situations. It helps in increasing response speed and reliability and reducing downtime, which could generate savings of \$210 billion in operating costs for logistics companies through 2025. The adoption of control towers is assumed to increase rapidly across all segments of the logistics supply chain (see Figure 4). Control towers would also be used by different canals such as the Panama Canal and the Suez Canal. It will help reduce waiting times by around 25%, which could lead to additional cost savings of \$20 billion to marine freight companies. Control towers would also have a positive impact on the environment as it could reduce emissions by 1 billion metric tons.

Figure 4: Adoption Rate of Logistics Control Towers



Source: World Economic Forum/Accenture Estimates

Analytics as a service

Analytics is the discovery and communication of meaningful patterns in data.³⁹ Relying on the simultaneous application of statistics, computer programming and operations research to quantify performance, it is a discipline that thrives in areas that are rich with recorded information.

The United States Armed Forces uses logistics services to enhance support for army operations around the world.⁴⁰ Its IBM Hybrid Cloud system processes 40 million unique data transactions every day to acquire, manage, meet and sustain the forces' materiel needs. The service is provided to more than 65,000 users and 150 direct trading partners worldwide, and operational cost savings as high as 50% in certain areas have been reported.

Businesses too commonly apply analytics to describe, predict and improve performance. Within logistics, several areas have already been shown to suit this kind of analysis.⁴¹

- Demand forecasting, which uses analytics to segment and assign forecasting profiles to different customer types, has improved predictions of future demand by 10 to 20%. This has helped trim deployment costs by as much as 20% and raise fill rates by up to 5%.
- By making safety stock and replenishment orders as dynamic as possible, inventory optimization can reduce inventories by up to 20%, while ensuring each customer segment receives the right level of service.
- Service costs can be reduced through maintenance analytics and customer warranty management. The optimization of spare parts can shrink inventories by 20 to 40%. Such optimization can even be focused on individual items within an inventory.
- Predictive asset maintenance improves the uptimes, performance and availability of logistics assets by assessing equipment reliability and recognizing early warning signals. Through optimized maintenance scheduling, it can cut maintenance costs by up to 30% and reduce the incidence of breakdowns by 75%.
- Network flow and path optimization analytics help minimize total supply chain costs. By matching projected demand patterns with available transport modes and with locations of factories and warehouses, they enable informed decisions based on the performed analysis, reducing distribution costs by 5 to 10% and lead times by up to 10%.

To achieve these cost reductions, companies must not only disseminate data internally but also exchange it with other industry stakeholders to ensure visibility all along the logistics value chain. Often, however, suppliers are reluctant to share data with customers, in case it is used against them in negotiations.

Looking to the wider community, analytics can have a major environmental impact. Network optimization can reduce the number of trucks on the road and increase last-mile delivery speeds – especially in cities – and thus lower emissions and waste production.

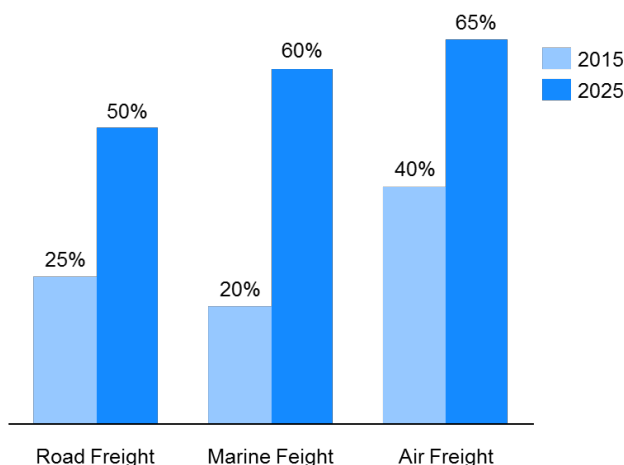
Case study

Startups such as Weft⁴² and large corporate spinoffs such as IONX⁴³ now offer easy ways to collect data at points along the delivery value chain via sensor-based technologies that can be attached to products or machinery. Weft can track shipping containers around the world in real time.⁴⁴ By analyzing this data alongside historical data for a container’s planned route, it can identify likely bottlenecks and shrinkage areas, alerting shippers to potential problems before they occur. At present, only a small proportion of the world’s 20 million shipping containers are tracked in this way, which means the potential savings through reducing cargo shrink and supply chain disruptions across the industry are enormous.

Digital value at stake

Analytics will help logistics companies reduce their operating costs. The largest beneficiary will be road freight companies, and we assess that analytics could lead to a reduction of 5% in fuel costs by optimizing transport routes. It can also lead to a decline in maintenance costs by 30% through better scheduling and predictive maintenance, and help in improving the utilization of logistics assets by 5%. In total, we estimate approximately \$520 billion can be saved in operating costs for road freight companies over the next decade. Similar benefits would also accrue to air and marine freight companies although to a lesser extent, and we estimate these in the range of \$30 billion and \$50 billion in operating costs, respectively. In addition to this, analytics has huge societal benefits: we estimate that improved route optimization and capacity utilization could lead to a reduction in emissions of more than 4 billion metric tons. The adoption of analytics is expected to increase rapidly among all the different modes of freight (see Figure 5).

Figure 5: Estimated adoption rates of Analytics as a Service



Source: World Economic Forum/Accenture Estimates

b. Logistics services

The future belongs to those who are best prepared for it. It’s a truism that applies as much in logistics as in other sectors. Right now, a number of new logistics concepts point to how services will be commissioned and executed in years to come. This second theme covers three that look set to have a lasting operational impact and will demand that providers overhaul their infrastructure if they are to continue competing across different market segments.

Digitally enhanced cross-border platforms

The internationalization of businesses, especially small and medium enterprises (SMEs), depends on reliable, easy-to-use logistics systems with global reach. Digitally enhanced cross-border logistics can thus boost worldwide trade for the SME sector in particular.

Current global shipping platforms tend to do one of two things: consolidate small-quantity shipments and forward them under one account to dominant logistics service providers; or act as price comparison engines between those service providers. They are missing the opportunity to match individual shipping demands with individual logistics capabilities.

Digitally enabled global shipping platforms not only connect individual sellers with millions of potential buyers. They display fully landed costs, offer printing functions for shipping documentation and include the option to place pickup requests. Customs filings, international packaging and import payments can be handled by service partners supporting the platforms, and the items can be sent to the international buyers with complete end-to-end tracking. Digitally enabled platforms can also consolidate demand from several shippers, optimizing the end-to-end logistics planning process and, based on warehouse location and targeted delivery location, suggesting appropriate transport modes.

In the past, only globally integrated companies could win a contract to deliver a global shipment, but open cross-border logistics platforms can now break down the end-to-end delivery process into steps (by geography or transport mode) and put these steps out for tender separately. This means independent, specialized SMEs can oversee the different steps and, together, offer an end-to-end service to compete with the big players. The platform coordinates the commissioned companies, takes care of documentation and offers monitoring and analytical services to the recipient.

There is just one drawback: more trade can mean more harmful emissions and waste, particularly if transactions involve smaller, less environmentally advanced logistics providers.

Case study

LightInTheBox launched such a platform in January 2015.⁴⁵ The China-based e-tailer, which delivers direct to consumers around the world, hopes its LanTingZhiTong platform will reduce shipping costs, cut delivery times and enhance customer satisfaction by connecting cross-border e-tailers with cross-border logistics service providers. It includes a global logistics price comparison engine, route optimization tools, and integrated logistics tracking and big data analysis tools.

ZhiTong and other next-generation platforms should foster international trade by helping companies offer their products to more customers. Emerging markets – and particularly customers in rural areas – can benefit from the investment in infrastructure, while greater demand for logistics services and the wider economic impact of increased trade should fuel local job markets.

Digital value at stake

It is estimated that global trade will increase by as much as 70% as a result of trade simplification and removal of trade barriers.⁴⁶ We assess digitally enhanced platforms to capture 20% of this increase in trade. This can provide SMEs access to a global marketplace with an estimated increase in profits of more than \$600 billion. In addition to this, there is further value addition flowing through platforms of approximately \$120 billion, if we assume a continued commission structure of approximately 12%⁴⁷ of trade value. In turn, this will drive value for logistics companies, which will benefit from an increase in trade volumes to earn approximately \$50 billion in additional profits. However, from an environmental perspective, increased trade flows without subsequent changes to emissions is likely to have a negative impact of greater than 1 billion metric tons in total. Given the COP21 Paris climate agreement, there is an opportunity for digital technologies such as drones and 3D printing to decouple the growth in trade from growth in emissions.

City logistics

The ultimate aim of this initiative is to reduce the number of vehicles in cities. To achieve this, it focuses on the optimization of logistics and transport activities in urban areas while considering traffic conditions, congestion issues and fuel consumption.

Urban logistics services can usually be divided between consumer-related distribution (independent and chain retailing, food deliveries, parcel and home deliveries) and producer-related distribution (construction materials, waste collection and disposal, industrial and terminal haulage). Reliable figures are hard to find⁴⁸ but current estimates indicate that urban goods movements account for 20 to 30% of total vehicle kilometers driven.⁴⁹

Many large cities strive to become strategic logistics hubs. Shanghai, for example, is now the world's busiest container port,⁵⁰ while Chicago is a major rail hub and freight distribution platform for North America. Istanbul is using its location to become an aviation hub between Europe and Asia.

City logistics have a major impact on the infrastructural requirements of a city. Intelligent traffic control systems, noise insulation, air pollution monitoring and underground routes are all valuable because they can improve the well-being of inhabitants.

Environmental concerns oblige every city to think about:

- Traffic regulations (e.g., forbidding daytime deliveries)
- Provision of freight distribution facilities (e.g., logistics centers and local freight stations)
- The right choice of vehicles for freight distribution
- Information and communication technologies (e.g., radio frequency identification, intelligent transportation systems, vehicle routing software and load sharing systems)

CO₂ emissions are expected to decrease as freight consolidation efforts across all logistics providers reduce vehicle miles driven in cities.⁵¹ The application of new technologies such as automated vehicles for mass transportation (e.g., buses, subways, trains) and the resurgence of inner-city logistics operations (e.g., couriers, shared inner-city postal hubs) should also make a difference.

Case study

Oasis is a women's clothing retailer based in the United Kingdom that ships to 24 countries. To cope with increasing demand, it uses a split-order system that minimizes the impact of stock fluctuations on customers.⁵² Orders are usually fulfilled from a distribution center but, if an item is out of stock there, Oasis has a Seek and Send service that can source the product from one of its stores and send it directly to the customer. If necessary, orders can be split, with some items sent from the distribution center and others from stores. Customers are offered standard, next-day and nominated delivery. Within those time frames, they can choose hourly slots throughout the week or a 90-minute delivery service in selected cities throughout the United Kingdom.

Same-day delivery

This is currently the fastest and most flexible solution for urgent and time-critical shipments. Consumers purchasing from an omni-channel retailer (e.g., a bricks-and-mortar grocery store with an online home delivery service) tend to want their goods as soon as possible – especially if they are perishables. Research last year predicted that the US same-day delivery market could grow from \$0.1 billion in 2014 to \$4.03 billion in 2018, at an average rate of 150% a year.⁵³

Case study

In 14 metro areas across the United States, Amazon already offers members of its \$99-a-year Prime program the chance to have items delivered to their door within a day.⁵⁴ To do this, Amazon leverages its growing network of distribution warehouses and delivery infrastructure. It also uses data to predict what customers will order – sometimes even processing orders before they have been placed.⁵⁵

Amazon Locker is another way the e-commerce giant can get goods to customers quickly.⁵⁶ A self-service parcel delivery option, customers select any public Locker location as their delivery address, collecting the order there using a unique pickup code.

Billa, the Austrian supermarket chain owned by Rewe, has launched a same-day delivery program for customers in Vienna and another major city, Linz.⁵⁷ Working with Berlin-based startup Lockbox, Billa delivers perishable and retail goods ordered online to its partner's secure boxes, which can be attached to front doors if the recipient is not at home. Deliveries take place between 18:00 and 21:00, and are operated by Billa itself. To fulfill them, Billa uses its local stores, treating them as extended warehouses.

Digital value at stake

Taking into account same-day deliveries such as Amazon Prime Now or Google Express shopping, logistics companies stand to earn an additional \$50 billion of operating profits, including \$30 billion in premiums for same-day deliveries. The underlying assumption is that about a quarter⁵⁸ of the population would resort to same-day deliveries, increasing the current 5% penetration in 2015 to about 40% in 2025. However, there is a negative impact to the environment to all this customer immediacy. Same-day deliveries could have a negative impact on the environment due to increases in air freight instead of road freight, which could lead to an increase of approximately 30 million metric tons in emissions.

c. Delivery capabilities

Even now, in the aftermath of the digital revolution and the early years of the Information Age, the need to move physical goods from A to B endures. Delivery methods, however, are starting to change. The trend of crowdsourcing, and innovations in manufacturing (3D printing) and technology (drones, autonomous trucks) have widened the range of options and opened up logistics markets to new players.

Drones

Once the stuff of science fiction, unmanned aerial vehicles (UAVs) have been making real-world headlines recently. It's their military capabilities that are most often up for public debate, but drones, as they are better known, have some exciting applications in logistics. Costs have plummeted since 2007 and the cost of a single drone then can now buy 150 today.

Capable of making fast, cheap deliveries – 30-minute turnaround times are already possible – delivery drones might encourage consumers to keep their fridges less well-stocked. Able to offer perishables on demand, home deliverers could well see a jump in purchasing volumes that raises revenues for logistics operations. With the right geolocation data, drones could even deliver direct to consumers outside the home. Need a refreshing drink on the beach, but don't want to give up your lounge? No problem. Retailers, even individual entrepreneurs, could rent capacity from drone logistics providers to get you exactly what you want.

It seems most likely that drones are primarily a replacement for last-mile delivery vehicles such as vans. The shorter delivery times and increased purchasing flexibility would appeal to consumers, while the ditching of bigger transport modes would shrink logistics' carbon footprint. With Amazon and DHL already putting delivery drones through their paces, logistics could be a significant part of an overall commercial UAV market that Statista projects will be worth \$6.4 billion by 2020.⁵⁹

Case study

Amazon is now working on a ninth-generation drone prototype which it says can carry payloads of up to 5lb (2.3kg) at up to 50mph (80kph).⁶⁰ The largest e-tailer in the United States hopes its UAVs will eventually locate the recipient of a delivery using data from their smartphone, perhaps making up to 400 million such deliveries a year.⁶¹

DHL, meanwhile, has deployed autonomous quadcopters to deliver small packages to the sandbar island of Juist, 12km off the German coast in the North Sea.⁶² In addition, SF Express runs a fleet of around 1,000 drones delivering 500 packages a day around China.⁶³ Finally, Swiss Post has joined forces with Matternet, a Silicon Valley-based UAV manufacturer, to trial drone deliveries of parcels weighing up to 1kg across distances of up to 10km.⁶⁴ Such a service could be especially useful in an Alpine country with lots of inaccessible small communities.

Digital value at stake

Drones can allow logistics companies to provide faster, cheaper (about 25%), and lower emission (about 90%) deliveries through avoidance of road traffic in last-mile delivery. Drone deliveries are cheaper because of battery power and near-autonomous operation. A group of drones would be required to be overseen by just a single drone minder. However, drones today account for less than 0.5% of all logistics deliveries globally. As technology improves and regulation changes, companies stand to benefit from premiums for faster/same-day deliveries. We estimate this could be worth as much as \$20 billion in operating profits over the next decade. The use of drones can also benefit society. It could lead to a reduction of 15 million metric tons in emissions, and prevent up to 4,000 deaths from road accidents. This impact is based on the assumption that drones could have a penetration of 8.5%⁶⁵ of all parcel deliveries globally by 2025.

Autonomous trucks

Self-driving passenger cars have generated more hype recently, but autonomous trucks offer the same reductions in road accidents and CO₂ emissions, while also promising to significantly boost business bottom lines.⁶⁶

According to the International Transport Forum, the volume of freight on the road will almost quadruple between 2010 and 2050.⁶⁷ In that time, autonomous delivery vans should optimize last-mile deliveries to consumers, but the biggest changes might come in B2B logistics. This is the area in which Germany-based automotive giant Daimler recently tested its autonomous Freightliner Inspiration Truck on roads in the US state of Nevada.⁶⁸

Moving in convoys, driverless trucks avoid unnecessary overtaking and, by using the slipstream of the vehicle in front and optimizing accelerations and decelerations, they can reduce fuel consumption by up to 12%.⁶⁹

Moreover, autonomous technology could prevent 90% of crashes that are caused by distracted or drowsy drivers.⁷⁰ Truck drivers who are relieved from paying attention to the road could be more productive behind the wheel, handling logistics and maintenance issues that would otherwise create a dangerous distraction while driving.

Convoy trucking marks the start of the process of automating truck deliveries and will see drivers take responsibility for two or more autonomous vehicles. The automation of subway trains is a useful guide here: when they have become automated, drivers have been retrained to monitor and control traffic.⁷¹

Digital value at stake

Autonomous trucking convoys offer a range of benefits to the industry. They are fuel-efficient and save up to 12%⁷² of the fuel consumed by traditional trucks. These convoys also save on employee costs. A convoy of three or four⁷³ trucks can be controlled by just one driver. Additionally, autonomous trucks have 14%⁷⁴ lower maintenance costs. In total, we estimate \$30 billion can be saved in operating costs from autonomous trucks. The shift toward autonomous trucks can also benefit society. It could lead to a reduction of 25 million metric tons in emissions, and prevent up to 400 deaths from road accidents. This impact is based on the assumption that autonomous trucks will be sold in developed markets from 2020 and will attain a market penetration of 5% on new truck sales in developed markets by 2025.

3D printing

Additive layer manufacturing (ALM), also known as 3D printing, creates three-dimensional solid objects from digital blueprint files.⁷⁵ Objects are created by laying down successive layers of material, each of which is a thinly sliced horizontal cross-section of the final object.

Aerospace leader Airbus recently concluded that 3D printing plane parts could reduce waste during the manufacturing process and lighten the final weight of its planes, which would reduce fuel costs and carbon emissions during their use by end clients.⁷⁶ On average, ALM generates 5 to 10% waste material (which can be recycled and reused), instead of the 90 to 95% typical of machining techniques that create a part by cutting away a solid block of material, rather than building it up layer by layer. With costs and supply lead times for tooling dropping 70%, Airbus is looking to increase the workload of its 3D printers, especially in the area of spare parts which, if they can be produced on demand, do not need to be stored for long periods in large spaces.

At first glance, this is technology that poses a great threat to the logistics industry: if end consumers can print their desired object somewhere close to their own location, nothing needs to be shipped around the globe.

Look again, though, and such nearshore manufacturing operations could be a source of succor to a proactive logistics service provider wanting to expand its range of value-added services. Imagine, for example, a blueprint file arriving from a manufacturer that a single logistics service provider then prints and ships, perhaps even installing the final object at the customer's location.

Digital value at stake

ALM could be a double-edged sword for logistics companies. On one hand, it could be a threat to logistics companies and reduce their operating profits by \$1 billion as a result of less shipping demand as companies shift toward printing out parts and supplies. On the other hand, it could allow logistics companies to provide newer services such as printing of products from licensed digital designs and directly supplying them to customers. We, however, have not valued potential benefits that could arise from new service offerings.

Crowdsourcing

Crowdsourcing is about getting what one needs from an undefined group of people – typically an online community – instead of from traditional sources (say, employees or suppliers). Everyone involved makes a small contribution that, in combination with everyone else's, should deliver the final result desired. In logistics, crowdsourcing can reduce the environmental footprint by helping industry players make more efficient use of available capacity and thus lower total driven miles.

Case study

Telogis in the United Kingdom runs a cloud-based software platform that collects route data from driver reports and fleet movements, helping logistics firms improve route planning and execution.⁷⁷ In Hong Kong, UberCARGO has a platform on which customers can place delivery contracts for private and corporate van and truck owners to fulfill.⁷⁸ Together, those who accept such orders represent a serious challenge to traditional courier services.

Keychain Logistics is another software marketplace, covering medium- and long-range trucking services. It eliminates brokers – and their fees – by connecting companies shipping products directly to independent semi-truck owner-operators who might be able to help them. In giving truckers an opportunity to deliver multiple orders in one journey and raise asset fill rates, Keychain anticipates a shift from large trucking fleets toward decentralized, flexible and smaller truck fleets that operate independently.

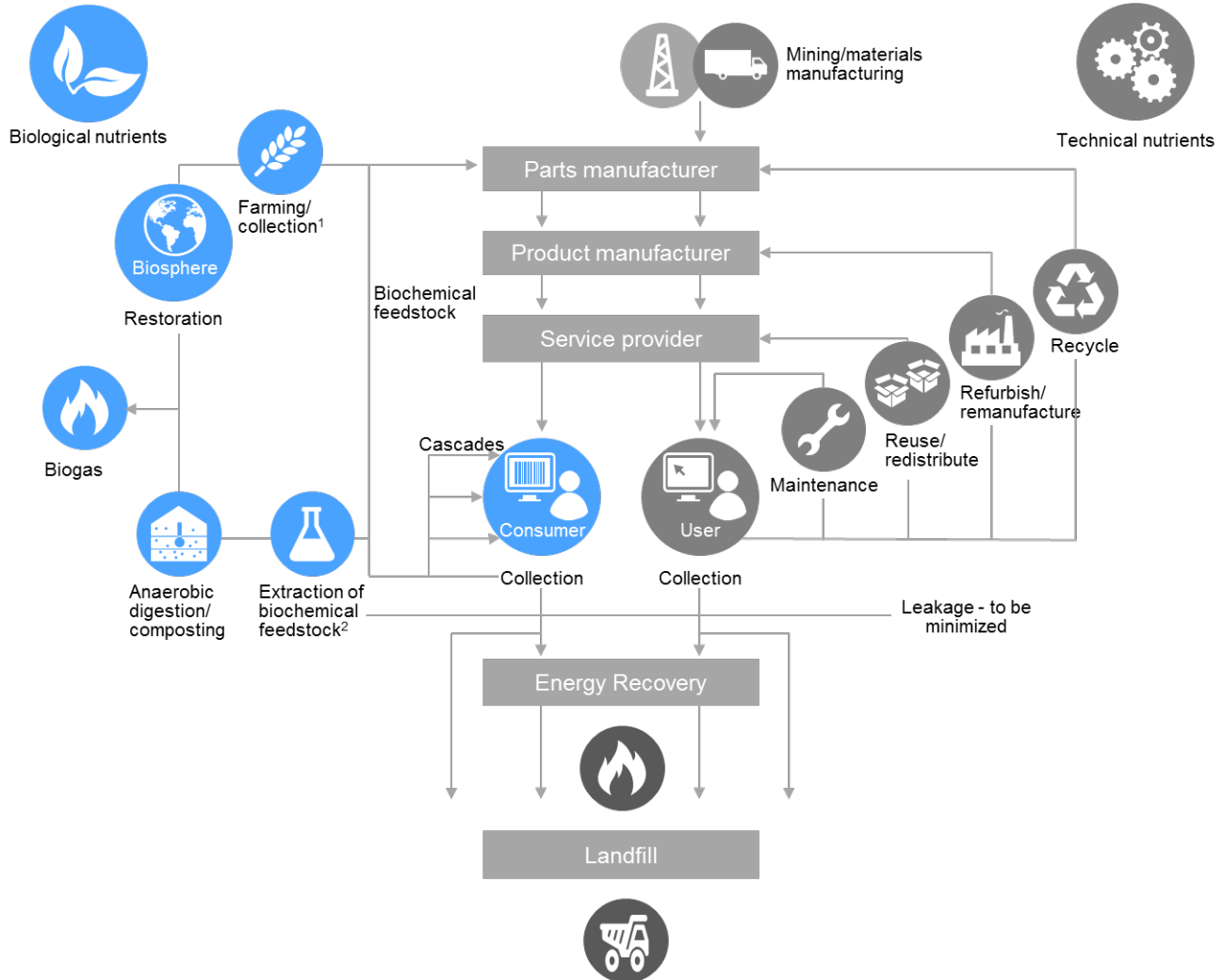
Digital value at stake

The largest impact of digitalization to the logistics industry is likely to come from crowdsourcing. Crowdsourcing platforms could allow newer entities from outside the industry to grab a share of the market from existing players. At the same time, it could also allow smaller trucking companies to improve their utilization levels by as much as 20%⁷⁹. We estimate that these platforms could charge a commission in the range of 20 to 25%⁸⁰ for providing their services and generate \$160 billion in operating profits. The crowdsourced platforms would offer better rates, convenience and real-time tracking, and this could lead to savings of approximately \$800 billion for the customers. On the flip side, major trucking companies could be at a risk of losing \$310 billion of operating profits to players enrolled on these platforms. Crowdsourcing would lead to improved utilization rates, which would lead to savings of 3.6 billion metric tons in emissions. These estimates are based on the assumption that crowdsourced platforms will reach a market penetration of 10% by 2025.

d. Circular economy

A circular economy (see Figure 6) is an alternative to a traditional linear economy in which resources are made, used and then disposed of.⁸¹ The idea underpinning the circular – or restorative – economy is that maximum value is extracted from resources while they are in use; then, at the end of a resource's service life, its constituent products and materials are recovered and regenerated. Based on nature's resource-efficient use and reuse of biological nutrients, the theory could reap practical benefits in the logistics sector.

Figure 6: Circular economy⁸²



¹ Hunting and Fishing

² Can take both postharvest and postconsumer waste as an input

Source: Ellen MacArthur Foundation circular economy team drawing from Braungart & McDonough and Cradle to Cradle (C2C)

The requirement for businesses to minimize the use of ‘new’ materials reduces the number of potential new logistics commissions, but increases demand for complex return processes.

Already embracing the theory are reverse logistics groups such as Cycleon, which specializes in managing end-to-end return processes.⁸³ Circular economies are set to become more prominent as multinationals such as Dell and Philips undertake structural overhauls.⁸⁴

Committed to closed-loop plastics recycling, computer technology specialist Dell takes back customers’ old systems and has become the first in its industry to offer a computer made with third party-certified closed-loop recycled plastics. In addition to helping the environment, Dell believes this initiative will deliver cost savings as it is scaled up.

With the aim of using natural resources more effectively, Netherlands-based Philips is in the middle of implementing a two-year plan to embed circular economies across its diversified businesses, believing this will also create value.⁸⁵

The Government of Denmark is another proponent of circular economies.⁸⁶ In concert with regional and municipal authorities, the Danish environment ministry has committed to use public procurement worth €5 billion to support a

nationwide transition to a circular economy. Specifically, the partners' procurement policies must adhere to green criteria on recycling, chemical use, long lifetimes and total cost of ownership.

e. Shared logistics capabilities

The sharing economy has already transformed several industries through the popularity of apps such as Uber and Airbnb. The sharing economy will also bring benefits to logistics, as it allows all participants to share fixed costs, enabling companies to make several smaller investments rather than a single large investment, which could consume a firm's budget entirely. The main applications for logistics will be in sharing cost-intensive physical assets, notably warehouses and freight-transporting vehicles.

Shared transport capacity

Logistics companies can share transport capabilities in two main ways. Firms can split vehicle capacity simultaneously (for instance, by ride-sharing) or over time (for example, by truck-sharing). Both ride-sharing and truck-sharing allow the cost of the journey to be divided, creating a hybrid between using a personal vehicle and using public transport. The importance of shared transport is growing, as it is a crucial strategy for reducing greenhouse gas and other emissions and mitigating the transport sector's impact on climate change.

Case study

Coyote, founded in 2006, is an example of a company that matches demand for client shipments with available carriers. The system specializes in scheduling shipments to travel on carriers' return trips (backhaul). Currently, trucks travel empty on up to half of all return trips, so the potential to improve efficiency is huge. Coyote says that in 2014, it eliminated 31 million 'empty' miles, avoiding 56,300 metric tons of CO₂ emissions.⁸⁷ In August 2015, UPS acquired Coyote for \$1.8 billion, demonstrating the merits of an asset-light business model in a mature industry.

Digital value at stake

Shared transport capabilities will involve creation of vehicle-sharing platforms, where logistics companies can share their information on assets, routes and fill rates. Improved utilization levels would be a win-win for the industry and the society. It could allow the industry to save \$30 billion in operating costs and help in reducing emissions by 680 million metric tons. At the same time, the newly created platforms could earn \$20 billion in operating profits. Our assumption is that 15% of the trucking market would be using shared transport platforms by 2025.

Shared warehouse capacity

Sharing warehousing among different companies allows these firms to benefit from cost synergies and greater flexibility. One of the advantages of this arrangement is that all the warehousing and information technology (IT) costs can be shared across the customer base at a particular warehouse. This mitigates the risk of having a large fixed cost base, making cost per unit easier to control. Sharing warehouse space could allow companies to carry out order and distribution consolidation in several locations, rather than just one, providing a better cost-to-serve ratio and reducing road miles due to improved drop densities.

Case study

Nestlé and PepsiCo are two companies that share warehouse capabilities. Through this arrangement, they share the storage, packing operations and distribution of fresh and chilled food products destined for their retail customers in Belgium and Luxembourg. They selected STEF to be their logistics service operator while TRI-VIZOR acts as the independent agent guaranteeing the neutrality of their joint operation and its adherence to competition rules. The earnings from any synergies are shared on the basis of an equitable formula.⁸⁸

Emmasbox, a startup in Germany, is looking to be another pioneer in this area, through the installation of shared, decentralized, cooled storage space in subway stations, with a view to addressing the last-mile delivery problem of

perishables in cities. These boxes will be available for rent by online retailers, who can use the storage space to deliver goods and perishables without interrupting the refrigerated distribution chain.⁸⁹ This trend will have a disruptive impact on existing warehousing and last-mile delivery companies, and on offline retailers. Shared storage, especially in urban areas, will become more common and relevant in the future.

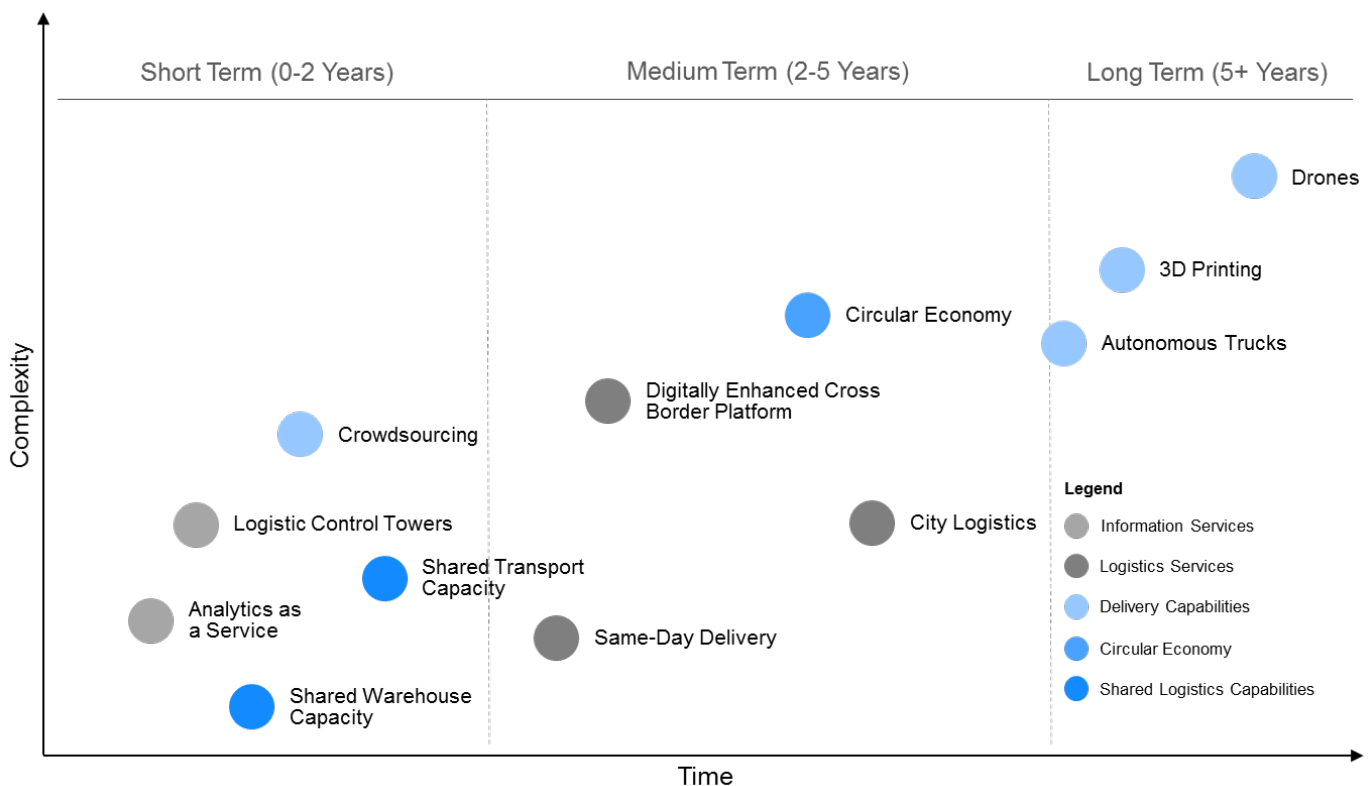
Digital value at stake

Shared warehouse agreements provide companies (customers of logistics companies) an opportunity to reduce their logistics costs by as much as 12 to 15%⁹⁰. We estimate that companies implementing these agreements could save close to \$500 billion in operating costs. This could have a negative impact to the tune of \$35 billion in operating profits for logistics companies. However, shared warehouse capacity could benefit the society through reduction in emissions by 1.3 billion metric tons. Our assumption is that 20% of the market could move into shared warehouse agreements by 2025.

f. Logistics digital roadmap

This analysis bears in mind the complexity and likely time frame that it would take to bring each of these digital initiatives to scale. A majority of the initiatives identified are expected to be viable at scale in the short to medium term. In fact, as Figure 7 illustrates, around three-quarters of these initiatives are likely to reach scale within the next five years.

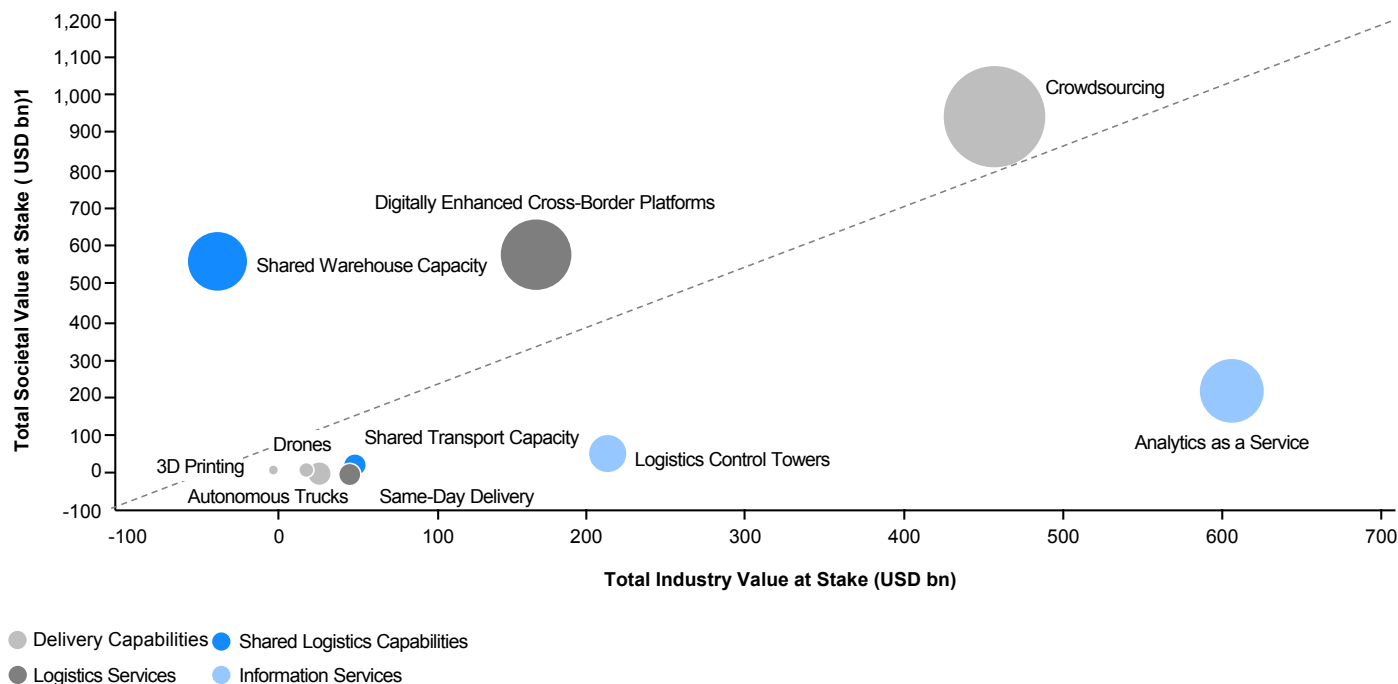
Figure 7: Future horizon of digital initiatives



Time indicates full technology maturity and vast industry-wide adoption
Source: Accenture Analysis, Industry SME Interviews, and Press Searches

g. Digital initiatives: Value at stake

Figure 8: Logistics Value at Stake



Note: (1) Total Societal Value at Stake includes impact on the consumers, society and environment. The impact on external industries has not been quantified. Only the incremental value of Logistics Control Tower (over and above what is already captured in Analytics as a Service initiative) has been shown. Economic value of congestion reduction and emissions considered in societal impact. Circular Economy and City Logistics have not been valued. Source: World Economic Forum, Accenture Analysis

Source: World Economic Forum, Accenture Analysis

Our analysis indicates there is \$1.5 trillion⁹¹ of value at stake for logistics players and \$2.4 trillion impact on the society as a result of digital transformation of the industry through 2025. Our estimates of the societal benefits include reduction in carbon emissions and traffic congestion, and benefits for customers. Value at stake manifests itself in five categories: data-driven information services, crowdsourcing, digitally enhanced cross-border platforms, long-term bold play capabilities, and customer and societal benefits.

1. Data-driven information services offer an \$810 billion upside to the industry. Industry players will use analytics to optimize routes, reduce maintenance costs and improve utilization. The big players will implement control tower solutions to augment these benefits with real-time visibility, which would generate incremental profits by reducing downtime and recovery costs.
 - a. Analytics as a service could add \$600 billion of operating profits to the industry.
 - b. Logistics control tower could add \$210 billion of incremental profits to the industry.
2. Crowdsourcing is a potential game changer for the industry. It will make the sector more competitive, and major trucking companies could be at a risk of losing \$310 billion of operating profits to players enrolled on crowdsourced platforms.
3. Digitally enhanced cross-border platforms will increase trade flows by simplifying import-export processes. These platforms could earn \$120 billion in the form of commissions. Logistics companies could earn \$50 billion in additional profits as a result of this increase in trade.

4. Long-term bold play capabilities: Autonomous trucks and drones will increase the industry's efficiency and bring significant societal benefits once the regulatory hurdles are overcome and mass adoption becomes feasible. However, over the next 10 years, they will have a relatively smaller contribution to the tune of approximately \$50 billion.
 - a. Autonomous trucks will make \$30 billion of business impact as a result of savings in fuel costs, maintenance costs, employee costs and insurance.
 - b. Drones will achieve \$20 billion of business impact from faster and cheaper last-mile delivery services in both rural and urban areas.
5. Customer and societal benefits: The greatest impact from digital transformation in the logistics industry will come from societal benefits. These include lower carbon emissions, less traffic congestion, lives saved through reduction in accidents, increase in cross-border trade as a result of platforms simplifying trade and discounts to customers on account of increased utilization levels. Digital alone has the opportunity to reduce emissions from logistics by as much 10 to 12% by 2025. We estimate the total benefits to the customers and the society to add up to approximately \$2.4 trillion coming primarily from three initiatives:
 - a. Crowdsourcing would offer better rates, convenience and real-time tracking to customers. This could lead to savings of approximately \$800 billion for customers. These platforms could have a benefit of \$180 billion for society in the form of reduced emissions and congestion.
 - b. Digitally enhanced cross-border platforms would provide SMEs access to the global market and give them an opportunity to earn incremental profits of \$600 billion. However, these increased profits would come at the cost of higher emissions, which could have a negative impact of \$55 billion for the society.
 - c. Shared warehouse agreements could allow companies to save around \$500 billion in operating costs. The use of these agreements would lead to benefits of \$70 billion to society in the form of reduction in emissions and congestion.

5. Recommendations

The digital transformation of the logistics industry is already under way. Based on an assessment of the five digital themes underpinning this transformation, a number of recommendations have been drawn up for business leaders that will position their enterprise to succeed in a fast-changing industry.

A number of suggested concrete investments in digital capabilities that will form the building blocks of a successful digital logistics business follow. They are divided between shorter-term 'no regret' capabilities, which a logistics firm needs to remain competitive, and 'bold plays', which are longer-term investments that may revolutionize a company's strategy.

Leadership and policymaker discussion topics

- **Should the larger industry players continue to invest in scaling their existing closed platforms or should they be adding new business models such as crowdsourced platforms and analytics as a service?**
- **How can logistics stakeholders incentivize faster implementation of shared warehouse and transportation capacity to reap significant societal and customer benefits?**
- **The logistics industry contributes 13% of all emissions globally. In light of the COP21 Agreement in Paris, how can industry stakeholders quickly agree on developing safe and trustworthy approaches to more environmentally friendly technologies such as autonomous trucks and drones?**

No regret capabilities

- **Collect operational performance data along the entire value chain.**
Gathering information only makes sense if that data is consistent and holistic. Master data management is crucial as all data must be linked to the right source. Even though most senior executives believe that their master data management is consistent and aligned, experience shows that around 70% of all companies lack this basic transparency.
- **Build or buy analytical capabilities to derive information from big data sources.**
Analytics capabilities should be utilized to derive information from the collected data. This helps identify correlations between several data points, enabling operational efficiency gains to be pinpointed across the value chain.

If a company chooses to build its own analytical capabilities to gain a competitive advantage, it should bear in mind the scarcity of properly qualified digital talent. Consequently, identifying, recruiting and retaining analytics talent become an important part of the human resources strategy.
- **Embrace shared transport.**
Logistics companies stand to gain by embracing shared transport. Shared transport platforms will allow logistics companies to improve their margins by increasing their utilization rates and reducing empty backhauls.

Bold plays

- **Focus on new delivery concepts.**
New physical delivery concepts (autonomous trucks, drones, 3D printing) have the potential to reduce operating costs. Even though they are not expected to reach the mass market within this decade, their development should be watched very closely, so as to spot the right time to invest in them and stay competitive.

Autonomous trucking convoys will be faster, greener and safer. These convoys will help companies save costs on a lot of fronts, including fuel, insurance and maintenance. Drones will revolutionize last-mile logistics and enable logistics companies to offer faster delivery services in both rural and urban areas. Logistics companies will have a dual benefit as a result of adoption of drones: they will be able to charge a premium for faster deliveries

on one hand and reduce operating costs on the other. Another added benefit of the increased penetration of drones will be reduction in emissions and accidents from road freight.

- **Have a strategy in place for emerging logistics concepts.**

In response to changing customer demand, new logistics concepts will need to be developed. Enterprises may need to have strategies for areas such as city logistics, to address the ever-growing demand for deliveries in urban areas, or same-day delivery, to meet increasing customer expectations of ever-faster deliveries.

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7. Endnotes

¹ Disclaimer: These calculations are subject to change. Impacts are based on estimates and would vary in range given a change in adoption rates or disruption in any of the initiatives

² Based on:

<http://about.van.fedex.com/blog/orphaned-polar-bear-cub/>

<http://www.fedex.com/ae/enews/2014/may-june/weird.html>

<http://quick.aero/quickintl/>

³ 15.1% compound annual growth rate (CAGR). Unless stated otherwise, average annual growth rates are calculated as CAGR

⁴ United Nations, “World’s population increasingly urban with more than half living in urban areas”

<http://www.un.org/en/development/desa/news/population/world-urbanization-prospects-2014.html>

⁵ Burt, David, et al. Cyberspace 2025, 2014, p. 9

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