Logistics and Supply Chain Innovation

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Multimodal, Birmingham
Launching a new book

• In the next ten years, the ‘Fourth Industrial Revolution’ (4IR) will have led to the transformation of economies

• The Logistics and Supply Chain industry is not immune.
• Large parts of the industry could become unrecognizable

• Today we launch The Logistics and Supply Chain Innovation Handbook
• Result of a five year programme of research looking at every element of the industry and its prospects.
The Fourth Industrial Revolution

- Opportunities...but also risks

- Digitalization of supply chains is enabling a **new generation of entrepreneurs**.
- Technological innovations are allowing large corporations to become more **customer-centric**.
- Innovations offer opportunities to address challenges such as **urbanization and sustainability**.

- Automation could **remove and de-skill jobs**.
- **Tax revenues could fall** due to the disruption of existing business models.
- On-demand last mile deliveries could result in **congestion** and more **pollution**, not less.
- The ‘gig economy’ could result in **unethical employment** practices.

What will supply chains look like in 2030?
Disruption and Innovation are not the same

• Innovation does not necessarily lead to disruption and...
• Disruption is not just about getting more efficient...
• A light bulb is not a ‘super-efficient candle’!
Innovation can spur three different types of disruption at different levels.

An example of this is warehousing.

<table>
<thead>
<tr>
<th>Activity/Initiative</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management and planning</td>
<td>Warehouse operations efficiency</td>
</tr>
<tr>
<td>Process innovation</td>
<td>Augmented Reality (AR) Glasses</td>
</tr>
<tr>
<td>Process disruption</td>
<td>Autonomous Mobile Robots (AMR)</td>
</tr>
<tr>
<td>Operating model disruption</td>
<td>Crossdocking/DC bypass/3D Printing</td>
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<tr>
<td></td>
<td></td>
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<tr>
<td>Sector disruption</td>
<td>Labour intensive to asset intensive</td>
</tr>
<tr>
<td>Company disruption</td>
<td>Revenue depletion</td>
</tr>
</tbody>
</table>
Breaking The Paradigm: The Rise Of The Disruptors

• Some **innovators** develop products to make the logistics process more efficient - **benefiting all supply chain partners without altering industry structures** or having a negative impact on the market incumbents.

• **Disruptors** use new technologies to transform processes and offer a compelling proposition to global shippers. By doing so they capture market share from the incumbents.

• **Amazon** has been the most successful disruptor of all.

<table>
<thead>
<tr>
<th>Process Innovators</th>
<th>Market Disruptors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freightos</td>
<td>Flexport</td>
</tr>
<tr>
<td>Fleet</td>
<td>Amazon</td>
</tr>
<tr>
<td>IContainers</td>
<td>Rethink Robotics</td>
</tr>
<tr>
<td>Cargobase</td>
<td>Starship Technologies</td>
</tr>
<tr>
<td>Elementum</td>
<td>FreightHub</td>
</tr>
<tr>
<td>Atheer</td>
<td>Convoy</td>
</tr>
<tr>
<td>Ubimax</td>
<td>Drive</td>
</tr>
<tr>
<td>Project44</td>
<td>Deliv</td>
</tr>
<tr>
<td>SeeGrid</td>
<td>Uber Freight</td>
</tr>
<tr>
<td>E2Open</td>
<td>Fast Radius</td>
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</tbody>
</table>

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Five key innovation themes which will define the Supply Chain & Logistics industry in 2030

1. Automation

2. Digitization

3. Blockchain

4. 3D Printing

5. Alternative Propulsion Systems
Types of Automation

Automation is affecting all supply chain and logistics sectors as technology enables companies to increase efficiency and reduce labour costs.

• e-commerce companies are driving **robotics** in the warehouse, as automation allows them to pick high volumes and cope with volatile demand.

• **Autonomous trucks** are being trialled on roads and in ports around the world which can interact with vehicles around them and highway infrastructure.

• **Autonomous ships** are being developed that can be monitored and guided remotely without the need for crew

• **Drones** are able to carry increasingly large payloads, overcoming road infrastructure deficiencies especially in developing countries.
• Advances in technology must address deficiencies in **Artificial Intelligence** which still means that vehicles are unable to respond appropriately in all events.

For the adoption of autonomous vehicles, it will be necessary for policy makers to implement:

• National and international legal frameworks to deal with issues including:
  • **Health and Safety**
  • The status of ‘human’ drivers or navigators
  • Insurance liability
  • Investment in ICT networks and ‘Smart Infrastructure’ to allow V2V and V2I communication
  • **Cybersecurity** initiatives which provide network resilience

• The role of **labour organizations** must not be underestimated in slowing adoption as warehouses and trucking companies become less reliant on workers.
**Digitization/Internet enabled innovations**

**Digitization** has led to new relationships being forged between customers, retailers, manufacturers and logistics companies, ‘breaking paradigms.’

**E-commerce** has disrupted retailing and transformed global supply chains allowing traders in developing countries to access global markets.

The ‘**Internet of Things**’, ‘**Big Data**’ and **Artificial Intelligence (AI)** – generating, sharing of data and making decisions without human interaction.

**Digital logistics platforms** better match demand in freight markets with supply.
Blockchain

• Blockchain is a **permanent digital record of transactions** that is stored across a decentralised network of computers.
• The network of computers supporting the Blockchain **confirm, verify and record** the transactions independently, providing ‘**trust through consensus**’.

**Blockchain in action**

• Blockchain enables all parties to **securely and seamlessly exchange information** about shipment events in real time.
• Its other core capability is **paperless trade**.
• This will **digitize and automate paperwork** by enabling end-users to securely **submit, validate and approve** documents ultimately helping to **reduce the time** and **cost for clearance** and cargo movement.

• Other examples of applications in the sector are:
  • Asset Tracking
  • Total visibility across and down into multiple tiers of the supply chain
  • Accountability
  • Process compliance
  • Improved collaboration across the supply chain
• **3D Printing** works by **building up layers of material** (plastic, ceramics or metal powders)

• Originally used for **prototypes** due to low set up costs and quick turn around, 3D Printing is now becoming more regularly used for **mainstream manufacturing**.

• The way in which each product is individually manufactured means that it is ideal for ‘**mass customisation**’ techniques.

• 3D Printing will mean that the **intermediate goods** in the supply chain will be **replaced** by the **raw materials** needed to make the printing materials.

• Multiple tiers of **inventories** held upstream and downstream will be **eliminated** as will be the need to move them from location to location.

• Instead, much **simpler supply chains** involving the bulk storage and movement of printer materials will develop.
3D Printing

Raw materials/ Substrate supply chain

Africa/Latam or Asia to North America and Europe Bulk Shipments

End Recipient

Postponed 3D printing customization in distribution center

3D Printing Facility

3D Printing of spare parts at forward stock locations
Diesel powered vans and trucks will make up a much smaller proportion of commercial vehicle fleets in the years ahead due to public policy legislation such as ‘diesel bans’.

It is still unclear which technology will win out, not least due to the diverse functions which vehicles undertake; the weight of freight they move; the number of stops they make and the range they require:

- Natural Gas (e.g. Wrightspeed)
- Hydrogen Fuel Cells (e.g. Nikola)
- Electric (e.g. Tesla)

The major fleet owners (UPS, FedEx and DHL) are testing a combination of all these technologies.
A Guide To Alternative Propulsion Systems: Choice for Fleet Managers

• Diesel power is by far the obvious choice (presently) for fleet managers.
• However, in terms of political importance, tail pipe emissions are taking priority over many other considerations.
• Diesel bans in cities are an inevitability which all the major manufacturers and truck/van owners are taking into account in their long term strategies.

<table>
<thead>
<tr>
<th></th>
<th>Range</th>
<th>Payload</th>
<th>Total cost of ownership</th>
<th>Tail pipe emissions</th>
<th>GHG emissions</th>
<th>Charging/fuelling infrastructure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diesel</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>All-electric</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>Electric hybrid</td>
<td>Yes</td>
<td>No</td>
<td>Weight of battery issue</td>
<td>Some emissions</td>
<td>Some emissions</td>
<td>Yes</td>
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<tr>
<td>Hydraulic hybrid</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Some emissions</td>
<td>Some emissions</td>
<td>Yes</td>
</tr>
<tr>
<td>Hydrogen fuel cell</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Dependent on source</td>
<td>No</td>
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<tr>
<td>Natural Gas</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Biofuels</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

June 2019
Industry-wide adoption or niche application?
## Future Profile of Logistics Segments

<table>
<thead>
<tr>
<th>Logistics segment</th>
<th>Road freight transport</th>
<th>Warehousing</th>
<th>Freight Forwarding/International Trade</th>
<th>Shipping</th>
<th>Express/parcel</th>
<th>Air cargo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative Fuels</td>
<td>Electric or Hydrogen</td>
<td>Photovoltaic</td>
<td>n/a</td>
<td>Electric or Natural Gas 'Clean' sulphur free fuel</td>
<td>Electric or Hydrogen</td>
<td>Electric</td>
</tr>
<tr>
<td>Automation</td>
<td>Autonomous (semi) Platooning</td>
<td>Automated and robotic Augmented/virtual reality ‘Tin’ fulfilment</td>
<td>n/a</td>
<td>Autonomous (semi) Automated hubs Robotics Autonomous vans (semi)</td>
<td>Autonomous (semi)</td>
<td></td>
</tr>
<tr>
<td>Physical technologies</td>
<td>Predictive maintenance Asset tracking IoT tracking</td>
<td>Drones IoT inventory management</td>
<td>n/a</td>
<td>Larger ships IoT tracking</td>
<td>Drones (niche) 3D Printing IoT tracking</td>
<td></td>
</tr>
<tr>
<td>Notes</td>
<td>Higher utilization rates</td>
<td>‘Smart’ and green Smaller units</td>
<td>Broking becomes less important as segment increases value add through manager role</td>
<td>Lower unit costs Consolidated industry South-south volumes</td>
<td>Optimized for City deliveries</td>
<td>3D Printing impacts intermediate high tech volumes Faster clearance</td>
</tr>
</tbody>
</table>
Available to purchase at www.koganpage.com

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