NEXT-GENERATION SUPPLY CHAINS
Shaping a New Era of
Industrial and Logistics Real Estate
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EMERGING SUPPLY CHAIN PERFORMANCE GOALS
Next-generation supply chains will evolve from the current linear model to an ecosystem capable of fulfilling a multitude of business objectives. Supply chain operators will prioritise resilience and sustainability as core goals.

EXISTING GOALS

LOCATION
• Manufacturing will be localised to tap into mass consumer markets.
• Industries will diversify supply chain locations to mitigate geopolitical risks such as trade conflict.

NETWORK
• Supply chain networks will be optimised using big data analytics.
• Artificial Intelligence and Internet of Things will enable real time management of supply chain operations.
• Last-mile logistics networks will be further integrated with retail.

FACILITY
• There will be growth in the number of smart warehouses powered by intelligent management tools and automated vehicles.
• More industrial buildings will be designed and built with environmentally and socially responsible features.

LAYOUT
• The layout of logistics space will be reconfigured to accommodate new technology. There will be more space for automation tools and data storage but less for parking.

ENABLERS OF SUPPLY CHAIN EVOLUTION:
Innovative Technologies and New Business Models
The evolution of supply chains will be facilitated by the adoption of new technology integrated with industrial and logistics properties. Other key trends will include new business models related to the sharing economy and green logistics.

THE TRANSFORMATION OF INDUSTRIAL AND LOGISTICS REAL ESTATE
Industrial and logistics assets will require significant change in terms of real estate strategy of location, network, space and facility.
01/ THE SUPPLY CHAIN EVOLUTION: DRIVERS AND GOALS

02/ ENABLING NEXT-GENERATION SUPPLY CHAINS

03/ IMPLICATIONS FOR INDUSTRIAL AND LOGISTICS REAL ESTATE
Rapidly upgrading consumer demand and the growing need for greater choice, quality, availability and delivery of goods is challenging traditional supply chains.

The coming years will see supply chains evolve from the current linear model to a responsive and dynamic ecosystems capable of catering to complex consumer demand while fulfilling a multitude of business objectives.

This report identifies the drivers and performance goals of next-generation supply chains; explains how the transformation of supply chains will proceed; and analyses how this will impact the industrial and logistics real estate market in Asia Pacific.
THE SUPPLY CHAIN EVOLUTION: DRIVERS AND GOALS
The relocation of manufacturing to emerging markets and growth of e-commerce have transformed Asia Pacific supply chains. New technologies are set to trigger the next stage in this evolution towards next-generation supply chains.

Shifts in Manufacturing Production

Over the past few decades, globalisation has drastically altered supply chains and dispersed manufacturing across the globe, underpinning the development of new industrial and logistics real estate.

Much of this production capacity moved to Asia Pacific\(^1\), initially to Japan, Hong Kong, Taiwan, Korea and Singapore, and then underwent a major shift to China in the first decade of the 21st Century.

More recently, the escalating trade conflict between the U.S. and China has prompted manufacturers to diversify capacity to Southeast and South Asian markets such as Vietnam and India to mitigate supply chain risks and costs.

E-Commerce Growth

The rapid growth of e-commerce and surging demand for fast and frequent delivery has reshaped how and where goods are distributed, bringing about an evolution from traditional logistics platforms consisting of regional distribution centres to more complex networks of last mile distribution hubs and delivery stations.

With e-commerce growth comes logistics footprint expansion. Research conducted by CBRE in the U.S. has found that every US$1 billion in e-commerce sales translates into 1.25 million sq. ft. of additional distribution space demand.

Asia Pacific e-commerce sales are projected to increase by a CAGR of 23.4% between 2018 and 2022, rising from US$1,798 billion to US$ 4,168 billion, in the process generating robust demand for new logistics space.

Technological Innovation

The supply chain evolution will be supported by the adoption of new technology including big data analytics, Internet of Things (IoT), artificial intelligence and augmented reality. These technologies will be integrated with industrial and logistics properties servicing next-generation supply chains.

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\(^1\) The Future of Global Manufacturing, CBRE Research, 2017

\(^2\) eMarketer, November 2018.
Supply chains traditionally sit along a straight line. However, this model lacks transparent information flow and provides little room for upstream supply chain operators to respond quickly to shifts in consumer demand.

New digital technology is enabling more timely and transparent information flow among supply chain participants and is driving the evolution of supply chains from the current linear model to a responsive and dynamic ecosystem capable of catering to complex consumer demand while fulfilling a multitude of business objectives.

With Asia Pacific now the world’s biggest manufacturing hub and largest consumption market, CBRE Research believes it is imperative for regional supply chain operators and industrial and logistics landlords to future-proof their industrial and logistics assets in preparation for this new era.

**FIGURE 1: THE EVOLUTION OF SUPPLY CHAINS: FROM A LINEAR MODEL TO AN ECOSYSTEM**

Source: CBRE Research, December 2018
Next-generation supply chains will have to meet a range of performance goals to effectively connect and service all stakeholders (Table 1).

Cost and speed, reliability and connectivity have traditionally been prioritised by supply chain operators as they increase efficiency and improve profitability.

Resilience, agility and sustainability are relatively newer objectives and will serve as the main focus of next-generation supply chains.

Resilience and agility will be highly prized as enterprises adjust supply chains more frequently amid growing contingencies and fast moving consumer market dynamics.

The coming years will also see a greater focus on sustainability as companies seek to attain long term business continuity and growth.

### TABLE 1: SUPPLY CHAIN PERFORMANCE GOALS AND THEIR ROLE IN SUPPLY CHAIN EVOLUTION

<table>
<thead>
<tr>
<th>Goal</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost and Speed</td>
<td>Lower production and distribution costs and more frequent and faster delivery to end-users. Critical for businesses to improve profitability.</td>
</tr>
<tr>
<td>Reliability</td>
<td>Assurance of the functionality of supply chain networks and the uninterrupted supply of materials and goods. Based on robust supplier-distributor relationships to provide the uninterrupted supply of goods and reduce the likelihood of errors and inconsistency.</td>
</tr>
<tr>
<td>Connectivity</td>
<td>Seamless connection and collaboration along different stages of the supply chain to create synergies and increase efficiency.</td>
</tr>
<tr>
<td>Resilience</td>
<td>The immunity of the supply chain against disruption. Requires business to implement effective systems and strategies to mitigate the negative impacts of extreme weather, natural disasters, price fluctuations and geopolitical incidents.</td>
</tr>
<tr>
<td>Agility</td>
<td>The flexibility of supply chain operations and rapid adjustment to new market trends and demand. Enables operational procedures and delivery options to react quickly to shortening product life cycles and ever-changing consumer demand.</td>
</tr>
<tr>
<td>Sustainability</td>
<td>Operational practices to minimise negative environmental and social impacts during supply chain operations.</td>
</tr>
</tbody>
</table>

Source: CBRE Research, December 2018
ENABLING NEXT-GENERATION SUPPLY CHAINS
The enablers of next-generation supply chains include technological innovation and new business models.

New technology is gradually being introduced across all stages of the supply chain from production to last-mile delivery and is helping supply chains become smarter. Key innovations include:

**Big Data and Internet of Things (IoT)**

*Strengthening agility, resilience and connectivity*

Digitalisation is enabling the collection of a massive volume of supply chain data by sensors and internet-enabled devices.

After being processed and analysed, this data can pinpoint opportunities for efficiency gains; identify potential risks; and ultimately support more informed decision-making.

Examples include demand forecasting, which can optimise inventory management. IoT can also support the convergence and sharing of data with supply chain partners and ensure smoother cooperation.

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**Case Study: Big data creating supply chain synergy**

In China, P&G and a major client have integrated their business plans, media resources and sales targets into a joint demand forecast based on big data algorithms. The demand forecast is entered into P&G’s supply system, which automatically reserves capacity in advance for purchasing, production and logistics. This has helped both parties to significantly reduce inventory and shorten the overall supply chain turnover time by 30%.

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3 P&G China Press Release, June 2018
**Artificial Intelligence (AI) – Strengthening agility and reliability; reducing cost**

According to the International Federation of Robotics, 49% of professional service robots sold globally in 2018-20 will be for logistics use.

Many of these professional service robots will be powered by AI, which is already widely adopted along supply chains in the form of Automated Guided Vehicles (AGVs), smart logistics management systems and warehousing automation.

AI can generate optimal solutions and execute continuous self-improvement in areas such as inventory fulfillment, scheduling and distribution routing.

Sorting and picking can be performed more quickly and accurately with the help of AGVs and AI-controlled automation systems, which can also mitigate the impact of labour shortages.

The smart logistics management system developed by Alibaba and its logistics arm Cainiao Network in China shortened the time required to fulfill the first 100 million Singles’ Day Shopping Festival orders from over a week in 2013 to just 2.6 days this year.

Smart logistics management systems can also save costs. Since 2014, Amazon has reduced operating expenses in its fulfillment centres by 20%, or around US$22 million per facility, after introducing Kiva robotics to automate picking and packing processes.

Autonomous vehicles can also expedite the flow of goods from ports and production centres to end users. Self-driving trucks will enable longer travel distances and result in lower delivery costs for consumers.

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**FIGURE 2: SMART LOGISTICS AND DELIVERY SPEED ON SINGLES DAY**

Source: Alibaba, December 2018

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Augmented Reality (AR) –
*Strengthening agility, reducing cost and improving speed*

Devices such as smart glasses and other visualisation equipment using augmented reality can enable staff to perform tasks in hazardous environments, such as areas with high temperatures or with dangerous chemicals, without physically needing to be there. They can also improve efficiency: A DHL study found that picking efficiency in warehouses could be increased by as much as 25% by using AR⁵.

⁵ DHL Press Release, January 2018

Challenges to Implementation

The main challenges to adopting these new technologies in next-generation supply chains mainly relate to their readiness for commercial use at scale. Based on Gartner’s Hype Cycle for emerging technologies, it is likely to take as long as ten years for autonomous vehicles to be deployed in widespread commercial use⁶.

Other obstacles include the variances in regulations in different markets and the lack of common standards. The creation of a supply chain ecosystem and closer connectivity between partners will also create additional concerns and requirements related to cybersecurity.

⁶ Gartner, August 2018
Green logistics – Fostering sustainability

Mirroring the wider business community, supply chain enterprises are increasingly integrating their businesses goals with environmental objectives.

Many companies are implementing energy-saving measures, which can also reduce operational costs, and cutting solid waste and greenhouse emissions to minimise environmental impacts.

In the U.S., FedEx, DHL and UPS are already using or plan to use electric delivery vans\(^7\), while in China, Alibaba has introduced biodegradable packaging and replaced paper labels with e-shipping labels\(^8\).

Environmentally-friendly facilities are another growing trend. Nike’s distribution centre in Antwerp, Belgium, uses 100% renewable energy, including energy generated by on-site solar panels and wind turbines. The facility is designed to allow the greater penetration of natural light, while smart lighting systems also save electricity\(^9\).

The adoption of renewable energy systems in industrial and logistics properties in Asia Pacific remains limited, with most facility owners opting to focus on improving energy management.

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\(^7\) UPS, April 2018
\(^8\) Sina Technology News, May 2018
\(^9\) Architectural Digest, Jun 3 2016
IMPLICATIONS FOR INDUSTRIAL AND LOGISTICS REAL ESTATE
Next-generation supply chains will drive significant change in industrial and logistics assets in terms of their location, network, space and facility.

LOCATION

Localisation in Mass Consumer Markets

Although next-generation supply chains will continue to be global, CBRE Research believes that localisation in mass consumer markets such as China and India will be critical for growing market share.

Multinationals such as Tesla, which recently announced plans to build its first overseas factory in Shanghai\(^{10}\), will therefore continue to invest in industrial and logistics assets in large emerging markets in the coming decade.

Diversification of Production

More companies will diversify production across different markets to hedge against risk. Ongoing U.S.-China trade conflict has already prompted several companies to relocate production to neighbouring countries.

Additional U.S. export related manufacturing is expected to be re-shared to markets with mature supply chains such as Japan, Korea and Taiwan. Mitsubishi Electric recently moved machine tool production for U.S. exports from China to Japan to avoid tariffs while retaining its Chinese factory to serve the domestic market\(^{11}\).

Although Southeast Asia and India, where labour and materials costs remain low, will gain popularity in the medium term, China will continue to play a key role in the global supply chain as technology infrastructure is upgraded to handle complex goods manufacturing.

These dynamics will generate solid demand for modern industrial and logistics space across Asia Pacific, where prime logistics facilities remain limited and represent just 10% of total stock.

In developing markets such as Southeast Asia and India where the supply shortage is acute, CBRE Research advises occupiers to partner with experienced developers with regional capability or identify build-to-suit opportunities.

In mature markets, older and lower quality logistics properties may provide asset enhancement or redevelopment opportunities.

**FIGURE 3: LOGISTICS PERFORMANCE INDEX – INFRASTRUCTURE**

<table>
<thead>
<tr>
<th>Location</th>
<th>Advanced/ Maturing Stage</th>
<th>Developing Stage</th>
<th>Emerging/Early Stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>4.25</td>
<td>3.75</td>
<td>3.01</td>
</tr>
<tr>
<td>Singapore</td>
<td>4.06</td>
<td>3.73</td>
<td>2.91</td>
</tr>
<tr>
<td>New Zealand</td>
<td>3.99</td>
<td>3.72</td>
<td>2.89</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>3.97</td>
<td>3.15</td>
<td>2.73</td>
</tr>
<tr>
<td>Australia</td>
<td>3.97</td>
<td>3.14</td>
<td>2.14</td>
</tr>
<tr>
<td>China</td>
<td>4.25</td>
<td>3.73</td>
<td>3.01</td>
</tr>
<tr>
<td>Korea</td>
<td>3.99</td>
<td>3.72</td>
<td>2.91</td>
</tr>
<tr>
<td>Taiwan</td>
<td>3.97</td>
<td>3.15</td>
<td>2.73</td>
</tr>
<tr>
<td>Malaysia</td>
<td>3.15</td>
<td>3.14</td>
<td>2.14</td>
</tr>
<tr>
<td>Thailand</td>
<td>3.01</td>
<td>2.91</td>
<td>2.89</td>
</tr>
<tr>
<td>Vietnam</td>
<td>2.91</td>
<td>2.89</td>
<td>2.73</td>
</tr>
<tr>
<td>Indonesia</td>
<td>2.89</td>
<td>2.73</td>
<td>2.14</td>
</tr>
<tr>
<td>Philippines</td>
<td>2.73</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cambodia</td>
<td>2.14</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: The World Bank, CBRE Research, December 2018

\(^{10}\) Financial Times, July 2018

\(^{11}\) Nikkei Asian Review, August 2018
Optimising Delivery Networks

The growth of omnichannel retail will continue to drive additional warehouse demand from e-commerce platforms, retailers and third-party logistics (3PL) operators seeking greater access to more neighbourhoods.

Urban distribution networks will need to be optimised for last-mile delivery to enhance delivery speed. Between 2015-2016, Amazon constructed more delivery hubs within large metro areas than large-scale warehouses. This enabled Prime Now customers to receive their orders more quickly, sometimes in under an hour.

Apart from consolidating shipments; combining automated and human delivery; and increasing handling capacity, big data will be utilised to structure efficient networks and provide more data-driven insights when formulating real estate strategy.

Operations in Real-Time

AI and IoT will enable the real-time monitoring and management of next-generation supply chains and will help improve performance, particularly around transportation. In India, DHL’s SmarTrucking platform provides route optimisation and navigation services featuring real-time analysis of traffic, weather and road conditions12.

Retail and Logistics: Two Become One

CBRE Research foresees the closer integration of last-mile logistics and bricks-and-mortar retailing as operators strive to improve efficiency. Many retailers are already strengthening their store-based fulfilment capacity to satisfy customer demand for faster delivery. In Australia, fashion brand CUE and footwear group RCG have introduced three-hour delivery by store-based fulfilment13, while in China, Hema supermarkets offer as-fast-as 30-minute delivery to shoppers living within a three-kilometer radius14.

Retailers are advised to adopt a holistic approach towards omnichannel operations. Retail store networks and logistics operations should be viewed as one to ensure that consumer orders are fulfilled in the fastest and most efficient way.

12 Supply Chain Digital, June 2018
13 Inside Retail, January 2018
14 Alizila, April 2018
SMATER AND GREENER FACILITIES

FACILITY

Smart Logistics

Next-generation supply chains will require smart warehouses featuring hardware such as robots, automated stacking systems, mechanical arms and AGVs connected by IoT and software including AI-enabled systems.

The entire process of warehousing from picking, sorting, docking, undocking, packaging and outbound logistics will be highly automated.

Smart warehouses will also be able to enhance surveillance, stock management, utilisation and overall traffic. This will transform the order fulfillment process to “goods-to-person” type and create greater efficiencies.

In the longer term, intelligent management tools will be adopted throughout the supply chain to integrate and manage all facilities from production to retail.

Case study: Automated warehouses

In October 2017, Cainiao Network opened China’s largest automated warehouse in Wuxi. The facility deploys more than 700 AGVs and has recorded efficiency gains of as high as 50% compared to traditional warehouses. IoT systems ensure AGVs do not collide and facilitate the automatic distribution of packages.15

Environmentally and Socially Responsible Facilities

Industrial and logistics assets serving next-generation supply chains will address Corporate Social Responsibility (CSR) requirements by incorporating environmentally friendly features and providing high quality working conditions.

Several major warehousing developers have already constructed facilities complying to leading environmental certifications such as the U.S. Green Building Council’s LEED. Prologis has two LEED-certified industrial facilities in China including a logistics distribution park in Tianjin, where it has introduced water efficient landscaping and plumbing fixtures designed to reduce water usage.16

Many companies are also adding amenities to their distribution centres and other facilities to attract and retain employees. Amazon provides training rooms and other amenities at its temperature-controlled fulfillment centres across India.

15 Alizila, November 2018
16 Prologis, 2018
LOGISTICS GOES VERTICAL

LAYOUT

Redesigns Accommodate Tech Upgrades

Automation and big data will transform the layout of industrial and logistics facilities. The use of AGVs and other automated hardware such as drones will require dedicated pathways, maintenance zones, stand-by areas and charging stations. The eventual adoption of autonomous vehicles and supporting applications for efficient delivery planning and execution will shrink the number of parking spaces for trucks as fewer vehicles will need to be parked on stand-by. Conversely, additional space for server rooms will be required to accommodate the technological hardware necessary to collect and process big data.

Vertical Logistics Solutions

The limited availability of logistics space and growing focus on achieving operational efficiency will spur the development of vertical warehouses. These facilities will include high-bay warehouses featuring ceiling heights up to 30 metres and highly automated systems capable of fulfilling a high volume of orders while improving storage density.

Markets with limited land supply are expected to see the further development of multi-storey warehouses. Space-constrained markets such as Hong Kong and Singapore have already seen logistics development progress beyond traditional go-downs and static structures in recent decades. China has also recorded a surge in multi-storey warehouse supply in recent years due to tighter regulations around industrial land use.

The continued tight availability of modern logistics supply, especially last-mile facilities, in gateway cities will drive the development of more multi-storey warehouses.

Goodman is reportedly planning to develop vertical industrial properties in Sydney and Melbourne while in the U.S. there are at least five multi-storey warehouses underway or in the pipeline in New York City, Seattle and San Francisco.

FIGURE 4: MULTI-STOREY WAREHOUSES AS A PERCENTAGE OF TOTAL NEW SUPPLY IN CHINA

Source: CBRE Research, December 2018

17 Up in the Air, the Case for Vertical Logistics Solutions, CBRE Research, 2016; Dematic 2018.
18 The Sydney Morning Herald, February 2018
19 U.S. Marketflash - Going Up! Vertical Solutions in Industrial & Logistics, CBRE Research, 2018
CONCLUSION

A NEW ERA OF INDUSTRIAL AND LOGISTICS REAL ESTATE

Technological innovations and new business models are set to play a defining role in driving the Asia Pacific supply chain evolution.

Next-generation supply chains will be characterised by dynamic ecosystems well-equipped to respond to sudden changes in consumer demand and shifting market dynamics: a world away from the traditional linear supply chain structure.

This evolution will transform the parameters for industrial and logistics real estate and drive significant change in property assets in terms of their location, network, space and facility.

Leasing demand for modern logistics space featuring high quality specifications and robust supporting infrastructure will continue to grow, while older facilities may be at risk of losing tenants.

Landlords are advised to familiarise themselves with the latest trends and developments relating to next-generation supply chains and upgrade their industrial and logistics portfolios to ensure they remain competitive.
CONTACTS

ADVISORY & TRANSACTION SERVICES

Manish Kashyap
Managing Director,
Advisory & Transaction Services, Asia Pacific
manish.kashyap@cbre.com.sg

SUPPLY CHAIN ADVISORY

Troy Shortell
Executive Director, Asia
troy.shortell@cbre.com.sg

Christine Miller
Senior Director, Pacific
christine.miller@cbre.com

INDUSTRIAL & LOGISTICS

Graeme Bolin
Senior Director, Asia
graeme.bolin@cbre.com.sg

Matt Haddon
Senior Managing Director, Pacific
matt.haddon@cbre.com.au

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