

# How will IoT transform industry in Asia?

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*“There is no ‘in between’.  
Data will win, every time.  
It’s just a matter of when.”*

**Bay McLaughlin, co-founder, Brinc.io**



# Foreword – Osborne Clarke



**Adrian Bott**  
Osborne Clarke

T: +852 2535 0126

[adrian.bott@osborneclarke.com](mailto:adrian.bott@osborneclarke.com)

Osborne Clarke has, like so many other major Western businesses, moved eastwards over recent years. The ability to provide an integrated offering that services the US, European and Asian markets is something that many of our clients value highly regarding their legal requirements.

As a sector-specialist law firm, we have published market-leading reports over recent years on a variety of tech-related topics, which aim to look ahead and open up conversations with our clients. This report is intended to do the same: to take a point in time and see how, in an Internet of Things (IoT) context, the Asian markets are working towards an increasingly connected future for manufacturing, logistics and supply chains.

For me, one of the key elements in this report is that the maturity of the Asian markets means that the default position is no longer “R&D in US or Europe, build in Asia”. Far from it. The report looks in some depth at the differing approaches of Hong Kong, mainland China, India and Singapore in adapting to IoT innovation and identifying their own roles in it as they head towards the mid-century.

The change in dynamic for China, for example, which involves no longer being primarily a manufacturing base but now being a centre of innovation, is going to force US and European companies to think again about their business strategies. What is the role of a German operation of a multinational IoT manufacturer in 2025? Will US tech companies typically remain head-quartered in Silicon Valley? Will European telecommunications businesses need to have a base in Shanghai? Where will logistics companies have to be based to take full advantage of China’s Belt and Road Initiative (BRI)?

The findings are not conclusive – the opportunities are there to be taken, but corporates need to act before the chance to be part of an IoT-driven future is lost.

The report observes that the interplay between the Asian nations is set to play out in a very interesting way. The twin strategies of “Made in India” and “Made In China” are going to see winners and losers in due course. Both countries have attractive qualities for both inward investment and outward investment, but culturally are so different as to ask the question: do you have to choose between India and China as your Asia hub?

To complement our European and US teams, we’re fortunate to have hired some first-class Asian legal talent over recent years: advisors that have a great track record in delivering country-specific or regional strategies and results. So, if IoT is (or will be) at the heart of your future business model, please allow me to introduce you to some of them.

Finally, this report would not have been possible without the time and insights so generously contributed by the leading individuals who agreed to be interviewed. On behalf of all at Osborne Clarke, I would like to thank them, along with our chief researcher, Andrew Kemp, and Osborne Clarke’s supporting partner in this collaboration, Stephen Lai at Conventus Law.

We hope you find this report an interesting read, whether involved in IoT or not. No matter which way your business is oriented, we hope we may have the opportunity to help you succeed in the future. There are, inevitably, myriad new or untested legal and regulatory issues being thrown off by many of the components of industrial IoT – whether AI, robotics, data or M2M – but it is here that OC’s sector expertise thrives.

# Foreword - Conventus Law



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## Stephen Lai

Managing Director, Conventus Law, Hong Kong

T: +852 6621 1608

[stephen.lai@conventuslaw.com](mailto:stephen.lai@conventuslaw.com)

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I was still at university when the term 'Internet of Things' or 'IoT' was first coined by Kevin Ashton in 1999. In fact, this idea was first mooted by Nikola Tesla as far back as 1926 when he said, "When wireless is perfectly applied the whole earth will be converted into a huge brain, which in fact it is, all things being particles of a real and rhythmic whole. We shall be able to communicate with one another instantly, irrespective of distance." In 1950, Alan Turing questioned whether machines will develop thinking skills: "It can also be maintained that it is best to provide the machine with the best sense organs that money can buy, and then teach it to understand and speak English. This process could follow the normal teaching of a child." Back then, all this seemed very much like science fiction.

My first exposure to IoT was in Stroud, England of all places! In 2001, a family friend who was an executive at IBM was talking enthusiastically about the concept of the "smart home" and how IBM at the time were prototyping the use of RF technology. After that conversation, the idea of IoT was no longer science fiction to me.

When I moved back to Asia in 2006, the region was in the middle of the manufacturing boom. China was known as the 'workshop of the world'. Since then, the Asia market has really matured, echoing Adrian's comment, "the maturity of the Asian markets means that the default position is no longer R&D in US or Europe, build in Asia."

It has been a great pleasure to be involved in putting this report together. For me, the report really underlines the maturity of the Asia manufacturing sector and I hope it will generate conversations about IoT in this space. Will Hong Kong utilise technology to realise its vision of the smart city and revive its manufacturing industry? Will Singapore continue to lead the way in R&D and attract more world-class companies such as Dyson to move their HQs there? What will 'Made in China' look like? What is the potential for India once they are fully embracing industrial IoT technologies? Will all these developments change the dynamics for businesses in North America and Europe who rely on Asia to produce their products? Finally, what does all this mean for you? Will these developments change the way you work?

I sincerely hope you will find this report interesting and that it will give you plenty to think about.



# Introduction

The Internet of Things (IoT) is changing the face of global business forever. The rise of low-powered, always-connected devices opens the door to the convergence of information and operational technologies (IT/OT), creating opportunities in automation, smart manufacturing and predictive asset management.

IoT, in a nutshell, is both the hardware and software that allows 'things' to gather, transmit and analyse data. It is the devices that connect to one another using unique IP addresses as well as the network that enables that connectivity. It includes sensor-equipped assets, communication electronics as well as data capture and exchange software.

While machine-to-machine (M2M) communication is not new, with M2M networks dating back to the 1990s, IoT is much more than this. It builds upon M2M and mobile networks, incorporates radio-frequency identification (RFID) technologies and increasingly uses artificial intelligence (AI) and big data to make sense of the information gathered.

The realisation of IoT in the industrial space, referred to as 'industrial IoT' (IIoT), will be key to realising the fourth industrial revolution. IIoT itself falls under the umbrella of Industry 4.0, which broadly refers to the digitalisation of industrial markets. The German Ministry of Education and Research (BMBF) coined the term 'Industry 4.0' in 2011 as part of its smart manufacturing strategy. Since then the term has spread across the globe to Asia, with governments striving to stay ahead of this latest revolution.

This report focuses on four territories from the Asia-Pacific region – China, Hong Kong, India and Singapore – in order to provide greater insight into how the manufacturing and logistics sectors within each are embracing IIoT technologies. Greater industrial connectivity offers up unique opportunities for each of these four economies.

China perceives Industry 4.0 to be the answer to fundamental demographic and economic shifts that might otherwise spell long-term trouble for its manufacturing sector. Hong Kong, meanwhile, has launched its own 'reindustrialisation' campaign that will rely on IIoT to breathe new life into its manufacturing sector. India is embracing Industry 4.0 technologies in the hope of turning the country into an advanced manufacturing hub, delivering on the central government's economic targets. Singapore, already a technological leader in the Asia-Pacific region, sees IIoT as a means of attracting new industrial investment and is positioning itself as a thought leader in the field.

As IIoT slowly penetrates Asia's manufacturing sectors, factory owners will be presented with the choice of whether to invest now, later or not at all. Given the scope of change that greater device connectivity promises, those that opt not to enter the race at all are not just risking being left behind, but could vanish altogether in time.

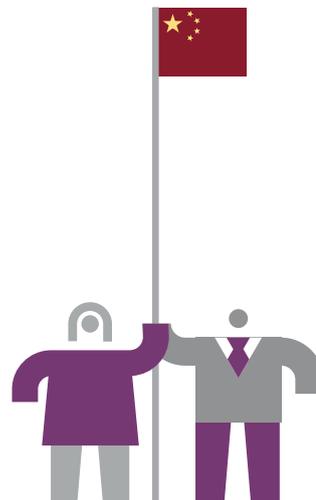
# China

China's economic success over the last four decades has been built upon its manufacturing might. In the wake of Deng Xiaoping's economic reforms launched in 1978, China rapidly turned itself into the world's factory. The country capitalised on cheap and plentiful labour to embark on a rapid process of industrialisation that has transformed the East Asian country into the world's second largest economy. China's GDP grew by an average of close to 10% per year until 2014, lifting 800 million people out of poverty. But times have changed – and so too has China.

China's working-age population, those aged 15-64, has been shrinking ever since it peaked at 1,005 million in 2013, according to China's National Bureau of Statistics (NBS) data. The labour pool shrank to 998 million in 2017, the first time it was below one billion since 2010. At the same time, the country's middle class has expanded in response to decades of rural mass migration to the country's cities. This all means that China can no longer count on a cheap and endless supply of labour to drive the manufacturing sector.

Moreover, the manufacturing sector's increasing sophistication has meant that the opportunity for productivity leaps through knowledge transfers from foreign operators is becoming rarer and Chinese companies must now focus on innovation to drive growth.

“There's such pressure on price, scalability and efficiency. Now, consumer demand is what drives a lot of the industrial innovation.”



## Made in China

Aware of this paradigm shift, the central government launched a 10-year blueprint for the manufacturing sector's development in 2015.

The Made in China 2025 Plan targets emerging industries such as robotics, autonomous and electric vehicle manufacturing, artificial intelligence (AI), biotech and aviation. The state provides these industries with subsidies, low-interest loans, rent-free land and tax breaks with the aim of optimising the structure of Chinese industry by emphasising quality over quantity.

The blueprint stresses "indigenous innovation" and "self-sufficiency" and has set a target of increasing Chinese technology suppliers' overall domestic market share to 70% by 2025. It also aims to cut operating costs, production cycles and product defect rates by 50%.

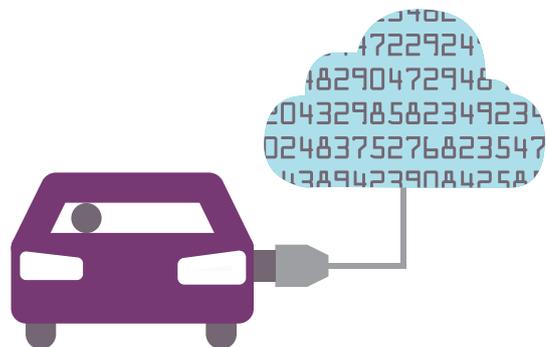
At the same time as developing its domestic agenda, the government has embarked on the Belt and Road Initiative (BRI), which aims to create a global web of trade routes and relationships with China at the centre. With this network, the central government aims to export excess industrial capacity as the economy shifts away from a reliance on heavy industry towards demand-driven growth. This rebalancing saw China's GDP grow by just 6.6% in 2018 – its lowest level since 1990. Made in China 2025 and BRI represent opportunities for manufacturers to expand domestic and foreign market shares by travelling up the sophistication curve.

## Survival of the fittest

China is already widely viewed as a leader in IIoT applications within the Asia-Pacific region. The rapid development of the manufacturing sector has created heightened competition, with players exploring IIoT in the pursuit of efficiency gains.

**Bay McLaughlin, the co-founder of accelerator, manufacturing studio and distribution company Brinc.io**, said: "There's such pressure on price, scalability and efficiency. Now, consumer demand is what drives a lot of the industrial innovation."

Telecommunications equipment manufacturer Ericsson has implemented IIoT applications at its assembly factory in Nanjing. In partnership with China Mobile, the company converted the facility into a smart wireless manufacturing plant by connecting more than 1,000 high-precision screwdrivers using narrowband IoT (NB-IoT) and Long Term Evolution (4G), category M1 (LTE Cat-M1) networks to communicate with integrated motion sensors, with the data analysed in a secure cloud.



# China

The screwdrivers had required routine calibrations and lubrication based upon the amount of usage, which had previously been manually recorded.

**Warren Chaisatien, Ericsson's global head of IoT customer engagements**, said: "Once those screwdrivers were connected, we could then monitor how they were being used, the force being applied, etc. Not just for maintenance purposes, but also to monitor how efficient they are, as well as for training and replacement purposes."

Chaisatien added: "In our Nanjing plant, we have realised significant savings: a 50% maintenance workload reduction and a 10-12% cost reduction, which is quite substantial."

The company revealed in 2018 that the project reached break-even in less than six months and delivered a 210% return on investment (ROI) within its first year.

Premium electric vehicle maker Byton, was founded in 2016 and has been built from the ground up to deliver intelligent vehicles for the future that integrate advanced digital technologies with a focus on user experience and connectivity. Byton has seven locations worldwide, with R&D, design and manufacturing operations in China, a design studio in Germany, an R&D centre in the US, as well as an investors relations unit in Hong Kong.

**Gerald Krainer, Byton's director of digitalisation**, said: "We are definitely working on manufacturing standards 4.0 in order to have a fully-connected plant and manufacturing process. It's not about different departments working on individual requirements. In the end, it's one architecture, one infrastructure that is going to ensure all the systems and the cloud infrastructure are connected from end to end."

Narrowband IoT (also known as NB-IoT or LTE Cat-M2) is a low-power wide-area network (LPWAN) technology that operates outside of the licensed LTE (4G) spectrum.

NB-IoT's main advantages lie in its power efficiency, thanks to its use of a simpler waveform, as well as the low cost of device creation. The technology also enjoys lower bitrates and better link budgets compared to LTE Cat-M1.

Long Term Evolution, (4G), category M1 (LTE Cat-M1) is used to connect battery-driven devices directly to a 4G network without a gateway. Devices use less expensive chips, because they are half-duplex and have a narrower bandwidth, and can enjoy a battery life of up to 10 years on a single 5WH battery.

Half-duplex systems allow data to be transferred in both directions, but restrict information flows at any given time to a single direction.

"China is moving at lightning speed and as we think about technology and even developers and such, China just has so much more innovation going on."

## E-commerce

As China's manufacturing sector has grown, so too has its need for more sophisticated logistics providers. Beyond shipping to wholesale international and domestic buyers, China's status as the world's factory eventually led to the emergence of the country's colossal e-commerce industry. The country's e-commerce giants have been quick to embrace IIoT, understanding the inherent efficiency gains that the technology offers.

Brinc.io's McLaughlin described JD.com and Alibaba as leaders of innovation, saying: "The level of innovation and what they're willing to try [in order] to shave off a second or a penny; it's mind boggling. They're approaching a point of full system integration, where it's automated from the point you pick a product at the warehouse right through to delivery to the end user."

In July 2017, Alibaba launched a smart warehouse in Huiyang using IIoT to leverage 60 automated guided vehicles (AGVs) into handling 70% of the facility's workload. The AGVs, which can travel at speeds of up to 1.5 metres per second and carry up to 500 kg, are responsible for picking warehouse items and transporting them to a human clerk who then packs and ships the items. Alibaba claimed the new system meant that a human warehouse worker was able to sift through 3,000 products during a 7.5-hour shift, up from 1,500 products when they had been required to pick the orders themselves. The worker's step count was also dramatically reduced from 27,924 steps to 2,563.

The e-commerce giant's success at Huiyang prompted it to set up another smart warehouse in Wuxi in October 2018, with close to 700 AGVs. The warehouse is part of Alibaba's Future Park initiative, a 160,000-square metre IIoT-powered logistics complex.

**Steve Suh, CEO and co-founder of e-commerce logistics provider Floship,** said: "Taobao, Alibaba and JD.com have been doing e-commerce for a very long time and thus a lot more e-commerce infrastructure has been developed in China."



# China



## Guohua Zhang

Co-Managing Partner, China

T: +86 21 6279 8808

[guohua.zhang@oclegalchina.com](mailto:guohua.zhang@oclegalchina.com)

China is the world's largest manufacturer. Nevertheless, its manufacturing sector still lags behind that of developed countries, for example in its level of innovation, the implementation of essential technologies and in reducing energy consumption. Against this backdrop, the 'Made in China 2025' initiative was launched by the government as a national strategy. The initiative calls for improving China's innovative capability; integration of industrialisation and information technology; and green development, by identifying ten key sectors for growth. As a result, we have seen various programmes supporting specific sectors, including robotics, smart manufacturing, and updating industry generally.

While the launch of this initiative means a tremendous opportunity for emerging industries, China's legal framework presents a major challenge. Booming innovation relies, among other things, on a clear, reliable and predictable legal environment, not only in relation to the law itself – for example IP protection, labour law, environmental and healthcare regulations – but also the role of government and the courts. And this very much depends upon the continued reform and restructuring of China's legal system.

Another concern of many foreign companies is their role in the implementation of Made in China. While the government has clarified that it will allow the market to play a decisive role and both foreign and domestic companies will be entitled to the same preferential treatment under the initiative, this has yet to be tested in its implementation.

## Efficiency gains

The push for greater automation is reducing workforce size, with McLaughlin noting that several mainland factories had been able to reduce their workforce significantly – in some cases, from 120 to 20 workers.

Further efficiency gains are also being pursued by the country's e-commerce giants, which are now working to integrate their end-product vendors into internal automation systems. McLaughlin said: "On one hand, the vendors don't really have a choice but to follow. On the other, it's also better for everyone involved in the supply chain to integrate."

Suh added: "China is moving at lightning speed and as we think about technology and even developers and such, China just has so much more innovation going on."

But while the e-commerce sector is beginning to change the face of Chinese manufacturing and logistics, McLaughlin warned that another huge portion of the sector was not being touched by the more consumer-driven supply and demand chain. "While labour is expensive, the transition costs of a lot of these solutions are also really expensive and fairly complicated."

The challenge for China is not to encourage those leading the race, but to win over those still to get off the starting blocks. Government initiatives such as subsidies and rent-free land will go some way towards achieving this.





### **Will Robertson**

Partner, UK

T: +44 117 917 3660

[will.robertson@osborneclarke.com](mailto:will.robertson@osborneclarke.com)

E-commerce, retail, logistics. Increasingly they are one and the same thing. Consumer demand for a quality product, good price, and reliable and swift delivery continues to rise, as does the willingness of consumers to shop online and with less regard for physical borders. This provides huge opportunity for Chinese e-commerce players and logistics providers alike to feed both local and overseas growing markets, with IIoT applications being central to much of this progress.

Consumer confidence concerns can be met with IIoT and blockchain-based solutions that trace product history, confirm product authenticity and enable live shipment tracking. IIoT innovation is helping achieve time and cost savings in warehousing and delivery activities through real-time inventory management, predictive analysis, clever data analytics and automation. And international laws are generally moving in the direction of global trade and removing artificial barriers to online sales – for example Europe's Digital Single Market initiative, which increasingly provides a level international playing field for web-based sales, and China is hungry to have its share. However, this doesn't come without legal challenges, as laws protecting consumers are still an international minefield for businesses selling and shipping internationally. Product returns, cancellation rights, impacts of late delivery, warranty periods, and health and safety obligations, are just some of the international legal considerations.

IIoT is driving huge change (and indirectly keeping many online shoppers very happy) but we see the longer-term beneficiaries in China being those entities who manage their legal positions appropriately and adopt IIoT technologies with this in mind.

## **Outlook**

IIoT adoption costs are not inconsiderable, but China's manufacturers cannot afford to count on historical advantages – such as low-cost labour – in the long term.

Lower cost manufacturing hubs throughout South and Southeast Asia, as well as in Africa, are springing up and will continue to do so thanks to China's BRI, which focuses on developing a web of global trade corridors that lead back to China.

E-commerce players are pushing the envelope when it comes to efficiency gains in the logistics sector, and their sheer size will help push their suppliers up the technological curve. But e-commerce will only encourage one aspect of China's manufacturing sector to embrace IIoT; for example, industrial manufacturers will remain untouched by speed-to-market pressures and thus will have less reason to invest in greater connectivity. But beyond simple operational efficiencies, IIoT offers manufacturers the opportunity to switch from being producers to service providers. China has long been pushing to transform its industrial-driven economy to one led by services, and IIoT technologies offer factories the chance to roll out Manufacturing as a Service.

# Hong Kong

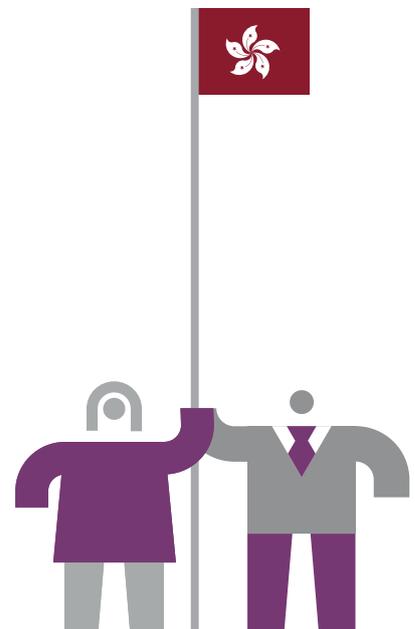
Hong Kong has a unique reputation as the world's freest economy, with minimal government interference and access to a swiftly-developing hinterland in mainland China. The city has been placed at the top of the Heritage Foundation's Index of Economic Freedom for 25 years running. However, China's growth over the past two and a half decades has eroded Hong Kong's economic importance to the mainland, prompting the city to look to new technologies to maintain its competitive edge.

In order to meet the challenges of competing with regional business hubs in Shanghai, Shenzhen and Singapore, Hong Kong is counting on IoT technologies not just to turn it into a world-leading smart city but also to reinvigorate its industrial sectors.

Hong Kong's leaders have been developing their smart city vision for the better part of a decade, formally acknowledging IIoT's importance in the 2014 Digital 21 strategy. In December 2017, Hong Kong released its Smart City Blueprint, mapping out development plans covering six major smart areas and including more than 70 initiatives. These initiatives envision revitalising traditional industrial sectors such as manufacturing by encouraging investment in high value-add smart factories and industrial parks geared towards advanced R&D.

The hope is that IIoT will help the manufacturing sector overcome traditional hurdles such as space and labour constraints by allowing operators to base their innovation wings in the city, while shifting low-skilled work across the border to southern China. Trade and logistical barriers are already being torn down between the region's major cities as part of the Greater Bay Area initiative and Hong Kong appears ready to capitalise on this change.

“The opportunity really lies in R&D and not so much where you put things together.”



## R&D

Setting up new traditional factories does not make much sense for the city, given that economies of scale, cheaper labour and a bigger market all exist in China.

Hong Kong is aware of these realities and envisions a future where innovations within the manufacturing space are conceived and developed in the city. It anticipates IIoT will underpin its drive towards higher value-add sectors and is investing in a wave of multi-billion dollar industrial developments that include the Science Park expansion, the Data Technology Hub, the Advanced Manufacturing Centre and the Hong Kong-Shenzhen Innovation and Technology Park where R&D can be spearheaded. Brinc.io's McLaughlin said: "The opportunity really lies in R&D and not so much where you put things together."

Hong Kong is already beginning to attract China-based manufacturers that want to expand their R&D divisions beyond the constraints of the mainland. DJI, now the world's largest drone maker, was conceived in Hong Kong before its founders moved to the manufacturing hub of Shenzhen. The company returned to Hong Kong in 2015 in search of R&D staff.

McLaughlin added: "One of the biggest disadvantages of R&D in China is that it's so localised, and developers really do not have as easy access to Western talent. The point would be to stay on R&D and try to keep the marriage of Western innovation within Asia. That's a unique role that almost only Hong Kong and Singapore can play."

While establishing new traditional factories in Hong Kong may appear unlikely, IIoT can help existing players to improve their stock management and increase their speed to market through deployment of technology.



**John Koh**  
Partner, Hong Kong

T: +852 2535 0108  
[john.koh@osborneclarke.com](mailto:john.koh@osborneclarke.com)

Hong Kong has always been able to re-invent itself – the drive for business makes that imperative. The ease of doing business, the rule of law and the simple tax environment has always made it attractive to all sorts of businesses, including start-ups. However, the relatively high costs of space and talent have always been seen as a limiting factor to successful expansion of traditional manufacturing capability.

The Hong Kong government has been keenly aware of this for many years and has led, and continues to support, a number of initiatives aimed at technology-rich businesses, including collaboration with universities and the private sector. Perhaps not surprisingly, aside from Hong Kong's appetite for FinTech innovation, in the context of IIoT, the focus of these is more emphatically on the technology – the R&D – than the manufacturing process itself; and on the development of AI and 'smart city' applications aimed at logistics and the supply chain. Over the last two years, as examples, the government has launched its Smart City Blueprint and plans to establish a research cluster (among others) on AI and robotics. In 2016, MIT set up its first overseas 'Innovation Node' here to take advantage of what it described as Hong Kong's "ready access to a unique manufacturing infrastructure that encourages prototyping and scale-up".

With opportunities brought by these collaborations and the larger-scale Greater Bay Area projects, Hong Kong should be able to capitalise on its advantages in R&D capabilities, technology infrastructure, legal system, IP development and protection, human capital and open economy to remain an attractive platform for innovative businesses (in the IIoT sphere, no less than others) – whether inbound or outbound.

# Hong Kong

## Managing manufacturing

Hong Kong-based data analytics provider Chain of Demand was launched in November 2017 with the goal of helping the fashion world understand consumer demand.

The company offers its customers a web-based interface that can show detailed predictions on where and when demand for certain products will rise and fall. It uses artificial intelligence (AI), predictive analytics and big data to deliver these insights. The platform can connect to other enterprise resource planning (ERP) and point of sale (POS) systems, pulling data on warehouse stock levels.

While **Chain of Demand** is focused on sales forecasts for the retail sector, this information can also be a powerful tool for manufacturers. **CEO and founder AJ Mak** explained how his company teamed up with fabric maker HKS Group to work with the manufacturer's clients to develop end-to-end demand-forecasting software.

Mak said: "HKS has a state-of-the-art manufacturing system where they have fabric ready, but need to know how much they should allocate for the year. They also want to know their capacity in terms of worker count and production planning to optimise operations."

He added: "When we work with one of HKS's customers, we model their demand. We know how much they're going to sell, then we know how much capacity they'll need from HKS's factory. The factory will also know what colours it needs to start dyeing."

By introducing predictive modelling, manufacturers can be more responsive to market trends, producing high-demand items more quickly and improving speed to market. While Chain of Demand is focused on the fashion sector at present, Mak intends to expand the company's predictive modelling service to other commercial sectors within the next year.



**John Buyers**  
Partner, UK

T: +44 20 7105 7105

[john.buyers@osborneclarke.com](mailto:john.buyers@osborneclarke.com)

Artificial intelligence (AI) and the internet of things (IoT) have an increasingly symbiotic relationship. It was the growth of IoT which was largely responsible for the generation of Big Data, the analytical fuel that powers these devices. Clearly AI can offer enhanced insights in relation to the flood of information provided by IoT. Increasingly, however, it is enabling IoT devices to make their own decisions at the 'Edge' - minimising the need for continual data hand off via expensive cellular connections and making their processing more cost effective. Aside from this, IoT and AI together in an industrial context enable transformative technologies such as predictive maintenance, data driven production planning and logistics optimisation. These technologies are all becoming core to Industry 4.0 manufacturing. There continues to be a huge potential for the Asia-Pacific region to lead on robotics automation, and China is still one of the world leaders in AI and machine learning development.

John Buyers is the author of *Artificial Intelligence - The Practical Legal Issues*.

## Next level logistics

Hong Kong's manufacturing sector is not alone in needing to adopt IIoT technologies to remain relevant in the face of technological changes in mainland China. Many of Hong Kong's third-party logistics (3PLs) providers have been slow to update their software platforms.

Suh sees Floship, a leader in cross-border e-commerce fulfilment, as a technology company first and foremost then as a logistics provider, describing many traditional 3PL platforms as "archaic", making cross-platform integration more challenging.

Along with conventional 3PL services such as logging inventory as it arrives at the warehouse and sending status updates to clients in real time, Floship also operates a dimensional weight scale (DWS).

"After each order is picked and packed, it is sent off to our DWS. Here the weight and dimensions are captured and pictures taken. In real time, the data on actual and dimensional weight is sent back to our portal," Suh said. He added that this information allowed Floship to predict shipping costs accurately and instantly bill its clients. "We're able to offer a prepayment model. In a traditional fulfilment environment, the billing actually happens maybe a month after a product has been sent because you have to wait for the courier bills to come in."

The pictures, moreover, allow both the company and the client to inspect the packing process and detect any defects or issues in real time.

While Floship has begun examining its options regarding automated warehouse solutions, mimicking developments already underway on the mainland, it has already automated its label-printing process, which allowed the company to trim around 30% of its workforce.

## Outlook

Hong Kong's strategic position in southern China combined with its business-oriented, open and minimally-taxed economy has made it both a gateway for international business looking to enter China as well as the Chinese city most capable of attracting Western developers. While it makes sense to keep traditional manufacturing on the mainland, Chinese businesses interested in working with international IIoT experts may find it easier to do so in one of Hong Kong's advanced industrial parks.

The mainland government's Greater Bay Area initiative to integrate 11 southern Chinese cities – including Hong Kong, Macau, Guangzhou, Shenzhen and Zhuhai – will also give companies in Hong Kong greater access to southern China's manufacturing hubs. As IIoT takes off in China's manufacturing cities, Hong Kong is positioning itself as the southern Chinese R&D hub, with access not only to talent and capital but also a government that is committed to supporting this commercial area.



# India

## India is counting on IIoT technologies within the manufacturing sector to spur a new industrial revolution.

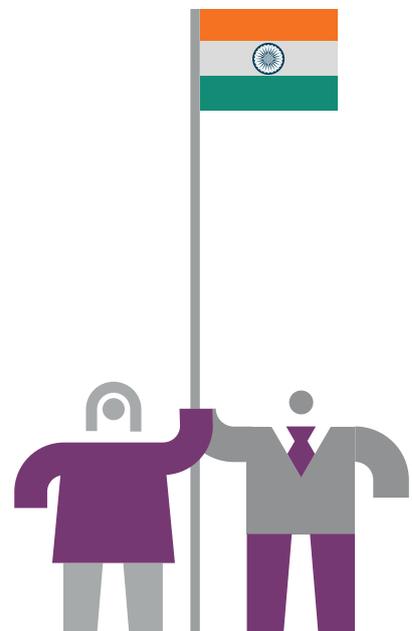
In 2011, the Indian government set a target of expanding manufacturing's share of GDP from around 15% to 25% by 2025, creating 100 million new jobs in the process. To achieve this, Prime Minister Narendra Modi launched the Make in India initiative in September 2014 to boost manufacturing across 25 sectors through policy reforms and taxation incentives.

The goal was simple: replicate China's success and turn India into another global factory. But with manufacturing still accounting for about 16% of GDP, New Delhi's efforts have clearly stalled. In order to deliver on its original 25% pledge, the government is now looking to embrace new technologies to revolutionise the sector.

In October 2018, Modi inaugurated the World Economic Forum (WEF) Centre for the Fourth Industrial Revolution and said India's contribution to the next industrial revolution would be "astonishing". Modi added that IIoT would take India's development to new heights.

But while IIoT promises efficiency gains for Indian manufacturers at a practical level, adoption of the necessary technologies has been somewhat slow so far. Few manufacturers have major budgets for IIoT initiatives, with many preferring to adopt a wait-and-see approach before committing heavily to new technologies.

*"Indian manufacturers are deeply concerned with securing their trade secrets. They know about the prospects of running more efficiently, with better quality and improved productivity, but they worry about protecting their proprietary information."*



## On the edge

There are a range of concerns driving this caution, from questions over value proposition to data security fears.

**Karthikeyan Natarajan, senior vice president and global head of integrated engineering solutions at Tech Mahindra**, said the biggest challenge to IIoT adoption within manufacturing was concern over corporate espionage.

He said: "Indian manufacturers are deeply concerned with securing their trade secrets. They know about the prospects of running more efficiently, with better quality and improved productivity, but they worry about protecting their proprietary information."

Natarajan suggested that edge computing should be considered when addressing these concerns, with the technology allowing clients to enjoy data analytics without having to rely on the cloud. "We don't want to rush moving manufacturing data to the cloud. Edge computing allows a lot of mobile analytics, making reliance on the cloud a last option."

Edge computing also offers clients the added advantage of being able to reduce data flows, cutting their bandwidth costs in the process.



**Béatrice Delmas-Linel**  
Managing Partner, France

T: +33 1 84 82 46 42

[beatrice.delmas-linel@osborneclarke.com](mailto:beatrice.delmas-linel@osborneclarke.com)

Cybersecurity and data privacy concerns are often cited as barriers to the adoption of greater connectivity and IIoT, particularly for consumer-facing companies. But it's interesting to note the comments of Karthikeyan Natarajan of Tech Mahindra that the biggest challenge to the pace of IIoT adoption in manufacturing is concern over corporate espionage.

Data breaches tend to be high profile because they often affect individuals and are therefore subject to regulation and the interest of the popular press. But for manufacturers and business-to-business (B2B) technology companies in particular, the protection of trade secrets is paramount to cybersecurity strategy and goes to the heart of corporate reputation. The risks here are very high but corporate espionage does not tend to be publicised.

While technical measures are a key ingredient to combating corporate espionage, organisational measures such as password protocols, employee vetting, confidential information protocols and incident response plans are equally as important, just as they are for the protection of personal data. Cyber criminals exploit human weakness as well as weak cyber defences.

Traditional industries can be slow to implement the kind of cultural change needed to adopt the best practices and so there are opportunities for IIoT-native companies to steal an advantage in this area.

# India

## Transmission optimisation

**Kapil Mahajan, Group CIO of major Indian logistics and supply chain company Safexpress**, said 90-95% of the GPS data sent from the company's truck fleet to its data centres is operational in nature and does not contain exception event information.

Safexpress has roughly 6,000 transshipment vehicles all equipped with GPS and each sending data every six minutes. This translates into about 13 million records per day covering vehicle speed, geo-coordinates, whether the truck has stopped and even if the ignition is on or off. Only 5-10% of the gathered data sheds light on non-standard operating conditions, information that is used for proactive monitoring. Moreover, Mahajan said data analysis could provide valuable insights that can help redefine and shape current practices or help evolve new agile business processes.

To maintain and secure this flow of data, the company needs to manage and continuously invest in a wide-area multiprotocol label switching (MPLS) network. The network, which has two dedicated bandwidths across each location, is supported by all of India's telecom providers. It has allowed the company to implement auto failover with software-defined WAN (SD-WAN) using Cisco Meraki hardware, which enables simultaneous use of both bandwidths. Moreover, the company's digital tools – handhelds, scanners, etc. – are also connected to 4G networks as an additional failover connectivity measure.

Failover refers to bandwidth redundancy. Auto failover refers to the automatic shift of data that is being transmitted on one bandwidth to another in the event that the first bandwidth fails.



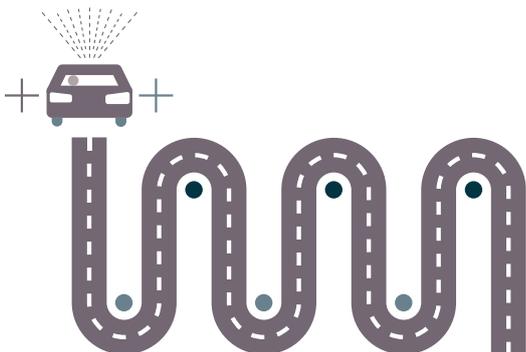
“Investors expect that connectivity will be stable and seamless but that’s not true for everywhere in India.”

Safexpress invested in multiple layers of bandwidth redundancy to avoid breaks in connectivity with its assets across the country. As their operation is totally digital, connectivity is of paramount importance.

While connection stability is key to all logistics providers, industrial players are also concerned with this issue.

**Anubhav Kapoor, general counsel and company secretary of software solutions provider Microland,** said: “Investors expect that connectivity will be stable and seamless but that’s not true for everywhere in India. Adoption is slowly happening at the end-user level. It’s just a matter of how soon we can resolve connectivity issues and security.”

In addition to worrying about guaranteeing network connections to remote manufacturing or logistics assets, investors must also worry about the security and integrity of the IIoT assets on the ground. Managing and maintaining technology at facilities in remote locations can be problematic, with vendors often limiting 24-hour service agreements to major cities.



**Prashant Mara**  
Partner, BTG Legal, India

T: +91 22 2482 0820  
[prashant@btg-legal.com](mailto:prashant@btg-legal.com)

The general update and integration of IoT in industry in India has been fragmented. While attempts have been made at policies to develop the IoT market, we are still some way away from a policy that comprehensively tackles legal issues arising from various IoT environments. While privacy and data protection are key considerations of the IoT regime, we are also seeing specialised IoT contracts dealing with contractual liability and interconnectivity agreements for inter-operability and sharing of information. Product liability issues are also under discussion, and an overhaul of current consumer protection laws is in the pipeline.

A large number of these key legal issues arise in IoT-focused M&A. As IoT becomes an increasingly critical product function and integral to the manufacturing supply chain, it will become necessary for manufacturers to bring this capability in-house, particularly given the constant innovation in the IoT space. To this end, traditional manufacturers will find value in the acquisition of IoT-focused tech companies.

Given India’s tech startup ecosystem, Indian tech companies are likely to be the focus of such investment and acquisition going forward. Companies considering this route must be mindful of the intricacies of acquiring technology companies in India.

# India



**Vikram Jeet Singh**  
Partner, BTG Legal, India

T: +91 22 2482 0820  
[vikram@btg-legal.com](mailto:vikram@btg-legal.com)

While the treatment of data as a commercial asset has not taken off in a big way in India as yet, the opportunities to create economic value from India's digital economy are huge. This is additionally so given that a large part of global data is routed through India for data analytics purposes.

While compliance and risks relating to customer data are largely addressed by contractual measures at present, there has been an increased recognition in the recent past of the economic value of this data, as well as the potential to misuse it.

This has seen an ongoing effort by the authorities to address gaps in the data-protection regime, and with the proposed overhaul of Indian privacy laws, data on Indian subjects will, for the first time, be governed by a comprehensive regulation. It is expected that the revised privacy regime will lay down the treatment of subject data and data analytics.

## To automate or not

Overcoming the aforementioned concerns would not only encourage Indian manufacturers to embrace IIoT on a larger scale but should also pave the way for greater automation.

Machine-to-machine (M2M) communication is valuable, but pairing it with data-sharing and analytics across the business' functions will offer manufacturers greater insight into their operational processes. This in turn will open the door to understanding when and where they can benefit from automating the labour process.

Microland's Kapoor noted that India has only partially adopted industrial automation, with the cost vs benefit question still unanswered for many operators. Labour costs are not as high as in Western countries, with the average factory worker earning less than US\$2 per hour.

“Key labour availability is still a concern. A lot of migration that used to happen from one part of India has stopped, but skilled labour is still in demand.”

Tech Mahindra’s Natarajan, however, believes that automation is not just about improving operational efficiency and cutting costs, but also about enhancing manufacturing quality while ensuring predictability of labour availability. “Key labour availability is still a concern. A lot of migration that used to happen from one part of India has stopped, but skilled labour is still in demand.”

Lower labour costs have seen Safexpress refrain from fully automating its logistics hubs and the company is looking for ways to improve operational efficiencies through automation, AI and workforce management. The company is experimenting with IIoT to track employee productivity.

Mahajan said: “Our hubs are not 100% automated, but they span acres and include mess halls and guest rooms for operation assistants to reside in. It can be very difficult to co-ordinate and move the right labour to where it’s needed at the right time despite there being a roster to manage operations 24/7, so we’re experimenting with IIoT-enabled smart bands and digital rosters provisioned on the handheld devices of the employees.

Beyond immediate and tangible incentives, such as productivity gains, India’s industrial players are turning to IIoT solutions to stay on top of government policy reforms that are creating both opportunities and challenges.



# India

## Logistical opportunities

The Indian government's move to introduce a single taxation system under the goods and service tax (GST) has presented logistics companies with a major opportunity to streamline their operations using IIoT solutions.

From a policy perspective the GST's introduction in July 2017 removed state-level taxes on goods, simplifying their transportation across state lines and clearing the way for warehouse operators to begin consolidating their storage solutions.

Shortly after the tax's introduction, reports emerged that several major manufacturers, including Lava, Whirlpool and Havells, were planning to rationalise their warehouse portfolios. Mahindra's Natarajan said: "One of India's food and beverage majors told us that they had close to 25 warehouses in India that they wanted to consolidate down to four, covering the north, west, east and south."

From an operational perspective, IIoT solutions will facilitate the move to a small number of major distribution hubs, while ensuring operational continuity. Natarajan added: "I understand that the current cost of warehouse and logistics is about 4-4.5% of revenue for some players, who are now looking to drop this to 1.5-2%. This represents a significant cost reduction from the possible digitalisation of the sector."

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**"The IIoT opportunity represents a huge difference in terms of how things can be done in manufacturing. It's revolutionary."**

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## Policy headaches

Policy changes or statutory compliance can also cause unexpected complexities. In April 2018, the government introduced the electronic waybill (e-waybill) system, requiring consignors or consignees to generate an e-waybill for any item valued at more than 50,000 rupees (US\$700) that crosses state lines.

Safexpress's Mahajan said: "Every time the transporter moves the package from one vehicle to another, they need to update the vehicle number on the government e-waybill portal. We had 200 people that were doing this manually. If an update is missed or an e-waybill is expired, and the enforcement agencies catch it, the penalties could be exorbitant and as high as 50% of the value of goods that are being shipped."

Beyond the financial implications, every time a vehicle inspection discovers a mistake in any of the consignments then the entire truck is held and the shipments for multiple customers are delayed. To avoid this potential outcome, Safexpress moved to automate its enterprise resource planning (ERP) software in December 2018 and connect it directly to the government's e-waybill system using APIs.

As such, updates are made in real time and the extension of expiring e-waybills happens automatically, freeing up personnel to move to other business areas and projects. The move towards automation was, Mahajan said, not driven by cost factors but for strategic reasons. Mahajan said: "Eventually [e-waybill non-compliance] will hurt your brand image and your reputation for providing timely and safe delivery to your end customers."

## Outlook

India's logistics players are leading the way when it comes to implementing IIoT technologies. This makes sense given the nature of their business. There are, however, still gains to be made in terms of warehouse automation and enhanced workforce management.

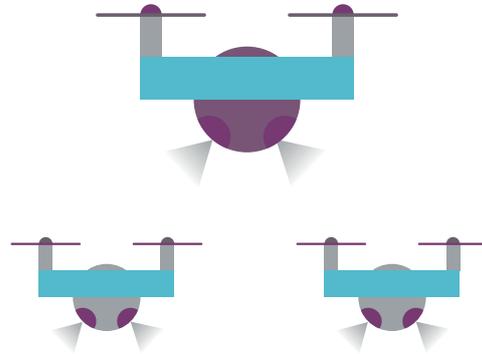
While manufacturers have been slower to integrate IIoT into their operational processes, they will eventually adapt as investment cycles free up funding for new initiatives. The obvious benefit from the installation of IIoT assets will always be automation. Efficiency gains are the holy grail for manufacturers in pursuit of better margins, with Microland's Kapoor saying: "The IIoT opportunity represents a huge difference in terms of how things can be done in manufacturing. It's revolutionary."

Beyond that, however, the sector needs to think bigger if it hopes to become an exporter to the world.

Greater uses of IIoT should also open the door to the more seamless transition of products from factory to end user, both in India and overseas.

As it stands, manufacturers manually inform third-party logistics (3PLs) that products are ready for pick-up and the 3PL then inputs the product details into their ERP on point of pick up.

By integrating more closely with 3PLs, which are already working to streamline their operations, manufacturers have the chance to develop strategies in relation to improving speed to market by syncing product production to delivery schedules.



# Singapore

Singapore is frequently referred to as a city of invention and reinvention. After carving out its future as an independent and sovereign state in 1965 and setting itself on the path towards export-led industrialisation, the city slowly transformed itself into a major regional financial hub. Its economy is driven by electronics and machinery manufacturing, financial services and the world's second busiest container port.

Having garnered a reputation as one of the world's most advanced economies, with the Heritage Foundation's Index of Economic Freedom ranking the city as the world's second most open economy (after Hong Kong) in 2018, Singapore is now looking to reinvent itself once again.

Economic planners have been developing Singapore's Smart Nation strategy for the past five years, with IoT at the heart of that plan. While GDP growth is slowing, slipping from 3.9% in 2017 to 3.2% last year, manufacturing continues to drive economic performance – accounting for 21.4% of the city's overall economy last year, according to the Singaporean Department of Statistics. Although the sector is growing, that growth has also slowed on a yearly basis, from 10% in 2017 to 7.2% in 2018. The sector must overcome high costs, productivity challenges and an ageing workforce; to do so Singapore has turned to IIoT initiatives and incentive programmes to attract high-value production to the territory.

As the city encourages the addition of advanced manufacturing, the government is also keen to develop a more efficient logistics sector. Enabling greater connectivity between the city's logistics providers should ensure greater operational efficiencies, which will be essential in the face of greater demands from manufacturers, brands and retailers from across the region.

The government has said it wants smart logistics to deliver interoperability across supply chains, using IoT to improve decision-making for enterprises of all sizes.

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*“For us, a traditional manufacturing company, being in Singapore is definitely a wake-up call. Being in Singapore has accelerated our move into the whole field of IIoT. That, in turn, is nurturing a group-wide drive to move into new business fields.”*

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**Ralph Lim**  
Director, Singapore

T: +65 6350 4383  
[ralph.lim@osborneclarke.com](mailto:ralph.lim@osborneclarke.com)

Singapore has embraced technology with the government recognising the need to future-proof Singapore's economy and rolling out the \$4.5 billion Industry Transformation Programme spanning 23 industries in six clusters. IIoT technology adoption features in all industry transformation maps for the five industries in the manufacturing cluster. These industries are aerospace, electronics, energy and chemicals, marine and offshore, and precision engineering.

However, with the adoption of IIoT, other issues will also arise. Cybersecurity concerns will inevitably increase owing to the integration of systems and the increased ease of access to these systems via the internet. Cybersecurity measures will need to be implemented to protect against the risk of cyber-attacks while frameworks such as incident reporting and crisis management to contain cyber-threats will also need to be put in place.

Businesses should also be aware of potential liabilities that arise when acquiring IIoT solutions from or outsourcing them to vendors. Issues such as intellectual property rights, indemnification, and regulatory compliance will need to be duly considered during commercial negotiations with vendors.

## Interest

Singapore's manufacturing base is looking to digitalisation and process automation to enhance its efficiency and long-term competitiveness. The sector is counting on IIoT to integrate all activities along the value chain, from R&D to post-production services.

Although still at an early stage, interest from industrial players in Singaporean IIoT is growing, thanks in no small part to government efforts.

In 2014, ABB established a Regional Robotics Packaging Application Hub that is focused on developing robotics manufacturing solutions. In 2017, Siemens opened the city's first fully-integrated Digitalisation Hub in order to test its cloud-based MindSphere IoT operating system.

**Laurence Liew, the director for AI industry innovation at AI Singapore**, said his department has several programmes to encourage industry to embrace AI and machine learning.

He said: "We incentivise companies by co-investing in projects. We'll put up SG\$250,000 (US\$184,000) in cash and kind, and we expect the company to meet that. It lowers the risk for them by 50%. We bring in researchers and engineers with the necessary AI background and the company brings both its domain expertise and engineers who we can train and work with."

He added that AI Singapore had received a significant number of inquiries from industry over implementing AI-IIoT projects. Liew said: "Those interested want to know how to start installing sensors on older machines or new machines that already have sensors and then how to collect the data, analyse and do predictive maintenance and/or anomaly detection."

# Singapore

Singapore's pursuit of IIoT applications is spreading awareness to more traditional multinational manufacturing outfits. While global automotive and industrial supplier Schaeffler has chosen not to establish a manufacturing centre in the city, offering refurbishment and repair services instead, Singapore's technological innovations have also made the city part of the company's global R&D network.

**Markus Palder, general counsel for the Asia-Pacific region at global automotive and industrial supplier Schaeffler,** said: "For us, a traditional manufacturing company, being in Singapore is definitely a wake-up call. Being in Singapore has accelerated our move into the whole field of IIoT. That, in turn, is nurturing a group-wide drive to move into new business fields."

In addition to Schaeffler's traditional bearing and production business, the company also offers condition-monitoring devices for client machinery. These devices measure vibrations and send data back to either Schaeffler's servers or its customers' servers, which then allows the company to offer predictive maintenance services.

Singapore's investment in virtual and physical infrastructure has also attracted Dyson, which announced in January that it intended to move its corporate head office to Singapore. The company said the decision reflected Asia's increasing importance to its business. At the same time, it committed to double the size of the Singapore Technology Centre, which was opened in 2017 with a focus on AI and robotics among other areas.

The move to shift its head office to Singapore comes after the company announced in October 2012 that it would establish its electric vehicle manufacturing plant in the city. Dyson cited at the time the city's pool of international talent, advanced supply chains and easy access to regional markets as offsets to concerns over higher average salaries.



**Simon Spooner**  
Partner, UK

T: +44 117 917 4112

[simon.spooner@osborneclarke.com](mailto:simon.spooner@osborneclarke.com)

Telematics, or the use of technology to transmit data from remote or mobile assets, has been able to bring key insights into a business's operations for a while now.

Take road transportation as an example. Economically, telematics can help improve fleet performance by reducing fuel and administration costs, identify under-utilised assets and monitor a vehicle's wear and tear. From a duty of care perspective, it can assist in meeting local compliance requirements and changing driver behaviours through the delivery of real-time training. More fundamentally, it can help decrease the number of accidents on the roads, reduce carbon footprints and increase customer satisfaction.

But the real change has perhaps come with the combination of telematics with other connected IoT technologies (think cargo-temperature monitoring or package tracking). With the ability to link up so much more closely with its cargoes, environments and supply chain through assorted networks of connected devices, traditional road transportation businesses can now join wider, interconnected digital ecosystems to create smarter and better solutions for their customer bases.

## Leading the pack

The city has been lauded for its investment in cloud infrastructure, IIoT and IT as well as its business-friendly policies. Market intelligence consultancy IDC ranked Singapore as leading the Asia-Pacific excluding Japan (APEJ) in terms of IoT readiness in the manufacturing sector for 2018. The Economist Intelligence Unit (EIU), meanwhile, ranked the city top of the Asian Digital Transformation Index 2018.

Singapore has been at the vanguard of establishing NB-IoT networks, with Singaporean telecoms provider M1 partnering with Nokia to launch a nationwide network in August 2017. Singtel, in partnership with Ericsson, deployed the island's first commercially available NB-IoT network in March 2018.

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“Singapore is very structured in the sense that when we identify a new technology then we establish government programmes and incentives to try to encourage its adoption. It's an approach that's peculiar to Singapore in a way, compared to other countries where there may be less involvement at a government level.”

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Much of Singapore's strength lies in its size. While other countries may dwarf the city state in terms of the scale of the IIoT initiatives they are able to roll out, Singapore's smaller size means it can be nimbler in responding to digital trends. The city not only boasts a broadband penetration rate of greater than 90% but also enjoys the world's fastest fixed line speeds.

AI Singapore's Liew said: “Singapore is very structured in the sense that when we identify a new technology then we establish government programmes and incentives to try to encourage its adoption. It's an approach that's peculiar to Singapore in a way, compared to other countries where there may be less involvement at a government level.”

Government support has also extended to guiding the evolution of a cutting-edge logistics network.



# Singapore

## Greater connectivity

In 2015, the government highlighted the importance of logistics to its Smart Nation initiative, with Minister for Communications and Information Yaacob Ibrahim noting that IoT would be used to improve visibility and decision-making for small and medium-sized enterprises (SMEs).

Ibrahim noted at the time that SMEs could benefit from improved 'track-and-trace' technologies considering that as many as 25 parties were required to process one export shipment. He said: "The lowered risk of shipment failure will result in cheaper insurance and a reduced need for excess inventory across the entire supply chain."

A key frontier for the sector is the development of autonomous vehicles, and the city has already thrown its support behind such R&D.

The government subsidised 70% of Belgian logistics group Katoen Natie's costs relating to the 2017 launch of a self-driving transport truck at ExxonMobil's refinery on Jurong Island. Singapore has developed itself into a key logistics hub for Southeast Asia, and developing a fully integrated and autonomous industrial sector will allow the city to remain a regional leader.



**Jon Fell**  
Partner, UK

T: +44 20 7105 7436

[jon.fell@osborneclarke.com](mailto:jon.fell@osborneclarke.com)

Connectivity is at the heart of all IIoT. Without it the sensors on each device cannot transfer the data they collect and simply become dumb terminals. The use of current technologies such as narrowband and LTE Cat-M2 networks facilitates the transfer of data while maintaining battery life. However, as the growth in IIoT continues, existing networks will struggle to cope with the demands made upon them to carry ever-increasing amounts of data. The speed with which such technologies can deliver data and the inherent latency in the systems means that near-instantaneous machine communication is not yet a reality.

The emergence of next-generation connectivity, such as 5G, will play a big part in the development of IIoT and will create new and exciting opportunities. 5G is often portrayed as bringing faster download speeds (which it will), but in reality it is so much more. It will have the capacity to carry huge amounts of data and allow instantaneous machine-to-machine communication. However, there is a catch. 5G will also require a huge investment in new infrastructure. Last year we undertook research into next-generation connectivity across Europe, China, India and the US. What we discovered from our research was fascinating. Businesses all around the world are looking at the opportunities that increased connectivity will provide. For a copy of this report see [bit.ly/nextgenconnectivity](http://bit.ly/nextgenconnectivity).

## Outlook

Singapore's support for IIoT has allowed the city to steal a march on other Asia-Pacific countries and state support is likely to continue.

The government has thrown its weight behind introducing open IoT standards while also pushing for greater regulatory knowledge within the space. In September 2018, the Singapore Management University (SMU) launched a new Centre for AI and Data Governance to support the accountable and responsible implementation of AI products and services. The centre received a S\$4.5 million (US\$3.3 million) grant from the government.

Beyond Singapore's attraction as a regional hub for business, the city has transformed itself into an IIoT thought leader. It has introduced incentives and funding to encourage manufacturers and logistics to experiment with greater connectivity, having already established world-class digital infrastructure to underpin these efforts.



# US and European viewpoints



**Emily Jones**

Partner, USA

T: +1650 714 6386

[emily.jones@osborneclarke.com](mailto:emily.jones@osborneclarke.com)

Despite ongoing trade and political tensions between the US and parts of Asia, the region continues to be a market that US tech companies cannot ignore and plan to address at some stage in their growth cycle. However, there is no 'one size fits all' destination for US companies looking to expand into Asia, and US businesses need to look carefully at their objectives and weigh those against the various relevant practical and legal factors when deciding which location in Asia will best fit their aims. For example, for some US companies, having a local sales team to focus on growth of enterprise customers in specific target markets will drive their expansion activities. For others, they are looking to set up additional R&D hubs. These factors materially impact the decision-making process.

For our Silicon Valley clients, in particular, it has become increasingly useful to talk to one of our experts on the ground in Asia about the practicalities of doing business. This can help enormously in terms of managing expectations and understanding the key issues, such as the process for incorporating an entity, local business registrations, new regulatory requirements especially around data privacy and security, employment laws, and taxation.

We are increasingly helping Silicon Valley companies as they assess the opportunities that Asia has to offer, while at the same time ensuring that they don't make costly mistakes which have significant legal implications.



**Andrea Schmoll**

Partner, Germany

T: +49 221 5108 4408

[andrea.schmoll@osborneclarke.com](mailto:andrea.schmoll@osborneclarke.com)

It is no secret that IIoT is transforming business models and production processes across all major industries in Asia, delivering dynamic competitive advantages. Forward-thinking Asian companies are looking at IIoT to achieve increased ROI and reduce operational disruptions. As is obvious from various initiatives, in particular regarding smart cities, automotive telematics and unmanned aerial vehicles (UAV), many Asian jurisdictions see IIoT as a key driver for economic growth in which they invest heavily.

It appears, however, that in some critical aspects of digital transformation, European companies risk lagging behind their Asian competitors. This does not mean that European companies are not keen to develop and implement IoT and analytics applications. In fact, corporations like Siemens, Schneider and Philips have significantly invested in IoT-related R&D and acquisitions. According to the latest update to the Worldwide Semiannual Internet of Things Spending Guide from the International Data Corporation (IDC), Germany will be the European IoT champion in 2019, with spending exceeding \$35 billion. However, the IDC also predicted that the Asia-Pacific region, excluding Japan (APEJ), will spend around 36.9% of the worldwide spend, making it the global leader for IoT spending in 2019. Asia therefore is still one of the top regions that our European clients are keen to explore and to invest in.

# Conclusion

With traditional manufacturing and logistics infrastructure having become commonplace on a global scale, operators must look beyond what exists now to what might emerge, if they hope to thrive in the not-so-distant future. The differentiator will soon be a willingness to implement and stay on top of IIoT innovations while finding ways to harness the accumulated data to secure vital efficiency gains.

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“You need to understand and digitise every single dimension of your business. Every single worker, every door, every piece of infrastructure, every crate, every product, every asset needs to be digitised.”

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Brinc.io's McLaughlin said: “You need to understand and digitise every single dimension of your business. Every single worker, every door, every piece of infrastructure, every crate, every product, every asset needs to be digitised.”

He argued that it was not about knowing what to do with the information now, but about being ready for the day that third-party software solutions arrive to transform your business model.

“The person who has taken the time to digitise their business now will be able to easily use that third-party algorithm when it arrives to find efficiencies of time or cost, and they will slowly take over that industry. There will be nothing you can do about it,” he warned, adding: “There is no ‘in between’. Data will win, every time. It's just a matter of when.”

The technological transformations underway in China already bear out these warnings. Chinese manufacturers, e-commerce platforms, 3PLs and telecoms providers are leading the rapid transformation of the country's economy. Investors would do well to heed the signs of change and start preparing their budgets to include IIoT initiatives sooner rather than later.

# About this report

## Acknowledgements

This report was researched and written by **Andrew Kemp, senior editor, Newsbase Ltd,** [andrew.kemp@newsbase.com](mailto:andrew.kemp@newsbase.com)

In researching the answer to the question “How will IIoT transform industry in Asia?”, we interviewed leading individuals from industry across China, Hong Kong, India and Singapore, including those from the technology, manufacturing and logistics sectors and government agencies. The interviews were conducted by Andrew Kemp during December 2018 and January 2019. We would like to express our huge gratitude and sincere thanks to the following executives for their time and insights so generously given:

**Warren Chaisatien,**

Global head of IoT customer engagements, Ericsson

**Anubhav Kapoor,**

General counsel and company secretary, Microland

**Gerald Krainer,**

Director of digitalization, Byton

**Chris Lewis,**

General counsel – global operations, Dyson

**Laurence Liew,**

Director for AI industry innovation,  
AI Singapore

**Kapil Mahajan,**

CIO, Safexpress

**AJ Mak,**

CEO and founder, Chain of Demand

**Bay McLaughlin,**

Co-founder, Brinc.io

**Karthikeyan Natarajan,**

Senior vice president and global head of  
integrated engineering solutions, Tech Mahindra

**Markus Palder,**

General counsel for the Asia-Pacific, Schaeffler

**Lynn Parker,**

Regional manager international trade & customs  
APAC, ASML

**Steve Suh,**

CEO and co-founder, Floship





**Simon Beswick**  
International CEO, UK

T: +44 117 917 4146  
[simon.beswick@osborneclarke.com](mailto:simon.beswick@osborneclarke.com)

## About Osborne Clarke

Osborne Clarke is an international legal practice with over 850 talented lawyers and 260 expert partners across 25 locations. We help clients across eight core industry sectors – technology, media and communications; transport and automotive; real estate and infrastructure; financial services; retail and consumer; energy and utilities; life sciences and healthcare; and recruitment – to gain competitive advantage in an ever-evolving, ever-developing global society. Our well-connected international group means we can offer the very best of Osborne Clarke's sector-led approach and innovative culture wherever in the world you interact with us. As listeners and problem-solvers, we have a robust understanding of the local business environment and in-depth legal expertise in each jurisdiction. We hope we may have the opportunity to help your business succeed in the future.

[osborneclarke.com](http://osborneclarke.com)



**Stephen Lai**  
Managing director, Conventus Law, Hong Kong

T: +852 6621 1608  
[stephen.lai@conventuslaw.com](mailto:stephen.lai@conventuslaw.com)

## About Conventus Law

At Conventus Law, we approach our business with a different perspective. We strive to create environments which encourage collaboration, generate conversation, create imagination, develop positive experiences and encourage community building.

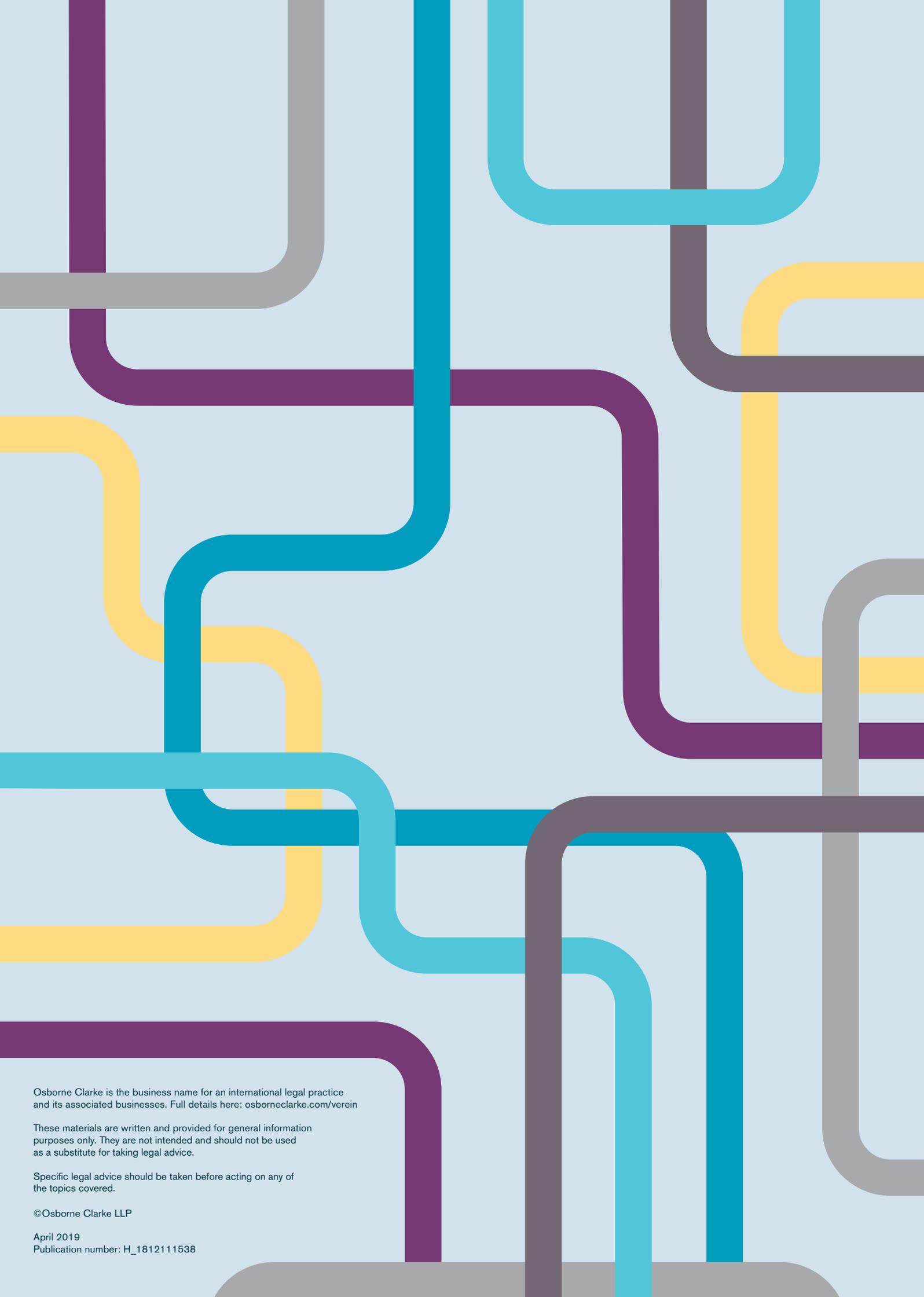
As an online legal media company, we want to challenge the market's perception of the role of the lawyer in a business context. We believe lawyers should be valued business advisors as well as trusted legal advisors.

Our narratives encourage businesses to look at law firms and legal departments in a different way. We hope it will lead to conversations about working with lawyers at a strategic business level.

By partnering with the best and most reputable international and domestic law firms across Asia, Conventus Law keeps the market informed about the latest business developments in Asia and gives businesses new ideas on how to navigate the business environment when investing in Asia.

As an online legal and business media publisher, we provide a full suite of media services for our partners.

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April 2019  
Publication number: H\_1812111538