The Connected Business

Wednesday September 30 2015

www.ft.com/reports | @ftreports

Disruption becomes the norm

Established companies need to make use of their advantages, writes *Richard Waters*

Memories of the last tech bubble, when big companies worried about being "dotcommed" by internet start-ups that wanted to take their trade, have faded. Instead businesses now fear being "Uber-ed".

From taxi drivers to television networks, from filmmakers to restaurants and banks, the ways in which individuals and companies do business is metamorphosing so quickly that many companies find it hard to keep pace.

The obsession with digital disruption has reached a flashpoint with the arrival of the smartphone, which is the platform for an invasion of older companies' hallowed grounds. The success of online lift-sharing company Uber has become an example for entrepreneurs out to attack industries once thought immune to digital upheaval.

Despite this, established companies still have many advantages, says Paul Willmott, a director at McKinsey who specialises in digital transformation. These include extensive customer bases, known brands and industry knowledge, which weigh in their favour.

For all that, the need to overhaul business processes, forge digital links with customers and, in some cases, recast entire revenue models can still be pressing. A common error is failing to pay attention to the bigger picture, says Surajit Kar, a principal at management consultancy PwC. Distracted by day-to-day events, or by minor adaptations to existing businesses, companies become stuck on the incremental instead of looking at the real game-changing forces in their markets, he says.

Illustration:

The ways in which digital markets tend to evolve can catch out the unwary and opportunities are often to be found between existing markets, says Mr Kar. In industries such as healthcare and financial services, for instance, digital competitors often use technology to insert themselves as intermediaries in different ways. Start-ups such as US-based Practice Fusion, for instance, have used the spread of electronic medical records and other clinical data to create markets in the healthcare field, such as selling data to insurance and pharmaceutical companies

Established businesses are faced with a common question, he says: "How far from our current business model is it and can we go there?"

Businesses still have a tendency to react to digital competition in knee-jerk ways — "ready, fire, aim", as Mr Willmott puts it. This is prompted partly by a fear that start-ups are moving so fast that established names have no choice but to speed up their own digital processes.

In fact, choosing not to be first into a new market can be a valid strategy, according to the McKinsey director. Retail banks, for instance, can afford to be slow to respond to challenges, given the cautious way their customers adopt digital channels and new brands.

In faster-changing markets such as the media, on the other hand, lagging behind disrupters can be fatal. For example, the rapid shift of classified advertising to the web left many US metropolitan newspapers that had relied on income from car, job and real estate adverts high and dry.

A key question is where the value in digital lies. Typically, the answer involves either looking to take costs out of the supply chain or recasting customer relationships through online channels, says Mr Willmott.

It is when it comes to digital execution that the pitfalls multiply. Most companies have understood the need to hire digital experts — such as chief digital officers, whose job is to spot potential challenges and create revenue opportunities when disruption occurs — and to give them some degree of insulation from mainstream operations to save newcomers from being swamped by short-term imperatives.

But that has often come at the cost of

Continued on page 2

Inside

Millennials want agile employers and terms
The bright young things demand flexible hours and informal conditions
Page 2

Talent wars
Competition for the best digital officers is fierce — but these 'ninjas' must fight their corners too
Page 2

Hits and misses
A look at some digital transformations that went well — and some that did not
Page 3

Opinion
Why cheap automation raises the risk of 'premature deindustrialisation'
Page 3

On FT.com

Interactive video
How can established companies innovate against newcomers with bright ideas?
www.ft.com/connectedbusiness

This cloud opens one stadium to
450 million fans.

learn more at microsoftcloud.com

Microsoft Cloud

Flexibility is crucial in attracting brightest young things

Millennial generation

Today's employees want the freedom to develop skills and passions outside the workplace, says *Jane Bird*

Five years ago, when Denis Baranov was studying computer science at university in Moscow, he began working part-time for DataArt, a US-based technology consulting company. After graduating, he continued working remotely for the company for two years while travelling.

He is now a full-time employee in DataArt's London office, and is able to persuade his employer to send him to conferences that also help with his PhD studies. This freedom and flexibility is a big attraction of the job, he says.

"I also value being able to collaborate with colleagues based in locations such as New York and Argentina," says Mr Baranov. "And I like being able to learn something new every day. For example, I am currently adapting our mobile technology for wearable devices."

At 26, Mr Baranov is a typical "millennial" — those whose birth dates range from the 1980s to the early 2000s.

Members of this generation expect their jobs to be challenging, creative and dynamic, says Maggie Stilwell, UK and Ireland managing partner for talent at the consultancy EY, which published a global generational survey this year.

Millennials are a confident bunch who want to develop their own skills and passions outside work, says Ms Stilwell. Organisations that are not flexible will lose employees.

"Informal" working hours can benefit staff, their teams and their clients, she adds, especially in organisations that work across different time zones.

For example, one EY partner with a six-month-old baby starts work early and takes a break in the afternoon to be with her daughter, before doing more work in the evening.

It is important for millennials to see that flexible working is the norm and that senior people are also part of that culture, Ms Stilwell says. "EY partners are meant to demonstrate visibly what flexible working means, so their diaries are open for everyone to see."

Vodafone UK is so keen to show its commitment to flexible working that not even the chief executive has a personal office. In addition to appealing to millennials, hot-desking and allowing people to work when and where they want has reduced office space at Vodafone by 30 per cent since 2009, increased productivity by 20 per cent, and led to energy and travel savings.

> 'Partners are meant to demonstrate visibly what flexible working means'

Tony Bailey, head of business services at Vodafone, says: "Previously, we had 10 people for every eight desks, now we have 10 for every six desks."

The company has also introduced instructive computer games to appeal to sales trainees. Questions are displayed on a pinball machine simulation, and players try to hit the right answers as they float across a screen.

"They accumulate points, compare their score with others and check on the leaderboard who is ahead. It's fun and interactive. We've had good feedback from millennials," Mr Bailey says.

Young people expect to use technology to create content, share ideas and ask questions. Nigel Danson, chief executive of Interact, which provides social internet software, says: "They are not likely to want to do this with email."

Millennials also enjoy using social media apps such as Messenger, Snapchat and Yammer. This can be a boon for companies, says Dan Rossner, a digital expert at PA Consulting:

"The default position of conservative organisations may be to lock down [social media] in case of one bad comment, rather than encouraging contributions that could enhance their brand."

He adds that net-savvy millennial employees can also help in deciding how much social media monitoring of corporate websites is necessary.

A Vodafone study of 1,100 people in small and medium-sized UK business found four-fifths of HR managers thought workplaces with millennials were more productive. Almost 60 per cent said they had learnt something from younger colleagues, and more than half thought hiring millennials helped companies stay up-to-date with technology

Vodafone's report found that the average millennial stays in a job for less than three years. In response, firms such as EY try to weave a long-term relationship by keeping in touch with alumni.

"They could become 'boomerangers' or go on to lead other organisations as clients or stakeholders," says Ms Stilwell.

Executives look for someone to shake up the whole company

Talent war Chief digital officers attract big salaries but they must step on many toes, reports *Jane Bird*

Five years ago, hardly anyone had heard of a chief digital officer, yet demand for their skills is now so great that they can command salaries of £500,000 plus generous benefits.

A shortage of people with the right credentials has led to a talent war, says Steven Zuanella, chief digital officer at Zurich Insurance. "Some organisations are offering crazy compensation packages as they bend over backwards to attract these people."

It is a very different role from that of the chief information officer, whose job — though complex — is more about following procedures and keeping the company's IT systems running.

The digital role, by contrast, is to lead transformation. The job involves looking for business opportunities that have been enabled by the digital revolution. It also involves focusing on customers and how their needs might change because of technological developments.

Understanding all that the role involves can be difficult, says Mr Zuanella, because it is new and spans the entire organisation, as well as working with outside partners such as suppliers, designers and developers.

Both chief information and chief digital officer roles are necessary and fundamental, says Mary Mesaglio, research vice-president at Gartner, the IT research and advisory group, who calls them "Samurais" and "Ninjas".

Traditional IT people, like the Samurai, behave according to a set of rules, she says. "They were well respected and that code of conduct could be very useful. The Ninja, as a highly unorthodox fighter, was better at dealing with an unconventional enemy."

But, she notes, it is difficult for the two roles to be performed by one person and there are often gaps, overlaps or ambiguities between them.

A 2014 Gartner survey of chief information officers found that only a third of companies with chief digital officers were "very clear" on how the role integrates with wider IT needs. Ms Mesaglio says that, in many ways, the digital job is an extension of the chief strategy officer.

Sometimes, the digital officer role is performed by the chief customer officer, chief innovation officer or chief technology officer. There is also overlap with the chief marketing officer and chief operating officer. Other titles for the role cited in Gartner's 2014 survey included director of emerging platforms, director of digital technologies and head of digital innovation.

> Traditional IT people, like the Samurai, have a way of behaving according to a set of rules

Steven Zuanella, chief digital officer at Zurich Insurance

Finding people with the necessary diverse skills is difficult, says Richie Etwaru, chief digital officer at IMS Health of the US. "Chief digital officers have to understand products and services, profit and loss, organisational structure and how industries work from regulation to public perception."

An unusual set of experiences is also useful, says Mr Etwaru. "You won't get differentiating ideas from somebody who has done the same job the same way for 30 years."

Post holders need to study the needs of their customers and must be able to anticipate how they will evolve.

Public tastes change faster than organisations can, says Mr Zuanella at Zurich, and galvanising leaders to focus quickly on this is an important chief digital officer role.

CDOs also need to be highly collaborative, skilled leaders who can work with difficult personalities because the job can involve treading on many toes. These qualities are more important than being a good technologist, Mr Etwaru says, because there will be lots of resistance.

"Chief digital officers need a very high level of emotional intelligence. You've got to be able to move people with you, not try to build your own fiefdom and put them out of work," he says.

The best approach for the digital officer is to create a blueprint or business model, then hand it over to the existing management, he says.

When hiring, organisations should be open about their culture and the gap that needs bridging.

Mr Zuanella says chief digital officers are often entrepreneurial and want to do things fast, so it is best to be honest if the organisation is not used to working that way. "Otherwise, it will be like a speedboat arriving in a fleet of oil tankers. The chief digital officer will just thrash around and get very frustrated."

Consumer-focused companies in areas such as retail and travel were the first to appoint people to the role, but it is beginning to appear in corporate finance, insurance, commercial property and logistics companies.

Even digital companies need a chief digital officer to stay ahead, says Mr Etwaru.

Mr Zuanella, however, sees the post as an interim one, because once an organisation reaches digital maturity, it will no longer be necessary. But they will probably be around for 15 years, he says.

Companies without a chief digital officer or a chief customer officer cope badly, says Mr Zuanella, unless they have people who can work across functional silos. "Lots of companies talk about this, but far fewer really have it."

It is crucial for chief executives to explain the role to the rest of the management team to ensure they understand what it involves. Chief executives, as Mr Zuanella says, are ultimately responsibility for ensuring digital transformation happens. "It is no good if they are detached," he says.

Disruption is the norm but there is scope to fight back

Continued from page 1

failing to transform core operations quickly enough. Many of the first companies to feel the heat of internet competition fell into this trap. The example of the newspaper industry again serves as a warning of how rapidly user behaviour can change, turning what seemed to be a manageable shift to online channels into a deluge of competition. When digital channels accounted for less than 10 per cent of newspaper revenues, it was easy to see them as sidelines.

As smartphones proliferate, the failure to embed a digital culture more broadly can be costly. The key is to create a team of both digital experts and employees from the traditional part of the business, and place it at the heart of a company's operations, says Mr Kar at PwC, to share skills and keep the business on track.

People with entirely different sets of business skills are often needed, as companies move from analogue to digital delivery channels. An effective manager of an ecommerce business, for instance, usually has a skills set that is at odds with those to a traditional retailer, adds Mr Willmott.

Stocking and running retail stores has little in common with running a winning website. And, crucially, managers who have learnt to operate in the analogue era must to learn how to use big data to guide decisions.

Companies that succeed in building an effective digital capability at the heart of their operations also need to be ready for the consequences, says Mr Willmott. Their senior-level decision-making, for instance, often needs to speed up to enable the digital division to move quickly. And they have to be ready for the way successful digital transformations often lead to an unsettling power shifts within companies.

> Incumbents tend to favour old ways of doing things as changes can dent profits and cause dissension

Navigating these waters leaves many businesses facing the toughest question of all: how quickly should they pull back from their traditional, profitable — but nonetheless shrinking — operations to invest in the digital future?

This is the innovator's dilemma, as described by Clayton Christensen, a Harvard Business School professor. Incumbents can find it hard to respond to newcomers with a good enough product, since doing so often involves turning away from doing profitable things.

For example, Steve Ballmer, the former Microsoft chief executive, by most standards had one of the most effective runs of any chief executive in his 14 years at the top. Its revenues climbed fourfold and it was the world's second most valuable tech company, though topped by Apple. Since he stepped down last year, however, Microsoft has raced to rebuild its business around the mobile devices and cloud computing.

Incumbents may tend to favour old ways of doing things, says Mr Willmott, as changes can dent profits and cause dissension. But it is better than finding the world has moved on without you.

Leaders who want to grow need to learn benefits of staying small

Strategy

Keeping individual business units lean and hungry is the best way to scale up successfully, says *Ravi Mattu*

Setting up a company is hard. You need to come up with a business plan, find investment, sort out legal and regulatory issues and then find enough customers or clients to pay the bills. And that is just the start.

But what happens when a company grows? It requires more structure and processes, making it harder to remain nimble and innovative. This is especially the case in the internet age, when companies can scale up so quickly that it is hard to manage the process.

As Stanford professors Robert Sutton and Huggy Rao point out in *Scaling up Excellence*, there is no definitive template to meeting this challenge.

Most experts, however, agree that culture matters. Vinay Gupta, head of business design at consultancy Ideo, stresses that culture trumps all when it comes to staying innovative.

He says: "A value system that encourages curiosity, empowerment and openness is what helps companies stay innovative as they grow."

As a company gets bigger, it becomes less flexible and open to new thinking. This means change takes longer to happen, he explains.

One answer to this conundrum may seem perverse: try and stay as small as possible as you grow.

This approach is a corporate reflection of human behaviour. The work of evolutionary psychologist Robin Dunbar has been influential in this regard. The Oxford professor has studied how we form communities and he says most of us struggle to maintain more than 150 "meaningful" relationships.

Beyond this, our brains find it difficult to cope.

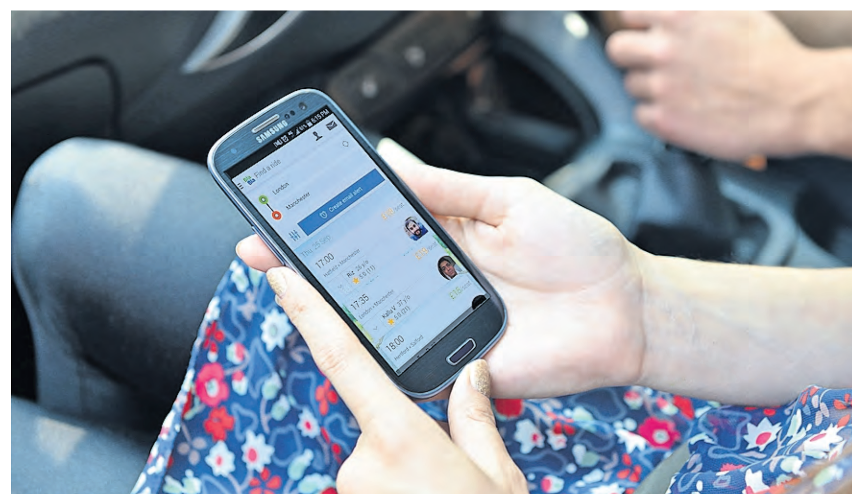
The so-called "Dunbar number" has been studied by fast-growing tech businesses, such as the social network Facebook, and has been a guiding principle for others in how they organise themselves. For example, WL Gore, the maker of high-tech fabrics including Gore-Tex, breaks up business units when they get beyond 150 employees.

BlaBlaCar, the French ride-sharing company that was recently valued at €1.4bn, has developed its own version of this approach. The company, founded in 2009, acts as an online marketplace, pairing drivers who have spare seats with passengers looking for a ride. It employs 400 people in 12 markets, from the UK and Germany, to Mexico, India and Turkey.

The company has expanded into new markets through acquisition, buying existing ridesharing companies and their employees.

Nicolas Brusson, co-founder and chief operating officer, says this allows the company to be "hyperlocal" and to respond quickly. "We benefit from these guys who are as smart as anyone you can find in the country, which saves us a year or two in setting up."

He says the company makes sure teams "never end up bigger than 10 to 15 people. This keeps a strong sense of purpose, people stay fast and hungry."



BlaBlaCar acts as an online marketplace, pairing drivers with passengers

The challenge is how to integrate the acquired start-ups, particularly when they are so widely dispersed.

Mr Brusson says the key for BlaBlaCar was to focus on "co-ordination rather than management". This means giving the local entrepreneur-run companies enough autonomy to come up with their own ideas, using the Paris headquarters to run finance and group functions.

To embed the culture and make sure there is enough cross-fertilisation of ideas and best practice, BlaBlaCar does not rely on electronic communication but makes sure its staff are able to "travel a lot" to meet in person.

Country managers gather eight times a year in Paris and the company runs a programme called "BlaBla swap", whereby any member of staff can spend a week working in another country.

"You can do some of this by Skype, but you need to do it in person — to go for a drink or a meal — for teams to really gel," says Mr Brusson.

But his most important insight reflects the no-template advice of Profs Sutton and Rao: no structure will last, so you need to be prepared constantly to change things if circumstances require it.

"You end up changing organisation every year," says Mr Brusson. "When you go from 100 to 200, to 400 or 800 employees, all the stuff you set up is going to last 12-18 months before you will need to restructure and break down your teams again."

Contributors

Richard Waters
West Coast editor

Ravi Mattu
Technology, media and telecoms news editor

Jane Bird
Jessica Twentyman
Freelance technology writers

Adam Jezard
Commissioning editor

Steven Bird
Designer

Andy Mears
Picture editor

Christina Madden
David Scholefield
Sub-editors

For advertising, contact:
Michael Duffy, +44 (0)20 7873 4646, email michael.duffy@ft.com.

All FT Reports are available on FT.com at ft.com/reports.
Follow us on Twitter: @ftreports

All editorial content in this report is produced by the FT. Our advertisers have no influence over, or prior sight, of the articles.

Digital option is not for faint-hearted leaders

Strategy To win, you need to rethink your company's priorities and jettison legacy processes, writes *Jessica Twentyman*

Digital transformation is not for a faint-hearted leadership team. Indeed, the authors of a recent study by Deloitte, the management consultancy, and MIT Sloan Management Review, the business journal, suggest that risk-taking needs to become the cultural norm for companies with digital aspirations.

"For every Google, Amazon or Facebook taking major risks, hundreds of companies are still playing it safe," says Phil Simon, a report contributor and business author.

In doing so, they are simply giving digital disrupters further opportunities to outpace them. "Today, the costs of inaction almost always exceed the costs of action," Mr Simon says.

Textbook cases of businesses that paid the ultimate price for failing to anticipate the effects of digitisation would include Borders bookstores, Blockbuster video shops and Kodak, the photographic technology company.

In the UK, WM Morrison supermarkets did not introduce online shopping until 2014, forcing it into a painful game of catch-up with digitally-savvy competitors such as Tesco and Waitrose.

The pace of digital disruption is "sweeping, breathtaking and accelerating," said Richard Fairbank, chief executive of Capital One, in a July earnings call about the US bank's second-quarter results. "To win in the digital world, we can't simply bolt . . . channels on to the side of our business or [transfer] analogue banking services to digital channels." Instead, digital must become the centrepiece of the bank's strategy.

Some business leaders, however, seem happy to simply add digital channels to existing systems and processes. The danger with this kind of thinking, say experts, is it allows digital disrupters to maintain their technological lead. Businesses such as Uber, Airbnb and Netflix were built on — and for — the digital age and have mobile and social media technologies at their heart.

Such newcomers do not have older systems and processes to worry about, and can focus on fine-tuning customers' digital experiences. As a consequence, they will continue to disrupt more established and less agile competitors.

Martin Gill, an analyst with Forrester Research, an advisory firm, says digitally focused companies need to put their organisation's purpose and underlying business model first.

Too often, he says, established companies find themselves hampered by existing ways of doing things.

Philippe Trichet, digital expert director at Boston Consulting Group, the business consultancy, agrees: "Companies need to be prepared to change everything – how they think and how they breathe." In his previous role as vice-president of customer experience at Schneider Electric, the industrial equipment company, Mr Trichet was involved in a digital transformation project that involved 30,000 employees in more than 90 countries.

"What made a big difference for us was that we had clear goals and the effort was led from the top," he says.

From the chief executive down, a common vision of the benefits the management wanted to achieve was communicated to staff. Says Mr Trichet: "It was made clear that digital transformation would affect everyone, so everyone needed to be involved in delivering it."

The project was deemed a success, despite significant challenges, including a large legacy IT estate and the need to join up fragmented sales, marketing and customer support processes.

The programme, says Mr Trichet, was not just about rolling out new IT projects, but about rethinking business processes to achieve greater agility, lower costs and greater customer satisfaction.

He adds that it resulted in increased revenues from cross-selling, improved satisfaction from routing customer service online, and increased efficiency by consolidating 145 call centres into 45.

Tesco was an early adopter of online sales with Click and Collect
S Saunders/Digital Nation

> 'Companies need to be prepared to change everything — how they think and how they breathe'

Case studies Some technological transformations that have gone well — and others that crashed

Failure **BBC's Digital Media Initiative**
Too much focus on technology, not enough on change management — that was what scuppered this initiative, according to an investigation by consultancy PwC.

The programme, which was cancelled in May 2013 and resulted in an asset writedown of £100m, lacked an executive steering committee to assess progress against agreed measures of quality, time and cost.

The project "focused on technology risks and issues, rather than [driving] operational change to business practices in the BBC", said PwC.

Success **Capital One**
According to a mid-2014 report from Capgemini Consulting, this US bank "has an unflinching focus on digital", with about 75 per cent of its customer interactions now handled digitally.

The bank has also been buying talent: in 2014, it acquired Adaptive Path, a San Francisco specialist in high-tech user experience design; in July it bought Monsoon, a Californian digital design company. "With its radical digital approach, Capital One is not just challenging its own wisdom, but that of the entire financial services industry," say the authors of Capgemini's report.

Failure **The Co-operative Bank**
In 2013, Co-op Bank cancelled an IT transformation programme resulting in a £300m investment write-off. This became a part of Sir Christopher Kelly's independent review into the bank's crippling capital shortfall. The project's problems, he wrote, included "changes to leadership, a lack of appropriate capability, poor co-ordination, over-complexity, under-developed plans in continual flux and poor budgeting."

Co-op Bank has since launched a £60m digital catch-up scheme that has had its own problems, according to consultancy Verdi.

Success **John Lewis**
UK retailer John Lewis has been one of the most successful companies in the fightback against online retailers, creating a "bricks and clicks" experience. Online sales account for about 33 per cent of revenues.

While half its customers buy in store, the rest combine experiences through hybrid services that let customers buy online but collect in store.

Last Christmas, group sales were up 5.8 per cent year on year to £777m in the five weeks to December 27, helped by a 19 per cent rise in the value of online sales year on year.

Cheap automation raises risk of 'premature deindustrialisation'

ON TECH
Carl Benedikt Frey

Historically, technology has shaped the economic trajectories of corporations, cities and even nations.

While the Industrial Revolution made the west rich and created the "great divergence" in incomes between the west and the rest, the adoption of western technology has more recently spread the fortunes of industrialisation to such places as South Korea, Turkey, and China.

Yet this process of rapid economic convergence risks coming to a halt, as labour-saving technologies put developing and emerging economies at risk of "premature deindustrialisation".

Over the past 20 years, China has become the "factory of the world" while western economies have seen a decline in manufacturing employment. The growth of such cities as Shenzhen, where the iPhone is assembled, is the inverse of the decline of old US manufacturing centres such as Buffalo, Cleveland and Detroit — now part of the "rust belt", since they have failed to produce new industries.

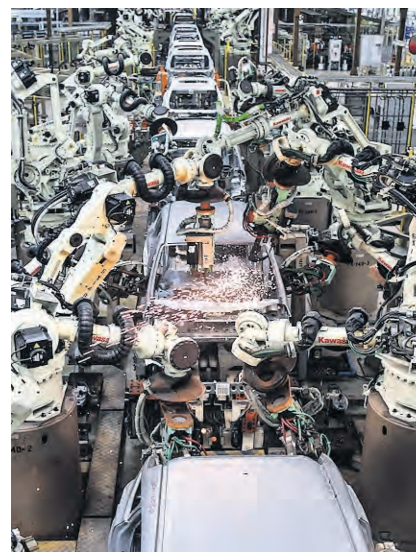
Nevertheless, China may be one of the last nations to ride the wave of industrialisation to prosperity.

As shown by Dani Rodrik of Harvard University, over the course of the 20th century, peak manufacturing employment has steadily declined in emerging economies. In Britain, the first country to industrialise, manufacturing employment peaked at 45 per cent before the first world war. By contrast, Mr Rodrik suggests manufacturing employment in Brazil, India and China has already peaked below 15 per cent.

This is in part because manufacturing processes are more automated. China in particular is not only the fastest-growing market for industrial robotics, it has replaced the US as the biggest market for automation.

In China's 12th Five Year Plan, workforce automation is a strategic area the country's leaders hope will sustain its competitive manufacturing edge.

While China's push has been driven by rising wages and concerns over a "peak-out" of its working-age population, similar trends elsewhere are cause for more concern. Since the 1980s, low-income countries in sub-Saharan Africa have seen declines in their manufacturing share, as have middle-income countries in Latin America, making it less likely manufacturing will provide a route for workers seeking to escape poverty.



Welding machines on a Ford Focus production line in China

Automation alone cannot explain this trend; many emerging economies have seen falls in manufacturing output. An alternative, albeit complementary, explanation for the failure of low and middle-income economies to achieve industrialisation comparable to that of the west is also globalisation itself.

While the transport revolution in general, and the container ship in particular, paved the way for emerging economies to export cheaper, increasingly sophisticated goods, countries with a comparative disadvantage in manufacturing started to import deindustrialisation, as they became more exposed to production costs abroad.

> Although service-led growth is one option, many low-skill services are equally automatable

These declining costs are largely driven by technology. For example, although the employment share of manufacturing in the US has fallen sharply, the output share has remained roughly constant over the past 50 years.

Thus, the US remains a competitive manufacturing location, but without producing many new production jobs. Even in low-cost locations, this will gradually become the case. Estimates by Citi Research show the payback period for industrial robots in China is now less than two years.

While many key technologies of the 20th century — the telephone, the container ship and the computer — helped companies co-ordinate cross-border production, shifting production to cheaper locations, developments in robotics and additive manufacturing have incentivised western companies to bring production back to automated factories.

In emerging middle-income countries, as well as low-cost destinations, labour will struggle to compete with ever cheaper technologies. In the absence of industrialisation as a path towards economic development, countries will need to discover new growth models.

Although service-led growth is one option, many low-skill services are today equally automatable. So the best hope for developing and emerging economies is to churn out more highly skilled workers. This is the lesson from the western experience.

Even though Ford and General Motors have some of the world's most modern factories, Detroit has failed to modernise and produce employment in new industries. By contrast, some older manufacturing cities — New York, Boston and San Francisco — have made the transition to become innovators in services, offering financial and legal services, advertising, data processing and computer systems design.

While emerging economies such as China have been able to industrialise by leapfrogging technologies, the challenge for the next generation of emerging economies is that they will have to leapfrog industrialisation itself.

Models of economic development will need to feature more investment in education, faster implementation of new technologies and — most importantly — higher rates of local innovation. Managing this process is, however, easier said than done.

The writer is co-director of the Oxford Martin programme on technology and employment and Oxford Martin Citi fellow at Oxford university

IF YOU AREN'T AGILE, NEITHER ARE THEY.

No matter how many of your developers practice agile methodology, if your business isn't built to support it at a management level, you won't see the value. The loss? Your profits.

It's time to retool your operations, planning and practices to meet the needs and complexity of a 24/7 development engine that caters to millions of customers.

Introducing agile management solutions from CA.
With a robust portfolio of software tools and the guidance you need to re-engineer your business, CA Technologies has the expertise and technology to help you embrace agility, banish inefficiency, operate with precision and innovate with less risk.

Rally Software, now part of CA Technologies, **HAS BEEN NAMED A LEADER** in the Gartner Magic Quadrant for Application Development Lifecycle Management **FOR THE LAST THREE YEARS.**

Planning
Up to 50% lower cost
Development
2x more productivity
Release
50% faster time-to-market
Operations
2x fewer defects

ca technologies
Business, rewritten by software™

Learn more at ca.com/agiledev

This cloud stands up

Microsoft Azure scales to enable AccuWeather to respond to 10 billion requests for crucial weather data per day. This cloud rises to the challenge when the weather is at its worst.

This is the Microsoft Cloud.

learn more at microsoftcloud.com