Industry 4.0: Building the digital enterprise

Asia Pacific Highlights

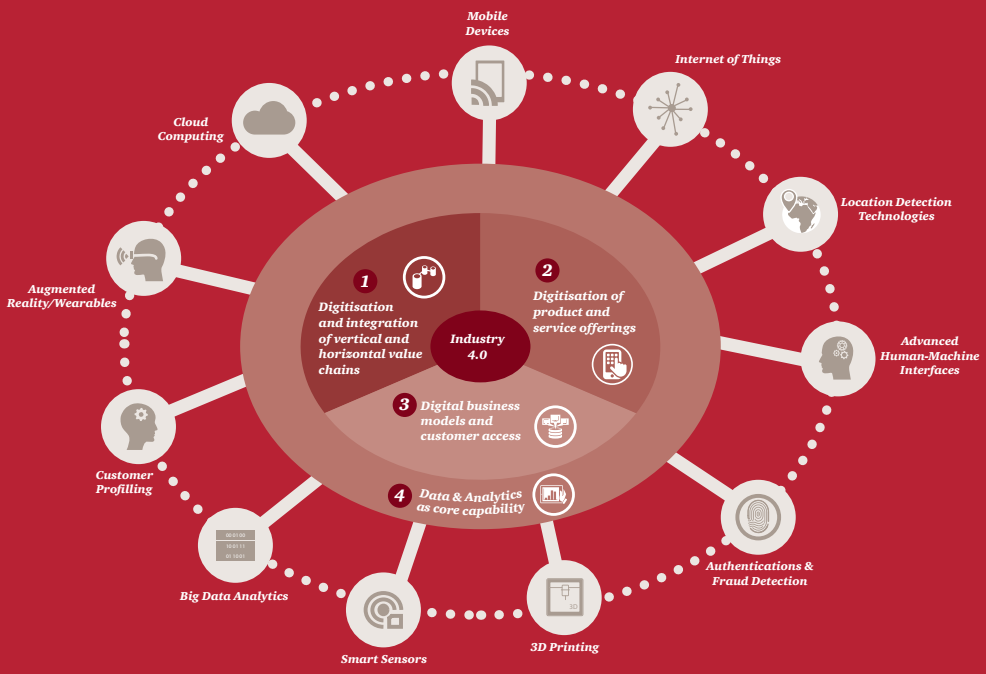
pwc

Behind the scenes of the world's leading industrial companies, a profound digital transformation is now underway. Industrial leaders are digitising essential functions within their internal vertical value chain, as well as with their horizontal partners along the supply chain. In addition, they are enhancing their product portfolio with digital functionalities and introducing innovative, data based services. The 2,000+ industrial companies that we surveyed worldwide (304 in Asia Pacific) are expecting to dramatically increase their overall level of digitisation. While just 33% of them rate their company as advanced today, that number jumps to over 70% looking ahead to 2020.

While terms like the industrial internet are also used to describe these changes, in this report we use Industry 4.0 as a shorthand to describe a journey industrial companies are taking towards a complete value chain transformation (see Defining Industry 4.0).

At the end of this transformation process, successful industrial companies will become true digital enterprises, with physical products at the core, augmented by digital interfaces and data-based, innovative services. These digital enterprises will work together with customers and suppliers in industrial digital ecosystems.

What we mean by Industry 4.0



While the term Industry 4.0 is becoming increasingly familiar, we use it in a specific way in this report. In our view, Industry 4.0 is driven by:

1) Digitisation and integration of vertical and horizontal value chains

Industry 4.0 digitises and integrates processes vertically across the entire organisation, from product development and purchasing, through manufacturing, logistics and service. All data about operations processes, process efficiency and quality management, as well as operations planning are available real-time, supported by augmented reality and optimize in an integrated network.

Horizontal integration stretches beyond the internal operations from suppliers to customers and all key value chain partners. It includes technologies from track and trace devices to real-time integrated planning.

2) Digitisation of product and service offerings

Digitisation of products includes the expansion of existing products, e.g. by smart sensors or communication devices combined with data analytics, as well as the creation of new digitised products which focus on complete integrated solutions. By integrating new methods of data collection and analysis, industrial companies are able to generate data on product use and refine products to meet the increasing needs of end-customers.

3) Digital business models and customer access

Beyond providing digitally enhanced products, leading industrial companies expand their offering by providing disruptive digital solutions such as complete, data-driven services and integrated platform solutions. Disruptive digital business models are often focused on generating additional digital revenues and to optimise customer interaction and access. Digital products and services are often part of serving customers with a complete solutions in a distinct digital ecosystem.

Regional overview

The implementation of Industry 4.0 is in full swing all around the world. More than a third (40%) of the industrial companies in Asia Pacific already rate their level of digitisation as high, and this value is expected to rise to 69% within the next five years.

Industrial leaders in the region are digitising essential functions within their internal vertical value chain as well as with their product development and customer access functionalities. More than half of them plan to invest 6% of their annual revenue or more in digital operations solutions. Furthermore, around the same number expect to see a return on their investment within two years or lesser.

We observed that industrial companies in Asia Pacific have the advantage to leapfrog ahead of those in the developed economies given their greenfield starting positions. As a result, they have fewer legacy issues – pertaining to outdated systems, processes, technological capabilities, and more – that needs to be addressed.

In order for industrial companies to leverage the full value of industry 4.0 they need to overcome key challenges. These include: fostering a strong digital culture (48%); and developing data analytics capabilities (49%). These two challenges alone provide organisations the tools and capabilities to reach their potential.

At the end of this transformation process, successful industrial companies will become truly digital enterprises, with physical products at the core, augmented by digital interfaces and data-based, innovative services.

'Even if only half of the expectations associated with Industry 4.0 are fulfilled, it will fundamentally change the competitive environment in the coming five years.'

Ong Whee Teck

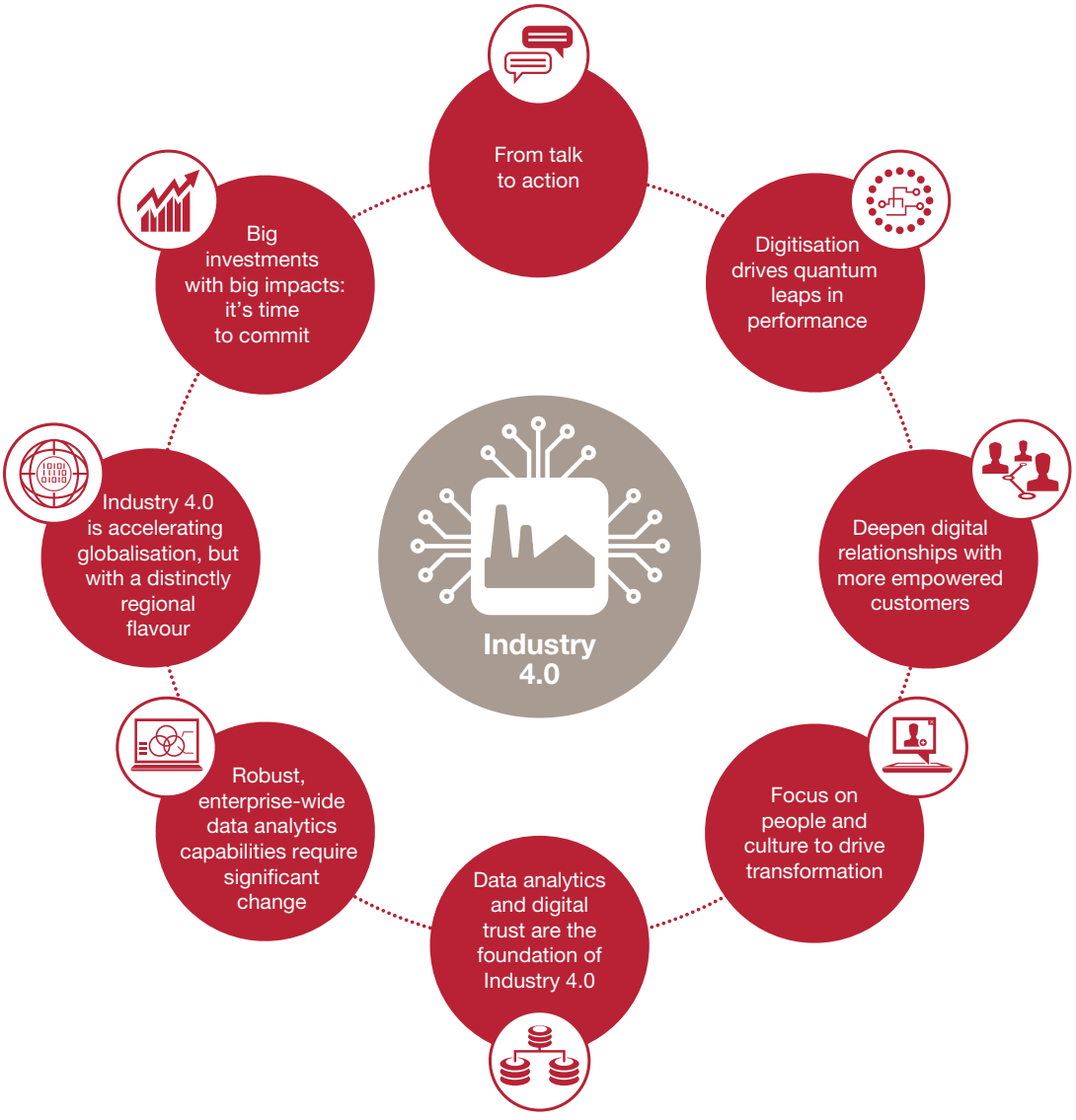
Technology Consulting Partner, PwC South East Asia Consulting

"It is prudent to build up sound expertise in data analytics and digitisation. Companies will need more than individual experts in collecting and evaluating data to implement Industry 4.0 strategies successfully"

Greg Unsworth

Digital Business Leader, PwC Singapore

Key findings from our survey research



Significant increase in digitisation by 2020

Industry 4.0 is no longer a 'future trend'. For many industrial companies, it is now at the heart of their strategic and research agenda.

Over two-fifths of industrial companies surveyed in Asia Pacific believe their vertical value chains and their product development and engineering function are already benefiting from an advanced level of digitisation and integration (see Figure 2).

While advanced digitisation and integration of horizontal value chain (i.e. with suppliers, customers and other value chain partners), digital business models and customer channels are progressing a little slower, big advances are expected in five years' time.

In general, we see that the Asia Pacific region is currently slightly ahead of the global average in their level of digitisation. This may be due to the region's lack of legacy processes, frameworks and systems, which is among the common issues faced by industrial companies in the developed economies.

69%

of Asia Pacific respondents expect to reach advanced levels of digitisation by 2020

Figure 1: Levels of digitisation and integration today and in five years

Q: How would you classify the current level of digitisation and integration in your company today and in the next five years?

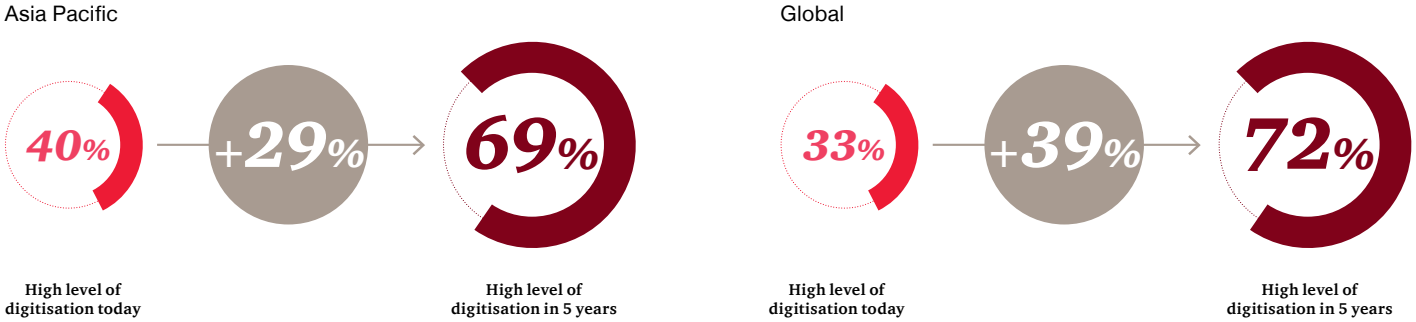
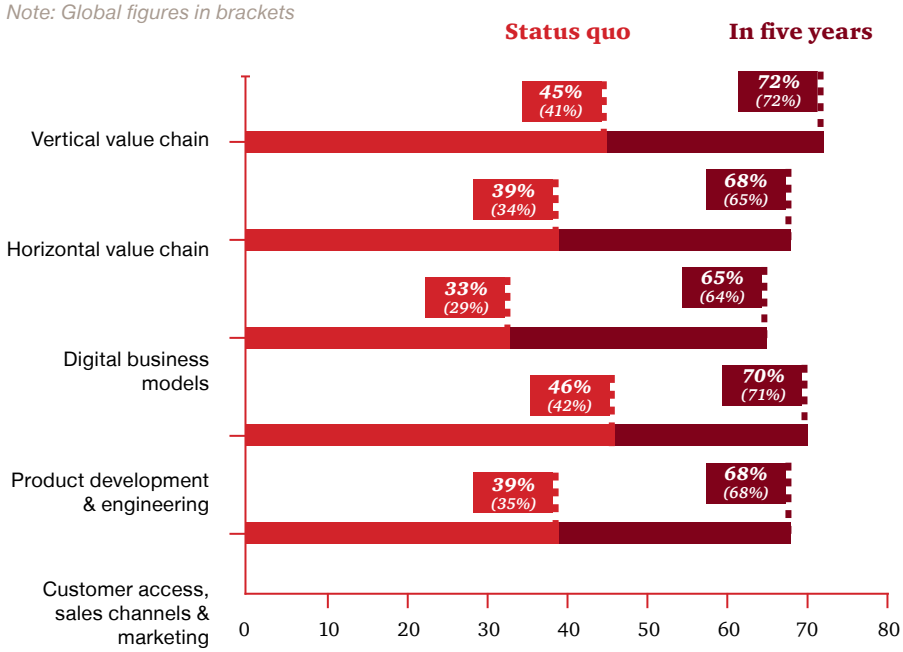


Figure 2: Digital operations - expected developments in Asia Pacific

Q: What levels of digitisation and integration are you expecting in the next five years?

Note: Global figures in brackets



Shown in Figure 1 and Figure 2: Percentage of companies surveyed reporting high degrees of digitisation (4 or 5 on a scale of 1 "very low" to 5 "very advanced")

02 Digitisation drives quantum leaps in performance

Generating additional revenues through new digital products and services

Industrial companies that successfully implement Industry 4.0 no longer need to choose between focusing on a better top or bottom line. They can improve both at the same time.

More than 80% of Asia Pacific respondents are expecting greater than 10% improvement in efficiency gains as well as lowered costs in the next five years, and 69% expect to see more than 10% improvements in generating additional revenue.

On a similar note, nine in 10 industrial companies plan to introduce and invest in at least one digital solution (see figure 4) to generate more revenue over the next five years. When compared with the global average, big data analytics is expected to be the biggest differentiator for the Asia Pacific region as an additional revenue generator, with 47% of its respondents planning to introduce it as a new product/service (global average: 38%).

Over the next five years,

91%

expect more than 10% improvement in efficiency gains, and

83%

expect more than 10% improvement in lowered costs

Figure 3: In addition to massively improved efficiency and costs, majority of decision makers in Asia Pacific expect improvement in additional revenue by more than 10%

Q: What cumulated benefits from digitisation do you expect in the next five years?

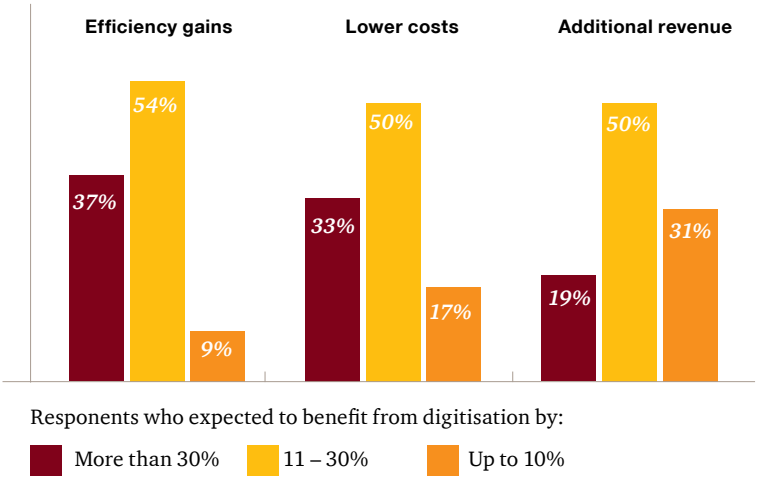
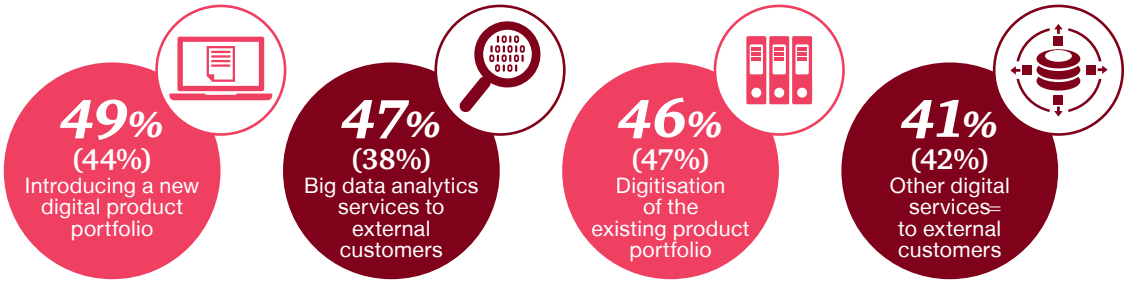


Figure 4: Nine in 10 industrial companies in Asia Pacific plan to expand their digital portfolio over the next five years

Q: Which of the following new digital products or services do you plan to introduce and expect will generate more than 10% of your future revenue over the next five years?

92% Total percentage of industrial companies planning to introduce at least one of the presented digital products and services

Note: Global figures in brackets



Note: Companies achieving 10% or more additional revenue in the following areas over the next 5 years. Multiple answers possible

03 Deepen digital relationships with more empowered customers

Enabling industrial companies to optimise customer relationships

Customers will be at the centre of the changes to value chains, products and services. Products, systems and services will be increasingly customised to customer needs, and many of our survey respondents say they plan to use data analytics to understand and meet them (further detailed on page 8). First movers who are able to establish successful industrial platforms will have a significant advantage over competitors.

Ultimately, industrial companies will need to own relationships with the end customers who drive demand.

Businesses are also strengthening their digital offerings to customers by digitising existing products, as well as developing and introducing new digital products or services. The opportunity is there not only to greatly increase the ability to respond flexibly and more rapidly to customer demands but also to anticipate demands, helping the customer get ahead of themselves in a range of predictive ways.

68%

of industrial companies in Asia Pacific forecast advanced or very advanced digital integration of customer access, sales channels & marketing in the next five years

Figure 5: Industry 4.0 is helping industrial companies in Asia Pacific get closer to their customers

Q: To what extent does your company use big data analytics to improve relationship and customer intelligence along the product life cycle?

Today

49%

(Global average: 51%)

Figure 6: How industrial companies are getting closer to customers

The biggest challenge: Lack of digital culture and training

Industry 4.0 has massive implications on how industrial companies choose to organise themselves and their delivery model. Our survey respondents say that their biggest implementation challenge isn't the right technology, it's a lack of digital culture and skills in their organisation.

The absence of a digital culture and the right training was identified as a top challenge by more industrial companies than any other (see Figure 7) at 48%, followed by unclear economic benefit of digital investments, and the lack of a clear digital operations vision and support, both at 45%.

While investing in the right technologies is important, ultimately success or failure will depend not on specific sensors, algorithms or analytics programmes, but on a broader range of people-focused factors. Industrial companies need to develop a robust digital culture and to make sure change is driven by clear leadership from the C-suite. They will also need to attract, retain, and train digital natives and other employees who are comfortable working in a dynamic ecosystem environment.

48%

of industrial companies in Asia Pacific see lack of digital culture and training as a top challenge to making operations more digital

Figure 7: Establishing digital culture among greatest challenges in Asia Pacific

Q: Where are the biggest challenges or inhibitors for building digital operations capabilities in your company?

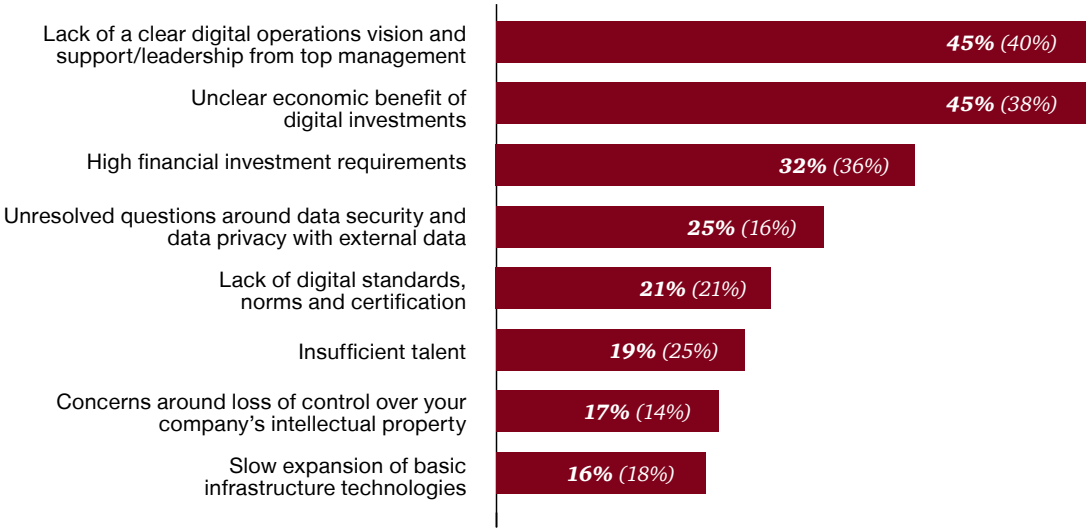
Note: Global figures in brackets

Today

48%

(Global average: 50%)

Lack of digtal culture and training



05 Data analytics and digital trust are the foundation of Industry 4.0

Data at the heart of Industry 4.0

Data fuels Industry 4.0 and successful data analytics is the pre-requisite for successful implementation of digital enterprise applications.

Many industrial companies are already using data analytics to analyse and report on processes (see Figure 8). Our survey respondents say their companies are focusing most on using data analytics to control and improve their overall business as well as manufacturing/operations planning, both today and in five years.

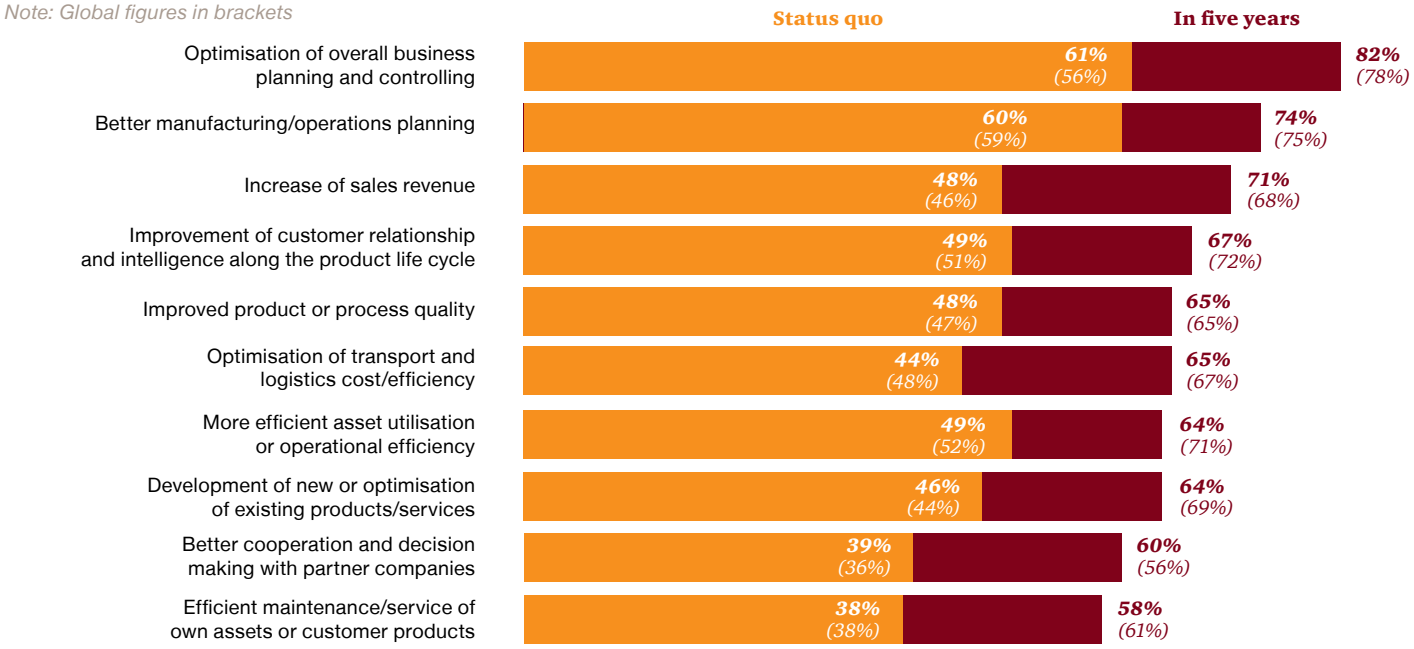
Meanwhile, industrial companies in Asia Pacific lag behind their global counterparts in using data analytics for improving asset utilisation or operational efficiency – at 64% compared to the global average of 71%. This may be due to there is a greater focus on building new infrastructure in the region than on optimising existing ones.

56%

of industrial companies in Asia Pacific see data analytics as important to decision-making today, and 82% agree they will be important in five years

Figure 8: Industrial companies looking at expanding their usage of big data in Asia Pacific

Q: In which areas are you using big data analytics today? / In which additional areas will your company use data analytics in five years?



Digital trust: Operational disruption is the top data security concern

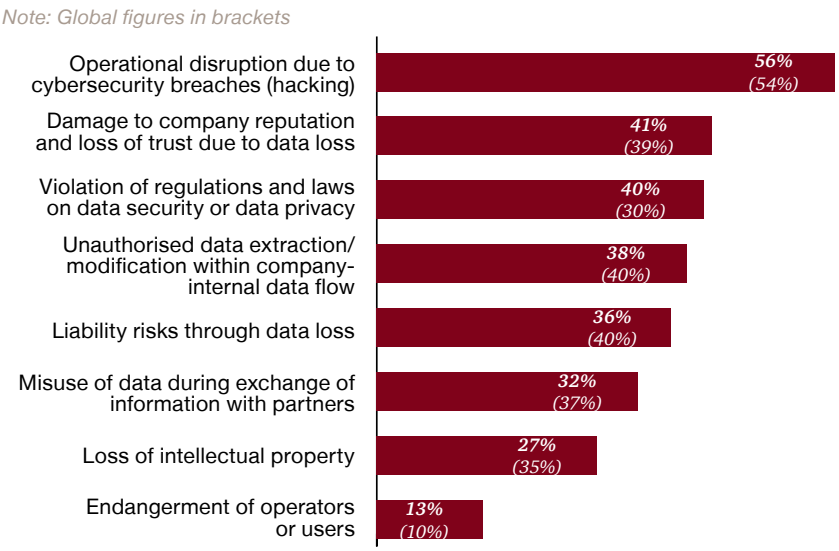
As digital ecosystems expand, so does the importance of establishing strong levels of digital trust, backed up by transparency and non-repudiation that provides proof of the integrity and origin of own and third-party data.

Strong risk management and data integrity systems can help industrial companies avoid breaches and better manage disruption to operations – the #1 data security concern of our survey respondents (see Figure 9).

Meanwhile, recent cases on reputational damage suffered by multinationals in the region, coupled with increased regulatory pressures to meet requiremenets arising from the Personal Data Protection Act (PDPA) and Technology Risk Management (TRM), have heighted industrial companies' awareness to address reputation and data security risks.

Figure 9: Data security concerns in Asia Pacific

Q: What are your main concerns in terms of data security?



06 Robust, enterprise-wide data analytics capabilities require significant change

Nearly half of the industrial companies still need to develop a robust organisation that support data analytics excellence

Only 19% of respondents in Asia Pacific rate the maturity of their data analytics capabilities as advanced (see Figure 10).

Meanwhile, our survey results reveals that opportunities to apply data analytics (i.e: solid business/technology knowledge) is more of an issue for industrial companies in Asia Pacific (see Figure 11). When compared with the global average, these companies have a slightly lower need for skills and competency in data analytics. This may therefore suggest that the biggest challenge for businesses in the region lies in applying these skills to solve business problems and create new digital opportunities.

Figure 10: Data security concerns

Q: What are your main concerns in terms of data security?

Note: Global figures in brackets

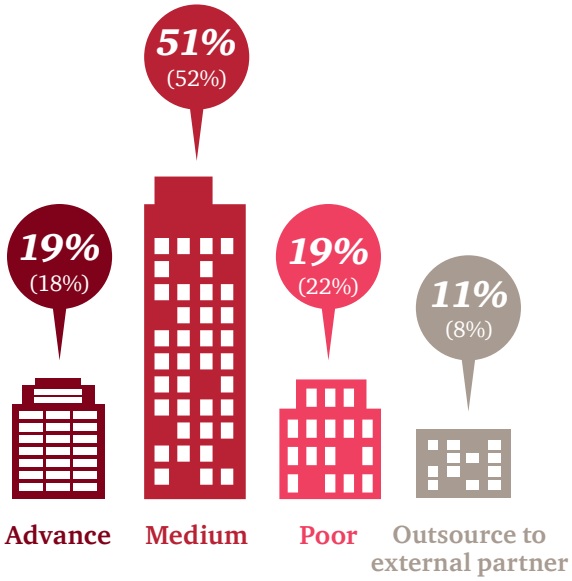


Figure 11: Data analytics – Top three challenges

Q: Where are the biggest challenges in regards to the utilisation of data analytics?

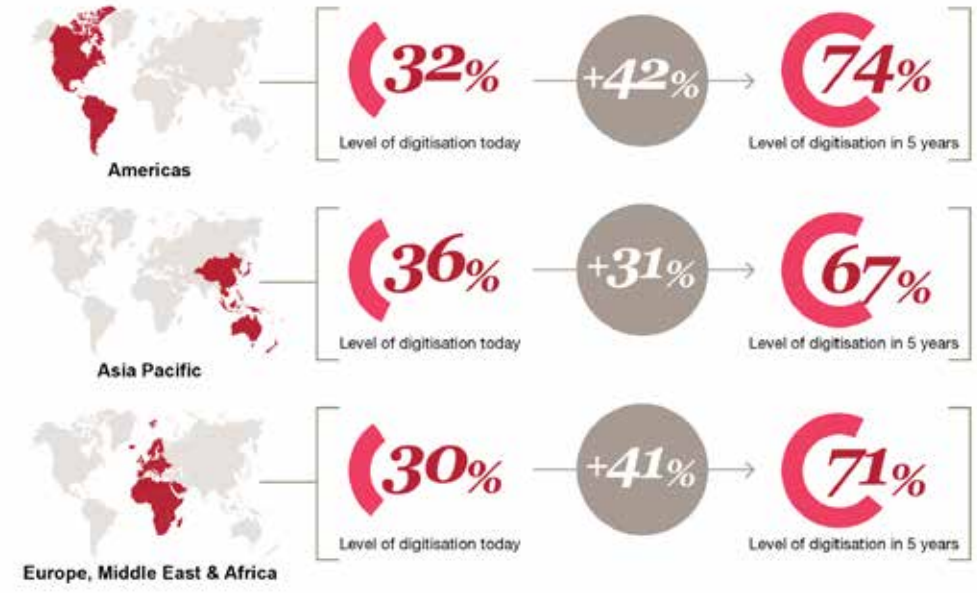
Note: Global figures in brackets

07 Industry 4.0 is accelerating globalisation with a distinctly regional flavour

Industrial companies in all regions are pressing hard on the Industry 4.0 accelerator and expect to secure significant benefits. But it is the industrial companies in the Asia Pacific region that are making the strongest running. They report making significant digital investments and they have already moved further forward in terms of current digitisation and integration. However, looking five years ahead, it is the industrial companies in the Americas, followed by those in EMEA, that are expected to have the largest gains in digitisation levels.

Figure 12: Industrial companies all over the world are expecting to dramatically increase digitisation over the next five years

Q: How would you classify the current level of digitisation and integration in the following areas in your company?// What levels of digitisation and integration are you expecting in the next five years?



08 Big investments with big impacts: it is time to commit

Industrial companies that do not strategically invest will lose competitive advantage

Our survey reveals that around 1 in 5 of Asia Pacific respondents feel their companies lag behind their competitors in digital operations capabilities.

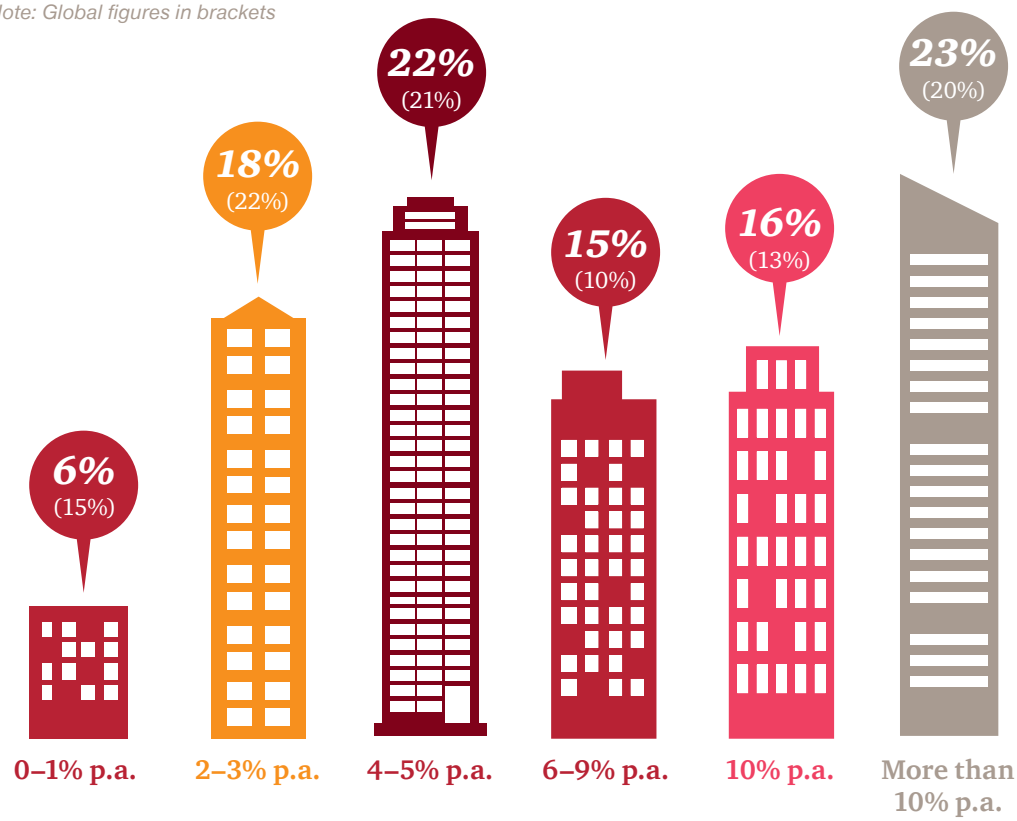
The next few years will be crucial for industrial companies looking to catch up.

About 2 in 5 industrial companies plan to invest 10% of annual revenues or more in digital operations solutions over the next five years (see Figure 13).

Figure 13: Investments in industry 4.0 applications by industrial companies in Asia Pacific over the next five years

Q: How high are your company's current and future investment in digital operations solutions? (Investment as a % percentage of anuual revenue)

Note: Global figures in brackets



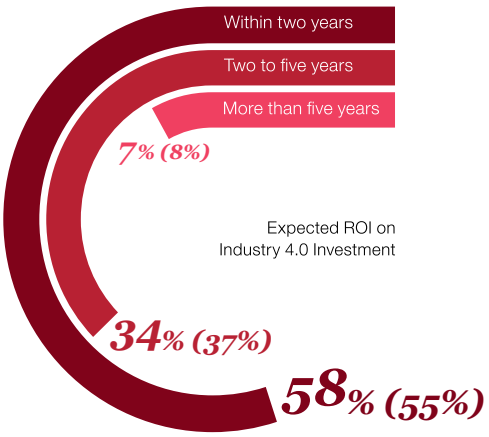
Three in five industrial companies anticipate return on investment within two years

Most industrial companies believe they will see a return on investment (ROI) within two years or less (see Figure 14) for their Industry 4.0 projects. Just over a third of industrial companies anticipate a longer timescale of two to five years, but very few think that it will take any longer than five years for Industry 4.0 investments to pay for themselves.

Figure 14: Most industrial companies in Asia Pacific expect Industry 4.0 investments to pay back within two years

Q: Which return on investment (ROI) period do you expect from your digital investments?

Note: Global figures in brackets



Blueprint for success

To move forward with Industry 4.0, digital capabilities are all-important. These take time and concentration; a step-by-step approach is important. But move with deliberate speed, so that you don't lose the first-mover advantage to competitors.

Blueprint for digital success

1) Map out your Industry 4.0 strategy

Evaluate your own digital maturity now and set clear targets for the next five years. Prioritise the measures that will bring the most value to your business and make sure these are aligned with your overall strategy. Make sure company leadership is ready and willing to champion your approach.

2) Create initial pilot projects

Use them to establish proof of concept and demonstrate business value. Target a confined scope, but highlight the end-to-end concept of Industry 4.0. Not every project will succeed, but they will all help you learn the approach that works for your company. With evidence from early successes, you can also gain buy-in from the organisation, and secure funding for a larger roll-out. Design pragmatically to compensate for standards or infrastructure that don't yet exist. Collaborate with digital leaders outside your organisation, by working with start-ups, universities, or industry organisations to accelerate your digital innovation.

3) Define the capabilities you need

Building on the lessons learned in your pilots, map out in detail what capabilities you need to achieve your vision. Include how enablers for Industry 4.0, like an agile IT infrastructure, can fundamentally improve all of your business processes.

Remember to develop strategies for attracting people and improving processes as well as for implementing new technologies. Your success with Industry 4.0 will depend on skills and knowledge. Your biggest constraints may well be your ability to recruit the people needed to put digitisation into place.

4) Become a virtuoso in data analytics

Consider how you can best organise data analytics; cross-functional expert teams are a good first step. Later these capabilities can be fully embedded in your functional organisation.

Learn to get value out of data by building direct links to decision-making and to intelligent systems design. Use the data to improve products and processes. Think big, but start small, with 'proof of concept' projects.

5) Transform into a digital enterprise

Capturing the full potential of Industry 4.0 entails often requires company-wide transformation. Look to set "tone from the top", with clear leadership, commitment and vision from the C-suite and financial stakeholders. Foster a digital culture: All your employees will need to think and act like digital natives, willing to experiment with new technologies and learn new ways of operating.

Remember that change doesn't stop once you've implemented Industry 4.0. Your company will need to re-invent its capabilities at faster rates than in the past to stay ahead of the game.

6) Actively plan an ecosystem approach

Develop complete product and services solutions for your customers. Use partnerships or align with platforms if you cannot develop a complete offering internally. You may find it difficult to share knowledge with other companies, and you may prefer acquisition. But look for ways to bridge this gap – perhaps with technical standards – so that you can profit from being part of platforms that you don't fully control.

Real breakthroughs in performance happen when you actively understand consumer behaviour and can orchestrate your company's role within the future ecosystem of partners, suppliers and customers.

Methodology

The PwC Global Industry 4.0 Survey is based on research conducted between November 2015 and January 2016 with almost 2,100 senior executives from industrial products companies in 26 countries across Europe, the Americas, Asia Pacific, Middle East and Africa. The majority of participants were Chief Digital Officers or other senior executives with top-level responsibility in their company for Industry 4.0 strategy and activity.

Results were weighted by country GDP to provide a balanced view in global totals. Country results reported are unweighted.

This territory findings report is based on interviews with 304 executives in the Asia Pacific region.

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