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Industry 4.0: Building the digital enterprise

India highlights





Introduction

Behind the scenes of the world's leading industrial companies, a profound digital transformation is now underway. Industrial leaders are digitising essential functions and processes. They are enhancing their product portfolio with digital functionalities and are investing in data analytics as a foundational capability to drive innovation and significant improvements in efficiency. In India as well, we see industrial companies planning to dramatically increase their overall level of digitisation. While just 27% of the Indian respondents rate their company as advanced today, 65% expect their company to reach this stage by 2020.

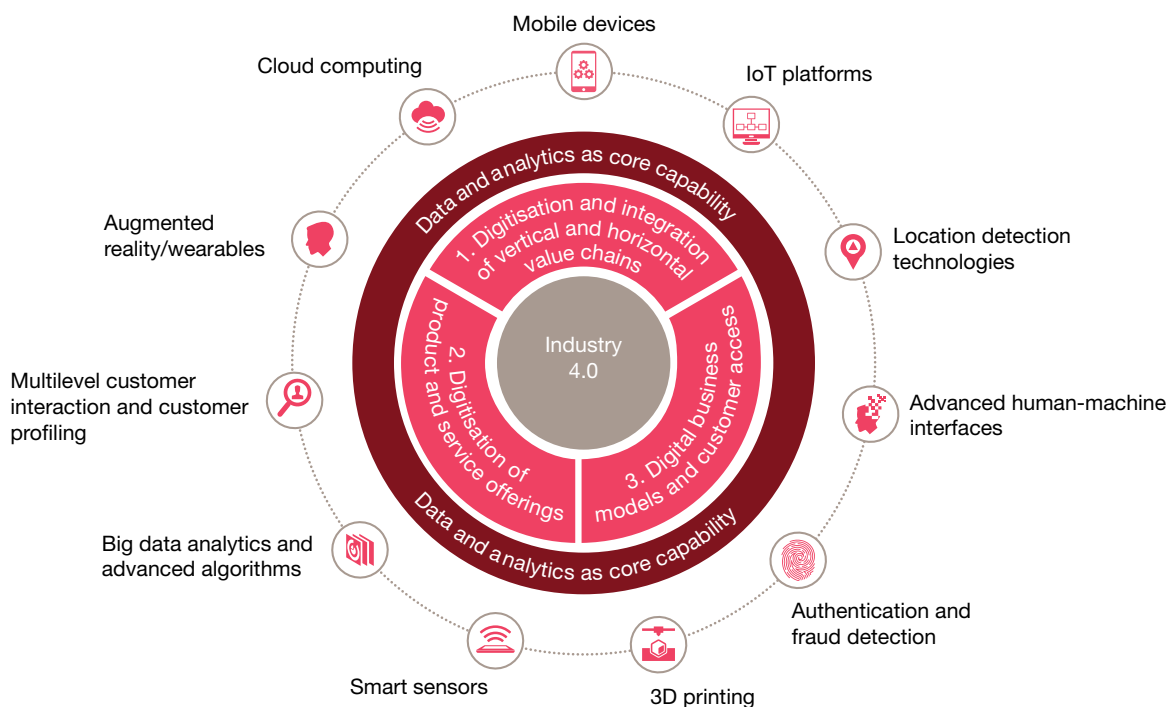
In this report, the term 'Industry 4.0' stands for the fourth industrial revolution. Other related terms include 'industrial Internet' or 'digital factory', although neither takes as complete a view. While Industry 3.0 focussed on the automation of single machines and processes, Industry 4.0 concentrates on the end-to-end digitisation of all physical assets and their integration into digital ecosystems with value chain partners. Generating, analysing and communicating

data seamlessly underpins the gains promised by Industry 4.0, which networks a wide range of new technologies to create value.

While terms like industrial Internet and digital factory are also used to describe these changes, in this report, we use Industry 4.0 to describe the journey industrial companies are taking towards a complete value chain transformation.

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. These developments will fundamentally change individual companies as well as transform market dynamics across a whole range of industries. And that is true in countries all around the world—in both developed and emerging markets.

Industry 4.0 framework and contributing digital technologies



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 the following:

Digitisation and integration of vertical and horizontal value chains

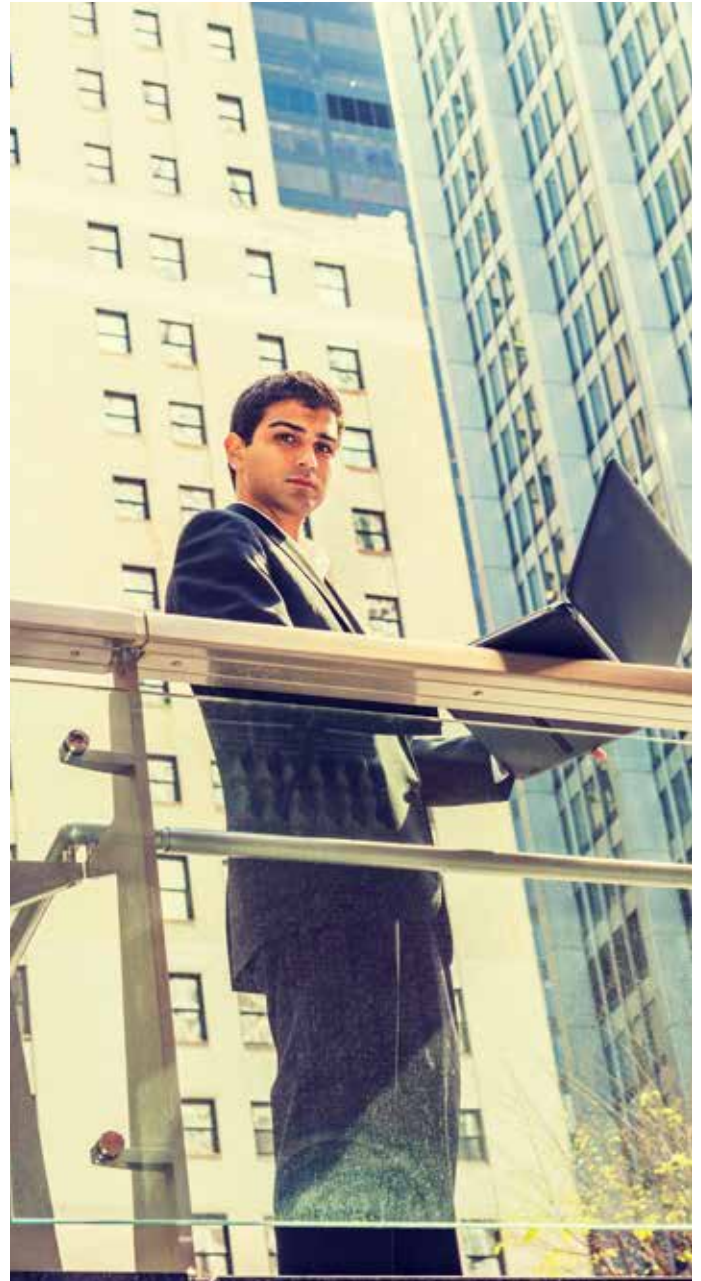
Industry 4.0 digitises and integrates processes vertically across the entire organisation—from product development and purchasing to manufacturing, logistics and service. All data about operations, processes, process efficiency and quality management, as well as operations planning, are available in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

Digitisation of product and service offerings

Digitisation of products includes the expansion of existing products, for example, 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.

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 focussed on generating additional digital revenues and optimising customer interaction and access. Digital products and services are often part of serving customers with a complete solution in a distinct digital ecosystem.



India overview

Digital is now a priority for most CEOs of industrial companies in India. More than a quarter (27%) of the industrial companies in our survey have rated their level of digitisation as high, and this value is expected to rise to 65% within the next five years.

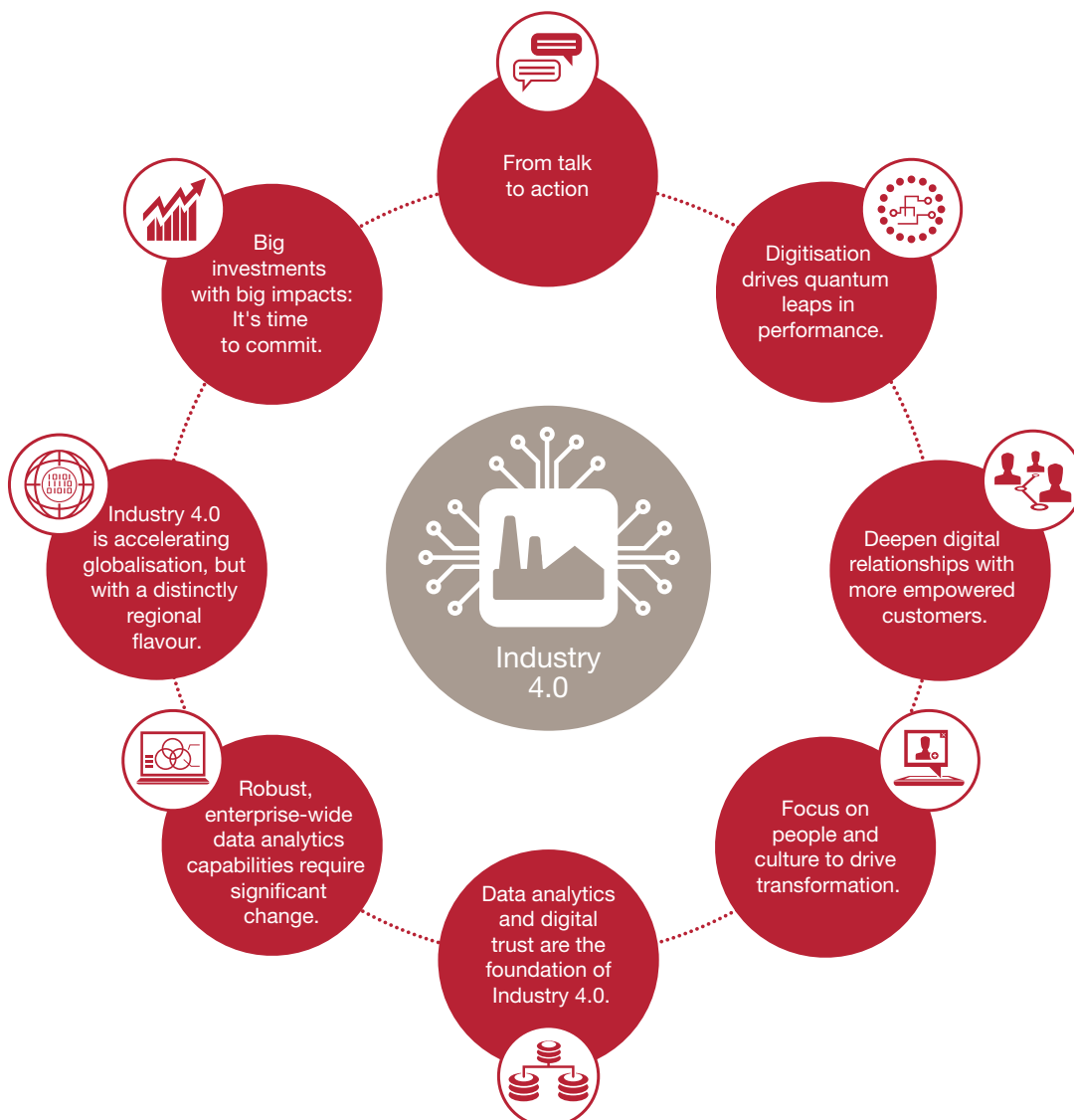
Industrial leaders in India are digitising essential functions within their internal vertical operations processes and are focussed on driving both revenue growth and operational efficiencies by adopting Industry 4.0. Also, 9 out of 10 companies expect to expand their product portfolio with digital offerings.

It was observed that industrial companies in Asia-Pacific and India 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, etc., which need 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 lack of a clear digital operations vision from the leadership (45%), lack of skills in data analytics capabilities (53%) and fostering a strong digital culture (41%). Operational disruption from cyber security breaches is another top concern for Indian industrial companies. Overcoming these challenges will enable them to reach their potential and objectives of digitisation by 2020.

Key findings from our research



From talk to action

Significant increase in digitisation by 2020

Industry 4.0 is no longer a 'future trend'. For many industrial companies, it is now a part of their strategy and research agenda. Companies are combining advanced connectivity and advanced automation, cloud computing, sensors and 3D printing, connected capability, computer-powered processes, intelligent algorithms and Internet of things (IoT) services to transform their businesses.

About 30% of the industrial companies surveyed in India believed their vertical value chains and their product development and engineering functions were already benefitting from an advanced level of digitisation and integration.

The areas of focus include digitising and connecting functions, such as digital order processes, customised product development and the automated transfer of product data to connected planning and manufacturing systems, and further on to integrated customer service. These are also the areas that they anticipate will be advanced in five years' time.

Currently, India (27%) is slightly behind the global average (33%) and Asia-Pacific (36%) in terms of level of digitisation. 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 slowly, big advances are expected in five years' time. Most Indian companies expect to reach a digitisation level of around 65% in five years as against 67% in Asia-Pacific.

Figure 1: Industry decision makers expect an overall surge in digital operations

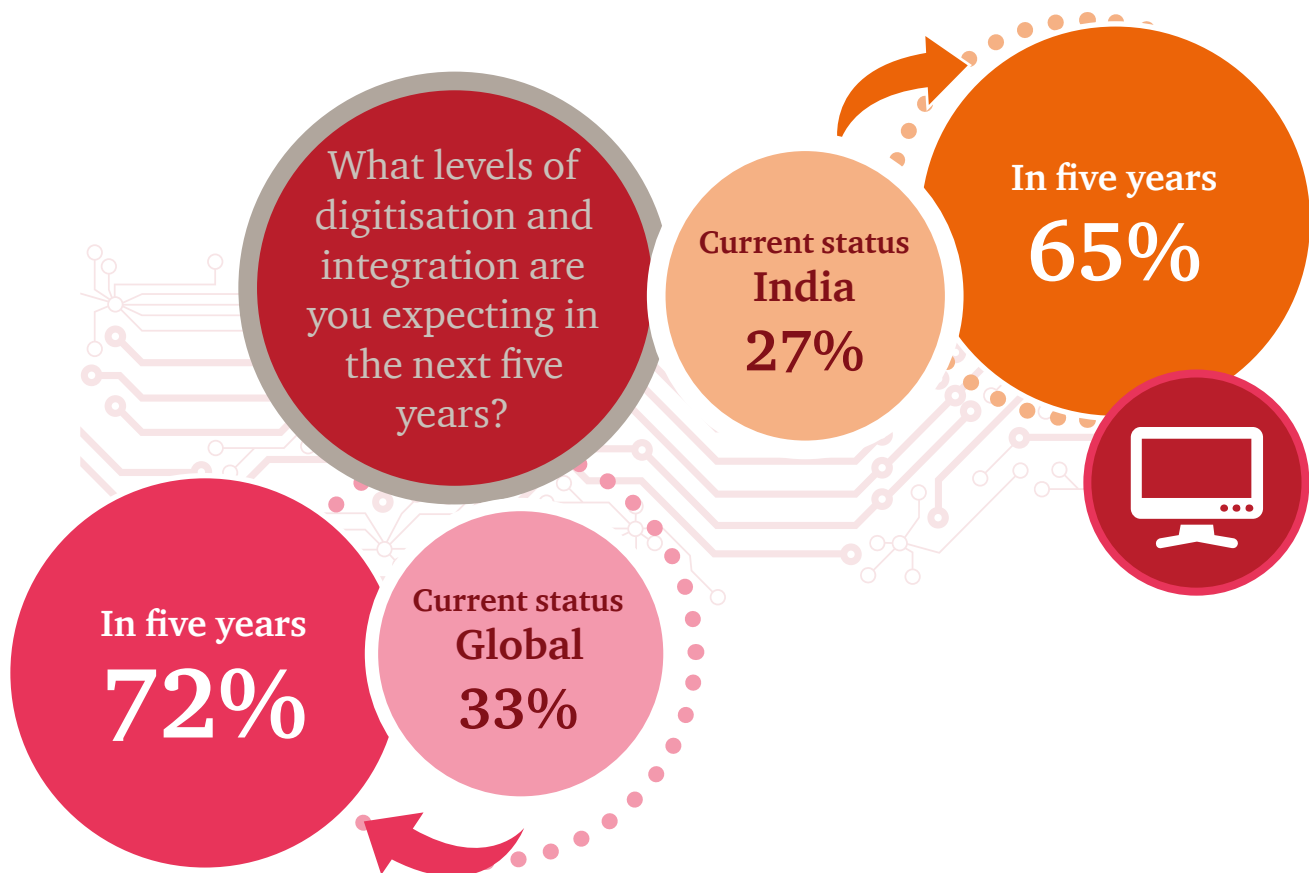
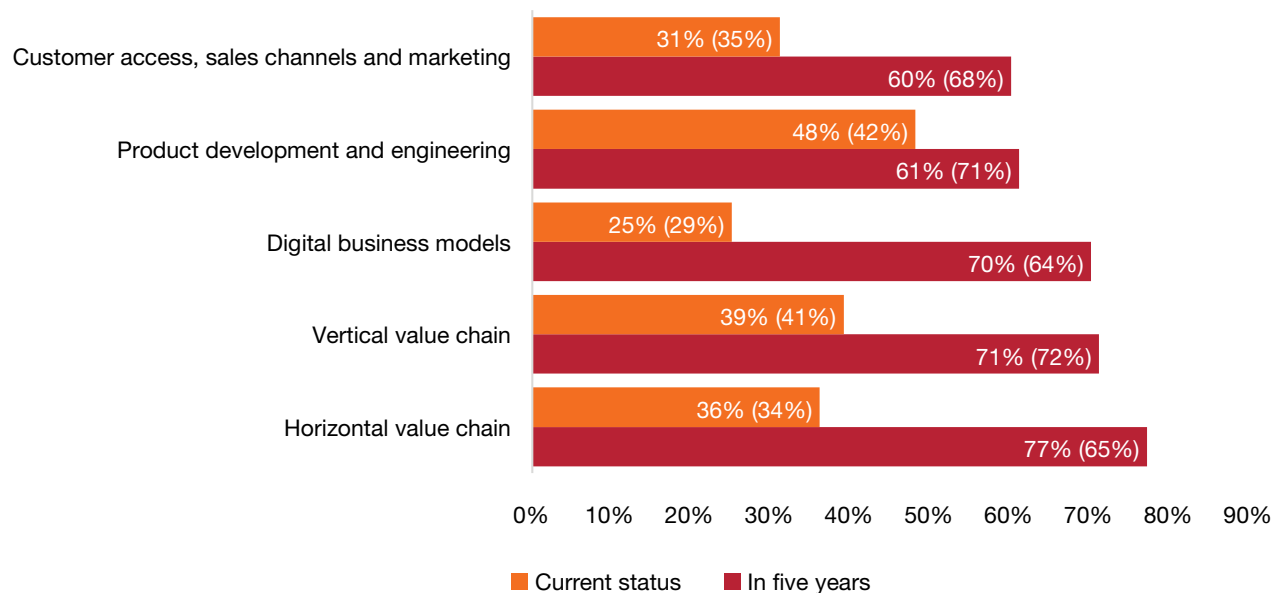


Figure 2: Digital operations: Big gains all across the board

How would you classify the current level of digitisation and integration in the following areas in your company?

Note: Global figures in brackets



Percentage of companies surveyed reporting high degrees of digitisation



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 focussing on a better top or bottom line. They can improve both at the same time. More than 80% of the respondents in India are expecting a greater than 10% improvement in efficiency gains. Also, more than 60% are expecting an over 10% reduction in costs from operations and an over 10% improvement in additional revenue in the next five years. High levels of cost reduction are expected in every industry sector studied for this report. Some of these cost savings can be achieved by implementing smart manufacturing initiatives such as integrated planning and scheduling for manufacturing. Such systems combine data from within the enterprise—from sensors all the way

through to enterprise resource planning (ERP) systems—with information from horizontal value chain partners, like inventory levels or changes in customer demand. Integrated shop floor planning improves asset utilisation and product throughput time. Another example is predictive maintenance of key assets, which uses predictive algorithms to optimise repair and maintenance schedules and to improve asset uptime.

Nine in ten industrial companies plan to introduce and invest in at least one digital solution to generate more revenue over the next five years. Also, Indian companies seem to believe that they will benefit more from digitising their product portfolio or introducing newer digital products. In contrast, their global counterparts think that enhancing digital services to customers will be more beneficial.



Figure 3: Revenues from digitising the product and service portfolio to grow significantly in the future

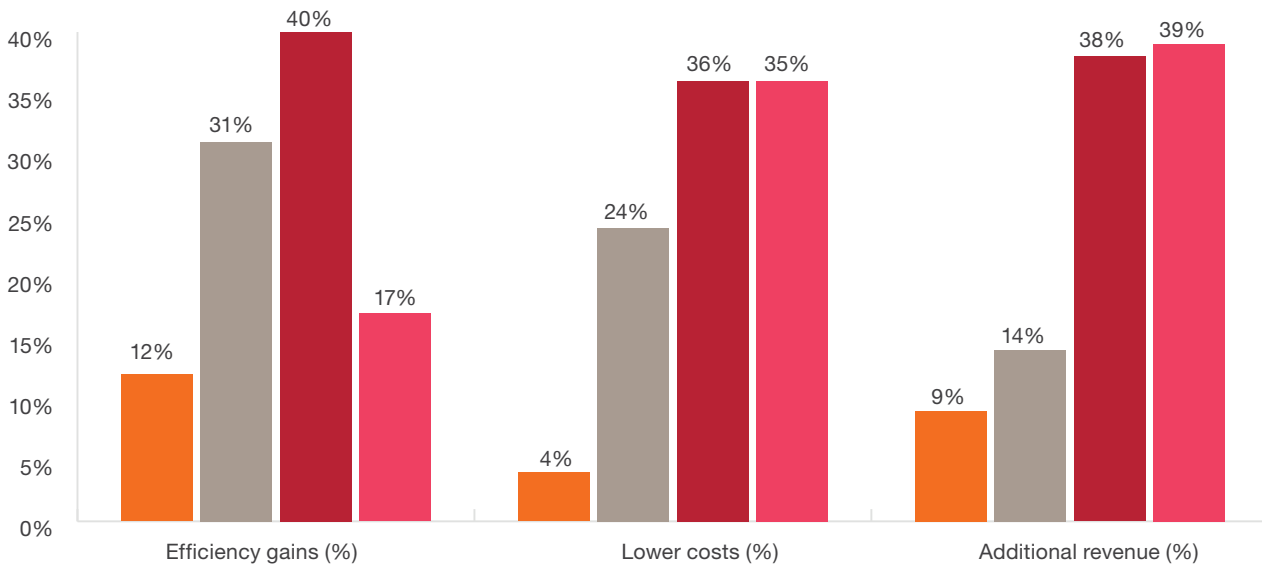
Which of the following new digital products or services do you plan to introduce and expect will generate more than 10% of your future revenue over the next five years?

Note: Global figures in brackets



Figure 4: In addition to improved efficiency and costs, double-digit revenue gains are expected by a majority of decision makers

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



Respondents who expect to benefit from digitisation by:

More than 50% 31-50% 11-30% Upto 10%

Note: Percentages have been rounded off.

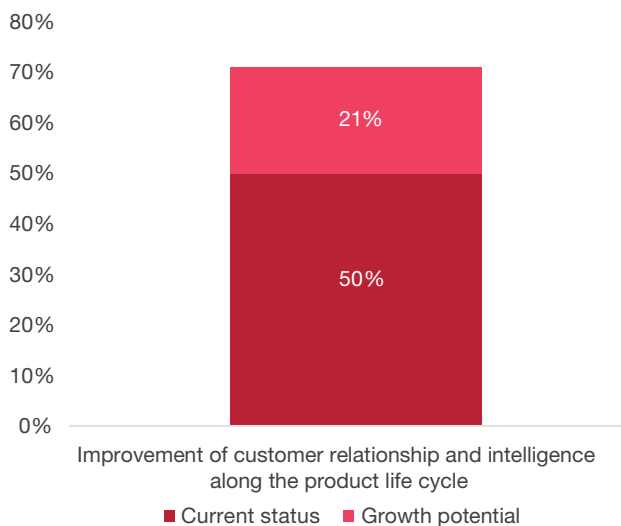
Deepen digital relationships with more empowered customers

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 (53%) said they plan to use data analytics to understand and meet them. 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 consumers who drive demand, even if that is not a model they are pursuing today. Businesses are also strengthening their offerings to customers by digitising existing products, either by offering them through digital channels, offering connected services or using data analytics to find hidden correlations to identify new product ideas even before customers know they want them. 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, thereby helping customers get ahead of themselves in a range of predictive ways.

Figure 5: Nearly three-quarters of companies (71%) expect the use of data analytics to substantially improve customer relationships and customer intelligence along the product life cycle in the next five years

To what extent does your company use big data analytics to improve relationship and customer intelligence along the product life cycle today and to what extent is it expected to do so in the next five years?



Greater integration of data between manufacturers and customers can open up new collaboration opportunities. Clever use of pooled data, for example, can allow manufacturers in business-to-business (B2B) markets to help customers in value-chain planning, drive efficiencies within the customer's operations and vice versa. Many companies have such collaborative opportunities in sight. Over a third (35%) of the companies in our survey said they planned to offer their big data services to external companies.



Focus on people and culture to drive transformation

The biggest challenge: Lack of digital culture and training

Industry 4.0 has massive implications on how a company chooses to organise itself and its delivery model. Companies will need to make sure that employees understand how the company is changing and how they can be a part of it.

From our interviews with industrial companies, the biggest challenges centre around internal issues such as culture,

organisation, leadership and skills rather than external issues such as whether the right standards, infrastructure and intellectual property protection are in place. The lack of a clear digital operations vision (45%), the absence of a digital culture and the lack of right training were identified as top challenges by most companies (41%). Lack of skills or competencies in the company's workforce was also rated as one of the biggest challenges by survey respondents when it came to making use of data analytics (53%).

Figure 6: Establishing digital leadership is among the greatest challenges India is facing today

What are the biggest challenges or inhibitors for building digital operations capabilities in your company?

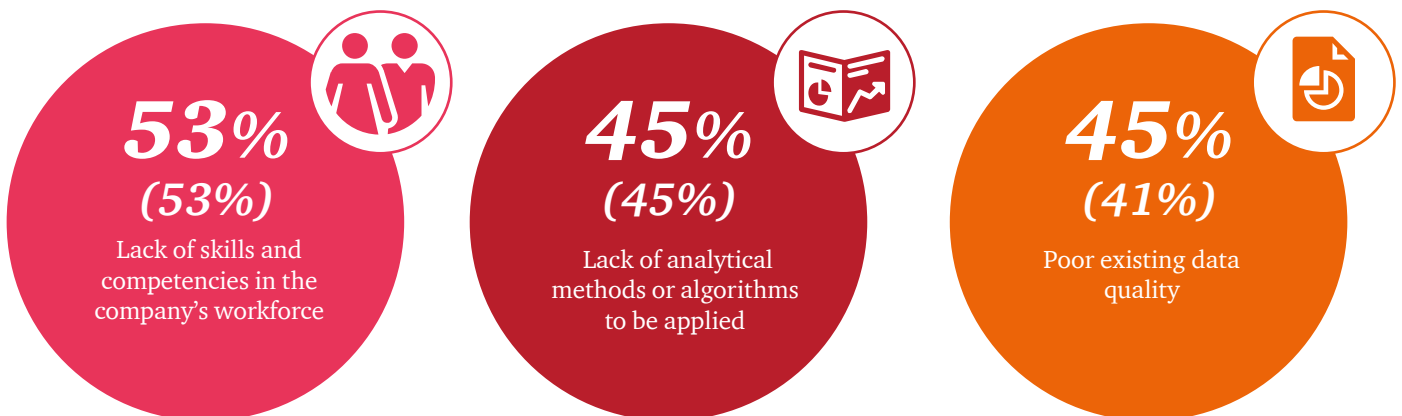
Note: Global figures in brackets



Figure 7: Decision makers mainly address skill-level challenges

What are the biggest challenges with regard to the utilisation of data analytics?

Note: Global figures in brackets



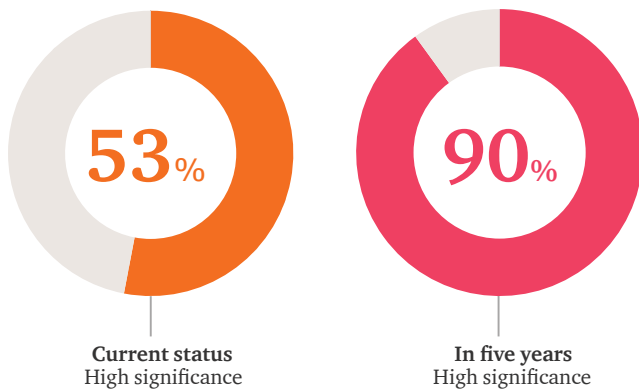
Data analytics and digital trust are the foundation of Industry 4.0

Data at the heart of Industry 4.0

Data forms the core of Industry 4.0 and embedding data analytics in operations workflow will make organisations truly digital enterprises. Around 53% of the industrial companies in India are already using data analytics and 90% expect data to have a significant impact on their decision-making in five years.

Figure 8: Data and analytics are becoming increasingly important to decision-making

What significance does the gathering, analysis and utilisation of data for decision-making have for your company?



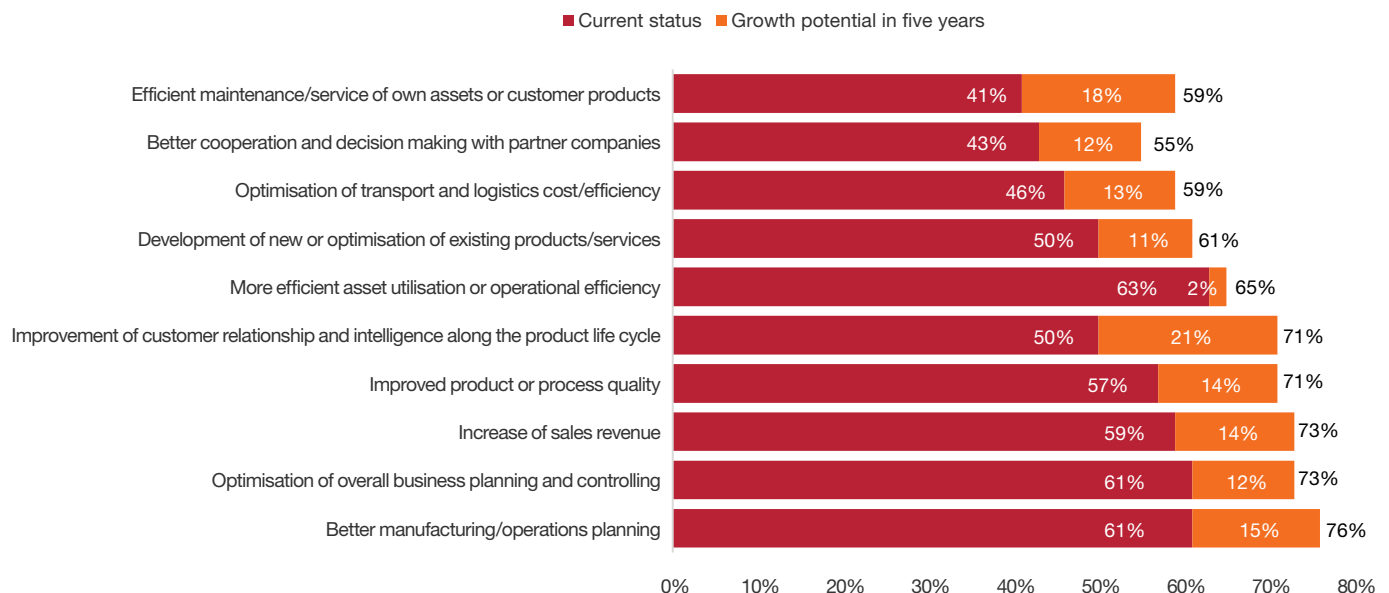
The volume, velocity (data refresh rates) and variety (types of data formats) have exploded in the last few years; hence, it is important to use innovative techniques to analyse structured and unstructured data for deriving meaningful business insights.



Our survey respondents feel that their companies are focussing the most on efficient asset utilisation, both for now and for the next five years.

Figure 9: Industrial companies are expanding the usage of data and analytics in India

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



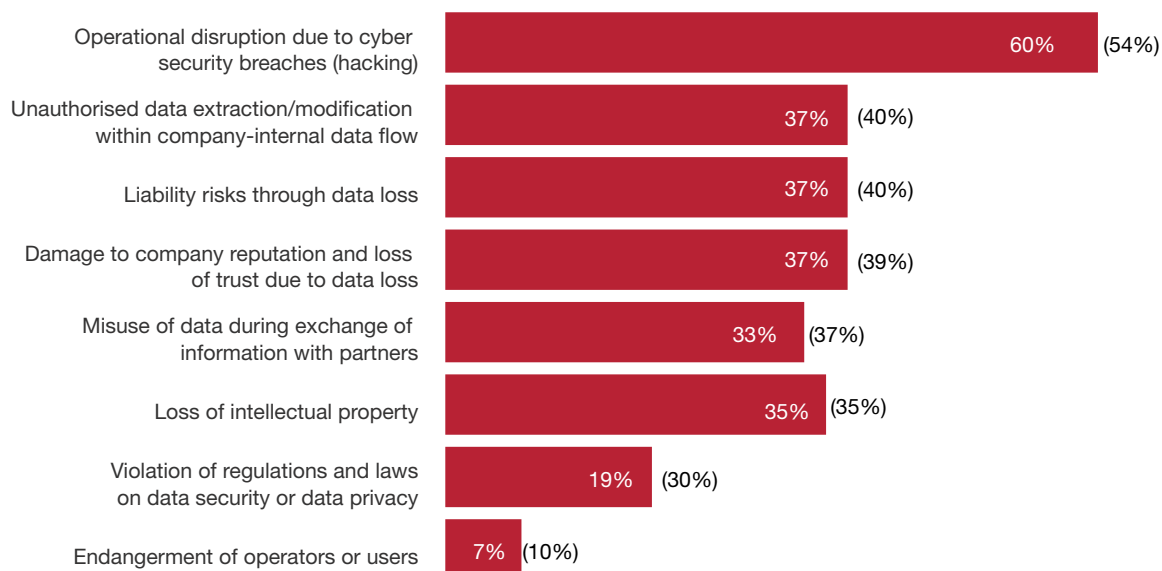
As industrial organisations are increasingly operating in digital ecosystems, it is important for them to treat data security as an integral part of systems and processes. Around 60% of the industrial companies in India feel that operational disruptions due to cyber security breaches are the main

concern. Their other concerns include unauthorised data extraction and liability risks due to data losses. Although digital trust is a complicated issue, it is based on three pillars: transparency, legitimacy and effectiveness.

Figure 10: Data security concerns in India

What are the main concerns in terms of data security?

Note: Global figures in brackets



Robust, enterprise-wide data analytics capabilities require significant change

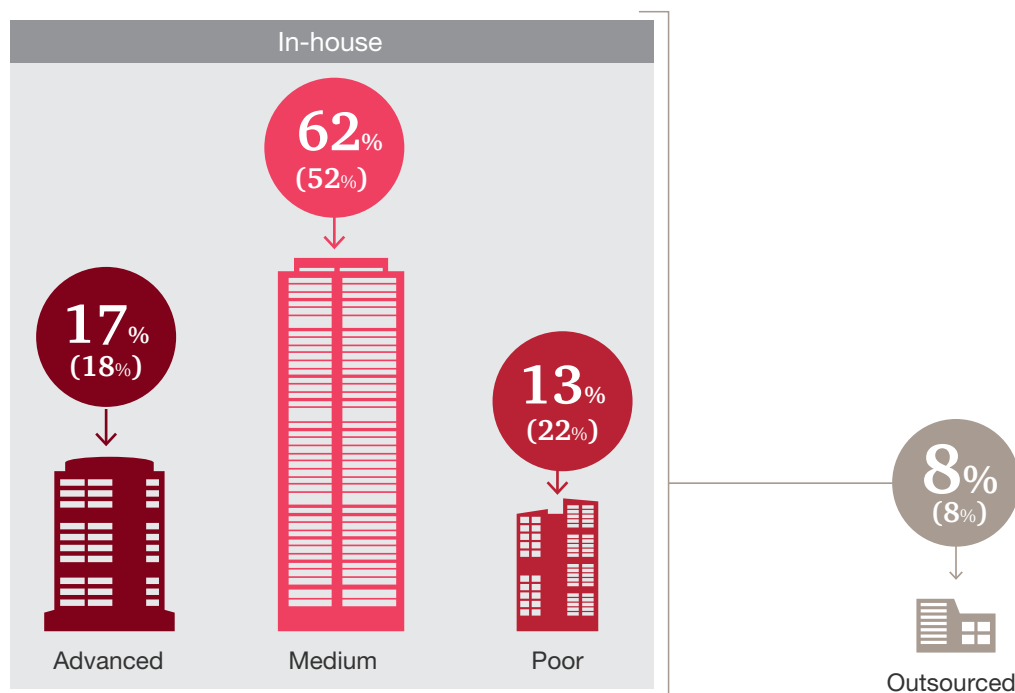
Seventeen per cent of the respondents in India rated their maturity in data analytics as advanced, while the majority (62%) rated it as medium, which is better than the global result (52%) for medium. Also, Indian companies match their

global counterparts in outsourcing analytics to external partners to the tune of 8%. This points to a trend where Indian and global enterprises are looking to build in-house capabilities in data analytics, rather than outsourcing it.

Figure 11: Lack of mature data analytics capabilities

How mature are the data analytics capabilities in your organisation?

Note: Global figures in brackets



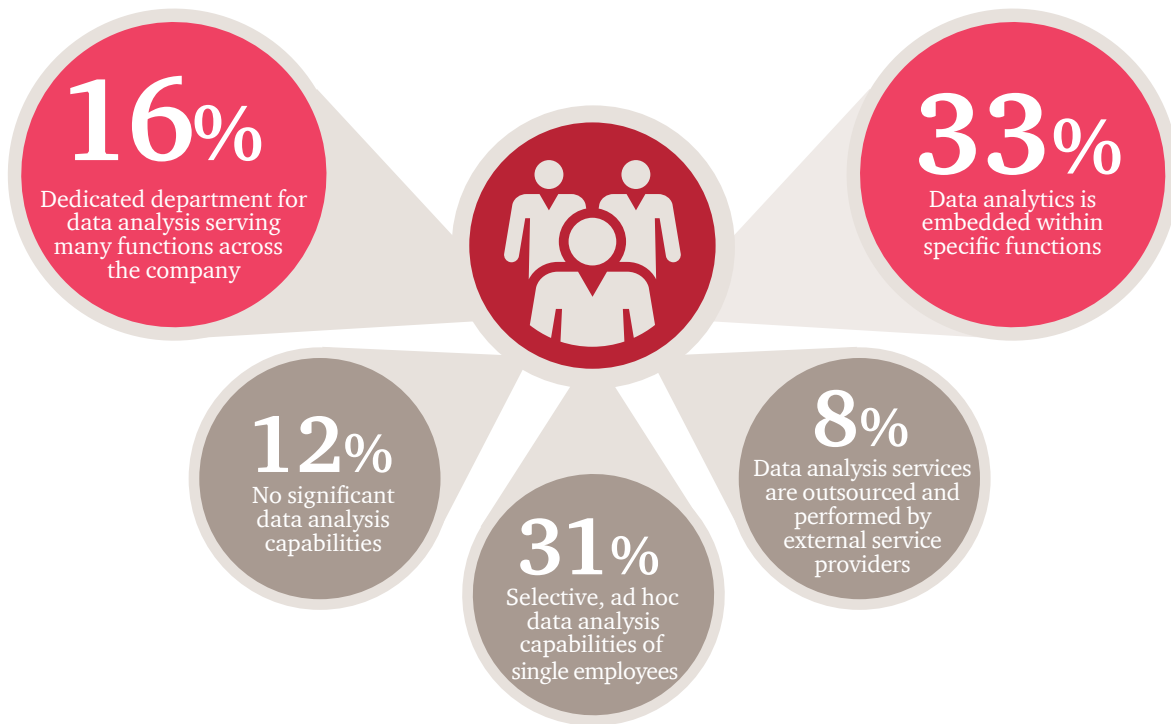
Industrial companies have not been able to utilise data analytics effectively in their operations. More than half of the companies either rely on the selective, ad hoc data analytics capabilities of individual employees or have no significant data analytics capabilities at all.

One-third have embedded data analytics into specific functions, giving themselves the flexibility and proximity to business knowledge in order to fully utilise the potential of data analytics. Around 16% of Indian industrial companies have a dedicated department for data analysis serving many functions across the company. This is higher than the global figure of 14%.



Figure. 12: Nearly half of the companies need to develop a robust organisation that supports data analytics excellence

How are data analytics capabilities organised in your company?



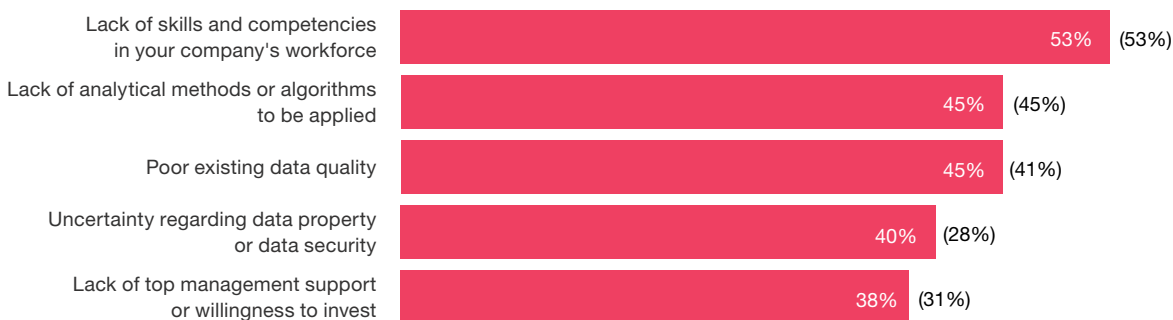
Industrial companies need to develop various skills in order to excel in data analytics, including data management, statistical modelling and data visualisation in addition to workflow integration for decision support. Our survey results shows that lack of these skills sets is a major concern for the companies in India as there is a general scarcity of

individuals trained in analytics. Other challenges include lack of analytical methods and overall poor quality of data. However, organisations can overcome the challenges if they follow the strong data governance and structured analytics development methodology.

Figure 13: Data analytics: Top five challenges

What are the biggest challenges with regard to the utilisation of data analytics?

Note: Global figures in brackets



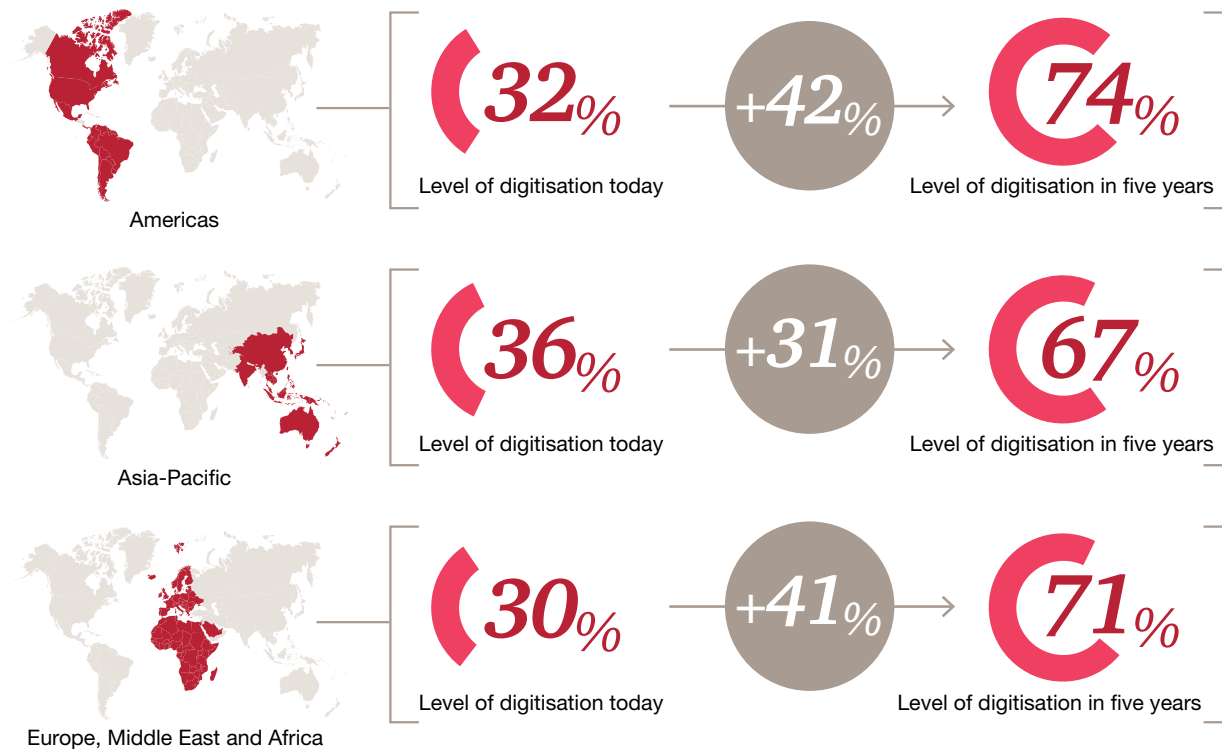
Accelerating globalisation, but with distinct regional flavours

Many industrial organisations have operations across the world, so successful Industry 4.0 implementation is not limited to specific countries and can be done across the globe. The companies in the Asia-Pacific region currently have the

highest level of digitisation. However, the companies in the Americas and Europe, the Middle East and Africa (EMEA) are more confident of increasing their digitisation in the next five years.

Figure 14: Companies all over the world are expecting to dramatically increase digitisation over the next five years

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

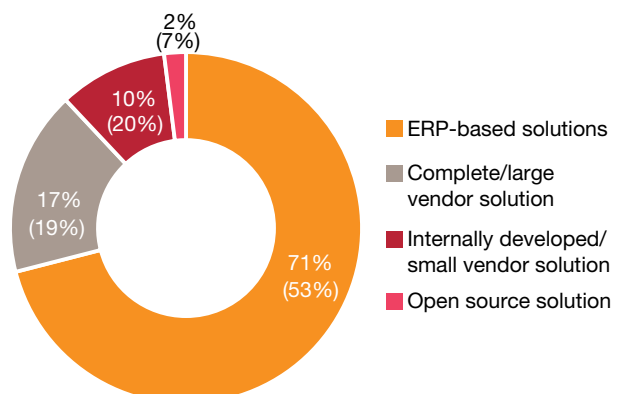


More than two-thirds (71%) of the organisations in India prefer ERP-based solutions for their big data platform. This is followed by large vendor solutions and internally developed solutions. Further, only 2% of the Indian industrial companies prefer to have open-source solutions, whereas globally, a large number of organisations are embracing open-source technologies due to their lower cost of ownership and access to latest research and development. Another area where Indian industrial companies are catching up is the hosting of analytics solutions on the cloud infrastructure where vendors are currently providing analytics as a service.

Figure 15: Preferred big data platform for Indian companies

Which is the most suitable big data analytics platform?

Note: Global figures in brackets
Percentages have been rounded off.



Big investments with big impact: It's time to commit

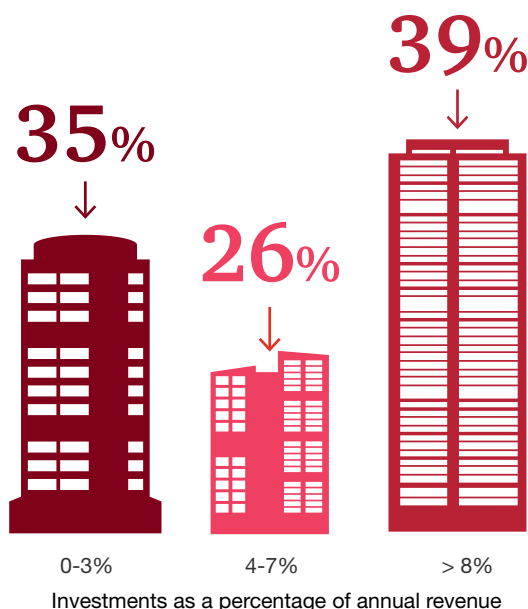
Indian industrial companies are willing to invest heavily in digitisation technologies such as sensors or connectivity devices as well as software and applications such as manufacturing execution systems.

There is a tremendous change in the outlook of Indian industrial companies in terms of their commitment to investments for digital operations solutions. According to the survey, 39% of the companies plan to invest more than 8% of their annual revenues in digital programmes in the next five years, which reflects their commitment to the vision of Industry 4.0.

The survey suggests that the average amount the companies are seeking to invest in the next five years is 5.1% of their annual revenue. Companies are fast realising that being the first mover can provide them with a substantial competitive advantage over other players who have not been investing in digitisation programmes.

Figure 16: Investments in digital applications to increase in five years

How high are your company's future investments in digital operations solutions?



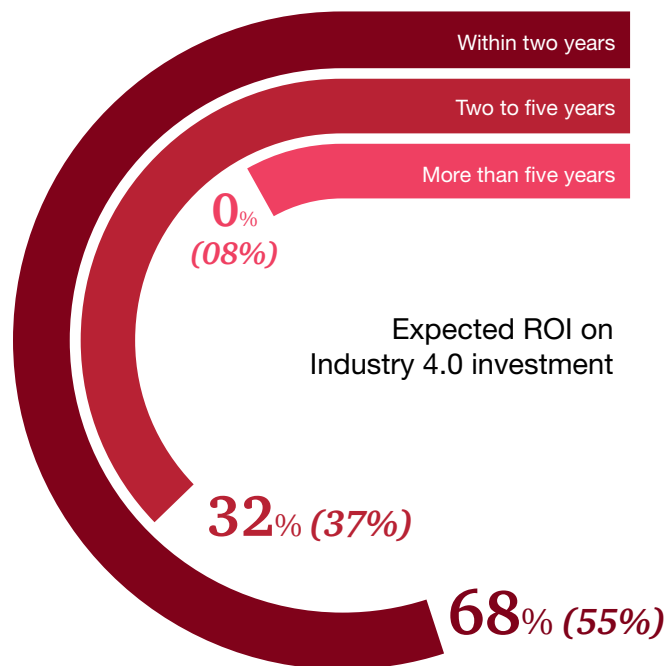
Indian industrial companies are more optimistic than their global and Asia-Pacific counterparts in terms of the payback period. All of them believe that they can get the return on investment (ROI) within five years, with 68% expecting it within two years. Further, a majority of the decision makers believe that it is the right time to invest and they intend to make substantial efficiency gains as well as generate additional revenue using digital technologies in the future.

Organisations need to act fast. Investing sooner and spreading out investments over a period of time will enable companies to avoid any huge capital investment costs later on. Within the next five years, implementation of Industry 4.0 will no longer be a luxury for organisations, but a necessity to drive their operations effectively and profitably.

Figure 17: More than two-thirds of Indian companies expect Industry 4.0 investments to pay back in two years

What ROI period do you expect from your digital investments?

Note: Global figures in brackets



Blueprint for digital success

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

Figure 18: 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 they are aligned with your overall strategy.

2) **Create initial pilot projects** and 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.

3) **Define the capabilities you need** by building on the lessons learned in your pilots, and 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.

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.

5) **Transform into a digital enterprise** as capturing the full potential of Industry 4.0 often requires a company-wide transformation. Look to set the 'tone from the top', with clear leadership, commitment and vision from the C-suite and financial stakeholders. Also, foster a digital culture whereby all your employees think and act like digital natives.

6) **Actively plan an ecosystem approach** by developing complete product and service solutions for your customers. Use partnerships or align with platforms if you cannot develop a complete offering internally.

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, the Middle East and Africa. The majority of participants were chief digital officers (CDOs) or other senior executives with top-level responsibility in their company for Industry 4.0 strategy and activity.

This territory findings report is based on interviews with 52 executives in India.

Contacts

Bimal Tanna

Leader, Industrial Products
bimal.tanna@in.pwc.com

Sudipta Ghosh

Leader, Data and Analytics
sudipta.ghosh@in.pwc.com

Ashootosh Chand

Partner, Digital
ashootosh.chand@in.pwc.com

Regional contacts

North

Dhiraj Mathur

dhiraj.mathur@in.pwc.com

Dinesh Arora

dinesh.arora@in.pwc.com

Pallab De

pallab.de@in.pwc.com

East

Arnab Basu

arnab.basu@in.pwc.com

South

Ashootosh Chand

ashootosh.chand@in.pwc.com

West

Bimal Tanna

bimal.tanna@in.pwc.com

Kavan Mukhtyar

kavan.mukhtyar@in.pwc.com

Nilesh Narwekar

nilesh.narwekar@strategyand.in.pwc.com

Shashank Tripathi

shashank.tripathi@strategyand.in.pwc.com

Sudipta Ghosh

sudipta.ghosh@in.pwc.com

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Arnab Basu

Joyce Lemos

Manan Tolat

Pallavi Dhingra


Sangeeta Singh

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