



Confederation of Indian Industry

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Unlocking the transformational value with technology



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Foreword

In this mobile-first, cloud-first world, businesses have been trying to harness the power of information technology to transform the way they work.

My interactions with business leaders across the industry led me to believe that technology can play a pivotal role in increasing growth, reducing costs of operations, enhancing user productivity and building a sustainable competitive advantage. Leaders are now increasingly confident that strategically leveraging technology adoption will help them stay at par with their global counterparts and significantly enhance their ability to deliver in the international market.

However, while the role of IT has been acknowledged as the driver for innovation and business transformation, there are several hurdles in the way of Indian companies before they can fully embrace the value that technology has to offer. To alleviate this, the government of India has set out a roadmap outlining policies to encourage enterprises to be able to invest more in R&D and to create a pool of qualified and skilled workforce. Industry leaders, too, are going all out to implement newer technological solutions that can help improve productivity, drive efficiency and profitability in their own organisations.

This joint CII-PwC report studied the manufacturing and infrastructure sectors and explored the ground realities in terms



Bhaskar Pramanik
Chairman, CII National Committee on IT, ITeS & eCommerce and Chairman, Microsoft Corporation (I) Pvt Ltd.

of the role and influence of IT in these industries. Some of the key questions that were asked and answered in this report are:

- If technological advances are one of the megatrends expected to transform businesses over the next five years, how are the government and industry strategizing and implementing solutions to tackle roadblocks in the way of technology adoption?
- What are some of the high-level bottlenecks and the probable routes to overcome them?
- How have some of the leading players in the industry brought about innovative ways to conduct their business through the right kind of IT intervention?

Case studies have explored success stories and best practices in detail.

This report has attempted to showcase how technology can bridge the gap between business strategy and operations. Additionally, it looks at how the use of the right IT tools, followed by timely monitoring and corrective actions can catalyse on-time and within-cost execution of projects.

I believe it is going to be an extremely relevant reference document for businesses defining their technology roadmap in order to enhance their performance in the global marketplace.

Introduction

Technology is the backbone of business innovation and all enterprises, big or small, are looking to leverage this enabler in order to maintain the competitive edge in the market.

However, this is easier said than done.

While businesses understand that in order to build an organisation that is agile and suited to withstand current market and economic volatilities, there are several things to be considered before taking a digital leap. More than just a strategy for any individual technology trend or for combining more than one of them, companies need a systematic approach to adopt technologies in a holistic fashion. The industry trends and challenges primarily drive the appropriate selection of technology solutions, which need to be fine-tuned to a company's needs based on its scale, capabilities and its specific issues.

This joint CII-PwC report takes a closer look at two industries in particular, manufacturing and infrastructure, and tries to decode the prevalent challenges in these two sectors, the kind of initiatives being taken to drive growth and development, and how IT adoption is playing an important role to overcome these challenges.

For manufacturing sector CEOs, the key areas of focus are new product innovation and faster time-to-market, cost optimisation through procurement/supply chain analytics, revenue maximisation through better demand forecasting and better understanding of customer needs. For infrastructure sector CEOs, the key areas of focus are collaboration with multiple stakeholders to achieve better efficiency and for achieving delivery of projects on-time at budgeted cost and with promised quality.



CN Raghupathi
Chairman, CII Sub-Committee on 'IT for Domestic Industry' and Head – India Business & VP, Infosys Ltd.

Technology initiatives and investments have to address these key areas. However, such investments in technology will need to be accompanied by a well-defined strategy prepared after careful due diligence and assessment of business requirements and proper risk mitigation. Through relevant user scenarios covering engineering projects and construction (EPC), resources, auto and ancillaries, water, energy, electrical utilities and transportation, we have tried to showcase technologies pertinent to address the operational and functional issues here and the triggers for their adoption.

The 12th Five Year Plan (2012-2017) has set into motion several initiatives that could help these industries to break away from the traditional mode of operations. This will help them make their presence felt in domestic and international markets through provisions for resources and regulations more conducive to digitisation for newer ways of doing business. At the same time, industry leaders are themselves proactively trying to leverage the power of technology to streamline processes, drive efficiency and productivity, establish better connect with their customers and bring innovative products to the market.

Even in the face of challenges in the manufacturing and infrastructure sectors, opportunities are abound to drive economic growth and help make India more conducive for conducting business and attracting foreign investment. It is all about evaluating and executing business strategies to deliver the right value at the right time through the right medium. And the right medium is undoubtedly technology, a powerful catalyst in driving growth in the Indian industry.



Market trends



The global economy may be recovering slowly, but with immediate pressures easing, CEOs across the world are now more optimistic and are making the transition from survival mode to growth mode. The changes they are executing in their organisation are no longer just about protection from economic turmoil. They are concentrating now on building the stepping stones to a future of growth and development. As per PwC's 17th Annual Global CEO Survey, the number of CEOs who believe that the global economy will improve over the next 12 months has doubled to 44%, compared to the previous year. On the other hand, only 7% of CEOs, compared with 28% last year, think that things will get worse towards the year ahead. Additionally, CEOs are feeling better about their own companies' prospects, with 39% now very confident of revenue growth in 2014.

This confidence is evident among India CEOs as well who are counting on domestic demand as well as their ability to deliver profitable growth in India and abroad. They are also aware of the huge market potential that India's middle class and the 'emerging middle' that lies just below, are creating for them. Revenue

growth is also expected to come from the new markets that are being explored beyond the borders as well from the new pockets of opportunities within India being driven by rapid urbanisation and rising incomes in rural and semi-rural regions.

India's emerging middle is creating huge market potential

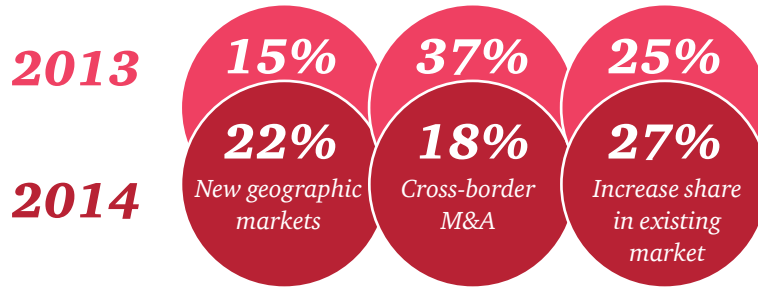
India's income distribution (millions)		Population (millions)	
Household income / year (INR)		2010	2021 (Projection)
> 850,000	Upper middle +	80	190
300,000 – 850,000	Middle	170	300
150,000 – 300,000	Emerging middle	470	570
< 150,000	Low	460	290

Source: PwC analysis, NCAER, CMI
*Purchasing power parity (PPP)





Indian companies are increasing their focus on new geographic markets



Source: 17th Annual Global CEO Survey
Base: India (2014=77; 2013=73)

PwC's 17th Annual Global CEO Survey has also thrown up three megatrends that CEOs think will transform their business over the next five years:



Technological advances



Demographic shifts



Shifts in global economic power

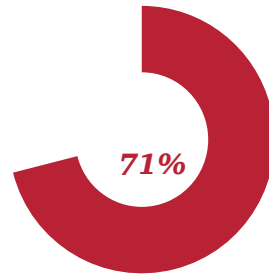
India CEOs are in agreement with their global counterparts and are increasingly recognising how these trends are interacting with each other to change consumers, the workforce as well as the operating environment.

CEOs identified three transformative global trends

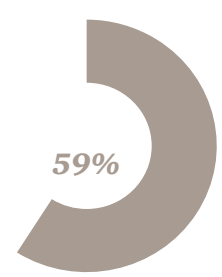
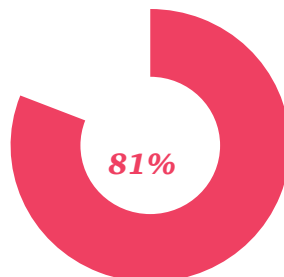
Which global trends do you believe will transform your business the most over the next five years?



India



Global



Technological advances

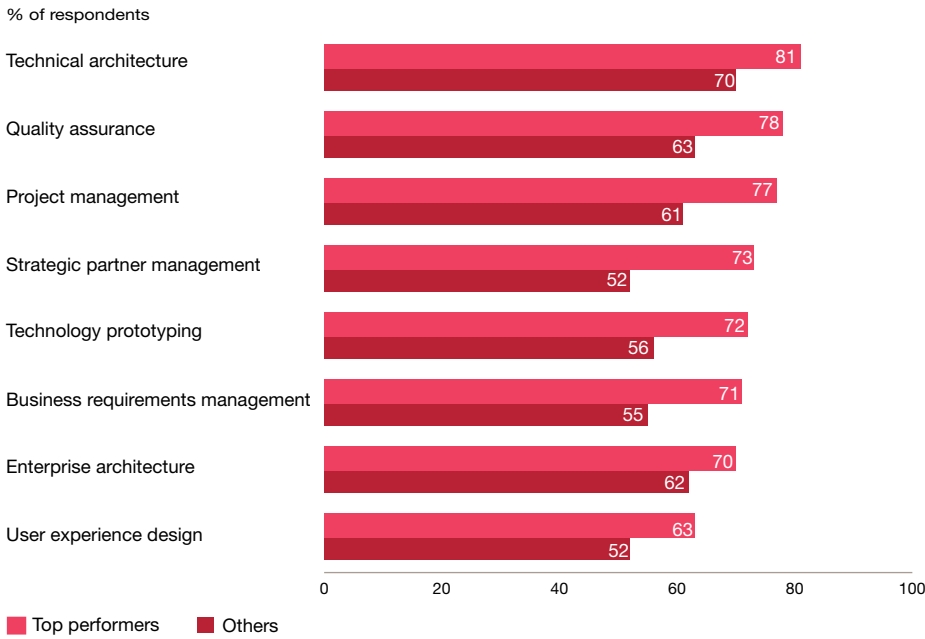
Demographic shifts

Shifts in global economic power

Source: 17th Annual Global CEO Survey
Base: All respondents (1,344); India (77)

Digital capabilities require a blend of traditional and new IT skills

Top performers were more likely to have stronger skills in crucial digital areas like enterprise architecture and user experience design.



It is not surprising then that digitisation, among others, tops the list as the driving force behind business transformation.

Already, the way business is being conducted is undergoing a paradigm shift. The CIO is now a strategic partner and an integral part of the boardroom driving conversations on evolving the business model to compel innovation. It is now imperative to run IT as a business, constantly focussing on how to make it perform better and to stay ahead in the market. PwC's 6th Annual Digital IQ Survey reveals that top-performing companies were those that were able to build a collaborative environment for both their IT as well as business functions to foster better. In these companies, while IT understood all aspects of the business, the reverse was also part of the deal.

Q. How would you rate your organisation's IT department on the following skills needed to integrate digital capabilities into your core business?

Respondents who stated 'excellent' and 'very good'

Bases: 375, 1,119

Source: PwC, 6th Annual Digital IQ Survey, 2014

Top 5 strategic technologies

While data, mobile, cloud, social, and cybersecurity technologies rank highly for all companies, what's most important strategically varies by industry.

Technology	Automotive	Business & Professional Services	Energy & Mining	Entertainment, Media, & Communications	Financial Services	Healthcare	Hospitality & Leisure	Industrial Products	Power & Utilities	Retail & Consumer	Technology
Data mining and analysis	●	●	●	●	●	●	●	●	●	●	
Private cloud	●	●	●	●	●	●	●	●	●		●
Cybersecurity	●	●	●		●		●	●	●	●	●
Mobile apps for customer	●			●	●	●	●	●		●	●
Social media for external	●	●	●	●	●	●	●			●	
Digital delivery of products and services		●				●				●	
Public cloud applications				●							●
Robotics			●						●		
Battery and power technologies									●		
Public cloud infrastructure											●
Sensors								●			

Q. Which of these technologies will be of the highest strategic importance to your organisation over the next three to five years?

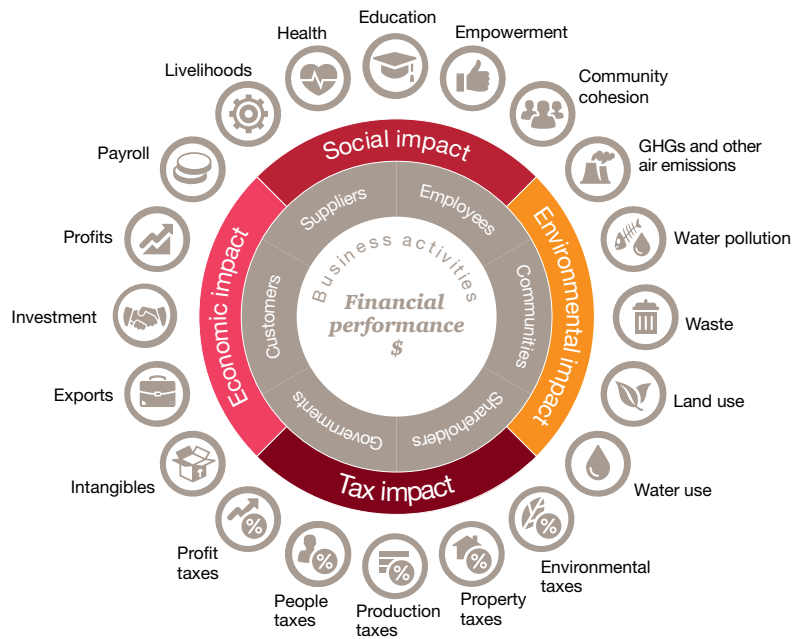
Bases: 375, 1,119

Source: PwC, 6th Annual Digital IQ Survey, 2014



For manufacturing and infrastructure CEOs, talent management and customer strategies, along with R&D and innovation, and usage and management of data and data analytics rank high on the priority list of aspirations. However, such investments in technology and other emerging technologies will need to be accompanied by a well-defined strategy prepared after careful due diligence and assessment of business requirements and a proper risk mitigation roadmap.

Measuring an organisation's total impact helps to show the best route forward



Source: PwC



Technology in the manufacturing industry



While CEOs are emerging from survival mode, the competitiveness in the market is stronger than ever. While growth cannot be denied, not every country is experiencing it at the same pace. Today, the advanced economies are mending themselves, while the emerging economies are slowing down. The BRICS (Brazil, Russia, India, China and South Africa) are no longer the only contenders; other economies are steadily gaining ground. PwC's 17th Annual Global CEO Survey revealed that CEOs in the industrial manufacturing sector are considering high-growth markets outside the BRICS over the next three to five years. The US and Indonesia are heading this list. Germany, Mexico, Thailand and Vietnam also had at least 9% of their votes.

Bottlenecks for the sector

Given this scenario, it is imperative for the Indian manufacturing sector to sharpen its productivity, profitability and competitiveness in order to maintain a place for itself in the global arena. The National Manufacturing Policy (NMP) was announced to make manufacturing an engine of growth by increasing manufacturing sector growth to almost 14% over the medium term. The intent is to have manufacturing contribute at least 25% of the GDP by 2022 from the current 15-16%. The government formed Cabinet Committee on Investment in January 2013 has cleared several big-ticket projects to give impetus to overall growth.

Gap between the allocated government spending and the need to upgrade physical and administrative infrastructure is a hindrance.

In order to achieve this, key areas have been identified.

1. Improve capital and labour productivity

Product lifecycles are shortening forcing Indian manufacturers to rethink their product and service offerings to invest in new product development. The increasing demand has boosted scales of operation. In order to compete on a global level, Indian manufacturers are aiming to improve capital and labour productivity.

2. Define architecture for obtaining necessary environmental clearance for new factories and reforms on land acquisition

This, in turn, has turned the focus on the need for a defined architecture to obtain necessary environmental clearances for new factories and reforms on land acquisition that will ensure a sustainable pace for the process of industrialisation. Further, a shift is required to utilise technological innovation for rising energy needs rather than relying on natural resources

3. Resolve IT adoption issues

Further, increased efforts are required in forming multinational partnerships, alliances and joint ventures in order to secure foreign direct investment (FDI), benefit from advanced technologies, and improve productivity through factory automation. However, one of the most complex areas to manage is the integration of IT and staff commitment to new ways of doing business and support for smooth integration.

Way out

Innovation

IT strategy blueprint

Simulation technologies and automation

Social business intelligence

Mobility

Enterprise performance management (EPM)

Analytics

Supply chain management (SCM)

Enterprise resource planning (ERP)

A large automotive engines and equipment manufacturer's adoption of ERP and CRM helped in the development of a solution roadmap for all its independent product groups and streamlined its workflows as well, while keeping the focus on the customer service function for effective customer interaction and through the creation of a new sales channel by using an internet portal. This also resulted in reducing non-value add activities, thereby increasing the productivity of its employees. A common sales team was established for all lines of business and a relatively smaller marketing team was able to cater to a large client base.

While organisations have already moved in their use of technology, from within enterprise integrated functioning to extended enterprise integration (with vendors and customers), many of them are now trying to build more flexibility for rapid response and changes in the scale of operations. The ability to respond to changes in demand patterns due to shorter product lifecycles, larger variety and increased customisation options is resulting in the need for higher flexibility across the entire supply chain and not just core manufacturing. Technology is playing a crucial role in defining the boundaries of this flexibility right from sensing the changes in demand signals to the ability to promise a definitive supply date to customers to decisions of what, when and where to manufacture as well as source.

However, getting there, across the horizon, means overriding various challenges. Dampened global demand has negatively influenced export volumes. Volatility in currency and interest rates are necessitating frequent changes in, and strengthening of, contingency plans.

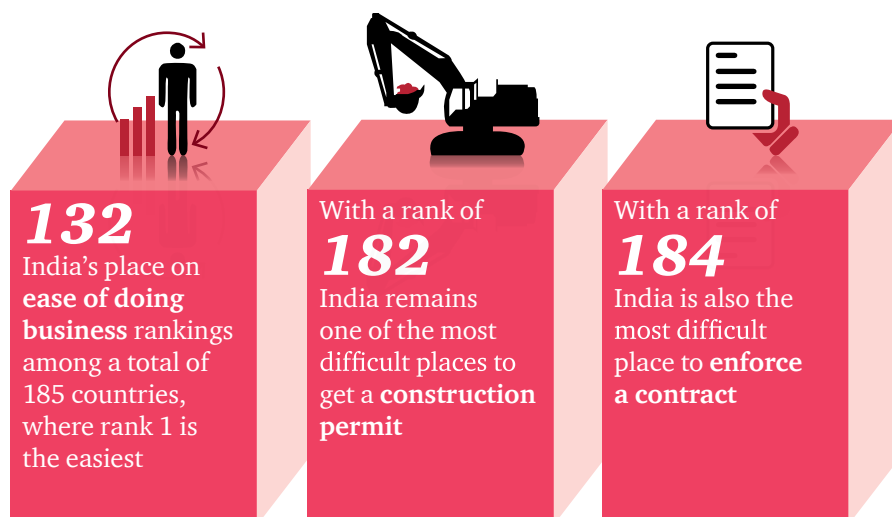
Weakness in demand indicators such as production, order books, capacity utilisation, inventory and exports remains a reason for concern. The growing fiscal deficit is impeding the government's infrastructure spend.

The gap between the allocated government spend and the need to upgrade physical and administrative infrastructure remains a hindrance. Especially, recent power outages and long-term shortage of power is casting a shadow over the sector. Adding to this, lower levels of capital availability and higher financing costs are hampering growth. While high input prices (such as

rising crude prices) are leading to contract pricing gaps, the combination of high inflation and subdued demand is restricting manufacturers to pass material costs to customers thus impacting their margins.

Tax laws lack clarity and archaic labour laws are only fuelling the problem of unavailability of adequate skilled manpower in this sector. More importantly, if innovation and technology have been identified as drivers of change, the industry's commitment to R&D is still not very strong.

Tedious regulations, legislations and taxation



Source: India Manufacturing Barometer Survey, July 2013
The World Bank Group

Tackling the challenges

Efforts are continuously underway to herald the necessary change in the manufacturing sector. The government has taken initiatives to push manufacturing growth and competitiveness through initiatives such as setting up the National Investment Board (for fast clearance of mega projects) and dedicated industrial corridors under the aegis of the NMP. To improve productivity, the sector is capitalising on automation and IT. There is diversification into product mixes with a focus on the changing needs of the consumer, both in domestic as well as global markets.

Though new projects will drive demand, product replacement is also expected to contribute to demand growth. Efforts are being made to improve the consistency of the end product's quality, while reducing process costs and increasing production volumes. There is a push towards relationship building with international partners in order to gain access to newer markets as a strategy for long-term commercial gains.

Attempts at backward integration and establishing relationships with major industry materials and technology suppliers are also being looked into to reduce risks of supply disruptions. Innovation is being targeted in the areas of operations management, process innovation, product design and utilisation of global distribution channels. According to the PwC report, *Rethinking innovation in industrial manufacturing*, improvements in sensor technology and radio frequency identification (RFID) tags are making it possible for machines to talk to each other as also send detailed information about how they're being used. This creates a huge amount of data, which new tools are making it possible to analyse in real-time. Further, there is R&D and investment in areas associated with productivity increases and product quality at the plant level, and in order to do so, they are capitalising on automation. A manufacturer of automation engines and equipments has leveraged IT to develop a roadmap to standardise its processes, enable effective customer interaction and create a new sales channel through the online medium. This increased R&D focus is to further strengthen total solutions capabilities.

The government has taken initiatives to push manufacturing growth and competitiveness by setting up the National Investment Board for fast clearance of mega projects.



The limited, but carefully selected investments are aimed at climbing the value ladder

Top three investment priorities in the next 12 months

New product or service introductions

57%

Research and development

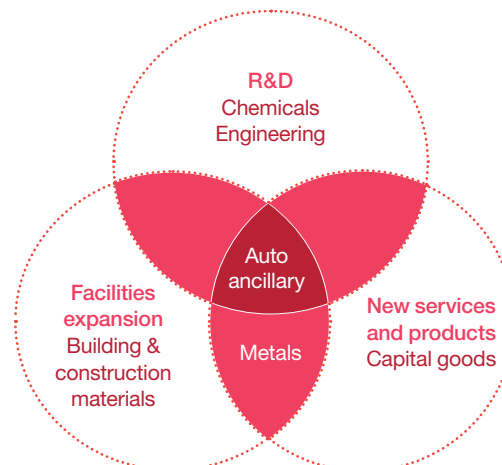
55%

Facilities expansion

47%

Source: India Manufacturing Barometer Survey, July 2013

Sector-wise investment priorities



Source: India Manufacturing Barometer Survey, July 2013

Additionally, there is diversification within product mixes with a focus on the changing needs of the consumer, both in domestic as well as global markets. Steel companies in India are focussing on value add products likely to fetch premium realisations.

In short, while being cautiously optimistic, the sector is using this period of comparatively sluggish activity to realign business models and prepare for the future. The most common themes for business transformation and revenue growth have been identified as new product or service introductions, R&D, facilities expansion and, most importantly, understanding changing customer preferences and demands and fostering long-term profitable relationships with customers.

The prioritised areas of investment in FY14—new product or service introductions, R&D and facilities expansion— point towards how important it is now to embed technology into the scheme of things in this sector. But this is no mean task. So far, not too much importance was given to the documentation and creation of IP and the regulatory framework related to this needs improvement.

Some amount of collaboration has helped in the creation of patents and technologies in manufacturing, but there is still a long way to go. Especially in the micro, small and medium enterprises (MSME) industry segment, their access to resources and funds for sourcing and internalising new technologies is limited. However, the government recognises the need to develop complex capabilities and drive innovation in this sector and in the 12th Five Year Plan (2012-2017), has outlined policy levers tailored to meet the IT requirements of the industry.

A ministry has also been created to provide MSMEs with access to risk capital, setting up relevant standards for the industry, improving interaction between the sector and academia and research institutes, and to stimulate demand so that MSMEs are motivated to adopt technological advancements. On the other hand, in order to enable large enterprises to leverage IT and deliver on a globally competitive platform, the government's policies aim to focus on improving the IP system, ensuring the availability of skilled labour by establishing institutions for technology, research and other educational institutions, and facilitating access to critical raw materials.

“The Indian dairy landscape is vastly different from the international dairy supply chain. In India, millions of small and marginal farmers who own two to three animals constitute the primary suppliers while the average herd size in countries such as New Zealand is more than 300. This means that discrete quantities and varying compositions of milk need to be received across a widely distributed geography and quickly tested, cooled and dispatched to chilling centres and processing plants. The assurance of right price for the right quality to the farmer has been delivered by the deployment of technology to measure and capture the quantity and quality of milk at each collection point. The entire supply chain has to be agile and is supported by technology to monitor quality and temperature and optimise distance travelled. Milk received at dairy plants and at every subsequent stage again needs quality measurement and checks in order to ensure that the product delivered to the consumer is of the highest quality. Mother Dairy has other verticals viz. dairy products, Safal (horticulture), Dhara (edible oils) which have processing plants too and SAP is deployed to enable the manufacturing and distribution processes across all the businesses. Mobile ordering and the asset monitoring application have been put in place for our distributors and we are in the process of deploying technology solutions to enhance the retail experience at our booths. SOP processes strongly embedded through systems are essential to achieve orchestration across the procurement, manufacturing and distribution processes.”

Annie Mathew
Chief Information Officer
Mother Dairy

Mother Dairy was set up in 1974 under the Operation Flood Programme. A wholly owned company of the National Dairy Development Board (NDDB), Mother Dairy manufactures, markets and sells milk and milk products under the Mother Dairy brand, Dhara range of edible oils, Safal range of fresh fruits and vegetables, frozen vegetables, processed fruits and vegetable products, fruit pulps and concentrates in bulk aseptic packaging and fruit juices at a national level through its sales and distribution networks for marketing food items.

Bridging the gap with technology

The industry is taking steps to compel business transformation through technology adoption initiatives. As per PwC's 17th Annual Global CEO Survey, data management and analytics are topping the list of IT needs of manufacturing CEOs worldwide. As more efforts are made to mobilise plans and strategies for data analytics, a spurt in tackling cyber threats is foreseeable on the horizon. On the Indian front, the trend is catching on, even if gradually.

One of the largest vertically integrated companies in India specialising in home furnishings, upholstery products and curtain fabrics, recently made a move towards a web-based analytical application to support online reporting for its business users. By implementing this easy-to-use integrated reporting solution, the organisation was able to enable its users to independently analyse the business warehouse (BW) information through reporting and analytical tools thereby reducing effort, technical dependency and time spent on reporting activities.

Features such as trend analysis, integrating data from different functional modules and clubbing it from different sources provided its management with detailed insight and improved the decision-making process. Further, the dashboards helped obtain a snapshot of the ongoing activities in the organisation. On the other hand, a leading heavy engineering company in India addressed its enterprise-wide transaction processing and management reporting requirements by building a strong foundation in business intelligence (BI) capabilities and management information system (MIS) in order to empower its decision-makers with relevant and real-time data.

The availability of customer-related data is also becoming imperative for a company's competitive edge in the market. Customers are becoming more demanding and their voice over the internet and mobile can make or break a brand. Riding on the SMAC (social media, mobility, analytics and cloud) wave, the largest two-wheeler manufacturer in India adopted social media business intelligence and analytics to measure customer service, competitor and sentiment analysis across competition and to crowdsource new innovative product ideas for itself. This helped define KPIs for the enterprise, based on which it was able to identify and prioritise its key initiatives. The reports generated from the analytics are giving the organisation a powerful way to look inside the customer mind and use that information to devise opportunities to deepen its relationship with them and build its brand along the way.

There is also the need to relook at the pricing and payment terms as customers are no longer happy with just a good-quality product. They want value additions and that too at a lower price package. In this scenario, Indian manufacturers know that IT is the need of the hour if business models have to evolve while maintaining operating margins.

Several of them are looking at enterprise resource planning (ERP) applications as well as customer relationship management (CRM) solutions to standardise business processes and enhance sales, marketing and service activities. A large automotive engines and equipment manufacturer's adoption of ERP and CRM helped in the development of a solution roadmap for all its independent product groups and streamlined its workflows as well, while keeping the focus on the customer service function for effective customer interaction and through the creation of a new sales channel by using an internet portal. This also resulted in reducing non-value add activities, thereby increasing the productivity of its employees. A common sales team was established for all lines of business and a relatively smaller marketing team was able to cater to a large client base.

Similarly, a premier fertiliser company in India relied on the development and implementation of new business processes through ERP while it was diversifying into the pesticides sector. This helped in better and integrated reporting and tracking of all business processes with improved financial analytics for all operations. In another instance, one of India's largest pig iron manufacturers ensured operational and functional efficiency by adopting an integrated IT solution for automating its core business processes.

It should be noted that, in their bid to climb the value chain, Indian manufacturers cannot rely only on lowering costs. So, they are taking their pick from investing in new products and services, R&D, and facilities expansion or in a mix of any of these. These, coupled with the ambitions of increasing their global footprint, are creating the need to keep a close eye on production planning, pricing, scheduling and product shipping. And with a fast-evolving economic and market scenario, the more real-time the availability of this information, the better.

This is where advanced supply chain solutions come into play for enhanced forecasting abilities, prioritising production and dispatches, inventory management, optimising production capacities for different lines of businesses, and for checking raw material availability at the time of rush orders to confirm delivery dates to customers.



With a fast-evolving economic and market scenario, the more real-time the availability of information, the better. Through the adoption of SCM solution, a leading industrial manufacturing company was not only able to automate its forecasting process resulting in negligible errors, but was also able to optimise its supply chain costs at a regional level. Overall, the SCM solution allowed for constrained production planning and scheduling that led to optimum resource utilisation.

Through the adoption of the SCM solution, a leading industrial manufacturing company was not only able to automate its forecasting process resulting in negligible errors, but was also able to optimise its supply chain costs at a regional level. Overall, the SCM solution allowed for constrained production planning and scheduling that led to optimum resource utilisation.

Sector leaders are hopeful that tax reforms that have been introduced will also be beneficial for manufacturing. For instance, the introduction of the Direct Tax Code Bill 2010 and the Goods and Service Tax could help. Further, the efforts towards cost restructuring due to the current slowdown is expected to reflect positively on the balance sheet of companies.

The industry is also seeking to reduce leverage by equity infusion through stake sale to PEs and strategic investors. The role of technology in meeting local tax and statutory compliances is also being recognised by this sector. The Indian subsidiary of the world's oldest and largest vehicle manufacturer used ERP to ensure complete mapping of all reporting and compliance requirements around indirect and direct taxation in India and standardised business rules across the organisation resulting in full compliance of statutory regulations of the country. It was also able to introduce automation in tax calculation, register maintenance and forms tracking, and better capital management.

Thus, the Indian respondents of PwC's 17th Annual Global CEO Survey have illustrated that the number of Indian CEOs who have already completed a change programme in R&D and innovation capacity, use and management of data and data analytics and technology investments, are far fewer than the ones who are still planning to implement these programmes. In such a scenario, the right incentive for technology adoption in the various industries will have to come from the government. So, for the manufacturing sector, if technology is to be the driver for innovation and competitiveness in the market, it will need to be ably supported by government regulations that will focus on developing the required policy

on technical regulations; review the existing ones to identify the gaps; raise awareness in the industry for sharing relevant scientific data with regulators so that effective technical regulations can be formulated; and develop training programmes for technical staff in the industry for writing company and industry level standards. The 12th Five Year Plan has all these on the anvil and more. The road ahead has been outlined for the role of IT in providing the required boost to the manufacturing industry. Now it remains to be seen how well the plans are executed so that Indian manufacturers are able to reach their desired destination as quickly as possible.

“Cairn India Limited being an upstream oil and gas company focusses on the predictability and reliability of its supply sources and seeks technologies that help maximise our existing asset-yield using techniques such as enhanced oil recovery (EOR). We also assess the potential of prospective assets and reliably predict their yield.

There are multiple technologies presently available for simulations and 'what if' analysis. We are working on integrating them into a single platform which is constantly updated not only with industry data but also with organisation specific live data to improve the certainty levels of forecasts.

Such a robust information cycle for forecasting is a key lever to unlock the full potential of assets and help address the nation's energy needs.”

KRD Srinivas
Chief Information Officer
Cairn India Limited

Cairn India is one of the largest independent oil and gas exploration and production companies in India. It operates more than 25% of India's domestic crude oil production. Through its affiliates, Cairn India has been operating for more than 15 years playing an active role in developing India's oil and gas resources. To date, Cairn India has opened four frontier basins with over 40 discoveries, 28 in Rajasthan alone.

Technology in the infrastructure industry



The 12th Five Year Plan (2012-2017) saw an ambitious investment target of about 1 trillion USD for the infrastructure sector. Though the pace of infrastructure development increased in the 11th Plan, there is clear slowdown in the 12th Plan period. The expectation is that the new government will be able to give a push to this critical sector.

Bottlenecks for the sector

Several years of underinvestment have led to dire deficits in critical areas such as transportation, electricity generation and water supply. Therefore, change has to be brought in not just to improve the industry, but also to drive economic growth by building a strong sector that will make India more conducive for conducting business and for attracting foreign investment. Demand-side pressures such as natural resources shortages and a large and growing population along with supply-side issues, such as retreating investors, have created challenges that need to be met to bridge the gap.

The state of the Indian infrastructure industry may be ridden with issues, but the bigger picture does reveal opportunities for growth and development through some process and governance restructuring. This transformation can be aided in a huge way through the use of the right technology.

Key areas that require attention are as follows:

1. Avoid duplication of efforts with the existence of multiple stakeholders

Earlier, infrastructure initiatives involved at best, two players. The government entity (project sponsor) was responsible for both the financing and quality aspects and the contractor was responsible for project execution. With the emphasis on public private partnership (PPP), project financiers and developers have become key stakeholders. This has also brought greater scrutiny into the decision-making, spending and delivery process, with several professional services (lawyers, independent engineers, rating agencies, auditors, etc) being involved. This change in the system can better drive efficiency with the use of technology, through better coordination and lesser duplication of efforts in the processing of information for the benefit of different stakeholders.

2. Reducing gaps in demand and supply

A high rate of urbanisation means that massive investment is required in everything from metro systems to clean water supplies, power generation to affordable housing. The sector needs to grow with increasing needs being presented by the rate of urbanisation in the country. The population has long crossed a billion and is continuing to grow. Keeping up with global trade is putting pressure on India's ports and proper roads and highways are required to improve freight transportation and to tackle growing traffic. Further, industrialisation is making big demands on the country's network of electricity and water. Also, the railway system is in dire need of increasing its freight capacity.

3. Preventing delays in project execution

While the major infrastructure players have operational capabilities, they tend to be at a disadvantage when it comes to timely execution of the project. This problem can be attributed to the challenges they face in terms of land acquisition, manufacturing bottlenecks and environmental clearances. Investment of time, effort and money in developing project planning and execution capabilities, streamlining of business processes and adoption of advanced technologies in the sector is expected to enable them to overcome such strategic hurdles to a large extent.

Way out

Innovation

Business process re-engineering

Enterprise resource planning (ERP)

Business intelligence (BI)

Document management system (DMS)

Dashboards

RFID tagging

Multi buyer and multi system (MBMS) system

High-value consumer management system (HVCMS)

Estimation and tendering systems

In order to optimise checkpoint operations, technology is being leveraged for monitoring various activities being carried out by government officials. This is expected to ensure that various legal provisions can be validated or checked for the vehicles passing through so that the authorities can use appropriate tools or artefacts in a court of law in case of any dispute.

Since various electronic equipment, such as surveillance systems, are used at the checkpoint, technology will help in post-mortem analysis of incidences, if any.

Tackling the challenges

The situation can be perceived as an opportunity for widening the market and for enhanced production capabilities. Focussed reforms and the choice of appropriate technological solutions to reduce investment lags, which in infrastructure projects in India are very high compared to those in many successful reforming countries, is what can enable this sector.

The 12th Five Year Plan will have to continue the thrust of upgrading road infrastructure, with the objective of improving mobility and accessibility while reducing the cost of transportation. The main target will be to complete ongoing projects, such as the Golden Quadrilateral and North-South and East-West corridors taken up in the National Highways Development Project (NHDP) Phases I and II of the programme. The national and state highways are expected to be upgraded to a minimum two-lane standard by the end of the Plan period.

The villages are to be connected with all-weather roads and prioritisation will be done in the areas of special links for feeder roads to important railway routes and ports, essential for developing domestic and international trade. The effort will be to integrate the road development programme with the other modes of transport so as to have an integrated transport movement. While undertaking

the construction of roads, modern technologies that can help improve energy conservation and environmental protection should ideally be taken up.

The National Highways had added 10,000kms in the 11th Five Year Plan. Another 10,000kms is planned to be added during the 12th Five Year Plan so that the total length of the highways reaches 91,200kms. This will require additional resources for maintaining and improving travel quality and will require adequate funding. Government innovations such as the adoption of a scheme for land acquisition for identified corridors by Punjab to reduce traffic congestion on major highways—with funds proposed to be released on the condition that these will be recovered by the Public Works Department (PWD) by imposing a cess on the sale and purchase and any development activity carried out by the private parties on lands adjoining PWD roads—could also be replicated in other areas.

Similarly, the Ministry of Shipping has taken several measures to encourage privatisation, but only in the form of build-operate-transfer (BOT) and PPPs so far. Additionally, the 12th Five Year Plan aims to promote intermodal connectivity by developing India's inland waterways. The strategies being formulated include setting up coastal terminals at major ports, providing adequate road and rail connectivity to inland waterways and

coastal terminals and non-major coastal ports, and lowering the manning scales and vehicle specifications for coastal.

In the Indian power sector, most of the participation by private investors has happened in power generation led by the de-licensing of generation, fiscal incentives for large-scale capacity additions and competitive procurement of power. The emphasis continues on the need to make the distribution business viable so that upstream generation and transmission businesses are able to recover their revenues.

Moreover, there is a need for reduction in creditor days to manageable limits especially in large states such as Uttar Pradesh, Madhya Pradesh, Jharkhand and Karnataka, among others. The agenda needs to also include liquidation of outstanding payables (above one year) through financial restructuring package (FRP) measures. On the other hand, importing equipment is providing developers with opportunities to tap into the export credit market for equipment financing at extremely competitive rates. This growing competition from international original equipment manufacturers (OEMs) coupled with the requirement for super-critical technology in new plants is making it imperative for power enterprises to adopt technological advancements which will drive growth in the domestic equipment market.

The inflow of the latest technology from developed countries such as Japan, France and Germany is also expected to boost the readiness of India's equipment players to compete with Chinese suppliers who are at an advantage right now due to faster delivery of equipment and lower cost of sourcing.

Public and private operators are also becoming a staple in the area of water management, which has grown from being just about providing access to drinking water to a complex network involving wastewater treatment prior to its discharge back into the environment and water conservation. As per the 12th Five Year Plan (2012-2017), the challenges in the water sector can be handled through a shift in the way water resources are managed in India. For example, irrigation projects cannot be approached only from an engineering and construction perspective. These have to be treated with the help of a more 'multidisciplinary, participatory management approach'.

The sustainable management of groundwater needs to be based on a new programme of aquifer (a kind of rock formation capable of storing and distributing groundwater) mapping. In fact, the 12th Five Year Plan (2012-2017) has proposed aquifer mapping as a prerequisite and precursor to the National Groundwater Management Programme, which will also be started during this Plan period. In addition to these, the Plan has suggested steps such as improved systems of water-related data collection and management as well as transparency in the availability of the data, and a new legal and institutional framework for water based on broader consensus among the states.

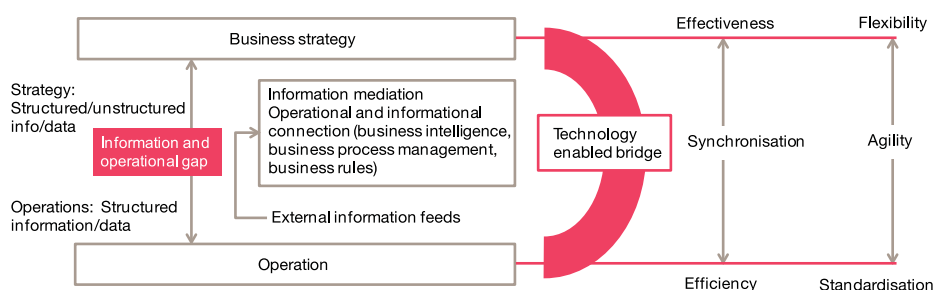
However, even if a roadmap has been drawn out, there is still a long way to go. For the water sector to meet growing demands and tackle the complexities in its fibre, multiple agencies involved in the various aspects of water management will need to stop working in silos and adopt a more coordinated and collaborative approach. Besides this, there has to be put in place clearly defined mechanisms for water allocations and accountability.

In short, the state of the Indian infrastructure industry may be ridden with issues, but the bigger picture does reveal opportunities for growth and development through process and governance restructuring. This transformation can be aided in a huge way through the use of the right technology. To fully leverage the benefits from technology, the infrastructure sector needs to view it not just as a support system, but as an enabler of business innovation.

Bridging the gap with technology

The Indian infrastructure space is marred with a common problem of transparency and data inconsistency. Processes are generally driven by skilled people and, predictability across projects is missing. While improving processes is a natural change and a function of industry maturity, technology is being seen as a lever for making this change in a faster and more predictable manner. The need for technology upgradation in the infrastructure sector, to reduce gestation lags and improve the quality of products that can maintain the balance between sustainability and development is more than ever.

How technology can help bridge the gap between business strategy and operations



We believe that business strategy in the infrastructure space today has tremendous potential to sponsor technology projects which can work on three tenements.

- **Process efficiency:** Infrastructure processes are complex and require strong technical and functional skills. Being an industry which is highly labour intensive, throughput of work that gets completed on a daily, weekly and monthly basis will be strongly aided by technology. Unlike conventional manufacturing industry ERPs, this industry requires several real-time, mobility and analytical solutions which will get more out of the individual.
- **Data accuracy:** Trusting data that originates from a site, a toll plaza, earthmoving equipment in use is always a challenge. Manual representation in any format always has room for data getting adulterated, unconsciously or otherwise. This has eroded trust in the infrastructure space. The social perception for this industry is therefore taking a beating. Eliminating manual intervention, capturing the moment of truth and using more decision support systems will certainly create a strong connect with both the investor as well as the user community.

- **Scalability:** While scalability is usually associated with volume, in the infrastructure industry it needs to get associated with heterogeneity. Today, while the government is taking several steps to open up the sector, the nature of projects that India is seeing has no precedence or benchmark, both in terms of complexity as well as scale. Hence, technology needs to transcend the boundary of infrastructure and look at how financial services, telecommunication or other industries higher in technology usage have used systems. The concept of enterprise architecture, use of social analytics, machine-to-machine interaction as well as the internet of things can certainly be explored.

“We, at SPOTON (www.spoton.co.in), have realised early that unless we enable customers with the right kind of data at the right time with serious intent, our business model will not survive in this cut-throat competitive world at all. Being the newest kid in the domestic express industry, we not only need to fight the existing Goliaths, but also deal with the current customer mindset.

As there is a myth that Indian labour is cheap, thus to feed the customer with the right kind of information, competition has adopted a strategy that is manual effort driven. We have always taken a different path and have shown the customer that the most accurate right kind of information can be delivered with precise automation at every juncture of the journey of a shipment. Our two-pronged approach includes the proactive alert to the customer at the beginning of the day and our extensive web portal by which customers can track each shipment real time. This has changed the game in favour of SPOTON. Thus when we grew, we had not added even 10% of the entire customer service workforce. Therein lie the benefits realised by leveraging IT in a profitable manner.”

Mrinal Chakraborty

**Director IT and Special Projects IT
SPOTON - Startrek Logistics Pvt Ltd**

SPOTON is the service brand of Startrek Logistics and specialises in the movement of cargo in India within the transit time. Its workforce of 800+ employees serves 18000+ pin codes through 10 major depots and 11 transit hubs to make the movement of the consignments fast, hassle-free and secure.

The implementation of a high-value consumer management system (HVCMS) in Maharashtra State Electricity Distribution Company Limited (MSEDCL) helped analyse important energy consumption trends, across industry and customer categories along with generation of the various actionable exception reports.

The use of the right IT tools followed by timely monitoring and corrective actions can catalyse on-time and within-cost execution of projects. Traditionally, the organisation structure of the infrastructure sector is fragmented and yet dependent on each other for proper functioning. However, there is little or, in many cases, no interfacing between the departments.

For example, during one of the recent studies that PwC did for a freight and logistics consortium, a huge opportunity was identified both for the technology companies in India, consignee and consigner. The usage of mobility across the entire value chain of cargo resulted in significant improvement of the overall profitability of the supply chain function. The same value could easily be passed on to the end consumer of the services. All this was made possible by using interoperable technology both at the consigner and consignee ends, within the intermediary such as CFS/ICD, during the entire transit process and unique post port gate entry. While the technologies have been around in India for almost a decade, the usage is unique as it uses a win-win situation where the beneficiary pays a small token sum to the service provider to gain invaluable data that can create a differentiated business experience for the end customer. It's the value added service which becomes an alternate revenue model.

Moving ahead on other areas, India's leading providers of turnkey solutions in the area of industrial water supply, an enterprise-wide ERP implementation initiative was able to enable the company to standardise its business processes such as tender estimation, customer and supplier billing and retention tracking.

It was able to reuse historical information for bid preparation and also improved the monitoring process of its sites through the integration of ERP and real-time reduction of data lag from its sites to its head office. In another such ERP initiative, the Kandla Port Trust, one of the major ports in India, is planning to create a centralised repository of all data and make it accessible across the organisation with proper access control, provide access to real-time information for management and reduce manual work and create a paper-less environment.

The completely integrated solution involving ERP, port management systems, BI solution, geographic information system (GIS) and mobile enablement that has been selected by the enterprise, is expected to enhance the monitoring capabilities for senior management and provide audit trails that will help reduce efforts required for internal audits.

In another instance, for the Maharashtra State Electricity Board (MSEB), the development and integration of an integrated system enabled low-tension billing collections, coal accounting, material management and the standardisation of its financial processes as well as integration with its high-tension billing module, thereby providing the required interface for the necessary areas of business.

On the other hand, IT enabling toll roads is expected to lead to the integration of road projects with ERPs for tracking the cost and progress of projects and interlinking both for management review. The use of the latest technology for the Toll Management and Highway Traffic Management System is expected to streamline the sector. The right IT infrastructure can help connect all toll plazas with the respective corporate offices for effective supervision. This method of direct revenue reporting to the corporate office will lead to reduced manual intervention and will provide a single console for the management of all the toll plazas for better control and coordination.

All these have rolled up to the introduction of the electronic toll collection (ETC) system that is gradually being implemented in all stretches of the national highways of the country.

An integrated approach to border checkpoints through IT enablement is also being taken into consideration to enable vehicle data sharing at a national level. A synchronised approach to data collection, storage and access at a national level is expected to help in receiving standardised and complete data and is also expected to be beneficial in optimising resources utilised for the project. In many of the states, a vehicle identification device is further being contemplated. Maharashtra and Punjab are contemplating the issuance of radio-frequency identification (RFID) tags for all vehicles. It will be in the interest of transporters to issue RFID tags that are compatible with all readers used across different border checkpoints and ETC points in the country. At the same time, this might be difficult if RFID projects in different states follow different RFID reader-tag interface technologies.

“At Kandla Port, we are leveraging technology to address issues related to access management and automated processing of various departmental transactions. We also believe that technology would enable us in data-driven decision-making and hence would aid in our quest for continuous improvement.

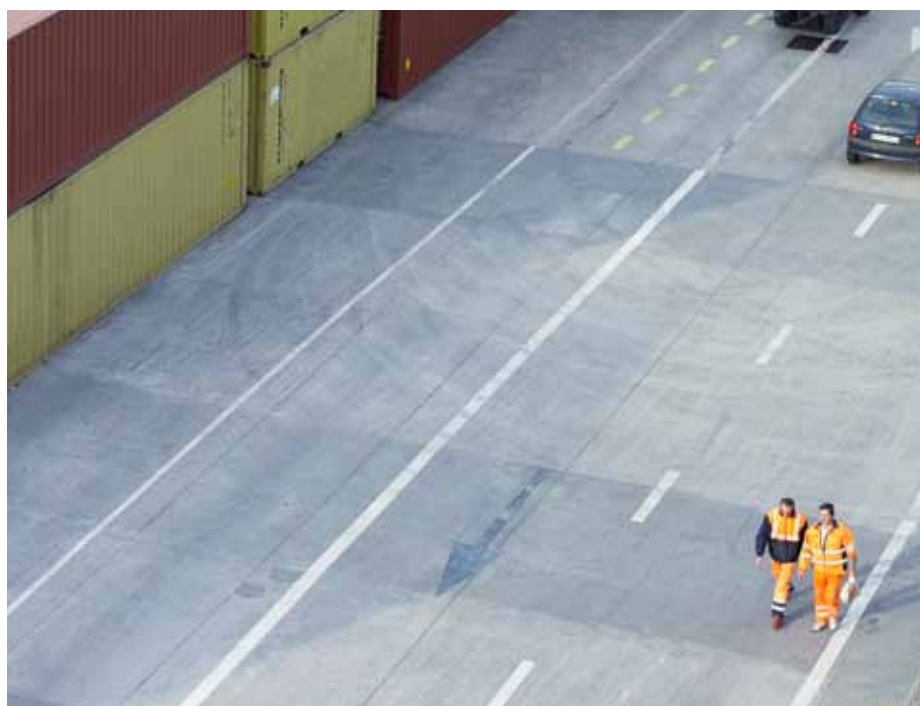
Having said this, we are mindful of the issues with regard to resistance to change and have been working on a phased implementation of technology. Initiatives we have taken are in the areas of automation of operations (e.g. yard and cargo management), access control and surveillance system and enterprise resource planning which includes the port management system (PMS).

Technology will become an inherent part of ports. The next big wave in technology for Indian ports will be with respect to GIS and mobility and their integration with the port management system.

Though some of the automation is covered through the port community system (PCS), there is scope for improvement with respect to the enhancement of integration with transport companies, clearing house agents, shipping agents, shipping companies and other stakeholders.”

R Murugadoss
Chief Engineer
Kandla Port Trust

Kandla Port Trust is a leading port in India and plays a major role in the country's international trade.



A multinational conglomerate, which operates out of India and Germany, took up the P&L statement initiative whereby all the company's individual businesses including energy infrastructure, transportation, aviation and lighting, among others, could be reported using one GGO region P&L statement.

As a part of the engagement, the conglomerate wanted to assess the readiness of its businesses (more than 65 ledgers) for the GGO regional level consolidated financial statements. Based on the analysis, it was able to come up with a roadmap to consolidate its financial statements for the purpose of management reporting (with the relevant details) and implemented a tool that helped automate the process of consolidating India-level information. The implemented application was able to improve the efficiency and accuracy of management reporting and steer all businesses towards a common vision, identify increased operational synergy and maximise value from each business, improve planning and forecasting capabilities to proactively adjust business activities, enable generation of insights to support effective decision-making, and distinguish profitable customers from non-profitable ones to understand cost trends and drivers.

In an ongoing initiative by one of the state border checkpoints, technology is being leveraged for monitoring various activities being carried out by government officials in order to optimise checkpoint operations in terms of effectiveness and efficiency. This project is also expected to ensure that various legal provisions can be validated or checked for the vehicles passing through so that the authorities can use appropriate tools or artefacts in a court of law in case of any dispute. Since various electronic equipment, such as surveillance systems, are used at the checkpoint, the project will help in post-mortem analysis of incidences, if any.

In turn, through this project the user department will be able to effectively and efficiently administer various mandated Acts, leading to higher compliance by transporters. A coordinated effort from different departments will drive improvement in the efficiency and effectiveness of operations. In the short term, through this technology initiative, this checkpoint is also likely to increase the revenue collected by its departments by way of fines, penalties and charges.

Such standardisation of processes and data availability for monitoring purposes is aimed towards enabling senior management with reports and data points to help them make informed executive decisions. As most of the activities of the infrastructure sector involve data collection at various steps of the process from different departments, collation

of this consumable data becomes a challenge. Moreover, by the time the report is prepared the information represented in it becomes obsolete. In such situations, a typical BI solution running over an ERP can help collate and represent real-time data for everyday operational decisions, track and present real-time information in the form of executive dashboards for tactical decision-making by the senior management, present trends and analysis for strategic decision-making by the various boards and ministries, and set key performance indices (KPIs) for all types of activities and track them to raise exceptions to appropriate levels.

Take, for example, the one P&L statement initiative undertaken by a multinational conglomerate, which operates out of India and Germany. All the company's individual businesses including energy infrastructure, transportation, aviation and lighting, among others, used to report their financial numbers to their corporate headquarters both for management and statutory reporting. With the change in the reporting structure from the existing business level to the geography level, this necessitated the need for a one GGO region P&L statement for management reporting.

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Technology has also worked as a tool for driving transformation in the electricity distribution business. The power corporation in Uttar Pradesh has initiated the Accelerated Efficiency Improvement Programme (AEIP) covering focussed and comprehensive support in select functional areas of distribution utilities. This attempt at efficiency improvement was aided by IT through a corporate-level revenue-monitoring system. Further, an MRI-based billing software and a flexible analysis and segmentation tool was implemented to profile high-value customers and streamline billing to plug revenue leakage.

The power corporation in Uttar Pradesh also brought its accounting systems in line with statutory and regulatory requirements in order to improve the quality and speed of its accounting functions. Further, it laid the grounds for transitioning the industry structure towards a multi-buyer and multi-seller (MBMS) system. Another example of IT supporting business transformation is the implementation of high-value consumer management system (HVCMS) in Maharashtra State Electricity Distribution Company Limited (MSEDCL). This database helped MSEDCL analyse important energy consumption trends, across industry and customer categories along with generation of the various actionable exception reports.

Like all technological advancements, while there are several benefits to be leveraged, it is imperative that the needs for and the impact of the transformation it is expected to bring in its wake is assessed thoroughly before implementing. This will facilitate smooth execution coupled with the appropriate change management framework comprising stakeholders and end consumers in order to be taken to its logical end.

The last word



Debdas Sen

Executive Director/Partner
Technology Consulting Leader, PwC India

Business ecosystems are becoming more digitised, even as the role of IT gets more strategic. Growth is being driven through the transformation of IT functions. Enterprises are adapting their business models to meet the changing needs of the market and are reformulating their strategies to be able to truly leverage the power of technology.

This role of IT as an enabler of business growth has become a pre-requisite in India as well. As per a recent survey conducted by PwC, 79% of Indian CEOs identified technological advances as the top global trend they believe will transform their business over the next five years.

In the manufacturing and infrastructure industries, technology is helping enhance productivity, profitability as well as competitiveness. The IT adoption initiatives in these sectors are not just reducing the bottlenecks here, but are also enabling business transformation. Through upgradation of the traditional technologies to the use of emerging ones, IT is driving growth in these two industries. However, such IT investments will need to be accompanied by a well-defined strategy prepared after careful due diligence and assessment of business requirements and an appropriate risk mitigation roadmap. Further, if technology is the driver of change, the sectors' ability to invest in it will need to be encouraged through focussed government initiatives that are gradually coming into play.



Notes

About CII

The Confederation of Indian Industry (CII) works to create and sustain an environment conducive to the development of India, partnering industry, Government, and civil society, through advisory and consultative processes.

CII is a non-government, not-for-profit, industry-led and industry-managed organization, playing a proactive role in India's development process. Founded in 1895, India's premier business association has over 7200 members, from the private as well as public sectors, including SMEs and MNCs, and an indirect membership of over 100,000 enterprises from around 242 national and regional sectoral industry bodies.

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The CII theme of 'Accelerating Growth, Creating Employment' for 2014-15 aims to strengthen a growth process that meets the aspirations of today's India. During the year, CII will specially focus on economic growth, education, skill development, manufacturing, investments, ease of doing business, export competitiveness, legal and regulatory architecture, labour law reforms and entrepreneurship as growth enablers.

With 64 offices, including 9 Centres of Excellence, in India, and 7 overseas offices in Australia, China, Egypt, France, Singapore, UK, and USA, as well as institutional partnerships with 312 counterpart organizations in 106 countries, CII serves as a reference point for Indian industry and the international business community.

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