Digital Transformation

With the advent of digital technologies, society is reshaping itself radically. In the last decade, digital technologies have brought fundamental changes in the industry and business environment. The holistic socioeconomic and industrial changes are a result of general-purpose technology aspects of digital transformation. Transformations due to general-purpose technologies are rare and have inherent capabilities of self-transformation to create long-term benefits across the entire global business environment. After steam engine, electricity generator and printing press, the recent development of digital transformation has created an opportunity with extensive sustainable and incremental influence for disruption and renovation. However, the most important difference between digital transformation and the previous general-purpose technologies such as steam engine and electric generator is the pace at which technology is being penetrated across the globe. To cope with the accelerated speed of global digitalization, the digital transformation process should be accepted, adopted and adapted across society and business.

Digital transformation has also reshaped the concept of business competitiveness and it influenced industry models to focus on the business ecosystem. The interactive economic community-based approach of the business ecosystem evolved due to the advent of digital technologies. The business ecosystems are the multidimensional dynamic matrix of entities networking with each other to generate and exchange maintainable value for all the participants. With the rapid growth of digital transformation, the concept of the business ecosystem is becoming more powerful where competition is getting replaced by the idea of co-opetition. With this changing dynamic, pursuing digital transformation is becoming important for organizations to sustain and flourish in the complex business ecosystem.

For enhancing customer experience and meeting fast-changing business needs, digital transformation enables an organization to transform the culture and way of working. Digital technologies such as big data, cloud, Internet of Things (IoT), Additive Manufacturing and Artificial Intelligence (AI) are creating immense value to organizations. The application of these technologies is not limited to any specific sector such as telecommunication services or information technology, rather it creates value across the industry. The discrete and process manufacturing sector has also started adopting emerging technologies like cloud and IoT. Investment in digital transformation is increasing globally across the business sectors. These investments show that every business sector, including manufacturing industries, has identified the importance of digital application and is implementing digital transformation.

Figure 1.1 Structure for Digital Transformation

To conceive and adopt digital transformation in an organization, a strategic structure, as illustrated in Figure 1.1, is a useful guideline. The strategic structure consists of six subject groups, such as Digital Challenges for Industries, Applicability of Digital Transformation, Digital Transformation Framework, People and Organization Structure, Capability Delivery Activities and Life Cycle Benefits.

1. Digital Challenges for Industries

Due to digital technologies, the world is transforming very fast. To cope with the changing business environment, driven by the concept of Industry 4.0, all businesses including the manufacturing sector have also started the digital transformation. Digital technologies are the enabler for Industry 4.0 Revolution. Adopting change is not an easy decision for an organization. Digital transformation, with its very nature of the soft application, is oriented toward services. On the contrary, the manufacturing sector deals with products and materials.

It is not easy to conceive the manufacturing sector business as services. Naturally, regarding investment for digital transformation, there is a decision-making dilemma in the manufacturing sectors. All other sectors, as well, have reservations regarding the extent to which digital platforms should be adopted. To overcome these dilemmas, there is a need for a balanced understanding of the digital transformation that will enable organizations, including the manufacturing sector, to arrive at a conscious decision. Also, it is necessary for organizations to identify various aspects that influence businesses in the digital era, such as exponential growth, deconstruction of the value chain, disruptions and business economies (Figure 1.2).
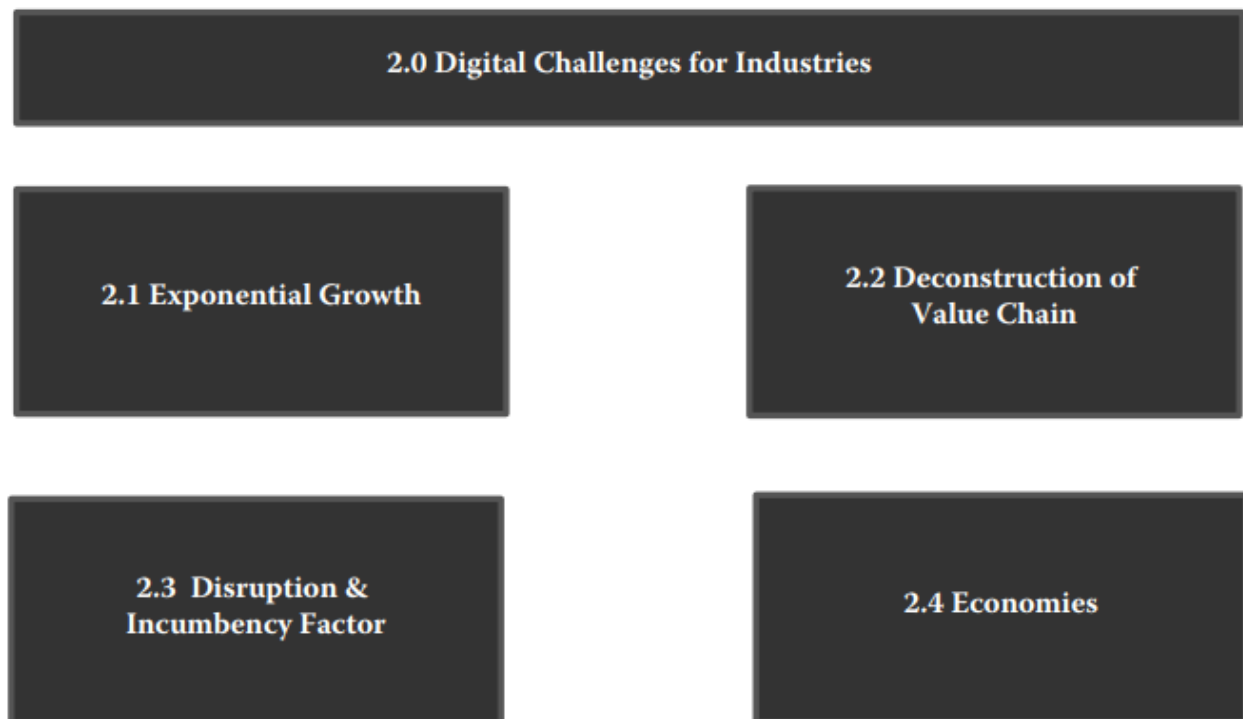

Figure 1.2. Digital Challenges for Industries

1.1. *Exponential Growth*

One of the most important things that makes digital transformation unique is the speed of change, which is commonly referred to as exponential growth. Everyday, normal human beings interact with lots of information or data. As per a study, humans receive 11 million pieces of information in one second, however, only 40 pieces of information can be processed by the brain. Therefore, it is a huge waste of information compared to information gained. That is the reason, normally the human mind is more processed with a linear way of thinking.

Digital technologies are evolving at an exponential pace, which is beyond the imagination of human understanding. Lack of understanding of the exponential growth of digital technologies is one of the major reasons for the dilemma that the majority of business

organizations are facing, especially the manufacturing sector. The understanding of the exponential nature of digital growth may be helpful to make appropriate business decisions.
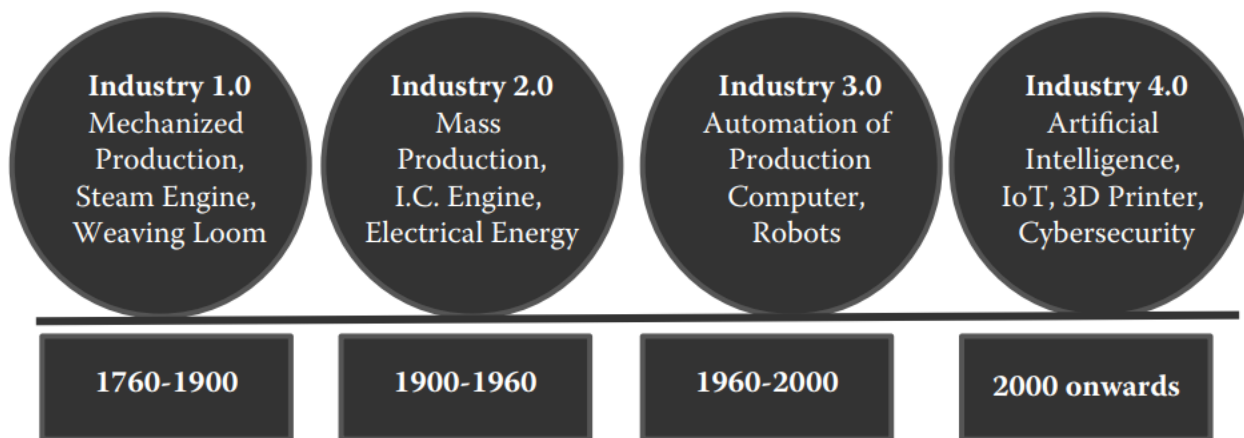
1.2. Deconstruction of Value chain

The purpose of any industry is to transform raw input into a market-ready product or service. The major player involved in this transformation process are suppliers, producers and distributors. This is applicable for any industry which includes the manufacturing sector. As per traditional business architecture, in every industry, over the period, each producer used to create their own vertically integrated value chain with a given set of suppliers and distributors to create value from the system for serving the end user . The purpose of creating a given set of suppliers, producers and distributors is to help the players communicate within the value chain with set parameters and save time and money to explore a new market. It helps to serve customers effectively, as the flow of information within a value chain is easier. More efficient is the vertical stack, more efficient is the organization. One of the major drivers for creating a vertical stack is the flow of information, as effective processing, communicating and storing information and data are crucial and involve time, money and risks.

With the advent of digital transformation, the link between players within the value chain is becoming weaker, because collecting, storing, processing and communicating information and data are becoming much easier, faster and cheaper. For example, if a steel fabricator suddenly needs extra steel plates of a certain grade and thickness, they need not rely upon and wait for their traditional suppliers; rather they can use any online supply chain portal and globally search for the material with various options. The portal itself will compare the options and provide the best available deal, which the fabricator can order straightway using the portal. Naturally, this phenomenon is breaking the traditional vertically integrated value chain and allowing horizontal interaction among the players with a more cooperative, but competitive business ecosystem.

1.3. Disruption and Incumbency Factor

With the exponential growth of digital application, the traditional business value chain is disintegrating, and the incumbent businesses are being disrupted by digital technology-driven approaches. What does disruption mean? Disruption is the action of holistic change of the traditional way of work of industry by utilizing new methodology or technology. As per a 2018 report, 93 per cent of executives feel that their industry is will be disrupted in the coming 5 years, however, only 20 per cent believe that they are adequately prepared to face the disruption. Even though executives understand that digital technology will create a good amount of change to the market, they lack confidence in adopting digitalization. Because most people believe that disruption is unpredictable, and it occurs by chance. Also, there is a general understanding that a disruptive force is going to occupy the entire market. However,

these are mere misconceptions as disruption can be predictably addressed with proper strategy. Disruption brings new opportunities and innovation to the market. Various new players enter the market with innovative ideas to disrupt the existing industry. But at the same time, existing legacy and incumbent businesses can also evolve with the proper mix of the introduction of new ideas and utilization of existing infrastructures. For example, with proper adaptation of digital technologies, manufacturing companies can uplift themselves to cope with the Industry 4.0 Revolution. Market disruption is not a new phenomenon. It occurred previously at various levels, such as at the product level or process level or industry level. But Industry 4.0 has special significance as it will affect all sectors in industries and cause a holistic socioeconomic change. The scale factor of change across the industry is also highly noticeable. That is the reason it is called a revolution. The world has experienced industry-level changes previously as well, with First, Second and Third Industrial Revolutions.

Industry 1.0 Mechanized Production, Steam Engine, Weaving Loom	Industry 2.0 Mass Production, I.C. Engine, Electrical Energy	Industry 3.0 Automation of Production Computer, Robots	Industry 4.0 Artificial Intelligence, IoT, 3D Printer, Cybersecurity
1760-1900	1900-1960	1960-2000	2000 onwards

1.4. Economics

Global wisdom has already acknowledged that there is no scope of going back by escaping the digital transformation process. Already businesses across the industry started investing or planning to invest in digital technologies. But still, there is a dilemma in many sections, especially regarding economic benefit against the investment and a few other concerns such as unemployment due to automation and political consequences. Also, there is debate over the productivity growth rate by introducing digital technologies. In this context, many people refer to Nobel laurate Robert Solow's famous remark that we see computers everywhere, but in the productivity statistics. This is famously known as Solow's Paradox. Adaptation of digital transformation is a complex process that requires a holistic change of business model. Implementation of the process is expensive and time consuming. Is there a recognizable and sustainable economic benefit to be gained from digital transformation? Is the huge investment in digital technology worthy for businesses? As per a 2020 Global Survey Report, 22 per cent of manufacturing and industrial companies were recognized as champions (for

the period between 2017 and 2019) that invested about 39 per cent of their total revenue for digital application and enjoyed a revenue gain of 27 per cent, whereas the remaining 78 per cent of companies in the sample invested about 26 per cent of their total revenue in digital transformation with a revenue gain of about 7 per cent. As per the survey, the champions invested 1.5 times of their total revenue in digital transformation and enjoyed four times higher revenue gain than the rest of the companies in the sample. According to another 2018 market research data, companies realized productivity growth and revenue over the past decades.

However, this growth was unevenly distributed, because it was driven by a small group of industry leaders. Who are the industry leaders? Industry leaders are referred to as the top 20 per cent of companies by productivity in each industry. The research categorizes digital technology into four segments, such as the Internet of Things (IoT), robotics, mobile/social media and cognitive technologies which include artificial intelligence (AI) and big data analysis (BDA). It has been observed that when technologies are adopted combining these four categories, productivity increases. The market research data revealed that leaders have realized a higher overall return from robotics and mobile/social media. On the other side, followers have yielded benefits from cognitive technologies (Big Data Analysis and Artificial Intelligence) and IoT. It was also found that asset-heavy industries realized greater value from robotics and asset-light industries realized more value from mobile/social media. In a broader perspective, return on investment in digital technologies is overall positive. Though there is a trend of increasing operating costs due to potential investment in process adjustment, skill development and training, adoption of digital technologies leads to positive results in annual turnover. Hence, the initial dilemma regarding return on investment on digital technologies is no longer valid. Rather, companies that are avoiding digital technologies or moving forward with the wrong investment strategy will eventually be disrupted. So, it is essential to follow a structured strategy for investment in line with the company's business objective.

2. Applicability of Digital Transformation

As per data analysis by a few global agencies, annual spending on the digital transformation between 2017 and 2020 increased from $0.96 trillion to $1.31 trillion. As per the various forecast, this spending is expected to reach $2.39 trillion in 2024. Investment in digital technologies is going to have a 53 per cent share of total global technology investment. The discrete and process manufacturing industry is going to spend about 30 per cent of the investment. Investment in Retail, Professional services and the transportation industry is also going to be significant. Various predictions say that financial services such as banking, insurance, security and investment services are going to see significant overall growth in digital investment. It is a known fact that digital transformation is having a huge impact on the IT and telecommunication industries. The forecasts show that globally all businesses across various industry sectors are providing importance to digital transformation spending. The nature and priority of investment vary depending on the industry sectors. There is no

perfect method of classifying industry sectors. One of the globally recognized classifications is the Global Industry Classification Standard (GICS) developed by MSCI and Standard & Poor's (S&P) in the United States. As per GICS, there are 11 sectors as Energy, Materials, Industrials, Consumer Discretionary, Consumer Staples, Health Care, Financials, Information Technology, Telecommunication Services, Utilities and Real Estate. Each sector includes various industries. The industries under these sectors are adopting digital technologies. A few examples are provided in the following regarding digital technology adaption in different industries.

For discrete and process manufacturing industries, the major spending priority is robotics, automation and root cause analysis. Also, manufacturing industries are gradually moving toward digitalizing the complete value chain, from product and process design to production and services. For example, one reputed industrial conglomerate has digitized its own electronics plant in Amberg, Germany with a 75 per cent automation rate. The output has been increased by a factor of 10 with a consistent number of employees. Only 11.5 defects occur per million products with a quality rate of 99.99885 per cent. In the construction industry, there is a significant impact of digital technologies which include 3D scanning, Building Information Modelling (BIM) and the application of automated machinery and equipment. The application of digital technologies is a major feature for smart cities and smart homes.

The hotel industry, which is part of the Consumer Discretionary sector, is also gradually implementing digital transformation. For example, one reputed hotel chain adopted digital technologies to personalize customer experiences and prioritize customer relationships. In return, they have gained stronger customer loyalty by boosting revenue and market share. The retail industry's investment focus is on omnichannel commerce platforms and omnichannel order orchestration. Omnichannel retail integrates the different methods of shopping available to customers such as in a physical shop, online or by phone. The transport industry's priority is building energy management and freight management. For the food industry, there is significant scope for implementation of automation and digital transformation by improving the value chain and production system. By 2030, the implementation of IoT in the supply chain could reduce food loss by about 35 million tons. One of the interesting developments of collecting data and linking the same with a mathematical model of Insurance-Linked Credit is a significant development for the agricultural sector which is having an enormous social and financial impact.

3. Digital Transformation Framework

How will a business embrace digital transformation? How will it formulate a digital transformation strategy? How will it invest in digital technologies? To answer these questions, businesses need to create a framework for digital transformation that includes strategy, enabler, process, governance and funding.

Strategy

Each business has a specific strategy. The strategy involves making choices that matter to businesses. The strategy is situational, dynamic and adapted to the needs of the enterprise. The main consideration of the strategy is to analyze the business environment and finalize the business objective and target. Accordingly, finding the gap in existing capabilities and arranging facilities to bridge the gap is the focus of a strategy. That is how classically strategy works in a more predictable and nonmalleable market scenario. Predictability and malleability are two important factors for formulating a business strategy. Predictability is the degree that helps to forecast a business environment. Malleability refers to the degree which denotes alteration of the business environment by the actions of players in the market. Digital technologies are making the market highly unpredictable and malleable.

By utilizing digital technologies, players in the market (either start-ups or incumbents) are trying to develop new concepts (processes/services/products) which have the potential to disrupt the existing business model and customer base. It applies to any sector and any industry. For example, in the steel industry, steel is no longer a mere product. Rather the concept of product service has evolved by applying the digital platform, which has the potential to reshape customer experiences. Therefore, steel businesses need to change their strategy from a conventional product sales model to a product-service offering model, which is the effect of digital technologies. The exponential growth of digital technologies is creating an enormous impact on business decision making. So, a business's overall strategy needs to focus on a digital platform. Instead of having a separate strategy for digital transformation, there is a need to bring digital thinking into an overall business strategy that will drive the entire business.

Digital Vision

The business strategy must analyze the competitive environment and how it's likely to be affected. Fast-moving digital technologies are creating various opportunities for businesses and have tremendous potential to disrupt any sector. While finalizing strategy, all the possibilities and associated risks which can arise due to digital technology need to be assessed. For example, supply chain management for different companies is being reshaped due to Industry 4.0. Adopting technologies to continuously upgrade supply chain management is part of a strategic decision. So, the company leadership team has to align business strategy with digital needs. Accordingly, a digital strategy needs to be formulated that will enable the business to achieve its objectives. While choosing any digital application, the factors, such as the impact, competitive advantages and associated disadvantages for business, etc., need to be evaluated. A tire manufacturer's strategic decision to expand business opportunities by utilizing a digital platform is a typical example. By utilizing IoT-based technology, the company shifted the traditional business of selling tires to selling

performance-centric outcomes which are backed by a money-back guarantee. In addition to developing a tire management system, they developed an ecosystem that includes telematics and training in eco-driving techniques. The service can effectively reduce fuel consumption by 2.5 liters per 100 kilometers drives, which has the potential to save $3,300 per annum for long-haul trucks (which is about a 2.1 per cent reduction in the total cost of ownership for truck fleet operators). It contributes to a reasonable reduction of carbon dioxide emissions as well.

Key Enabler

The framework must clearly define the enabling factors which drive the digital transformation process. The enabling factors are people, operating models, data and technology. Businesses need to cultivate a favorable culture by motivating people and building capabilities to deliver digital transformation processes.

Due to the advent of digital technologies, businesses have entered an age of continual innovation. Innovation is not limited to product or process only. Innovation in every level of business and organization is of paramount importance in today's industries. In today's fast-moving evolving market, the target is to maximize the value delivered to the customer or end user. Organizations need to improve efficiency by effective resource utilization, with the opportunity created by the digital platform. Adopting a digital platform is not about purchasing some software or digital service-oriented product and applying them in an organization that will start yielding profit beginning the next day. Rather there is a need for transformation in the overall approach of an organization, which hints at a change in the organizational culture. Culture is always driven by *people*. If the people do not have the right mindset to change and the organizational approach is not conducive to adopting a digital platform, the process of digital transformation will cause more trouble to the organization. To yield the maximum benefit of digital transformation, the business strategy has to focus on two important parameters: agility and way of work.

People are the most important factor in adapting agility and implementing a new way of work. The framework provides a guideline for upskilling employees in addition to utilizing their existing knowledge level. Also, the framework should provide an actionable guideline to facilitate change in mindset and organizational culture.

Businesses need to create capabilities to adopt digital transformation. Data and analytics, technology, ecosystem and measuring indicators are capabilities that act as an enabler to implement and assess the digital transformation process.

Data is the core of digital transformation. An enormous amount of data used is generated from the day-to-day activities of the business. However, not many organizations capture and

analyze these data effectively for value-added usage. Effective data management and *analytics* have the potential to become a competitive differentiator for a business. In a fastmoving digital economy, speed of decision making is crucial, where effective data and analytics competency plays a major role. Therefore, a business should consider data and analytics as a strategic priority. The digital transformation framework should illustrate the authority of the person or persons that will be responsible for data management and analytics within the business. There should be a clear guideline for data identification, collection, quality, types of analysis and new practices.

The benefits of data and analytics have to be identified. Accordingly, across the business, the initiative needs to be taken so that the concept of data and analytics becomes an integral part of the business culture. The framework should provide a guideline for building or borrowing analytical competencies as part of business strategy. The target is to create a data-driven business, which eventually has the potential to change the nature of work (related to data and analytics within the business) and the nature of the business, as a whole.

Technology and digital transformation have a symbiotic relationship. Technologies, such as cloud, IoT, Artificial Intelligence, Additive Manufacturing, etc., are real-time enablers or tools which need to be adapted to suit business requirements. Investment in digital technologies is significant. The digital transformation framework should provide high-level guidelines for the identification and selection of technologies to suit business requirements. Requirement and selection of digital technology should be an integral part of business strategy.

Due to the extensive growth of Internet services and digital technologies, businesses are not only affected by their sectors, rather businesses can be affected by other players from different sectors. These are increasing the need for interrelation and interconnection of businesses, resulting creation of a *business ecosystem*. The business ecosystem comprises heterogeneous players in the market, such as suppliers, competitors, customers, etc., along with many multifaced relations. The concept of co-opetition is under the process of evolution where companies are building competitive capabilities through cooperation with other players in the market which includes competitors and customers. This is applicable for businesses whose core product is physical as well, such as manufacturing sectors. The framework for ecosystem economy has created an environment for worldwide interaction and amalgamation of different businesses by sharing resources and knowledge, crowdsourcing, and so on.

Digital Duality
A company's digital transformation framework should focus on changing the existing legacy business into a more efficient organization by digitizing all business functions and, at the same time, promoting new innovative ideas for ensuring digital growth.

Customer expectations are changing with the advent of digital applications in various fields of life. The customer wants enhanced service from every transaction. This is irrespective of the type of transaction and type of purchase they are planning. For every transaction, the customer wants to interact more on the digital platform with a predictable experience, rather than physical interaction. To meet customer expectations, companies need to engage and deliver a persistent customer experience. Faster and simpler automated processes need to be designed to respond to evolving customer expectations. A seamless amalgamation of the entire value chain of the company's business is essential to deliver real time information and services with predictable future actions. In this context data is the most essential part of the business. The existing running business model should be enhanced based on data that will seamlessly flow across the entire business operation. This is possible only when a company can focus on digitizing the whole business model by creating value from data at every level of business. Each function of the business has to be interactive with each other, based on the flow of data. The framework for digital transformation should guide the process of digitizing the core of the business.

The purpose of digitizing all the functions (i.e. processes, internal and external transactions) is to make the running (legacy) business more data driven and efficient. The company's existing IT department needs to attend to all the requirements so that the digitized process works smoothly for all functions. However, the company should be aware that, by utilizing the digital platforms (technologies and processes), numerous innovations are continuously evolving which can anytime create disruption, in some or other way. To safeguard the business, the company has to continuously explore options to develop a new product or service or business processes or functions. The company always needs to thrive to grow and change for the future. To ensure these growth options, the company can utilize fastmoving digital platforms in innovative ways. It can help the company to sustain even if disruption happens by other players in the market. Also, with the new growth options, the company can disrupt the market by creating new unexplored opportunities or the company can disrupt itself partially or fully before other players can disrupt it. To ensure digital growth, focused digital technology team(s) boosted with a new set of skills need to be identified and adopted. While preparing the company's digital framework, a high-level policy has to be framed to encourage agile digital thinking and to promote digital growth.

Ambidexterity
In today's challenging business environment, companies need to see backward constantly to attend to the existing processes, products and services, while looking forward to promoting innovation for future growth. This requires a strategic balance to exploit existing capabilities and explore new prospects. This phenomenon is called ambidexterity (Figure 4.4). This is not an easy job and very few companies have historically handled this duality efficiently. Ambidexterity enhances a company's performance. But at the same time, it causes tension between the two distinct capabilities which possesses a challenge for the company to create equilibrium between exploitation and exploration.

The strategy of prioritizing exploration over exploitation has the risk of suffering the cost of experimentation without gaining much of the benefit. The companies that focus on exploration exhibit multiple underdeveloped new ideas without considerable distinctive competencies. One of the telecom industry giants is a typical example. The company invested heavily in research and development through multiple technology centers and huge skilled manpower. At the peak, the company's R&D department had approximately 30,000 employees working at about 100 technology centers across the globe. However, despite focusing on exploration, the company's business performance declined considerably. As a result, the company laid off around 60,000 employees and closed the majority of its technology centers.

Two-Speed It

Every company has its existing legacy information technology (IT) architecture, which is built over a period of time to improve the efficiency of the legacy business. However, due to the rapid expansion of digital technologies, customer expectations are evolving very fast and every business (either the product or process or business value chain) is under the threat of disruption. To satisfy customers' changing requirements and to mitigate the risk of disruption, companies are transforming toward the digital business model, by adopting digital technologies and platforms. Companies need to strengthen their capabilities in various areas, such as digitizing core business processes and automating operation, innovating digital products and services, knowing customer behavior by using data and analytics and enhancing the multichannel experience for the customer.

Digitizing business processes (core) and automating operation is essential as it enables quick response times to customer, and helps in reducing operational costs by reducing waste and increasing efficiency.

Digital product innovation is important to address changing customer needs. One such example is linking a meteorological forecast with an agricultural loan by using a cloud server and analytics.

Understanding customer behavior by using data and analytics (with the consent of the customer) is significant business leverage for companies to improve customer experience and to increase sales through effective cross-selling.

Governance and Funding

The digital transformation framework should highlight governance structure and funding pattern for implementation of digital transformation. There can be a different approach to governance based on a company's business objectives. However, the creation of a governance committee is one of the best practices. The governance committee should include

representatives from the digital team, which unites the business functions. The governance committee needs to be empowered to make decisions on whether to start or keep or kill projects. The governance committee needs to decide on fund initiatives as well and track the progress of agile fast-moving projects.

4. People And Organization Structure

The preparation of digital transformation is not about making some trivial alterations to the existing rigid business processes. While start-ups are born with a digitally ready inbuilt agile work culture, the legacy businesses face genuine challenges such as lack of digital leadership skills, cultural stagnation, risk aversion and a long vertical chain of commands. For overcoming these challenges and adapting digital transformation, a profound cultural shift is essential. Participation of various stakeholders with early and frequent feedback is essential for bringing agile culture and a new way of work (WoW).

Effective engagement, collaboration and equal sense of responsibility of people are essential for the successful implementation of an agile culture and the digital transformation process. This engagement is essentially the internal engagement of the company's leadership and employees. However, here the customer is also an important entity. The company should build open relationships with customers so they become interested in being a part of the company's agile way of work.

Leadership

A company's leadership should have a strong understanding of the necessities and prerequisites of the digital transformation process. The company's leadership should envisage a digital vision, create a culture of inclusiveness and effectively communicate with the entire organization by encouraging digital thinking and innovation. The leadership must understand that people are key in the process of digital transformation. Employees should be encouraged to think innovatively and communicate their pioneering ideas openly. Also, the company needs to identify the skill development requirements of its employees and further upskill or reskill them. Leadership should focus on a gradual shift toward the lean and liquid organization with a fewer chain of commands. Leadership should make a conscious decision to identify the steps for continuous improvement at a sustainable pace.

Employees

Employee participation is an essential component for creating an agile organizational culture for a successful digital transformation. Agility is the value proposition of an employee's

capacity to collect and disseminate information about environmental changes and respond to that information rapidly and pragmatically.

Employees need to be empowered to take faster action to solve problems.

Employees should have productivity-enhancing technologies to take rapid action. Employees need to have the freedom to experiment and learn from mistakes. The company may adopt tools such as risk management software to help team leaders understand the risk associated with experimentation. In the agile organization, employees mitigate the risk of experimentation by regularly sharing pertinent knowledge and proficiency across teams. matrix structure of an organization may make it tough for employees to maintain clear expectations and lines of responsibility. So, in the case of matrix structure-based organizations, the company should initiate flexibility in interactions by creating a network of human beings.

Customers

The purpose of being agile is to serve the customer faster with value added effective services. A customer-centric culture is core for an agile organization. Speed, adaptiveness and innovation are encouraged to serve needs and to improve the experience of the customer. An agile organization brings the customer in center stage by encouraging them to participate in the product development from inception.

5. Digital Transformation Technological Tools

Proper selection of technologies for business purposes is crucial. A few of the important and popular digital technologies which are used by modern businesses extensively are Big Data, Cloud, Internet of Things, Cybersecurity, Additive Manufacturing, Artificial Intelligence, Machine Learning and Blockchain

5.1. Big Data
Big Data is a large and complex set of data. These voluminous data set can be used for business purposes if they are stored, processed and communicated effectively and efficiently. However, due to the enormous volume, conventional data processing software cannot handle them purposefully. The concept of big data become popular in the first decade of the twenty-first century. An open-source framework, such as Hadoop and Spark, becomes instrumental in storing, processing, analyzing and communicating big data faster and cheaper. The concept of big data is based on five Vs: Volume, Velocity, Variety, Value and Veracity.

Volume In today's time, a massive volume of unstructured data generates through various sources. Proper collection, storage, process, analyze and communication of these data are

hitherto impossible by conventional software. With the advent of digital platforms, it becomes possible to handle these big data sets.

Velocity Data generation and collection rates have become faster. Collection of data and analysis faster for quick and timely business use is a real success of digital platforms.

Variety When a massive data set is generated from multiple sources and multiple modes, naturally they are not fully structured. Digital technologies made the data possible to process with a fit for purpose.

Value Thanks to digital technologies, big data becomes capital as data possesses intrinsic values.

Veracity Due to modern digital technologies, data handling costs have reduced considerably. Big data is now cheaper and more accessible. It has helped in making accurate and precise business decisions.

Big data is used for various business purposes, such as predictive maintenance, machine learning, fraud and compliance, operational efficiency, innovation, customer experiences and product development.

5.2. Cloud

The "cloud" denotes servers that are accessible over the Internet. It includes databases and software that run on those servers. Cloud servers are situated in data centers all over the world. Cloud computing refers to the delivery of computing services over the Internet. The services include servers, storage, networking, databases, analytics, software and intelligence. The major advantages of the Cloud are cost, flexibility, global scale, productivity, performance, reliability and security.

Cost Cloud computing removes capital expenditure for the purchase of hardware and software and setup, electricity for power and cooling, the racks of servers, and the IT experts to maintain the infrastructure.

Flexibility Cloud allows businesses to be more flexible in work practices. Cloud services can be accessed from any locations, with the help of Internet connections. It provides faster services that can be accomplished with few mouse clicks.

Global Scale Cloud services provide the ability to scale. Cloud provides the right scale of computing power, storage and bandwidth from any location.

Productivity IT teams need not focus on maintaining their servers. It reduces the workload of IT personnel so they can concentrate on other important work.

Performance The cloud services run on a worldwide network of protected data centers, which are updated regularly to the latest, fast and most efficient computing hardware.

Reliability Cloud makes data backup, disaster retrieval and service continuity easier and less expensive.

Security Cloud providers offer policies, technologies and controls that enhance security.

The types of cloud services include System as a Service (SaaS), Platform as a Service (PaaS), Infrastructure as a Service (IaaS) and Serverless Computing.

Software as a Service (SaaS) Software as a Service is a technique for delivering software applications over the Internet. With software as a Service, cloud providers host and maintain the software application and underlying infrastructure. Users connect to the application, usually with a web browser on their phone, tablet or PC, by using the Internet.

Platform as a Service (PaaS) Platform as a Service refers to cloud services for developing, testing, transporting and maintaining software applications. By using PaaS, developers can quickly create web or mobile apps.

Infrastructure as a Service (IaaS) Infrastructure as a Service is the fundamental category of cloud services, where IT infrastructure can be rented. The infrastructure refers to servers, virtual machines (VMs), networks, storage, operating systems.

Serverless Computing In the Serverless computing model, cloud providers allocate on-demand machine resources by taking care of the servers on behalf of their customers. In this execution model customers are charged based on usage, but not for a fixed amount of bandwidth or number of servers.

5.3. Internet of Things

Internet of Things (IoT) refers to the network of objects (described as "Things") that communicate with each other over the Internet. Things can be anything and everything. Sensors, software and other digital technologies are attached to the things which help communicate between each other. It is not only computers or mobile, IoT can connect all the things of the world and make them talk to each other.

In IoT, essential components can be divided into three categories:

• Sensors that collect and send information: Sensors, which could be a light sensor, temperature sensor, air quality sensor, material sensor or any other sensor with a purpose, automatically collect information from the intended environment and transfer the same to the target component with the help of defined connections.

• Components that receive and act on information: There are components or machines which receive information and act upon it in a defined way. Examples include computer printers or cars.

• Components that do both: The most interesting part of IoT includes the components that not only collect information and send but also receive information and act on it. Collected information is sent to supercomputers which make sense of all the information.

IoT has extended the power of the Internet beyond computers and smartphones to a whole span of things and processes.

By using low-cost computing, big data, the cloud and mobile technologies, physical things can collect, analyze and share data with minimal interference. It is a connection between the physical world and the digital world.