

Management of Data, Innovation and Changing Competition in Digital Transformation

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Introduction

With the effect of rapid advances in information and internet technology applications in recent years, it has become a necessity for businesses to keep up with the times. This process has accelerated industrial activities, production, and the harmonization of all other components related to production. In addition to designing new business models, it is necessary to make a digitalization-based transformation as businesses change their way of doing business. When we consider digital transformation within the scope of production, it is also seen as the process of developing information strategies for cooperation and improving a company's products in a global environment using information technologies. Transformation should not only be within the scope of its business model, production or activities, but also the managers who manage the transformation should combine digitalization with innovation and creativity, and try to present and create the technology of the future in advance. With the emergence of new technologies, products, services, and business models, the leaders of tomorrow should be ready to adopt a different corporate structure in businesses where it has become a necessity to determine the principles of digital transformation. Providing the adaptation process to the digital transformation, which is seen as the vision and mission of the future, and the realization of the transformation have special importance in terms of competitive advantage.

Digital transformation plays an important role in the process of industrial activities as it supports innovations and changes in product development. Digitization can be expressed as a reflection of the adoption of digital technologies in business and society, as well as related changes in the connectivity of individuals, organizations, and things. In the digital world, which is developing at an unprecedented pace with the development of the digital age, while the assimilation of digital technologies continues to progress rapidly, businesses are also trying to transform rapidly. Businesses that adapt and adopt this process in a short time will make their activities sustainable, while those that do not will become more passive and maybe even face the danger of extinction.

Digitization is the inclusion of all kinds of objects in the digital network using information and communication technologies. Although the Internet has been called virtual until now, it can now be called physical. Because now it has become a technology that touches people and becomes a part of them. Digital transformation emerges with the blending of personal and corporate information technology environments and covers the transformational impact of new digital technologies such as social, mobile, cloud and internet of things in businesses (Sebastian, et al., 2020). Digital transformation includes the application of digital technologies to change basic business transactions, products, processes, organizational structures, and management concepts (Saglam, 2020). Table 1 shows the digitalization forecast figures for the world population and connected device increases (Sahinaslan, E. & Sahinaslan, O., 2019).

Table 1. Digitization forecast figures by years

Year	World Population (Billion)	Connected Device (Billion)	Number of Devices Per Person
2003	6.3	0.5	0.08
2010	6.8	12.5	1.84
2015	7.2	25	3.47
2020	7.6	50	6.58

When the figures in Table 1 are examined, it is seen that the world population grew by approximately 5.5% between 2015 and 2020, while the increase in the number of connected devices was at the level of 100%. Parallel to this, the level of increase in the number of devices per capita is about 90%. These increases naturally trigger world market increases.

Digital transformation does not mean digitizing the business by replacing the old technology with a new one without changing the way businesses work (Accenture, 2015). Digital transformation creates radical changes in the way businesses do business, the living standards, and the processes of individuals and societies (Sahinaslan, E. & Sahinaslan, O., 2019). Integration of new needs into the existing process in the analysis and planning of the digitalization process. In addition, it is also planned to remove the process steps of the existing process that are ineffective or that will no longer be needed with new technologies. Designs made by removing process steps that will no longer be needed or add value increase the success and usability of the digitalization process. While designing the digital transformation process flow, priority should be given to making the process flow user-friendly by supporting the opportunities and opportunities offered by appropriate new technologies, in addition to the basic process flow that should be in a standard process such as entry, query and approval. Otherwise, the expected efficiency from the transformation cannot be achieved, and the excitement and motivation of the employees towards the transformation may be disrupted. It may even be subject to strong user resistance. The most difficult part of digital transformation for businesses is to create the necessary capital infrastructure for technology, as well as to manage change within the business, and provide a mentality transformation for employees to adopt this change. Today, it is not possible for businesses to provide and change the way they do business and customer satisfaction only with new technologies. A successful digital transformation in businesses is closely related to the creation of change in business culture, the change management process, and other strategic approaches. Because of the development of digital technologies and the impact of digitalization on all business processes, managers will need to understand how the transformation will affect their operations. In this process, it is important how the managers will follow the path to realize the digital transformation, what kind of strategies they will include, and how they will evaluate the situation of the business. With the emergence of new technologies, products, services and business models, the leaders of tomorrow should be ready to adopt a different corporate structure in businesses where it has become a necessity to determine the principles of digital transformation. Studies on digital transformation have shown that the increasing competitive positioning of successful firms is not only dependent on the technologies they adopt, but more importantly, on the strategies developed by their leaders (Ismail, et al., 2017). While the building blocks of a digital transformation strategy for managers are known, clearly defined rules on how to approach digital transformation and implement a well-defined digital transformation strategy are lacking (Hess et al., 2016).

It is argued that digitalization changes the interaction of employees in the workplace, their expectations from employers and careers, and when and where work is done. In this sense, the development of digitalization affects institutions on many levels internally, as it requires the adaptation and development of new knowledge and new ways of working (Bondarouk & Ruël, 2009). In order for businesses to adapt to today's process of change, they need to question themselves more and more every day and eliminate their deficiencies in order to adapt the structure and strategies of their businesses to change. Digital transformation, which affects the ways of doing business, designs, models, and processes in order to improve the performance and activities of businesses, requires the capabilities that companies should have for the collection, processing, and analysis of data (Schallmo & Williams, 2016).

The dynamic capabilities of businesses are of great importance in the realization of digital transformation in an increasingly competitive environment. It will be easier for businesses that want to gain a competitive advantage in a constantly changing business environment, to choose appropriate internal and external resources to create different dynamic capabilities and to realize digital transformation as a result of having these resources. In this study, the effects of data, innovation and changing competition process on the administrative processes of enterprises within the scope of digital transformation were examined. Each of them was examined under separate headings and the facts in the digital transformation process were discussed one by one.

Data in Digital Transformation

We can define the data, which is the raw material of digital transformation, which can cause a change in many activities in the daily lives of individuals, production, health and working life, as the results obtained based on observation and experimentation in its most general form. It is a fact that data alone does not mean information and meaning. Information can only be accessed by cleaning, processing, analyzing, and interpreting the data (Yilmaz, 2009). The discovery of information in data has been made possible by the application of special algorithms that can capture patterns in big data. Although this process is developing day by day, it is possible to obtain high-quality information from low-level data by using machine learning, artificial intelligence, and statistical methods (Fayyad et al., 1996).

In almost every stage of his life, increasing digitalization has brought with it huge amounts of data. In the 1990s, John Mashey introduced the concept of big data in the literature. While the concept of big data and its analysis was initially an interesting concept for statistics, computer science, and econometrics departments, today it has become a popular and even mandatory concept that changes and develops engineering, health, production, R&D, and many other fields (Ularu et al., 2012).

The development of internet-based smart systems has led to a significant increase in the amount of data produced all over the world. While the digital data produced in 2015 was approximately 15 zettabytes, it is estimated that this rate will be approximately 160 zettabytes in 2025. As can be seen in Figure 1, digital data production has followed an increasing trend over the years (Rydning et al., 2018).

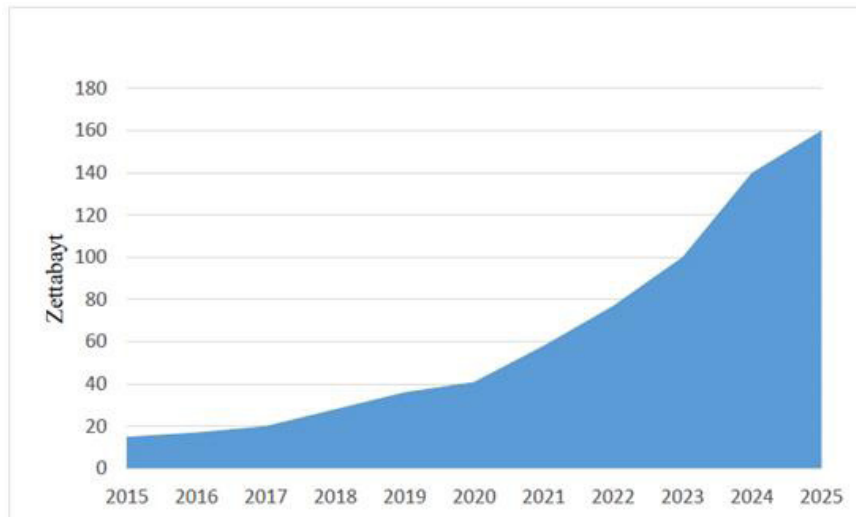


Figure 1. Increase in digital data by years

What makes the data import is the analysis of the obtained data. Big data analysis enables the inactive information to be processed and transformed into information that creates value. Technological structures that will enable data to be analyzed will also serve the benefit of people.

Data Analysis

Digital data is huge in variety and volume. Today, while the data produced almost every second increases, the storage costs, technology, and costs related to the analysis and processing of the data have united the users to the point of obtaining high benefits (Kokhan, 2021). Because the cost-benefit analysis of analysis processes that require investment costs should be stronger in terms of investors and users. The real benefit in data will be provided by the technology that can store and analyze unstructured or semi-structured data and the correct use of this technology with trained human resources (Gupta & George, 2016).

The potential value of big data is only realized when it is used to power decision-making. To enable this type of evidence-based decision-making, organizations need a variety of processes to meaningfully transform high-volume, fast-moving, and diverse data. These processes consist of five stages data management and data analysis shown in Figure 2 (Gandomi & Haider, 2015).

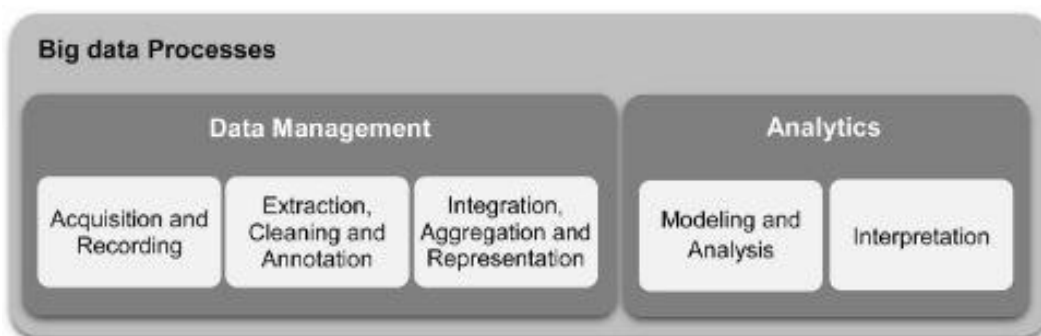


Figure 2. Processes for extracting insights from big data

The following benefits are provided by big data analysis (Manyika et al., 2011);

- It makes the data more transparent and useful and important to the business.
- As organizations create more functional data and store it in digital format, they gain access to much more precise and detailed performance information.
- Big data gives even small companies a chance to be stronger in their competitive environment.
- Thanks to big data, consumers can access many goods and services unique to them more easily and quickly.
- Complex analyzes make decision-making significantly easier. The potential of all decision support software known today will be developed by big data like never before and not anticipated.

Application Areas, Challenges, and Challenges of Digital Transformation in Institutions Risks

Production technologies have been the fundamental steps leading the transformation. Digital transformation in the industry, leaving behind the old technologies, cyber-physical smart systems, smart factories, internet of things, big data, cloud computing, etc. entered our lives with concepts (Hermann et al., 2016).

Barriers such as not knowing how to benefit the whole society, lack of skills and skilled workforce, inadequate infrastructure, incomplete or inadequate regulation, and consumer protection, and especially difficulty in obtaining finance are some of these challenges (Ebert & Duarte, 2018).

With digitalization, instantaneous data becomes more integrated into the information transformation process and decision-making mechanisms. Insights provided by not only structured but also semi-structured or unstructured data can help improve the quality of service delivery in the public and private sectors, and make effective decisions. Mechanisms, effective risk management and strategy development, etc. it will create a transformational benefit on the basis of all sectors by contributing in many aspects (Marr, 2019).

Advantages of Big Data

Digital transformation has led to very effective changes in businesses. Changes in production methods, production systems that require fewer people, unmanned dark factories that produce with smart sensors, etc. These situations have led to the birth of new professions and the design of new ways of working. It is very important to be able to make accurate predictions in order to understand the effects of all these changes in working life and to put the policy response on the right ground. At this point, it has become an important issue to read about the digital transformation experienced with the right insights (Papas, et al., 2018).

Big data, technology infrastructure, and manpower trained in analysis have high investment costs, but the opportunities it offers, its superior performance in decision-making mechanisms, more effective product development, and an efficient approach that will reduce costs in the medium and long term (McNeely & Hahm, 2014). In many organizations that have just realized their digital transformation, if the structural changes are made by big data, proper storage, processing and conversion of data into insight, an

effective solution-oriented, better decision-making, cost-effective, auditable, secure, and sustainable service model can be developed (Nickerson & Rogers, 2014).

Innovation in Digital Transformation

In recent years, the combination of digitalization and innovation is one of the most focused topics in all sectors. It is known that both concepts alone have great effects on the success factors of businesses. He emphasizes that researchers have recently taken an intense interest in digital innovation in parallel with the approaches in the industry (Brynjolfsson & McAfee 2014; Chesbrough, 2017). The successes of businesses in using information technologies in all their processes have led them to digital technology-based innovation in their new products and services. In this case, information technologies as a driving force cause radical changes and transformations in products and services in all sectors.

It is seen that businesses try to include inter-industry and inter-individual cooperation in the innovation process by using the advantage of information technologies in order to reach innovative approaches on issues such as ensuring effective resource use, expanding the differentiated and personalized product portfolio, and increasing productivity. Innovation policies are also tried to be created for different sectors, individuals, cultures, and perspectives to use networked thinking in harmony. Today, many businesses share their innovation processes. Businesses that gained their competitive power from research and development activities carried out within the boundaries of the company in the past, today create platforms where they can use collaborative approaches more in their innovation strategies. Considering the concept of digital innovation from a broad framework, it has been defined as significant changes in the product, process, or cooperation models of enterprises, perceiving them as new and their concretization with information technologies (Yoo et al., 2010). With digitalization, products have begun to take on different and complex dimensions. In other words, a digital-based product can have features that can be programmed, smart, monitored, and connected to other devices with information technologies integrated into its structure. The effect of digital technology on the acquisition and development of new information has also led to the rapid digitalization of information. With the rapid developments in communication technology, the development of processing power in devices, the availability of easier options in service processes, and the development of product designs has emerged as the unifying values of digitalization. This emerging situation differentiates digital innovation from the previous ones. This digital innovation presents a more complex and difficult structure compared to others.

This new approach brings new opportunities and risks for businesses. The fact that the customer and market structure has a more heterogeneous structure every day has forced businesses to design new products/services by taking into account the reality of very different customer expectations. This situation has led to the formation of important new perspectives such as faster and more flexible structuring, leaving the previously closed innovation to open innovation-based cooperation, following technological innovations in internal and external environmental analysis, and logical change in product/service design. It is seen that the digital innovation process has a structure that differs significantly from the analog innovation process. In order for businesses to be successful in digital innovation, their competence in using digital technology in the product/service process and their desire for this competence are very important. It is essential for businesses to follow digital technology innovations in their own and other sectors and integrate these changes into their own processes.

Otherwise, it will lag behind the rapidly changing digital technology. Digitization comes to the fore with its unique features, which enables the awareness of digital innovation to emerge and the business to develop an effective differentiation strategy against its competitors.

Digital Innovation Strategy Management Processes

Digital innovation, at any scale, should be a vital part of business strategy within the scope of innovation and R&D efforts. Innovation is not something that can happen alone. For this, it may be necessary to innovate in the production processes, the technology used, and the production methods. Process, technology, and method change should provide a competitive advantage to the business by reducing production costs. This competitive advantage will not only give the company the opportunity to become a sole supplier, but it will also discourage those who want to enter the market (Aksu, 2019). Within the scope of digital innovation, businesses are faced with three basic structures. These; The digital environmental structures of the enterprise in its own and other sectors, the acceptance risks of the products and services of the enterprise in the market, and the ability of the enterprise to meet the market demands. Since these three basic issues interact with each other, businesses should act in integrity while evaluating these basic situations. In recent years, there has been intense and fast competition in all sectors. Against this competition, businesses need an effective and efficient digital innovation process management while using their resources. Three key elements will be important when assessing the digital innovation capabilities of the business structure. These are the organizational structure of the business, the logic of product development, and the analysis of the digital environment. Figure 3 shows the important parameters for managing a successful digital innovation strategy.

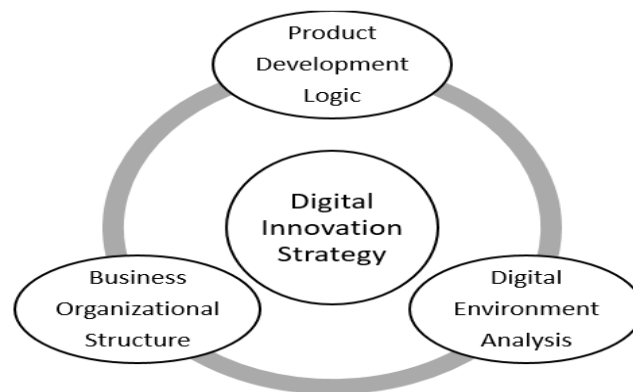


Figure 3. Digital innovation strategy management processes

Organizational structures of the business

The business wants to develop its existing products with digital technology and use it as a change effect for itself. In order to realize this action, the structural features of the business in the learning process of new technologies are at the forefront. It is necessary for the business to effectively implement a sustainable innovation learning strategy in its own life cycle. The desires and attitudes of the managers and employees of the enterprise in this direction are the basic conditions of success. With the establishment of this continuous education relationship, the business should constantly encourage its employees to follow and acquire digital competencies.

Product development logic

The digital innovation learning process will be more effective when the innovative ideas of the employees in the business structure are provided with the opportunity to create a spontaneous innovation initiative within the entire business with the idea platforms. It is essential to consider the product and service based on digital technology. With the establishment of a continuous education relationship, continuous encouraging behaviors should be exhibited in order to follow and acquire the digital competencies of the employees of the enterprise. Effective use of external stakeholders in the design process is very important for knowledge, which is one of the basic conditions of successful product design.

Digital environment analysis

Digital technology is in continuous development and transformation with different innovations in different sectors every day. This will be possible by constantly monitoring digital technology and analyzing how the business will use it in its product and service portfolio. In this way, the harmony of the employees with the digital technology will be realized within the business process, such as improvisation. Businesses can make these analyzes more effective with special working groups that will follow the near external environment analysis.

Competition in Digital Transformation

When businesses consider competition as a roadmap that includes fixed movements in an unchanging time period, they cannot determine the effects of their own competitive strategies and the effects of businesses that are directly or indirectly affected by these effects (Turkkan, 2001). Considering that competition takes place in a dynamic process, designing this process in a dimension that includes the necessary flexibility and counter-interactive maneuvers will ensure that businesses are prepared for the developing conditions and the agenda that can change at any moment.

Dynamic dimension of competition process in digital transformation

The awareness that competition is a dynamic structure should be considered both for businesses and potential competitors. Today, as a result of increasing competitive pressure, the emergence of various technological innovations in the medium and long term and the possibility of being open to development make the final results of competition unpredictable. As a result of these situations not being foreseen, businesses are forced to withdraw from the competition by failing. In order to eliminate these dangers, it is becoming more and more important for businesses to create dynamic competitive strategies with dynamic features by calculating the new formations that will emerge in the context of their past experiences and future predictions.

Competition components

It has become one of the main tasks of business management to be able to accurately reveal and make sense of the components that give dynamism to the competition process.

Future orientation

The most important reason for the future-oriented design of competition is that although people do not have the opportunity to turn to the past and reorganize the past, the initiative to shape the future is always in question (Goldsmith, 2004).

In this process, businesses should be sensitive to their customers and customer-oriented, be environmentally sensitive and take environmental responsibility, and reconcile uncertainty and risks with opportunity openings. Being aware of the fact that we live in the age of value, it should be able to make serving its customers the most important feature of its identity (Howard, 2005).

Collaboration focus

The need for businesses to differentiate themselves from their competitors is based on the ability to focus on a specific area and create the ability to specialize in that area. In the globalizing competitive environment, businesses act with the logic of competition instead of individual competition, cooperation instead of conflict, and instead of me, in order to use limited resources in the most effective way, facilitate resource availability, to increase the synergy of technological processes, logistics, marketing and human resources and to benefit from expertise skills. Who is our strategic partner? They should ask themselves the question (Hanan, 1996).

Talent orientation

The most important factor that brings dynamism to the competition process is that businesses are prepared against the uncertainties of the future and possible changes that may occur according to the degree of certainty of these uncertainties. The only factor that can eliminate the difference that may arise between the current strategic formulations and the changes faced and prevent the interruption of the competition process is the talent and skill portfolio of the human resources of the enterprises.

Speed orientation

Being future-oriented, benefiting from the synergy created by joint competition and relying on their talents are the building blocks of the road to dynamism. But while creating all these, businesses need to get ahead of their competitors, who have the capacity to experience the same processes, without ignoring them. Businesses that cannot reach speed will be doomed to be surpassed by their competitors. The most critical and fragile element of global competition is the time factor.

Ways to maintain competitive dynamism

The competitiveness of the business will depend on its digital capabilities. The digital capability of an organization is the ability to communicate correctly with customers, suppliers, and internal and external environment elements and to use digital channels effectively in relation to these environments. Moreover, these channels can reduce the cost of commercial processes. In this way, competitors with high digital skills that will enter the market will scale up very quickly by using these skills, and they will be able to put even companies that are the leader of the sector in a difficult situation.

Thanks to their digital capabilities, organizations can find the opportunity to act on common ground with other organizations and even competitors in the marketing of other

products and services that are close to and complement the goods and services they offer, and can even be purchased with them. Labor costs can also decrease in businesses with high digital skills. Because software, robots, and artificial intelligence applications take the place of employees in many fields. As a result, even if they are very strong at the moment, organizations that ignore the current global digitalization process and do not aim to develop their digital capabilities in their strategies will soon face competitive difficulties.

The Process of Digital Transformation

The process of realizing digital transformation should be managed within a plan. Businesses that want to initiate digital transformation must first define their vision, understand their capabilities, explore opportunities to start new ventures and restructure their operations by making the necessary preparations (Figure 4). The business should also address strategic questions about each of the following issues (Rose, et al., 2016, p.8):

Define the vision. It is about understanding the evolving customer needs and competitive environment and redefining the vision accordingly in order to realize the desire for digitization. Is digitization a threat or an opportunity? How the market developing and what is are our competitors doing? Should we create new businesses or improve our current cost position? Questions such as answers are sought. **Submitting New Offers.** It's about better meeting customer needs in existing businesses or creating new multi-billion-dollar growth opportunities with new venture portfolios. Questions to be answered; How do we define a portfolio of new digital business opportunities? How do we create a business case to invest in digital growth? is in the form.

Strengthening Core Business Processes. It's about redesigning and rethinking business processes. The aim is to increase the effectiveness of incremental change in operations and improve the customer experience. How can we use digital to get better efficiency from the business? How can we optimize our operations? Questions are addressed.

Building a Strong Digital Foundation. It is the establishment of the basis of digitalization by evaluating the organizational structure, business processes, tools, infrastructure, employees, and stakeholders of the enterprise. How does the current organization compare to the vision for the future? How do we acquire the skills needed to bridge the gap and develop the business in that direction? This is the final step in seeking answers to your questions.

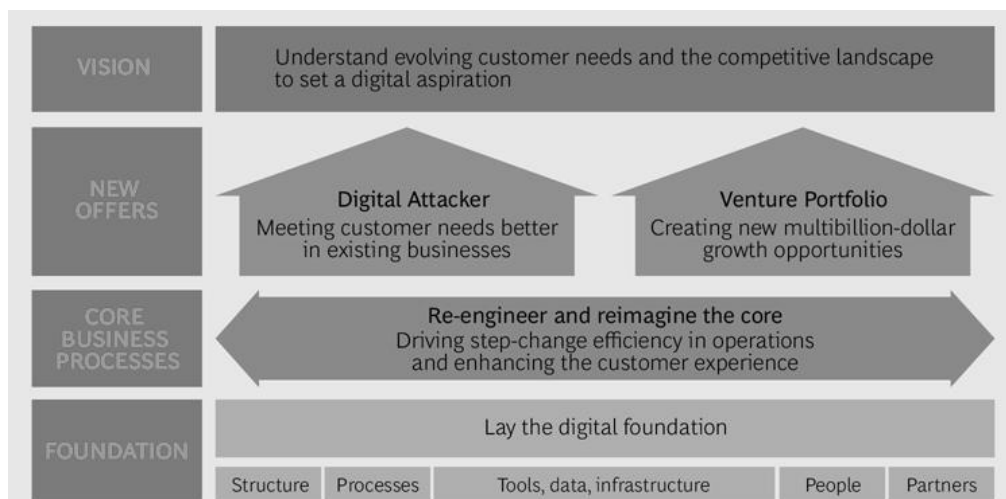


Figure 4. The process of digital transformation

It has been determined that it will guide the effective digital transformation program in three stages (CapGemini & MIT, 2011):

1. Thinking about the digital future for the business: Many digital transformation initiatives cannot add value to the business because they do not have a digital vision. The firm's senior management must create a digital vision for the future and communicate it to the organization. Successful digital transformation is created from the top down. The real value of digital transformation often comes when it is valued between silos and then helps others see that value.
2. Investing in digital initiatives and skills: Transformational activities require investment. Investment activities are a strategic risk-bearing decision process to be carried out by senior managers. As with any investment, digital transformation operations require understanding the investment need, managing risk, and making the necessary changes to reap the benefits of change. In addition, there are value gains that can be derived from existing investments.
3. Leading the transformation and change from the top: Unless the digital business vision of senior executives is supported by top-down communication and governance within the organizational structure, it is difficult for digital transformation to become active and turn into action. The final step in guiding digital transformation is the process of senior executives leading the transformation and communicating and managing it to the organization.

Conclusion

Digitalization refers to the transformations that occur as a result of the adoption of information and communication technologies, which enable the production, processing, sharing, and transfer of information, by the decision-making mechanisms in the economy. Digital transformation is largely the result of telecommunication networks, computer technologies, operating systems, artificial intelligence, cloud computing, internet of things, etc. due to the widespread use of technologies.

Digital transformation, customer needs, and expectations in the company of new developments and opportunities. It consists of redesigning and transforming existing processes by reading well, and taking into account new technologies. Technological transformations have become a driving locomotive rather than a lever in achieving long-term business goals. Being in the future has become to some extent directly proportional to being in the digital world of the future. Whether they are individuals, businesses or institutions, they will be successful to the extent that they can realize the need for this transformation and make the necessary transformations on time, and they will gain a competitive advantage.

With the effects of the digital economy and digital age in today's businesses, the new search is to be "digital". In a number of industries, companies are dedicating resources to becoming digital companies to bring new products and access more information to digital technology to streamline their business processes. Businesses that cannot realize digitalization in their business models and designs, especially in production, will be doomed to disappear in the sector after a while.

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