

HOW DOES DIGITAL MATURITY LEVEL AFFECT FIRMS' CORPORATE STRATEGY?

Dr. Funda KILIÇ¹

Cite As: Kılıç, F. (2021). "How Does Digital Maturity Level Affect Firms' Corporate Strategy?", International Journal of Disciplines Economics & Administrative Sciences Studies, (e-ISSN:2587-2168), Vol:7, Issue:35; pp:835-848

ABSTRACT

The aim of this study is to examine how digital maturity level affects corporate strategies, particularly after the rapid digitalization processes that came with the pandemic, it is aimed to explain how digitalization is included in the strategies of companies, how digitalization is handled on a departmental/functional basis between those who have invested in digitalization in the past and have reached a certain level of maturity and those who are at the beginning of the digital transformation process. The study was conducted in 26 manufacturing companies in Turkey within the organization in the ISO Second 500 List. The data were obtained by using both qualitative and quantitative methods, the method of in-depth interviews with 56 high level managers and survey with 132 employees. As a result of this study, there are differences in the corporate strategies of companies that are more mature in digitalization and companies that are at a lower level. Companies with a high level of digitalization have a high level of digitalization of products and services, as well as organization and processes. However, in companies with a low level of digitalization, the subject of products and services has been handled on the basis of the production department and digitized, but the organization and processes have not been sufficiently digitalized. While companies with high level of digitalization give importance to digitalization in all departments of R&D, finance, accounting, sales and marketing, companies with low level of digitalization give their focus to production and finance departments and partially support digital transformation in other departments. While trainings are given to increase the digital awareness of employees in mature companies in digitalization and the perspective on digital transformation is dominant in the corporate culture, it has been determined that employees in companies with low digital maturity level are supported only in necessary vocational training.

Key words: Digital maturity level, digital transformation, corporate strategy

1. INTRODUCTION

The purpose of strategic management is to establish a compliance between the business and the environment, while this is in place, the success of the business will be continued, not adversely affected by the unforeseen events in the environment, and will remain present. The purpose of this management was to maximize utilization and efficiency, as the traditional management style is more about the internal business. If the environment does not change for a long time, or if it changes slowly, this management style will be successful. But in recent years, due to the pandemic, the environment have been constantly changes and changes are very fast. Success and survival of the business is possible by evaluating opportunities due to environmental changes, minimizing adverse impact and thus adapting to the environment. Firms have to benefit from both speed, cost and customer relationships in order to take their place in the global market and stay in competition environment. In doing so, it is a priority to combine key capabilities, to effectively utilize emerging technologies or external resources.

The impact of Pandemic, the implementation of digital transformation in the industry and the sustainability of the industry has been raised. In the global field, the industry is able to achieve digital transformation increasing the awareness of digital transformation for firms using technology, identifying the roadmaps they will follow, their competence in digitalization and identify what they need to improve themselves on it's important. Digital technologies are discovered and spread. Transformation costs and applications are becoming more and more convenient (Remane, Hanelt and Wiesboeck, 2017). But on the other hand, there are businesses that are still not aware or aware of digital technologies, but are experiencing problems in the selection, purchasing and implementation stages, which may still be considered a transition period. The issue is not about the purchase of digital technologies, but about the overall consideration of other factors in the business and not being considered as one of the key elements in corporate strategies.

The aim of this study is to examine how digital maturity level affects corporate cultures. Especially after the rapid digitalization processes that came with the pandemic, it is aimed to explain how digitalization is included in the strategies of companies, how digitalization is handled on a departmental basis between those who have invested in digitalization in the past and have reached a certain level of maturity and those who are at the beginning of the digital transformation process. With this aim, this research is important as it draws

¹ Independent Researcher, İstanbul, Turkey

attention to the level of digital maturity, which is partially studied in the strategic management literature, especially in the post-pandemic period, where the digital transformation process is extremely important.

Today, the world is breaking through crucial process under pandemic conditions. The pandemic not only significantly affects people health but also affects daily routine. Notably, firms in the society can respond to these crucial conditions. They need to consider flexible management processes and manage their digital transformation processes correctly. It is seen that various digital maturity models have been created in recent years. Some digital maturity models, developed largely by consulting institutions, aim to measure the current level of digitalization of the business on the one hand and to provide a pathway to digital maturity on the other. However, the generalizability and consistency of the developed models remain largely uncertain (Thordsen et al., 2020). These digital maturity models generally consist of presenting a standard questionnaire to businesses, matching the responses received with the maturity model stages, and presenting standard recommendations according to the maturity level evaluated. However, every business is different because it has different characteristics, needs and goals; For this reason, it is emphasized that the digital transformation roadmap definition process should be adapted to the context in which the business operates (conditions such as time, place, place) (Colli, Madsen, Berger, Moller, Vejrum, Bockholt, 2018).

According to the IT Dictionary of Gartner, a technology consulting firm, defines "Digitalization (digitization) is the process of moving from analog to digital form". In this study, first of all, what the concepts of digital transformation and digital maturity mean for businesses will be questioned, and the dimensions and features of some digital transformation models available in the literature will be mentioned. The aim of the study is to examine the concept of "digital maturity" and to shed light on future research by mentioning the features of digital maturity models. In the literature part of the research, studies on three subjects are presented: corporate strategy based on functions, digitalization in Turkey's industry and digital maturity level. In the methodology part research sample and scales used in the research is given, in the findings section, the data obtained as a result of the research method application are presented, and these findings are discussed in the conclusion section. In the last part, the limitations of the research and suggestions for the future are included.

2. THEORETICAL FRAMEWORK

2.1. Corporate Strategy

The concept of strategy based on ancient Greek origin is based on the combination of the words "stratos", which means the army, and "ago", which means giving direction and directing. Organizations are able to determine their strategies and how to configure their resources in a challenging competitive environment, and how stakeholders will meet their expectations in their markets (Johnson, Scholes and Whittington, 2008). Strategy is the process for an organization where long-term goals are set, action plans are created, decisions are made for the allocation of related resources. The strategy relates to the long-term direction of an organization and the scope of its activities for its strategic decisions.

Strategies selected by businesses are classified and explained by many researchers. Researchers who make significant contributions such as Mintzberg (1978), Miles and Snow (1978), Ansoff (1987) and Porter (1996) in strategic management explained the strategies that businesses choose in different perspectives. Miles and Snow classify the strategy types as defenders, prospectors, analyzers and reactants (Laugel, Boer and Acur, 2006). Porter (1980) competition strategies, Rumelt (1984) the importance of not emulating products and resources so that businesses can achieve sustainable competitive advantage, Barney (1991) the importance of implementing value-generating strategies for competitive sustainability, Burns and Stalker (1961) competition strategies, and that low cost strategies are generally appropriate.

In the reviewed strategic management literature, three key generalized components of the content of an organization's strategy were identified. First, the strategy is perceived as "communication" (plan). Second, the strategy is perceived as "intent". The third has perceived the strategy as "actualized". Chandler (1962) classified strategies as plan-a direction, guide-course of action, intention rather than actual. Some of the researchers who describe the strategy as plan, game plans, policy, goals and mission are Andrews (1987), Chandler (1962), Dess and Miller (1996), Hofer and Schendel (1978). The strategies intended to create the strategy are Porter (1996) as position, Barney (1995) as source based. They expressed Farjoun (2002), Mintzberg and Waters (1985) and Pettigrew (1977) as a series of actions and behaviors. The main researchers who are discussing as a series of decisions and choices are Hax and Majluf (1988), Markides

(2004), Miller (1987), Mintzberg (1978), Pettigrew and Whipp (1991), Pfeffer and Salancik (1974) (Steensen, 2014).

Functional strategies in the strategy classification based on the management levels of the business are prepared and implemented at medium or lower management levels. The main group of functional strategies and sub-groups are located under each parent group. Examples of key groups are key departments within the business, such as marketing, manufacturing, finance, human resources and research development. Ulgen and Mirze (2010) grouped these functions as follows in Figure 1. The strategies that firms within a business group set to achieve their goals are business segment strategies. These strategies determine how the business will compete and what the competitive advantage is.

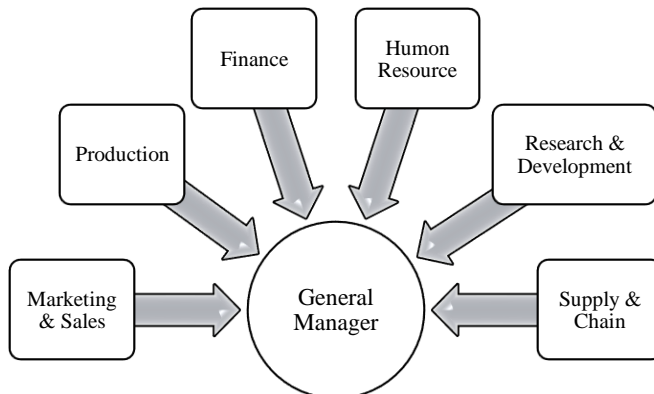


Figure 1. Functional Strategies

2.2. Digitalization in Turkey's Industry

The concept of digitalization in the industry was shaped in America and Germany in 2010. America developed the concept of "smart manufacturing" with the idea that the next leap in manufacturing productivity would be achieved by making much more extensive use of modeling and simulation in the manufacturing process, and at the same time, Germany introduced the concept of "Industry 4.0" with the idea of digitizing manufacturing.

The phenomenon of digitalization in the industry, brought to the public's agenda with the report "Industry 4.01 as a Requirement for Turkey's Global Competitiveness", prepared by TÜSİAD in collaboration with The Boston Consulting Group, lays the groundwork for systems where sensors, production tools and information technologies are increasingly connected to each other and goes beyond a single company. referred to as industrial value chains (<https://tusiad.org/en/reports/item/9011-industry-40-in-turkey-as-an-imperative-for-global-competitiveness>). These new connected systems, called cyber-physical, will interact with each other using standard internet-based protocols, predict errors and analyze data to adapt to changing conditions. In the Industry 4.0 period, these systems will become widespread, enabling faster, more flexible and efficient processes and making it possible to produce higher quality goods at lower cost. Thanks to the aforementioned structural changes, while productivity will increase in production, growth in the industry will accelerate and workforce profiles will change along with it. Technological elements affecting Industry 4.0; big data and analysis, smart robots, virtual reality, additive manufacturing (3D Printing), cloud technologies, simulation, horizontal/vertical software integration, internet of things (hardware integrated sensors network), cyber security.

Big data and analytics; With the collection and comprehensive evaluation of data obtained from many different sources, the quality of production increases, energy savings are provided and equipment maintenance is facilitated.

Smart robots; Due to its advanced sensors and control units, it works in close cooperation with people and reduces costs with a more autonomous system.

Simulation; operators have the opportunity to test in the virtual world before actually setting the machine parameters for the following product on the production line, thus reducing machine setup time and increasing quality.

Vertical and horizontal system integration; Time, resource and cost management becomes much more efficient with the end-to-end interconnection of Information Technologies systems from the customer to the shipment process and with full integration.

Internet of Things; means that sensors and field devices with limited artificial intelligence and automation control mechanisms in the current structure are brought together in a common structure. In general, it enables the data and devices in the field to be intelligent and companies to establish performance systems in production. But with the Internet of Things, more devices, even semi-finished products, are allowed to benefit from integrated data processing by connecting them with standard technologies. In this way, the equipment in the field can communicate both with each other and, if necessary, with the central control systems.

Cyber security; With the remote access structure brought by the pandemic, security vulnerabilities are increasing for both countries and companies. In this respect, with the increase of interconnected management and production systems, it has gained importance to manage access to machines in order to protect against cyber security threats.

Cloud technologies; Increasing the data and functions of the machines on cloud platforms, providing more data-based services to production systems, and even moving the systems that monitor and control processes to the cloud are becoming an important competitive advantage.

3D Printing; prototyping of parts has started to be used more and more widely, especially in areas such as complex and light designs, to produce special products in small numbers. High-performance and decentralized additive manufacturing systems reduce logistics costs and stock levels.

Virtual Reality; Although these systems, which support various services such as part selection in the warehouse, product selection, logistics management, employee safety infrastructure, they can be used as augmented reality in the future in order to improve the decision-making and operation processes of companies and to provide real-time information to their employees. is used.

In the Istanbul Chamber of Industry "Digital Transformation Analysis in Industry Report" in the Istanbul Region, digital applications were questioned in depth under the headings of technology and data analytics, production, quality and maintenance processes in 48 companies from four different sectors in order to determine the Digital Transformation level of the Istanbul region (<http://www.isodijital.com/>) A digitalization score was calculated for each title, and the digital transformation level of the companies was determined with the average of these. For this purpose, the answers of the companies participating in the study were scored between 1-4 using the digital maturity analysis scale, the general and digitalization scores of the companies were calculated and the companies were positioned at four levels. As a result of ISO's research, the General Digitization Score of the Plastics and Chemistry Sector is 2.0. At this level, which is defined as the "Controlled Management" level, executive and decision-making processes in companies are guided by the objectives. Business processes, on the other hand, are largely regulated by preventive systems and condition-defined decision mechanisms. In companies that have not yet reached this level, execution and decision-making are often driven by emergency responses. Issues are addressed as they arise. Performance measures are absent or insufficient. It is seen that there are studies for the transition to the "Controlled Management" level in companies that are at the "Reactive Inefficiency" level. Companies that manage their business with daily decisions or emergencies are working to develop processes and preventive systems that are managed according to objectives. When the scores obtained by the Plastics and Chemical Industry companies in four dimensions are compared with the general average of all companies from different sectors within the scope of the study, it is seen that the sector companies are above the general average in all dimensions. The highest average score of the Plastics and Chemical Industry companies is in the field of Production and Quality Processes (2.2), and the lowest average score is in the field of Technology and Data Analytics (1.7). The lowest score is in Technology and Data Analytics. There are companies that collect data from various points in the production area and monitor them in real time, as well as those that collect partial data from machines and view them instantly. Technical competence in data science in general has not yet been formed in the sector. As a result of this report, ISO recommended with three proposals for the digital transformation of the Plastics and Chemistry Sector:

- ✓ Increasing productivity by digitizing own business processes: In general, digital transformation is expected to contribute to resource, workforce and energy efficiency by digitizing all business processes – Smart manufacturing

- ✓ Establishing infrastructures that allow end-to-end integration with the customer, ensuring participation in the smart supply chain – Smart supply chain
- ✓ Developing value-added products and services to suit the customer's changing needs – Smart product and service.

2.3. Digit Maturity Level

The supply of digital technologies also brings solutions that can transform firms into opportunities in their growth by achieving sustainable competitiveness and profit in the face of increasing complexity (De Carolis, Macchi, Negri and Terzi, 2017). The concept of maturity refers to the “complete, perfect or ready” status and is a result of progress in the development of a system. Mature systems develop their capabilities over time to realize some desired future situations (Teichert, 2019). Fraunhofer Institute is a German research organization with 75 institutes spread throughout Germany, each focusing on different fields of applied science. It is the biggest organization for applied research and development services in Europe. There are several innovations and developments, they work on practically all application-relevant technology fields. According to their digital transformation measurement study there are six sub-dimensions that determine the level of digital maturity (<https://www.ipk.fraunhofer.de/en/references/digital-transformation-assessment.html>)

Evaluation is made on 33 statements that measure these 6 dimensions. These sub-dimensions and sample expressions measuring these sub-dimensions are as follows:

1. Corporate strategy; example statements: Digitization is a central component of our corporate strategy. We have defined responsibilities and roles to shape digital transformation in our company.
2. Corporate culture; example statements: Top management actively drives the digital transformation in our company. Middle management actively supports the change processes necessary for the success of digital transformation. Activities for the company's digital transformation are communicated to our employees in a target-oriented manner.
3. Organization and processes; At our company, we make extensive use of the flexibility of new ways of working and organization made possible by digital technologies. Interdisciplinary collaboration in our company is being broadly expanded to shape digital transformation. In our company, business processes are regularly reviewed in terms of improvement potentials by using digital technologies.
4. Staff and competencies; The professional and methodical competencies of our employees are well developed to successfully meet the challenges of digitalization. The personal skills of our employees are sufficiently developed to successfully meet the challenges of digitalization. Our company offers the necessary education and training programs to increase the skills of its employees to deal with the latest digital technologies. Our company uses digital solutions for human resource management tasks in a comprehensive and systematic manner.
5. Technology; We invest long-term in new digital solutions to systematically improve existing technologies in the company. We regularly update our IT infrastructure to reflect the latest technological developments. Our company has a mature IT and data architecture to collect, consolidate, consolidate and evaluate data in real time.
6. Products and services: We systematically and continuously monitor foreign market and technological developments in order to identify new approaches for the further development of our business model. Our company systematically analyzes and uses digitally collected usage data in order to continuously improve its product and service portfolio. We have comprehensively complemented our products and services with additional digital offerings.
7. Supply chain and business networks: We make extensive use of digital software solutions for our client management. Our company comprehensively optimizes digital channels and interfaces for its customers. We make extensive use of digital software solutions for our supplier management. We use regular exchange with external experts and partners to develop additional knowledge in the field of digitization.

The digital maturity assessment of seven dimensions is rated on Fraunhofer scale out of 5. It evaluates the maturity level obtained by measuring over 5 intervals:

0,00 at 0-0,99; Basic data and level of knowledge are limited, many processes are not owned. The concept of digitalization is not included in the corporate strategy of the company. It is partially digital when the company needs it and where it is mandatory.

If it is at the level of 1,00-1,99; There is awareness about digitalization. Even if it is not at the center of the company's corporate strategy, the company invests in digitalization at the point it deems necessary, but does not give priority to vertical and horizontal integration, that is, end-to-end flow between all units.

At the level of 2,00-2,99; digitalization is seen as a long-term competitive advantage, not a mandatory requirement within the corporate strategy of the company. Within the scope of the company's Human Resources strategies, there are partially policies to increase employee skills for digitalization. Even if digitization is not all-encompassing, the company has efforts in this direction. In the corporate culture of the company, activities for digital transformation are not communicated to its employees in a target-oriented manner. Information technology infrastructure is updated regularly, but the mastery of data analysis and management is limited.

At the level of 3,00-3,99, digitalization is important for the company. It is included as a separate budget in its corporate strategies, and it strives for digitalization not only in the field of production but also on the basis of units. It tends to research within the scope of business networks and alternative solution partners in the implementation processes of digitalization policies.

At the 4,00-5,00 level, there are automated and continuously improved processes, and it has a structure independent of human initiative, integrating new and current technology compatibility from the management to the lowest level business unit. Asset management, failure management, project management, periodic maintenance management, online status monitoring and tracking, risk management and energy optimization etc. By taking real-time data against scenarios, time-independent suggestions and decision support systems can be created instantly against "what if scenarios" from the management level. Based on this information, the main question of the research is whether companies in the process of digital transformation create a strategy for digitalization on the basis of their functions while creating their corporate strategies, and if they do, which functions they give priority to. Further, it is also how the level of digital maturity affects digital strategies on the basis of functions. The research model is given in Figure 2.



Figure 2. Research Model

3. METHODOLOGY

Creswell (2004) assumes that there are two types of methodology named qualitative and quantitative research methods. In this study, both methods have been used to understand the relationship of variables. Fraunhofer digital maturity level was used for measuring the level of digital maturity which was comprehensively discussed in the literature part. The factor analysis was applied to ensure the reliability and validity of the scale. As a result of the analysis, the cronbach alpha value is 0,70 and above, the digital maturity variable is divided into 6 sub-dimensions, which ensures the reliability and validity of the scale, as it is seen in Table 2.

Qualitative research method was used in the analysis of the data to explore the relation between variables. Qualitative research is defined (Yıldırım and Şimşek, 2016) as a method in which qualitative data collection methods such as observation, interview and document analysis are used and a qualitative process is followed to reveal perceptions and events in a realistic and holistic way in the natural environment. Interview technique was used within the scope of qualitative research, and data were obtained based on the answers of the participants with semi-structured questions. Semi-structured questions contains with corporate strategy and digital maturity level items. Initially, the conversations recorded as audio files were transferred and decoded into text as a total of 212 pages. In addition to the researcher, texts were evaluated independently by two consultants who entered the discussion, and content analysis technique and cumulative results were created and interpreted.

Purposive sampling was used to select the sample. Companies entering the top 500 with financial capital in Turkey are listed by the Istanbul Chamber of Industry ISO each year. In this list, 30 manufacturing

companies were identified that were rapidly entering the digital transformation process due to pandemic effect. 26 of these companies agreed to participate in the investigation. Survey has been sent to 250 people such as human resources, finance, sales, marketing, research development, information technology managers, surveys have been completed by 132 participants. In order to determine the digital maturity level of the companies in the research, a total of 56 senior and middle level managers were interviewed, and it was completed in a total of 162 hours between February 2021 and May 2021. Code and categories were comprehended in terms of participants' responses. Given the consistency rates between the encoders, it was determined that there was a 90% consistency between the second advisor and 87% consistency with the third advisor. Since the percentage of consensus in qualitative research is considered reasonable to be close to 80, it is advisable that the analysis is consistent (Baskale, 2016; Berg, 2001; Merriam, 1998).

Demographics data of the participants are given in Table 1.

Table 1. Demographics of Sample N=56

Gender	Frequency	%	Cumulative %
Female	24	43%	43%
Male	32	57%	100%
Total	56		
Position			
Senior Manager	29	52%	52%
Middle Level Manager	27	48%	100%
Total	56		
Age			
30 - 40	34	61%	61%
41 - 50	22	39%	100%
Toplam	56		
Tenure			
1-5 years	12	21%	21%
6-10 years	28	50%	71%
10 years - +	16	29%	100%
Total	56		

4. FINDINGS

As can be seen from the Table 1., the digital maturity level variable sub-dimensions are consist with Fraunhofer Digital Maturity Level Assessment (https://websites.fraunhofer.de/DTA/?page_id=646&lang=en). According to factor analysis results there are six dimensions of digital maturity level; corporate strategy, leadership and corporate culture, organization and processes, employees and competences, technology, product and services, supply chain and networks. Cronbach's alpha is one of the most widely used measures of reliability in the social and organizational sciences. A general accepted rule is that score is of 0.6-0.7 indicates an acceptable level of reliability, and 0.8 or greater a very good level. However, values higher than 0.95 are not necessarily good, since they might be an indication of redundance (Hulin, Netemeyer, and Cudeck, 2001). Each dimension cronbach's alpha is over 0.70 at an acceptable range which means the measurement has reliability.

Table 2. Factor Analysis of Digital Maturity Level

Factor	Item	F.L.	E.V.	C.A.
Corporate Strategy	1. Digitalization is a central component	0,73	15,54	0,85
	2. Defined roles for shaping the digital transformation	0,71		
	3. Measurable goals have been defined	0,69		
Leadership and Corporate Culture	1. The top management is actively driving the digital transformation	0,72	13,4	0,80
	2. The middle management actively supports the change processes	0,65		
	3. Using digital technologies	0,72		
Organization and Processes	2. Interdisciplinary cooperation	0,69	12,75	0,82
	1. Flexibility of new forms	0,62		
	4. Digital models for planning, design and monitoring	0,61		
Employees and Competences	3. Skills of employees are well developed	0,71	11,75	0,77
	1. The professional and methodical competences of employees for the challenges of digitalization	0,65		
	6. Digital solutions are used for the human resource management	0,64		
Technology	1. Invest long-term in new digital solutions	0,74	11	0,72
	3. Necessary standards and regulations for IT security	0,72		
	5. Extensive use of digital information and communication technologies	0,65		
	1. Monitor external market and technology developments	0,72	10,75	0,70

Product and Services	3.Involves external stakeholders to develop digital products and services	0,72		
	4. Entirely supplemented products and services with additional digital offerings.	0,7		
Supply Chain & Networks	3. Supplier management digital system	0,74	10,54	0,70
	1. Digital customer management	0,73		
	4. Entirely optimizes the digital interfaces to its suppliers	0,69		
		Total: 85,73		
KMO	0,91			
Barlett's Test of Sphericity	Approx. Chi-Square	7015,02		
	df	343		
	P değeri	0		

N: 132

The digital maturity level of companies is 2.08 out of 5. The distribution of digital maturity in companies; 27 percent of them are between 1.00-1.99, 30% of them are between 2.00 - evel 18, 3% of them between 4,00 – 5,00 as in Table.3.

Table 3. Digital Maturity Level Distribution

DML Scores Level	N	%
1,00 - 1,99	9	27%
2,00 - 2,99	10	30%
3,00 - 3,99	6	18%
4,00 - 5,00	1	3%
Total	26	

Corporate digital strategy value is 1.30. The digitalization goals of companies are partially included in their corporate growth strategies. Digitalization targets for all areas of the company have not been established in writing. The digitalization targets for all areas of the company were partially communicated to the employees by the senior management in written or verbal form. The effect of digitalization on companies today and in the future has been partially examined. It is necessary to create a roadmap for the digitalization strategy, to determine annual and 3-year targets on the basis of departments, and to define their responsibilities and roles in writing.

The digitalization value in the leadership and corporate culture dimension is 1.30. Leaders' perspective on digitalization is positive, but implementation-oriented action is weak. Top management partially directs the digital transformation in companies, middle management supports the change processes necessary for the success of digital transformation. Activities for the digital transformation of companies are not communicated to their employees in a target-oriented manner.

The digitalization value for organization and processes is 2.16. It is seen that companies benefit extensively from the flexibility of new working and organizational forms made possible by digital technologies, but do not extend it to all processes. Although ERP software is an important investment item in the majority of companies, end-to-end integration is limited. While digitalization completes end-to-end processes in some of the companies, it only takes place mainly in production processes in others.

The digitalization value for employees and competencies is 2.07. Companies partially offer the necessary education and training programs to increase the skills of their employees to deal with the latest digital technologies. In order to respond to the changing needs with digitalization, the status of employees' digital competencies is not regularly evaluated. Digital solutions are rarely used in a comprehensive and systematic way for human resources management tasks, and the HR unit is perceived as part of personnel affairs in some companies. Employees have competencies for using digital platforms. The digitalization value in the technology dimension is 2.65. Considering that companies are engaged in production activities, it has been observed that there are processes that are necessarily automated, but the same perspective does not reflect on other business units as a whole and the level of awareness is limited. Although there is an information technology architectural infrastructure, information on data analysis, data management and cyber security is partially available. The digitalization value for products and services is 2.45. Foreign market and technological developments are partially monitored in order to identify new approaches for further development of the business model. Companies partially analyze digitally collected usage data to continuously improve their portfolio of products and services. The use of new generation technologies such as the internet of things, big data and analysis, smart robots, and IOT technologies are partially present in the production processes. The digitalization value for supply chain and business networks is 1.75. Digital software solutions are partially used for customer management, and digitalization is preferred in production

processes. Digital channels and interfaces for customers are partially optimized, and digital software solutions are partially utilized. External experts are partially used to develop additional knowledge in the field of digitization.

Table 4. Digital Maturity Average Means

Category	Average
Digital Maturity Level	2,06
Sub-dimensions of DM	
Corporate Strategy	1,30
Leadership and Corporate Culture	2,01
Organization and Processes	2,16
Employees and Competences	2,07
Technology	2,65
Product and Services	2,45
Supply Chain and Networks	1,75

According to the data obtained, when the digital maturity level is divided over the average value of 2.5, it is seen that 12 of the 26 companies are above the average and 14 of them are below the average as in Table 5. In-depth interviews were conducted with department managers of companies with high and low maturity levels. These departments are as follows research and development - R&D, production, finance-accounting, sales and marketing.

Table 5. The Number of High and Low Digital Mature Companies

Above Average DML	Digital Maturity Level	Below Average DML	Digital Maturity Level
1	5,00	1	2,47
2	3,96	2	2,38
3	3,83	3	2,14
4	3,69	4	2,03
5	3,66	5	2,02
6	3,50	6	1,87
7	3,19	7	1,51
8	2,99	8	1,45
9	2,87	9	1,43
10	2,86	10	1,27
11	2,83	11	1,23
12	2,64	12	1,17
		13	1,15
		14	1,01

When 14 companies with high digital maturity levels are examined, it is seen that the answers given in the interviews support this. Data on the basis of departments are kept in digital environment. When we look at the results of the interviews with company managers with low digital maturity, it is seen that companies do not transfer their data to digital media, and the risks in terms of data security are high as in Table 6. and Table 7.

Table 6. High Digital Maturity Category and Code List

Category	Code	N
R&D	Acces to all formulas is authorized	14
	R&D digital policy and strategy is available as a written document	12
	Test results in laboratories are stored in digital	10
	Software programs for data security and privacy are available	10
Production	All production processes in the factory are automated	16
	Production is monitored instantly and simultaneously	16
	With the VR application, production processes in all countries can be monitored remotely	8
	Production is made through robotic applications	8
Finance & Accounting	Blue-collar workforce is used to monitor robots and machines	10
	Accounting program is followed through software	16
	Future-oriented financial software forecasting programs are used	9
	Finance and accounting departments are under separate management	16
Sales	In both sections, data is stored on digital platforms	15
	Customer data is tracked on the digital platform from order entry to shipment	12
	Forecasting software is used in sales data	7
	Digital sales applications are made to increase brand awareness	13
Marketing	Pipeline of sales is followed in digital environment	11
	Digital marketing applications are made to increase brand awareness	14
	Brand management is also done on digital platforms	15
	Customer feedback is received and stored digitally	13
	There are digital marketing applications for brand perception	11

Category	Code	N
R&D	Partially conducted leak tests for data security of formulas	10
	R&D digital policy and strategy is not available as a written document	12
	Testing and storage of results in test and laboratory services are outsourced laboratories are stored in digital	11
	Software programs for data security and privacy are partially available	7
Production	All production processes in the factory are automated	12
	Some part of production is monitored instantly and simultaneously	7
	Production processes in all countries can not be monitored remotely	12
	Production processes are carried out by the blue-collar workforce	11
Finance & Accounting	Accounting program is followed through software	12
	Future-oriented financial software forecasting programs are not used	12
	Finance and accounting departments are managed by the same head office	7
Sales	In both sections, data is stored on digital platforms	12
	Customer data is partially tracked on the digital platform from order entry to shipment	14
	No software programs for planning process	11
	Digital sales applications are partially used	12
Marketing	Pipeline of sales is followed manual methods	8
	There is no marketing department	4
	Digital marketing applications is partially used	11
	Customer feedback is received and stored manual	10
	There are partially digital marketing applications for brand perception	5

In the interviews made with the senior managers of the companies with high and low digital maturity level regarding their corporate strategies, it was determined that there were differences in the corporate strategies of the companies according to the digital maturity level as in Table 8. The sub-dimensions of the digital maturity level which are corporate strategy, leadership and corporate culture, organization and processes, employees and competences, technology, product and services, supply chain and networks, it has been determined that there is a difference in companies in the high and low level groups.

Table 8. Digital Transformation in Corporate Strategy

Category	Code	N
High Digital Mature Digital Strategy	Digitalization is a central component of our corporate strategy	14
	Defined roles and responsibilities for shaping the digital transformation	14
	Long-term goals set for digital transformation	14
	The digital transformation team is also positioned within the organization chart	12
	Annual, 3-year and 5-year analyzes were made on the basis of departments for digital transformation	10
	Gap analysis was made on the basis of departments for digital transformation	10
	Digital transformation budgets have been prepared on a departmental basis on an annual, 3-year and 5-year basis	10
	The talent and skill development program for new generation technology applications has been created for lower, middle and upper level employees	12
	Business development processes are periodically reviewed for new generation technology applications	11
	N=14	
Low Digital Mature Corporate Strategy	Digitalization is not included in corporate strategies, but is budgeted within departments	12
	A separate team structure has not been established within the organizational chart for digital transformation	0
	No written job description for digital transformation	0
	Investments are made in digital transformation to ensure production processes	7
	Production automation cost has a weighted ratio within the budget	9
	Employee training programs are geared towards vocational training and operational processes	10
	Programs that increase education and awareness for new generation technologies are only offered at the senior level	11
	Business development processes are handled through the market, competitors and growth rates	9
N=12		

Table 9. Digital Maturity Sub-Dimensions based on High and Low Degree

Components	High Level Digital Maturity	Low Level Digital Maturity
Corporate Strategy	Strategy planning for digitalization was carried out on the basis of all departments	Digital investment budget is reserved for production, finance and accounting departments. Not available for other sections.
Leadership and Corporate Culture	Management has perspective on the importance of digitalization at all levels	Digitalization in corporate culture has gained importance with the Pandemic. Managers have partial digital awareness.
Organization and Processes	Programs used on the basis of departments are intended to create institutional memory	In some departments, processes are followed manually.
Employees and	There are training programs and applications to	Employee training programs are planned according

Competences	increase the digital competencies of employees.	to professional needs
Technology	Applications regarding cyber security, data analysis and data security are carried out and followed.	There are simple applications for data security, data analysis and forecasting are not done.
Product and Services	Application and follow-up processes for production and services are in digital environment	Production processes are automated.
Supply Chain & Networks	Approved supplier list is available. international and domestic business networks are regularly developed.	There is a list of approved suppliers, but it is followed manually.

5. CONCLUSION

Technologies profoundly transform “the strategic context of organisations, the nature of competition, the behavior and expectations of customers, the conduct of business, the way products/services are produced, delivered, worked and ultimately the nature of entire industries” (Teichert, 2019). With the discovery and diffusion of digital technologies, digital transformation costs and applications are becoming more and more convenient in almost every industry (Remane, 2017). However, in this period, which can still be considered as a transition period, there are businesses that do not know enough about digital technologies or that have problems in the selection, purchasing and implementation stages even though they are aware of it. The problem is not primarily in the purchase of digital technologies, but whether they can be used holistically with other factors in the business. In this context, digital transformation is based on the harmonization of organization, business models and corporate strategies with digital technologies. The findings are in line with Kane, Palmer, Philips, Kiron and Buckley (2017) study regarding digital transformation which tries to help businesses adopt digital business processes and practices to help them compete effectively in the digitalizing world. There are differences in the corporate strategies of companies that are more mature in digitalization and companies that are at a lower level. Considering the corporate strategies of companies that are more mature in digitalization, digitalization is at the center of corporate strategies, duties and responsibilities for digital transformation are defined, they are included in annual, 3-year, 5-year targets, they have a separate budget, business development for new generation technologies is carried out, and employees are digitalized, employees were trained to increase their competencies for transformation. When the corporate strategies of companies that are at a lower level of digitalization are examined, it has been determined that digitalization is not included in corporate strategies, duties and responsibilities for digital transformation are not defined, they are not included in the scope of annual targets, the budget is determined according to the needs in the production department, business development is only market-oriented, and employees are trained only on professional subjects.

Due to the digital transformation process involves multi-disciplinary activities, it requires a range of experts in various fields that may not be available in all businesses, especially small and medium-sized ones. This makes it difficult for many businesses to grasp the idea of Industry 4.0 and create comprehensive strategies to address digital transformation. Therefore, there is a need for some methodologies and models that can support businesses in making this transformation operational (Colli, 2018). The findings are in line with Planing and Pfoertsch (2016) study that businesses are configuring strategic decision-making areas in two major dimensions, “digitizing products or services” and “digitizing business models”. Companies with a high level of digitalization have a high level of digitalization of products and services, as well as organization and processes. However, in companies with a low level of digitalization, the subject of products and services has been handled on the basis of the production department and digitized, but the organization and processes have not been sufficiently digitalized. While companies with high level of digitalization give importance to digitalization in all departments of R&D, finance, accounting, sales and marketing, companies with low level of digitalization give their focus to production and finance departments and partially support digital transformation in other departments.

Salviotti, Gaur and Pennarola (2019)’ research is to examine the relationship between digital maturity and other strategic factors. It shows that a digital vision shared by senior management about the role of digital technologies is positively associated with a higher level of digital maturity. It provides evidence of a higher digital maturity for those who take a business-wide holistic view of the impact of digital technologies than those who focus on a single or limited number of functions or processes. It provides evidence of a relationship between higher digital maturity and employee training and hiring employees with digital skills. The findings is in agreement with Salviotti et al (2019). While trainings are given to increase the digital awareness of employees in high digital companies and the perspective on digital transformation is dominant

in the corporate culture, it has been determined that employees in companies with low digital maturity level are supported only in necessary vocational training.

This study's findings is also in agreement with ISO Turkey findings, the General Digitization Score of the Plastics and Chemistry Sector is 2.0 out of 4.00 which means the sector is at the average. In this research companies' the level of digital maturity is closed to average (2.06 out of 5.00).

During the Covid-19 pandemic, businesses have different motivations for innovation. In order to get out of the crisis, they tend to make changes in their corporate strategies. At this point, digitalization is an important issue. However, it is very critical for companies to know their level of digitalization in order to use their resources correctly during the strategic planning stage. Otherwise, they can put the company in a more difficult situation with wrong investments and expenditures.

LIMITATIONS

This study was examined in different corporate firms and data was conducted by both qualitative and quantitative methods. The sample size of data is one of the limitations in this research. As a result of quantitative method, the outcomes of interviews are limited. Quantitative research's main purpose is the quantification of the data. The researcher used the quantitative research method in addition to the qualitative research method to minimize the constraints.

RECOMMENDATIONS

In the perspective of strategic management area, the future research may contain different sectors as a moderator because application of that research in different sectors may give different results. This study relies on perceptions of the respondents about the behavior of their respective firms. Especially, in terms of digital maturity level data, perceptions may be misleading. This study can be repeated by increasing the number of participants and also for further studies, to identify the effects of digital maturity on firm performance more precisely, the number of firms may be increased.

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