A GENERAL ASSESSMENT UPON POSTGRADUATE AND PHD THESES PREPARED RELATED TO DIGITAL TRANSFORMATION IN TURKEY

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Abstract

In recent years, mainly in information and communication technologies, cloud computing, artificial intelligence, internet of things, big data, advanced robotics, etc. developments in technologies have revealed the concept of digital transformation. In other words, digital transformation is a transformation process that occurs when the internet, communication, informatics, sensor, automation, artificial intelligence - machine learning and robotic technologies significantly affect and change all social structures and systems. It is observed that this process deeply affects all social, cultural and economic institutions and structures in the world. In short, an intense digital transformation is taking place in every field where people and society take part. It is not possible for the scientific world to remain irrelevant to the issue of digital transformation, which has such a great impact. Indeed, when the literature related to digital conversion is assessed, it is seen that there were many academic works published in as papers, articles, books, projects, thesis and etc. in different branches of science both in the World and in Turkey. In these studies, it is seen that each discipline examines "digital transformation" from its own perspective. In this research graduate theses, which were prepared between the years 2013-2020, digital transformation was examined. Purposeful sampling method was used in this study, which was conducted in the documentary scanning model. The sample of the study consists of 43 theses archived by the Higher Education Council's Publication Documentation Department. "Thesis Evaluation Form" was prepared by the researchers to analyse thesis. 43 theses within the scope of the research are classified according to their types, subjects; distribution according to publishing years; distribution according to affiliated institutes and branches of science; distribution according to research methods used; distribution according to measurement tools and distribution according to sample groups were collected with using evaluation form. The findings obtained in the research were interpreted based on percentage and frequency values which were shown on tables and graphs. According to the results of the research, it has been determined that there has been a huge increase in the number of theses prepared on digital transformation since 2018, that there are more master's degree theses than doctoral theses on this subject, and that quantitative research methods are used the most in theses and scales are used as measurement tools. In addition, it has been determined that the areas that mainly focus on public institutions, businesses and universities are discussed in the theses.

Keywords: Digital transformation, post graduate degree theses, PhD theses, Turkey

INTRODUCTION

According to researchers and scientist, there have been three industrial revolutions until today. Those revolutions, from a production style with agricultural and labor-intensive working conditions until the beginning of the 18th century, paved the way for the transition to a manufacturing style masterfully handled by automated and programmed special purpose machines and robots. This transition has changed people's working conditions and increased their welfare level. The fourth industrial revolution, also referred to as digital transformation,

changes and transforms all social structures on a larger scale than ever before, with the effect of this accumulation. Industry 4.0 has been a different period compared to previous industrial revolutions. In this period, the products started to be personalized instantly in line with the needs of the consumer. The technological tools, like the internet browsers, smart phones, smart cars and etc. which obtained various kind of data constantly from our daily lives (which is called part of big data), can keep in touch with other technological manufacture departments to change the style of manufacturing in the light of deposited data. In the previous industrial revolution, the need for human beings in many business areas has disappeared with the development of machines. It has become possible to talk about a similar scenario in this period too. Machines, which, are no longer the tools that fulfill certain orders, have become learning objects through technological advances like machine learning, smart robots, artificial intelligence, etc (Carvalho, Chaim, Cazarini & Gerlamo, 2018, p. 672-674).

Industry 4.0, known as digital transformation, which started to be founded in the early 2000s, is a process that we are still in today and continues to develop rapidly. As it was mentioned before, along with digital transformation, many products and services created with manpower are now revealed through a system and mechanisms that require the least amount of people. Digital transformation is a complex structure that includes real and virtual systems, informatics, Internet of Things and Internet services. This transformation is a process that occurs when internet, communication, informatics, sensor, automation, artificial intelligence - machine learning and robotic technologies significantly affect and change almost every field. In the new process of digitalization rapid steps are being taken towards an environment where virtual and physical systems are integrated with each other, so that objects connected to the internet will become wise and where the physical world and the virtual world are intertwined (Aksoy, 2017).

Today, with the digital transformation, the rapid changes in social and economic structures have forced countries, societies, institutions and people to adapt to the change movement in order to gain competitive power. In this context, people, institutions and countries have to develop some strategies for this competitive power they want to achieve. Universities are undoubtedly the most important institutions that need to develop new strategies for in this competitive digital transformation. Universities that provide education by creating a learning environment, conduct scientific research and produce knowledge are important scientific and research institutions. In addition, universities train the qualified human resources needed in the digital transformation process (Ennals, 2003, p. 92). The most striking reflections of the steps and strategies taken by the universities towards the new process are seen in scientific studies. The results obtained in scientific studies lead to the practices planned to be carried out in the future, giving ideas and strategies for the future of digital transformation.

In this study, graduate theses, which were conducted in Turkey between the years 2013-2020, related with the subject of "digital transformation" were discussed. However, it is thought that it would be beneficial to create a short conceptual framework about the digital transformation process before analyzing the data.

A THEORETICAL FRAMEWORK ON DIGITAL TRANSFORMATION

There is no definition accepted by everyone regarding digital transformation, in other words, Industry 4.0. Depending on the perspectives, the definition of industry 4.0 differs from each other. For instance, Deloitte AG (2016, p.3) considers Industry 4.0 as a new stage of change in the organization and management of the value chain process of the manufacturing industry. (Deloitte AG, 2016, p. 3). According to Geissbauer, Vedso and Schrauf (2016), Industry 4.0 refers to the complete coding of physical assets for production and the integration of digital systems with the value chain (Geissbauer, Geissbauer, Vedso & Schrauf, 2016, p. 6). In opinion of some authors, digital transformation is closely related to virtualization, while for some, every sector

is completely computerized. Industry 4.0 is a concept that brings together existing developed technologies. Because of this reason most of the times Industry 4.0 is not accepted as a new a concept of 21. century. Industry 4.0 is to use the tools provided by operational development, communicative sophistication and information technologies to increase the level of automation and digitalization of production in production and production processes. The aim is to manage all value chain processes in order to increase efficiency in production processes and to provide high level products and services (Gilchrist, 2016, p. 195). Industry 4.0 is also a name for current trends associated with the digitalization process. It is focused largely on the manufacturing sector. However, its existing potential goes far beyond production (Woodhead, 2017, p. 4). Digital transformation, which includes digital systems that can instantly intervene in the changing needs of people and technologies that have the ability to communicate with each other, facilitates access to personalized products with these features and evolves into a system structure that can directly respond to changing needs with an expanding coverage area day by day (Göktaş & Baysal, 2018).

The reason that makes the fourth industrial revolution different from its predecessors is that its scope is not only limited to intelligent and interconnected machines and systems, but much broader. The world has transitioned from third industrial revolution to fourth, which is an integration of the physical and virtual world, together with interoperability, advanced artificial intelligence and autonomy (Hwang, 2016, p. 10). The 4th Industrial Revolution is happening much faster than the previous industrial revolutions. Three reasons must be considered in order to emphasize the existence of a fourth and different revolution:

- Speed: Unlike previous revolutions, the fourth industrial revolution is developing exponentially rather than linearly.
- Width and Depth: Based on the digital revolution, it combines multiple technologies that lead to unprecedented paradigm shifts in economy, business, society and individual.
- Effects on Systems: It includes the collective transformation of countries, companies, industries and systems operating in all areas of society.

In addition to these three reasons that reveal the difference, the uniqueness of the Fourth Industrial Revolution can be summed up in its three important characteristics:

- Including three aspects of technological progress (digital, physical and biological) and their integration;
- The rapid spread of technological progress over the Internet to the world;
- It extends its effects in every aspect of human life (University of Stellenbosch Business School, 2017, p. 6-7).

The digital transformation, which affects the whole world, deeply affects and transforms political, social, cultural and economic structures. In this process, it is observed that the restructuring process has just been started in many fields such as industry, education and informatics. It is noteworthy that in this transformation process, systems such as internet of things, cyber physical systems, industrial automation, smart robots and big data have started to be used in many business areas and corporate structures. The use of these new technological systems by companies also creates a competitive environment (Özdemir & Özgüner, 2018).

Unlike other revolutions, Digital Transformation, also known as the Industry 4.0 Revolution, is the first revolution announced before it takes place, and its effects continue to be discussed every day. Although all the benefits of the previous industrial revolutions were revealed after the revolutions were concluded, unlike the other three, it is thought that there is a chance to take action and make a choice in this revolution (Gilchrist, 2016, p. 195). In the digital transformation process, universities are institutions that have to take an important role and responsibility in taking measures and developing strategies. Especially the researches on digital

transformation in theses, which are the most important scientific outputs of universities, will be a reference to both theory and practice.

OBJECTIVE, METHOD AND FINDINGS

Objective and Method

Between the years 2013-2020 in digital transformation graduate theses produced in Turkey aimed to examine the different variables descriptive survey method was used in this study. Sample of the study consists of graduate theses produced in Turkey related to digital conversion, between the years 2013-2020. Data of the study was compiled from Higher Education Council, Publication and Documentation Department[1]. This study includes only publicly available theses. In order to obtain the data of the study, a comprehensive search was done in Higher Education Council, National Thesis Database on 01 November 2020. At the end of the search, 51 thesis were reached.[4] The obtained 51 thesis studies were saved in the computer in pdf format. Saved theses were examined by using a thesis evaluation form, which consists of 10 items and created by researchers. 10-item evaluation was made for each thesis. Then, the data in the thesis evaluation form were transferred to SPSS 22 Program, converted into numerical values and expressed in frequency and percentage values.

Table 1. *Distribution of Theses According to Years and Academic Levels*

Years	Masters degree	PhD	Total
2013	1	-	1
2014	-	-	-
2015	-	-	-
2016	-	2	2
2017	-	-	-
2018	3	-	3
2019	25	3	28
2020	17	-	17
Total	46	5	51

Considering the distribution of theses by years, it was seen that the number of theses related with the subject of digital transformation remained quite limited until 2019. The number of theses made on this subject until 2019 is 6. While 3 of 6 theses were done in 2018, 2 were done in 2016 and 1 in 2013. It is also noteworthy that there were no theses on these topics in 2014, 2015 and 2017. While 46 of the theses made between 2013-2020 are at the master's level, 5 of them are doctoral studies. While 2 of the doctoral theses were done in 2016, 3 of them were done in 2019. It was seen that the master's theses, which make up the majority of the theses,

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[4] Theses can be accessed from tez.yok.gov.tr

were densely written in 2019 and 2020 (42 theses).

Table 2. Distribution of Theses According to Institutes

Name of Institute	Number of Theses
Social Sciences Institute	40
Institute of Science	11
Educational Science Institute	-
Health Sciences Institute	-
Total	51

When Table 2 is examined, a significant portion of the work done in digital transformation in Turkey, prepared by the Institute of Social Sciences (Thesis 40) is noteworthy. The number of theses prepared by the Science Institutes is 11. The most striking finding in the table is that no studies have been conducted by the Institutes of Health and Education Sciences, focusing on digital transformation. One of the important areas that digital transformation has affected in practice is health sciences. It is noteworthy that there were no studies on this subject in health sciences institutes that produce thesis in this field.

Table 3. Distribution of Theses by Departments

Name of Department	Number of Theses
Business Administration	13
Industrial Engineering	6
Economy	4
Public Relations and Publicity	3
Information Systems Management	3
Journalism	3
Communication Sciences, Management Engineering, Computer Engineering, Software Engineering, Distance Education, Media and Communication Systems, Travel Management and Tourist Guidance, Law, Sociology, Educational Sciences, Communication, Informatics, Technology and Information Management, Engineering Management, Aviation Management, Radio Television and Cinema, Local Governments, Total Quality Management, Political Science and Public Administration	1 (19)

13 of the 51 thesis which were related with digital transformation, were prepared in the department of Business Administration between the year 2013-2020 in Turkey. 6 theses on this subject were made in Industrial Engineering departments. These findings are not surprising.

Because the areas most intensely affected and shaped by digital transformation are business and industrial fields. 4 theses prepared in the economics departments, 3 theses prepared in each of the Public Relations, Information Systems Management and Journalism departments can bring to mind the idea that these areas are heavily influenced by digital transformation. Communication Sciences, Management Engineering, Computer Engineering, Software Engineering, Distance Education, Media and Communication Systems, Travel Management and Tourist Guidance, Law, Sociology, Educational Sciences, Communication, Informatics, Technology and Information Management, Engineering Management, Aviation Management, Radio Television and Cinema, Local Governments, Total Quality Management, Political Science and Public Administration departments, one thesis focusing on digital transformation has been carried out.

Table 4. Distribution of Theses According to the Type of Method

Type of Method	Number of Theses
Quantitative Method	32
Qualitative Method	16
Mixed Method	3
Total	51

As it was seen in Table 4, it is striking that most of the theses are prepared using quantitative methods. It is noteworthy that the majority of 32 theses prepared by quantitative method were created using description, relational scanning, and experimental design methods. Qualitative method was used in 16 theses considered within the scope of the study. In these theses, qualitative method types such as field research, action research, case study, phenomenology were used. It was determined that both quantitative and qualitative methods were used in all 3 thesis studies on digital transformation.

Table 5. Distribution of Theses According Data Collection Technique

Data Collection Technique	Number of Theses
Survey	29
Documentary Scan	10
Interview	10
Content Analysis	3
Other (Modelling, Case Study, Observation, Panel data method, Correlation Analysis)	5

Considering the data collection techniques used in 51 theses discussed within the scope of the study, it supports the findings in Table 4. It was seen that the survey technique used as the most preferred technique in quantitative method studies (29 theses). In addition, documentary scanning techniques were used in 10 theses, and interview techniques were used in 10 theses. While content analysis technique was used in 3 theses, Model Building, Case Study,

Observation, Panel data method, Correlation Analysis techniques were used in 5 theses.

Table 6. Distribution of Theses According to Sampling

Sampling	Number of Theses
Employees	29
Corporate data	8
Consumers	5
Managers	2
Students	2
Other	5

Table 6 includes distribution of theses according data collection technique. It was seen that the most studied samples in the thesis were employees (29 theses). In some studies, students, consumers, managers, etc. Different sample groups were preferred. Institutional data were analyzed in 8 studies.

Table 7. Most used keywords

Keyword	Number of used keywords
digital transformation	35
industry 4.0	10
digitalization	5
digital	4
information and communication technologies	3
new media	3
social media	3
analytical hierarchy process	2
big data	2
blockchain	2
digital activism	2
e-government	2
internet	2

leadership	2

It was determined that a total of 224 keywords were used in 51 theses examined in the study. It was seen that most of the theses use co keywords. The unique number of keywords used was 155. The most preferred keywords are given in Table 7. As it was seen in Table 7, the most preferred keywords in theses were *digital transformation* and *industry 4.0. Digital transformation* keyword was used in 35 out of 51 theses and industry 4.0 keyword was used in 10 out of 51 theses.

Figure 1: *Distribution of Keywords*

The figure shows all 155 keywords used in theses. The size of the keywords varies according to their usage frequency in theses.

CONCLUSIONS

Transformation is a process that takes place continuously due to human nature. In the great transformation processes of societies, scientific studies play an extremely important role in guiding the changes experienced and determining strategies for the future. In this study, theses related with the subject of digital transformation were evaluated between 2013 and 2020, the following results were obtained:

- Most of the 51 theses evaluated within the scope of the study (46 theses) are at the master's level. Considering the distribution of theses by years, there is a large increase in the number of theses made on this subject since 2019. It is seen that three doctoral dissertations were made in 2019 related with digital transformation. This finding can be evaluated as a reflection of the increasing interest to Industry 4.0 subject both in practice and in theory.
- Most of the theses were prepared under the Social Sciences Institute. Both education and health sectors are two areas that digital transformation has greatly affected. A striking result is that there were no theses written on these subjects in Educational Sciences and Health Sciences Institutes. The absence of thesis studies on this subject can be considered as a deficiency for both fields.
- Theses prepared on digital transformation have very different contents and

subjects. The abundance of theses on digital transformation prepared by business departments is striking. It is also seen that the departments of Industrial Engineering, Economics, Public Relations, Information Systems Management and Journalism are increasingly interested in the subject.

- It is striking that quantitative methods are preferred in most of the theses and questionnaire was preferred as data collection technique in studies. In addition, it is noteworthy that employees are preferred as samples in studies.
- It is possible to say, in the field of digital conversion, especially in the last two years in Turkey, there have been master's and doctoral theses prepared in many different subjects with very different perspectives. It can be said that especially the field of social sciences shows more interest in this subject than other fields. Also, thesis related with this subject in Business and Industrial Engineering branches are remarkable. In addition, it is possible to follow the traces of the digital transformation wave, which deeply affects and reshapes fields such as economics, public relations and publicity, information systems management, journalism, in the theses made in this field in recent years.

This study has been limited to only theses in Turkey. A wider study including books and articles prepared on this subject will be a guide for future research. In this context, a comprehensive bibliographic study and citation analysis study on digital transformation is presented as a suggestion.

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