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DIGITAL TRANSFORMATION NEED ANALYSIS: A RESEARCH ON MANUFACTURING BUSINESSES IN KONYA AND KARAMAN (TR 52) PROVINCES

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ABSTRACT: Successful digital transformation of businesses requires; organizational competency and some resources and conditions related to the ecosystem in which they are located. Therefore, the success of enterprises in realizing digital transformation is closely related to the existence of these requirements. The aim of this study is to determine the current situation of the manufacturing industries in Konya and Karaman provinces with regards to digital transformation, the difficulties they face in digital transformation process and their needs for an efficient and effective digital transformation. Primary data collected by using three different data collection tools; surveys, interviews and focus group meetings are used in the current situation and needs analysis studies. Collected data were evaluated using SPSS software. The findings and results are presented in the form of graphics and tables. By interpreting the results obtained; the significance of the study and the validity of the methodology used were evaluated. It is expected that the results obtained in this study will contribute to the planning and policy development activities on the digital transformation of manufacturing industries in Konya and Karaman provinces.

Keywords: Digital Transformation, Manufacturing Industries, Konya, Karaman

Dijital Dönüşüm İhtiyaç Analizi: Konya ve Karaman (TR 52) İllerindeki Üretim İşletmeleri Üzerine Bir Araştırma

ÖZ: İşletmelerin dijital dönüşümü başarıyla gerçekleştirmeleri; kurumsal kapasiteleri ve bulundukları ekosistem ile ilgili birçok imkân ve şartların varlığını gerektirmektedir. Dolayısıyla, işletmelerin dijital dönüşümü gerçekleştirmedeki başarısı bu imkân ve şartların sağlanması ile yakından ilişkilidir. Bu çalışmanın amacı, anket, mülakat ve odak grup toplantısı şeklinde üç farklı bilgi toplama aracını kullanarak Konya ve Karaman illerindeki üretim işletmelerinin dijital dönüşüm alanındaki mevcut durumun, dijital dönüşüm konusunda karşılaştıkları zorlukların ve dijital dönüşüm sürecinin etkin ve verimli olarak gerçekleştirilmesi için ihtiyaçların belirlenmesidir. Bu çalışma kapsamında yürütülen mevcut durum ve ihtiyaç belirleme çalışmasında birincil verilerden yararlanılmış, elde edilen veriler SPSS yazılımı kullanılarak değerlendirilmiş, elde edilen bulgu ve sonuçlar grafikler ve tablolar biçiminde sunulmuştur. Elde edilen sonuçlar yorumlanarak sonuçların anlamlılığı ve kullanılan metodolojinin geçerliliği değerlendirilmiştir. Araştırma kapsamında elde edilen sonuçların, Konya ve Karaman

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illerindeki işletmelerin dijital dönüşümü konusundaki planlama ve politika geliştirme çalışmalarına katkı sağlaması beklenilmektedir.

Anahtar Kelimeler: *Dijital Dönüşüm, Üretim İşletmeleri, Konya, Karaman*

1. INTRODUCTION

Manufacturing can be defined as the creation of a new product by changing the geometry, properties, and/or appearance of a particular material by applying physical and/or chemical processes with the help of machines and manpower, or by combining more than one part (Groover, 2019). Since the early 1990s, the use of computers and electronics in industrial manufacturing has provided significant improvements in process automation and optimization. When industrial automation applications found widespread use in every field, flexible manufacturing systems began to be used in order to respond more quickly to changing customer demands and product lead times. At the beginning of the 21st century, various problems have emerged in the field of industrial manufacturing, especially in developed countries, due to the increase in labor costs, bottlenecks caused by the lack of qualified workforce, and the shift of capital to the service sector (Özkan *et al*., 2018). The fourth industrial revolution in manufacturing, also known as Industry 4.0, was born in Germany at the Hannover Fair held in 2011. It aims to enable smart machines, smart production systems, and also smart factories, which are capable of making decisions without the need for human interaction (Grenacher, 2018). Beyond that, it allows end-to-end digitization of the production chain and the integration of every stage of manufacturing, from design to shipping. Thus, data collected from manufacturing processes can be turned into useful inferences and competitive advantages (Szozda, 2018).

Smart manufacturing describes the use of digital technologies to manage and control manufacturing operations in industrial process chains. Digitalization in production makes the machines can share tasks with the machines they are connected to. For this reason, smart manufacturing offers more efficiency than traditional manufacturing based on pure automation (Kusiak, 2018). On the other hand, a smart factory refers to a new generation of a factory that can optimize performance by itself, adapt to changing conditions in real-time, and handle manufacturing processes by itself (Hozdić, 2015). Thanks to their advanced communication infrastructures, smart factories are suitable for integrating field devices (sensors, actuators, controllers, etc.), machines as well as products with information systems. So, decentralized decision-making mechanisms can be established for flexible and agile production, especially thanks to machine-to-machine (M2M) communication applications and artificial intelligence support (Wang, 2016).

Smart factories are built on the integration of modern technologies (i.e., Internet of Things, Artificial Intelligence, Big Data) used to dynamically control the complex processes required for digitized production, based on digital data streams over entire production lines. The implementation of smart factories, first of all, requires connectivity for end-to-end data transfer at every stage of the manufacturing process. Internet of Things (IoT) is a large-scale communication infrastructure used to connect embedded devices equipped with various sensors, actuators, and communication modules (called "things") to the Internet for remote monitoring and control. The industrial IoT (I-IoT) provides an opportunity to collect data from processes and supply chains with the help of networked sensors and smart devices (gateway, router, etc.). It is also used to connect machines distributed within the factory to the Internet and to each other (Lampropoulos et al., 2019).

Industry 4.0 requires data collection from each stage of industrial processes. In parallel with the increase in the number of IoT-enabled sensors, the amount of data collected from the manufacturing lines increases significantly. As a result, an emerged large collection of unstructured data clusters is collectively known as big data (Shahbazi and Byun, 2021). In order to provide timely decisions to help in improving the processes and products, data analytic techniques are used to uncover hidden patterns, unknown correlations, market trends, customer preferences, and other useful information within big data

repositories. But, traditional data analytics usually do not handle such a large quantity of data (Singh, 2014). Artificial Intelligence (AI) is a key tool for the digitalization of the manufacturing process. It allows to learn from large data sets, solve problems, and continuously adapt to new data without human intervention. Clearly, AI is a concept that refers to a set of technologies to combine data, algorithms, and computing. It can also accelerate the data analytics that offers supplemental insights for decision-making (Kinzel, 2017; Rahmani *et al*., 2021).

The concepts of digitization, digitalization, and digital transformation have an important place in the realization of new trends such as smart production and smart factory that emerged with Industry 4.0 (Sjödin et al., 2018; Tutkunca, 2020). Digitization refers to the conversion of processes from analog to digital form without any change in content. Digitalization is the re-establishment of business models, industries, and even societies based on digital data in the light of developing information and communication technologies. The main triggering factor for digitalization in manufacturing is the rapidly changing market conditions and the effort to develop the ability to respond to customer demands. Digitalization offers the opportunity to change existing business models and generate new revenues by incorporating modern technologies into business models. Digital transformation is the use of information and communication technologies in all stages of manufacturing, starting from the raw material supply, especially the production lines, in order to improve processes and eliminate existing inefficiencies (Bloomberg, 2018).

Digital transformation requires a radical change in the cultural, organizational, and administrative aspects of the enterprises. Understanding, accepting, and effectively managing this change is the starting point for the transition from traditional to smart manufacturing systems and smart factories. The main target of activities for digital transformation is to reveal fully digital and connected manufacturing environments. It should be emphasized that the digital transformation in the industry is not the revision of automation systems on existing processes using new technologies, but the redesign of existing processes and products to offer innovative solutions and services. Continuing digital transformation in parallel with technological developments brings many new opportunities for manufacturing companies. In order to take advantage of these opportunities, the right business model, appropriate technologies as well as necessary organizational and cultural changes should be determined. In this context, the authorized institutions and governments around the world continue their work to inform all their stakeholders, especially small and medium-sized enterprises (SMEs), which are the heart of the economy and society, about digital transformation (Rupeika-Apoga, 2022).

In order to determine where the digital transformation activities of enterprises should focus on and to plan how they will follow in this process, first of all, it is necessary to understand their requirements and know what level of digital maturity they have in the current situation. Managers must have a strategic awareness of the path they will take to implement digital transformation, the techniques they will use, and how they will assess the state of the company (Sağlam, 2021). In this paper, we present the results of the need analysis study that investigates the digital transformation of the manufacturing industry in the Konya and Karaman provinces. The remainder of the paper is organized as follows: Section 2 explains the material and method that cover the need analysis study. Section 3 presents the key findings of our research. Finally, Section 4 concludes the study with reflections and future directions.

2. MATERIAL AND METHOD

The survey focus group discussion, and interview techniques were combined in this study to strengthen the general validity and reliability of the digital transformation need analysis. The findings achieved can be compared and complement each other when the defined techniques are used together. Thus, it is planned to get more objective and rational results by getting rid of the constraints and assumptions of only one technique. In the abstract, the study's model is represented in detail in Figure 1.

The sample was chosen based on the extent of terminological necessary infrastructure for digital transformation. To ensure that the study managed to produce healthy results, a semi-structured interview technique was used to examine the content of the concepts of digital transformation, digital industry, and

industry 4.0 in the Karaman-Konya region, as well as the knowledge, competence, and opinions of businesses with a higher level of terminological knowledge than the average. Therefore, the study preferred the purposive sampling strategy. Although 65 firms were identified and their opinions solicited as part of the study, the data of 42 of these enterprises was judged to be appropriate for examination and analysis. In the survey conducted in the first stage, the responses provided by the participants to the structured questions were quantitatively assessed using the SPSS Statistics 22.0 program.

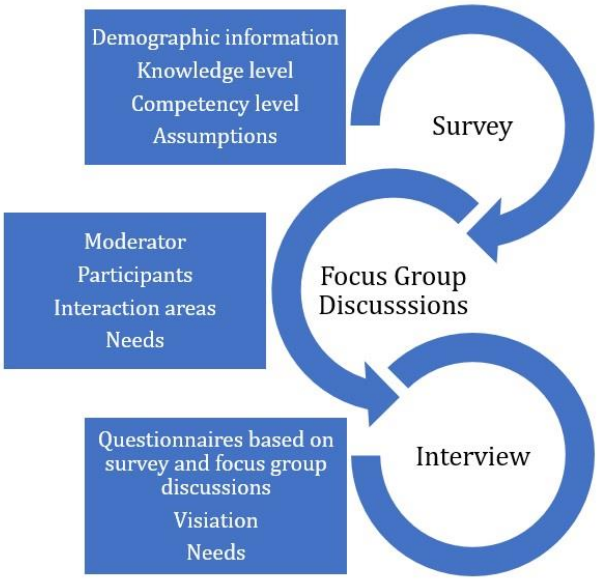

Figure 1. Model of the study.

A focus group discussion were conducted as part of the Needs Analysis Study's second stage. The purpose of the focus group interview is not to collect data from several people at the same time, but to benefit from the interaction results by discussing structured or unstructured agenda questions related to the topic of interest of the researchers and participants (Lune and Berg, 2017). The number of participants in focus group discussions varies depending on the agenda issue, the region where the conversation will occur, and the problem or difficulty (Bal, 2013; Mishra, 2016). Information about the focus group discussions was distributed seven days before to the meeting through the Karaman and Konya Provincial Directorates for Technology and Industry, InnoPark Konya, and relevant platforms and organizations, as well as an invitation call. Due to COVID precautions, the meeting was held via an internet platform moderated by an expert. The meeting's schedule included presenting the survey study's findings, along with recording the participants' perspectives on digital transformation through a series of unstructured questions. The thoughts, expectations, requests, ideas, and complaints of representatives from companies and institutions about digital transformation were examined within the scope of the study as a consequence of the focus group discussions.

Interviews with company representatives were planned based on the results of the survey and focus group discussions. Especially in the field of social sciences, the interview method is accepted as an effective data collection method. It is used as a basic data collection tool to reveal the organizational culture and symbolic concepts in organizational studies (Yıldırım ve Şimşek, 2016). The interview technique is used for a predetermined purpose, different from ordinary daily conversation. In this context, companies that are aware of digital transformation were asked to schedule an appointment according to a previously established calendar by communicating about the interview framework. During the interview process, representatives from companies that are authorized and experienced in digital transformation were interviewed. Five primary interaction issues based on the digital transformation subject were determined

at a focus group discussion moderated by an expert. In order to examine these issues in more detail on a representative basis, interviews were held within the scope of company visits. In this perspective, representatives from 10 manufacturing businesses operating in the Konya - Karaman Region were interviewed. The data collected during the interviews were organized and examined, and some conclusions have been drawn.

3. STUDY FINDINGS

In a more rational and objective framework, a survey, focus group discussions, and interview methodologies were utilized combined to identify the need for digital transformation in manufacturing businesses in the Konya and Karaman provinces. These selected methods are scientifically complementary to each other.

3.1. Findings of the survey

This part contains the demographic findings, Chi-Square analysis, and analysis of attitude difference, as well as the findings obtained within the scope of the survey study.

3.1.1. Demographic Findings

It has been shown that the business representative whose opinions were obtained operate in ten different sectors. When the sectoral distribution of these businesses is examined, it is discovered that there are at most 13 machinery/equipment firms, 8 electric/electronic/automation company, 6 chemical/plastic/petroleum companies, 4 building materials companies, and 3 food companies. Medium-sized firms account for 45 percent of the businesses questioned; small businesses account for 36 percent; big businesses account for 12 percent, and micro-scale businesses account for 7%. Small and medium-sized firms (SMEs) account for 88 percent of the businesses polled on digital transformation. Table 1 shows the total number of employees from companies in the Konya-Karaman region who have a high level of awareness regarding digital transformation and whose opinions have been studied.

It was discovered that while 62 percent of the businesses whose opinions were gathered in the Karaman region's digital transformation requirements determination survey have an R&D unit and conduct R&D activities, only 8 of these businesses, or 43 percent, have a ministry-approved R&D unit. Only 38% of these companies that are aware of digital transformation haven't any R&D department.

Table 1. Demographic Findings

Sector	**n**	**Firm Scale**	**n**	**%**
Energy	2	Micro	3	7
Food	3	Small	15	36
Construction	4	Middle	19	45
Wood materials	1	Big	5	12
Pharmaceuticals/Cosmetics	1			
Chemistry/Petroleum	6	**Employees**	**n**	**%**
Electrical/Electronic/ Automation	8	0-9	9	21,5
Metallurgy	2	10-49	17	40,5
Metalware	2	50-249	13	31
Machinery/Equipment	13	250-499	3	7

For a particular region, an export item is a sort of activity that is strategically important in terms of earning foreign currency and providing financial depth to the country. While 28 of the companies that are aware of digital transformation and have expressed their perspectives said they export, 14 said they do not. 67 percent of the businesses answered said they have the expertise and knowledge to export.

Table 2. Company Competencies

Research and development unit		
Yes		**No**
Ministry-approved R&D unit	R&D unit	There is no R&D unit
19%	%43	38%
Export competence		
Available		No export
67%		33%
Digitization of products		
Available		No Digitization
43%		57%

The level of digitization was forecasted in terms of product variability, and the participant firms were questioned if it was possible to digitize the items produced. While 57% of participating firms claimed that digitizing items is not possible, 43% of these companies stated that digitizing products is manageable.

3.1.2. Chi-Square Analysis

The study's objective was to determine if there is a statistically significant relationship between export competence and R&D activities. While 8 exporting companies have Ministry-approved R&D units, 13 have private R&D units; seven companies haven't R&D studies.

H1: There is a statistically significant relationship between the export competence of firms and their R&D activities.

The statistical analysis of these two independent variables revealed a significant relationship between export competence and R&D activities. It is projected that digital transformation and the associated R&D activities would greatly increase companies' export potential.

Table 3. Export - R&D Relation

		R&D activities			
Export competence		Ministry-approved R&D unit	R&D unit	There is no R&D unit	**Total**
Available	N	8	13	7	28
	%	29	46	25	67
No export	N	0	5	9	14
	%	0	36	64	33
Total	N	8	18	16	42
	%	19	42,9	38,1	100,0
P = 0,018 < 0,05					

While 13 of the 28 exporting firms that are aware of digitization and whose opinions were explored as part of the research believe that digitizing their products is available, 15 companies responded that

digitizing their products is not possible. While five out of fourteen non-exporting enterprises claimed that digitizing their products is available, nine stated that it is not practicable.

H2: There is a statistically significant relationship between the export competence of firms and their digitization of products.

The relation between the export competences of participating firms and their attitudes toward product digitalization was examined, and no positive relation between these two independent categories was discovered. As a result, it was discovered that there is no strong relation between the positive and negative attitudes toward digitization of products held by exporting and non-exporting companies.

Table 4. Export - Digitization Relation

Export competence		**Digitization of products**		Total
		Available	No Digitization	
Available	N	13	15	28
	%	46	54	67
No export	N	5	9	14
	%	36	64	33
Total	N	18	24	42
	%	43	57	100
P = 0,508 > 0,05				

As a **result**, it was discovered that there is no strong relation between the positive and negative attitudes toward digitization of products held by exporting and non-exporting companies.

3.1.3. Usage level of Digital Industry Tools

The research questioned the companies whose opinions were gathered about which technologies they use and to what extent in the digital industry. The scale was designed in the range of "(0) Not Used, (1) About to begin using, (2) Used in partially, (3) Used in fully". The firms whose opinions were evaluated generally concentrate on process modeling and computer simulation (Avg. 1,38), information and data sharing (Avg. 1.28), and ERP systems (Avg. 1.16) technologies, and they employ these technologies the most seen. It has been discovered that the level of use of technologies contained in the concept of digital industry by these companies is quite low. It can be seen that the digital twin (Avg. 0.09), autonomous/intelligent processes (Avg. 0.16), and virtual reality (Avg. 0.28) technologies are among the technologies within the scope of the digital industry of companies that have the lowest averages.

Table 5. Digital Tools of Highest Usage Level

	Process Modeling & Computer Simulation		**Information & Data Sharing**		**ERP**	
	N	%	N	%	N	%
Not used (0)	15	35,7	16	38,1	17	40,5
About to begin using (1)	3	7,1	6	14,3	6	14,3
Used in partially (2)	17	40,5	12	28,6	14	33,3
Used in fully (3)	7	16,7	8	19,0	5	11,9
Total	42	100	42	100	42	100

64.3 percent of the companies questioned were aware of process modeling and computer simulation, 61.9 percent were aware of information and data sharing, and 59.5 percent were aware of ERP utilization technology. Infrastructure studies have been completed for these technologies, and they have been partially and fully integrated.

Table 6. Digital Tools of Lowest Usage Level

	Digital Twin		**Autonomous & Intelligent Processes**		**Virtual Reality**	
	N	%	N	%	N	%
Not used (0)	39	92,9	39	92,9	36	85,7
About to begin using (1)	2	4,8	2	4,8	2	4,8
Used in partially (2)	1	2,4	1	2,4	2	4,8
Used in fully (3)	0	0	0	0	2	4,8
Total	42	100	42	100	42	100

At a rate of 92.9 percent for digital twin and autonomous/intelligent processes, where the level of awareness of the companies from which data was collected about digital twin, autonomous/intelligent processes, and virtual reality technologies are extremely low; 85.7 percent for virtual reality technology was never used.

3.1.4. Digitization Level of Business Processes

The study examined the level of digitization of the business processes of the companies whose opinions were asked. The scale was designed in the range of "(0) No digitization, (1) During the initial phase, (2) Used in partially, (3) Used in fully". It is noticeable that the organizations questioned emphasize digitization in their purchasing (Avg. 1.78), internal communication (Avg. 1.69), and sales, advertising, quality control, and document management procedures (Avg. 1.61) processes, respectively. The level of digitization of the processes mentioned in these companies has been assessed to be initial or partial. Using averages, it has been shown that the level of digitalization is lowest in energy management (Avg. 0.52), predictive maintenance (Avg. 0.76), and waste management (Avg. 0.95) processes.

Table 7. Highest Level of Digitization Processes

	Purchasing		**Internal communication**		**Sales (E-commerce, ERP, customer feedback)**	
	N	%	N	%	N	%
Not digitization (0)	4	9,5	4	9,5	6	14,3
During the initial phase (1)	8	19	11	26,2	9	21,4
Used in partially (2)	23	54,8	21	50	22	52,4
Used in fully (3)	7	16,7	6	14,3	5	11,9
Total	42	100	42	100	42	100

90.5 percent of purchasing procedures, 90.5 percent of internal communication, and 85.7 percent of sales processes (E-commerce, ERP, customer feedback) began digitization in the companies from which

data was acquired for the study. Infrastructure studies for digitization certain processes have been completed, and the studies are in the early stages of implementation, or the digitization has been partially or fully implemented.

Table 8. Lowest Level of Digitization Processes

	Energy management		**Predictive maintenance**		**Waste management**	
	N	%	N	%	N	%
Not digitization (0)	27	64,3	23	54,8	22	52,4
During the initial phase (1)	8	19	8	19	6	14,3
Used in partially (2)	7	16,7	9	21,4	8	19
Used in fully (3)	0	0	2	4,8	6	14,3
Total	42	100	42	100	42	100

When the general trends are taken into account, it has been discovered that the digitization processes of energy management, predictive maintenance, and waste management processes of the companies that were informed within the scope of the research are insufficient, and these processes have the lowest averages. The fact that 64% of companies have no plans to move to digitization on a critical subject like energy management stands out as a significant failure. The insufficiency of struggles on digitization in waste management, which is an essential issue in terms of sustainability and the environment, has been documented as a notable outcome in recent years.

3.1.5. Analysis of Attitude Differences

The general response averages for the Likert-type questions on digital transformation asked of the companies whose opinions were sought were determined. Businesses exhibit the highest participation in the potential of digital transformation to provide a competitive advantage. The appearance of such a result might be noted as a positive development in terms of exhibiting businesses' awareness of digital transformation as a competitive tool. The approaches of companies in the Konya-Karaman region that are aware of digital transformation were examined using several variable categories. Non-parametric tests are used when different tests are unable to generalize to the entire population. Only tests that were valid on the sample were used in this case.

Table 9. Attitude difference in terms of independent groups

Mann-Whitney U	Export competence	
Averages of knowledge, competence, and judgment expressions	Asymp. Sig. (2-tailed)	0,304
	ExactSig. [2*(1-tailed Sig.)]	**0,308**
P=0,308 > 0,05		
Kruskal Wallis	Firm scale	
Averages of knowledge, competence, and judgment expressions	Asymp. Sig.	**0,988**
P=0,988 > 0,05		
Kruskal Wallis	Sector	
Averages of knowledge, competence, and judgment expressions	Asymp. Sig.	**0,062**
P=0,062 > 0,05		
Kruskal Wallis	R&D activities	
Averages of knowledge, competence, and judgment expressions	Asymp. Sig.	**0,009**
P=0,009 < 0,05* Significant difference		
Ministry-approved R&D unit	R&D unit	* There is no R&D unit

When the views of exporting and non-exporting enterprises on digital transformation are compared, it is determined that the average of these two independent groups' views on digital transformation is not significantly different (P = 0,308 > 0,05). In terms of firm scale, the businesses whose opinions were sought were divided into four groups. More than two group variables were used to assess the responses of these firm scale groups to the Likert-type questions about digitalization. As a result, it has been determined that there is no significant difference between the average views of the company groups on digital transformation (P = 0,988 > 0,05). The knowledge, competency, and judgment expressions of sector representatives who are aware of digital transformation in the Konya-Karaman region and participated in the needs analysis study do not differ significantly (P = 0,062 > 0,05). The relation between R&D activities and digital transformation is foreseen. R&D activities are systematically carried out by participating companies, expressing the transformation of knowledge into innovative product and process design. Companies' perspectives on digital transformation differ depending on whether or not they conduct R&D or own an R&D unit (P= 0,009 < 0,05). Post Hoc tests were used to determine which groups the difference in a tendency among the participating companies were. As a result of this analysis, it was discovered that there is a statistically significant difference between the perspectives of companies that conduct R&D activities and those that do not. It can be claimed that companies with R&D units have a better level of awareness of digital transformation, and there is a favorable association between R&D projects and digital transformation.

3.2. Findings of focus group discussion

The thoughts, expectations, requests, ideas, and complaints of representatives from companies and institutions about digital transformation were analyzed within the scope of the study at the end of the

discussion. Five basic interaction areas that formed within the context of the digital transformation agenda, in which representatives from companies and institutions as well as academicians expressed their opinions, were recognized under the moderator's guidance. These are the domain headers:

First Detection: Priorities must have been determined strategically.

It was stated that the participants were conscious about the digital transformation issue, but they did not have a comprehensive plan, policy or strategy for the realization of this transformation. Following the discussion on the subject, it was agreed that determining strategic priorities in digital transformation, focusing on topics that will provide competitive advantages in worldwide competitiveness, and exhibiting and promoting application examples would be very beneficial.

Second Detection: Financial options should be increased and expanded.

During the discussion, participants shared their experiences with the high costs of the digital transformation process. Even partial digital transformation costs, according to business leaders, have a negative impact on business owners' decisions. The main evidence for this viewpoint is that labor costs in Turkey are extremely low when compared to those in developed countries. As an alternative to a thorough digital transformation, business owners and managers prefer minimal labor costs in the short term. As a result of the discussions, enhancing digital transformation funding choices and providing more flexible usage options have already been added to the agenda.

Third Detection: Human resources should be evaluated properly.

Qualified human resources have been identified as the most important component in the digital transformation process, with opinions expressed. Representatives from company and the university developed a lot of constructive and valuable suggestions for the training and retraining of qualified human resources. The integration of students into the sector through application-oriented programs and agreements within the scope of University-Company cooperation is illustrated with examples as a solution to the problem of qualified human resources. Furthermore, it has been said that creating work settings that allow employees to develop as individuals is a strategy that can help solve the problem of qualified human resources.

Fourth Detection: Inter-institutional cooperation and coordination should be developed.

The representatives of the businesses brought up the fact that in terms of advanced technology, automation, and software, regional businesses are outsourcing to big cities, which is having a negative impact on the region's digital transformation process. Regional universities, technoparks, and innoparks were underlined, as well as the importance of regional businesses taking more initiative in establishing R&D and business solutions for the local needs. Opportunities for collaboration and coordination were reviewed, with an emphasis on the mutual benefit potential of regional institutions and corporations serving the digital needs of regional companies.

Fifth Detection: Institutionalization must have cared.

The subject of institutionalization has been highlighted as the most significant barrier to regional enterprises' survival in a global competitive environment. The meeting underlined the connection between institutionalization, which includes all subordinate units and begins with top management practices, and the digital transformation process. Institutionalization seems to have a positive impact on human resource training, employment, and retention. Business representatives claimed that the chances of success for digital transformation assistance programs are much higher if participants attend institutionalization training.

3.3. Findings from qualitative interviews

Interviews were conducted as part of company visits in order to examine the five interaction areas identified in the focus group meeting in significant detail on the basis of representatives. Open-ended questions were asked in a standardized order during the interview. The answers to these questions were grouped and evaluated, and the results were categorized under the following headings.

✓ Participant's awareness of Industry 4.0 and Digital Transformation is limited to the surface level has been discovered. Although all of the participants claimed to be familiar with industry 4.0 and digital transformation, it was discovered that they lacked technical knowledge of the depth of these concepts and the scope of interaction.

✓ It has been determined that the common subject expressed by the participants whose opinions were sought focuses on cost. The list consists of the benefits mentioned by the participants. The digital transformation and Industry 4.0 process in businesses:

- It has the potential to increase productivity.
- It has the potential to increase capacity utilization rates.
- It's possible that it will develop ergonomics at work.
- It is capable of assisting in the data collecting, analysis, and decision-making processes.

✓ When company managers' investment requirements for digital transformation were questioned, it was discovered that they focused on more general issues rather than defining a specific procedure. Additionally, it has been determined that managers generally describe a need for software in terms of investment needs. Five of the managers interviewed stated that they have no plans to invest in industry 4.0 or the digital transformation process, four others stated that they have invested in state-of-the-art machinery and equipment, and one manager stated that digitalization studies with automation solutions are currently in progress.

✓ Managers interviewed for their perspectives place a premium on improvements to the production line when considering the impact potential of digital transformation. Managers believe that if digital transformation occurs, their jobs will get easier; there is widespread agreement that data collecting, analysis, and decision-making processes will become significantly healthier. This perspective is seen to be based on rudimentary knowledge of digital transformation rather than a forecast of the future.

✓ Digital transformation, according to managers, is an extremely expensive process. As a result, the government has been asked to provide support programs in order to lower the expenses of this transformation. Machine, equipment, and software support are among the most commonly reported problems within the area of assistance by company representatives. Among the primary themes indicated by the managers within the scope of help are issues such as training, and employment of qualified human resources required by digital transformation. It is stated that the success of the digital transformation process is closely intertwined with a region's or area's infrastructure, human resources, and culture, so it is critical for businesses to create an interaction climate for digital transformation.

✓ In terms of business, it has been determined that the visited companies require experienced and skilled human resources in the digital transformation process. Companies are aware that the usage of structural elements required by the transformation process, as well as the integration and use of equipment and processes, is heavily reliant on qualified human resources.

✓ Managers claim that the digital transformation process cannot be completed entirely with existing business assets and resources, and that external assistance is required; however, they do not have a budget for this, so they ask for assistance in areas such as consulting, mentoring, and technological guidance. According to records, external institution support has been requested through public finance initiatives.

✓ The subject of digital transformation is accepted as a process that has the potential for change transformation and development in terms of public authorities, companies, employees, and society. The importance of obtaining and using reliable information about the process is critical. The managers frequently benefit from the internet environment in general, and they connect with organizations such as the Presidency Digital Transformation Office, TÜBİTAK Digital Academy, Ministry of Industry and

Technology, and TÜSAD, according to the interview process.

✓ The Company managers who came together for the interview noted that an organization that has completely accomplished digital transformation in practice and has seen the advantages of digital transformation in practice will inspire their efforts in this area. In this context, there is a need for a role model that fully integrates digital transformation into business processes with a publicly supported project.

4. CONCLUSION

The level of digital transformation awareness among manufacturing businesses in Konya-Karaman region was evaluated in terms of different variables by using surveys. The awareness of the SMEs responding to the survey about digital transformation is a promising result for the future. According to the results of the survey, a positive relationship was determined between R&D activities and export competence. It is possible to conclude that the variable of R&D competence in manufacturing firms has a beneficial impact on digital transformation. Supporting the R&D potential in businesses will also contribute to the implementation of digital transformation. Needs for digital transformation was determined by Likert-type survey questions. Purposive sampling method is used in the surveys. As a result of the survey, it is observed that the utilization of digital industry tools in the businesses is quite low. Level of using digital industry tools (which are most significant components of digital transformation) should be increased. Integration of these digital industry tools to product/service realization processes is seen a critical success factor. Furthermore, the level of digitalization of business processes has been assessed to be low. It is expected that the amount of digitization of business processes should be better. Promoting the use of digital industry tools and digitalization of industrial processes will have a positive effect on digital transformation efforts.

The interaction areas on which the participants came to a consensus by discussing and listing their proposals were determined within the scope of the focus group discussion. The difficulties and areas of need highlighted in the focus group discussion were found to be in line with the survey study's findings, and a number of valid and consistent solution recommendations were also brought to the agenda. The digital transformation needs that have been brought to the agenda can be summarized under five topics. The first is to determine strategic priorities; the second is to provide assistance and funding for digital transformation; the third is to need qualified human resources; the fourth is to cooperate and coordinate, and the fifth is the need for institutionalization.

The interview forms were created using the results of the survey study and focus group discussions. The emphasis during the interview procedure was on predetermined question titles. The responses were carefully recorded and examined. The meeting will focus on the most intensive financing, machinery, equipment, and software support for company managers' digital transformation needs; it has been noted that support types such as consultancy, mentorship, and technological guidance support are on the agenda. The survey, focus group discussion, and interview technique findings employed within the scope of the study have been decided to support one another, and the survey findings collected in the general context define the interaction areas reached in the focus group discussion.

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