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Identifying the Challenges of Small and Medium Enterprises (SME) Business Model in the Path of Digital Transformation during the COVID-19 Pandemic

Mahsa Akbari[a]*, Fereshteh Sadat Ahmadi[b]

[a] *Assistant Professor, PhD, Department of Management, Karaj Branch, Islamic Azad University, Karaj, Iran.*
[b] *Master of Business Administration, E-Commerce, Islamic Azad University, Tehran, Iran.*

Abstract

The aim of this study was to identify the challenges of the business model of small and medium enterprises in the path of digital transformation during the COVID-19 pandemic. This study is categorized as an applied and exploratory research which was carried out by a survey. In order to screen and investigate on the components extracted from the literature, the fuzzy Delphi method was used by a Delphi panel consisting of 30 experts and experts in the field of research who were selected by the purposeful sampling method. In the next step, in order to ensure the factorial structure and the validity of the constructs, and the overall fit of research model, field method was used. Then, for distribution of questionnaires, a survey of 162 senior managers of small and medium companies in Tehran was carried out. Smart PLS software was used to analyze the data. The findings indicate 22 sub-components in the 6 main components of change challenges, market, and financial, organizational, individual and environmental challenges. The results also showed that the factor of "lack of necessary infrastructure" has the highest priority, "lack of government support during the Pandemic" and "lack of intangible resources (experience, knowledge, flexible manpower) for digital transformation" is in the next ranks.

Keywords: Digital Transformation, Business Model, Small and Medium Enterprises (SME), COVID-19;

1. Introduction

Today, digital technology is of particular importance for company managers or people who want to boost their business and attract many customers to their business (Ahmadizad, Shafie and Mahmoudi, 2019). With the advent of digital technologies, classic business models are disappearing and being replaced by new business models, which are

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* Corresponding Author.
E-mail Address: Akbari.Mahsa@Gmail.Com

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flexible, immediately changeable, and knowledge-based (Wong S., 2020). Hence, the concept of digital transformation is increasingly used in research. It is growing (Sandkohl, 2019). Digital transformation is the practical use of the Internet in the design, manufacturing, marketing, sales, presentation and management model based on data (Shalmo, Williams and L. Boardman, 2020).

With the start of digital transformation and increasing competition on the global stage, small and medium enterprises (SME), which are considered the most effective factors in the economic and social growth and development of any country, are also under pressure to accept and use digital technologies more intensively (Peltier, Kotier, 2019). According to global statistics, small and medium enterprises make up 99.83% of all companies and have an important role in the economy with 72.7% of total employment, 50.6% of total added value and 55.1% of exports. (Yolas, 2019). Indeed, SMEs can use digital technology to support their business functions such as marketing (business operating systems, including social media applications), finance and accounting (open source software or secure mobile payment solutions) or human resources. (share tools, such as video conferencing, shared calendars, and instant messaging) (Lee, 2018).

However, digital transformation has created many requirements to change activities and processes due to continuous environmental changes (Warner et al., 2019) and due to the associated costs and consequences, difficult choices for managers in the use of digital technologies and initiatives. created (Lagzian, Mehdi, Islamkhah, Mohammad, 2017). On the one hand, they should be able to take advantage of current opportunities by using existing business models, and on the other hand, they should create innovations that maintain their survival (DJS et al., 2016). The process of finding a new business model can create differences of opinion among senior managers, which is an obstacle for companies to achieve a fundamental transformation of the business model (Wolf et al., 218). So that in the next ten years, at least 40% of companies will disappear due to lack of compatibility with new technologies (Peltier, Cottier, 2019). In Iran, as in the rest of the world, the use of new technologies has become very common, and since the early nineties, due to the boom in smartphones, the use of mobile business has increased, and it is predicted that in the coming years, digital transformation in businesses will increase more than to appear before (Fadaei et al., 1400).

Meanwhile, the Covid-19 pandemic has caused significant environmental changes (Avarva, Popel, 2021); The occurrence of a pandemic crisis such as the corona virus threatens the survival of manufacturing companies and especially the industrial sector on a global scale, which will lead to devastating social and economic results for the manufacturing sector (Salimi Zawiya, Seyyed Ghasem, 2019). The various challenges that small and medium-sized companies face during the pandemic include reduced customer purchasing power, limited interaction and working hours, lack of raw materials, canceled orders, cash flow problems, and supply chain disruptions. et al., 2020), which urges companies to use digital technology on a larger scale and under time pressure to respond to this crisis. In fact, many companies have tried to improve their digital capabilities in response to the pandemic situation (Priyono et al., 2020). Meanwhile, some companies have tried to implement digital transformation in their business models in a short period of time, because the slower its speed, the greater the gap in the required changes in the business environment (Bjorkdal, 2020). In addition, employees who work remotely have increased the need for companies to make digital transformations urgently. Otherwise, companies cannot work properly (Sen, 2020). In such a turbulent environment, the process of changing the business model of companies in digital transformation faces more challenges than normal conditions, in this situation, managers can no longer see digital technologies as a support function. In the current situation, the normal planning process for digital transformation will not be very effective (Priyono et al., 2020).

In Iran, the epidemic of the Covid-19 virus has caused an unprecedented shock to businesses. In the meantime, the destructive effects of the spread of the virus on small and medium-sized units are evaluated as more severe in comparison with larger units. This is due to the limited resources and obstacles facing current expenses, greater vulnerability, less resistance due to the scale and size of their activities, and the low level of acquisition of new and less digital technologies of these companies. Of course, on the other hand, these companies have more flexibility to change their business model due to their smaller structures. Since digital transformation is a quick response to the current unforeseen crisis, currently one of the concerns of the managers of these units is the synchronization and implementation of digital transformation platforms in the business model and facing its challenges; Therefore, considering what was said and preventing the liquidation of small and medium-sized companies in the conditions of the Corona epidemic, as well as the capabilities of these companies to quickly change their business models, the

question of what challenges companies face in the process of digital transformation in their business models are facing, it remains unanswered and is a theoretical gap. Therefore, the main research question is presented as follows:

What are the challenges of the business model of small and medium-sized companies in the path of digital transformation during the Covid-19 pandemic?

2. Theoretical review

Currently, the use of digital technologies in the world has become very extensive and comprehensive, and people use them widely in all fields. The main purpose of digital technologies is to create communication between people quickly, effortlessly and economically. People are connected with a wide range of digital services and resources. In fact, digitalization includes the use of digital technologies and data to change the current business model, change the way of working, and also give other dimensions to interactions with customers, contractors, government organizations, and create new opportunities to generate income and create new products. Is. In this regard, we examine the important terms in this field as below.

2-1. Digital transformation

Although digital transformation is one of the current hot topics, the ideas of digital products, services and media were already well understood in the 1990s and 2000s (Wu, 2020); For example, in the retail industry, advertising campaigns are considered important digital channels that can be used to reach customers in the 1990s and 2000s (Matiasen et al., 2017). From 2000 to 2015, the emergence of smart devices and social media operating systems led to a change in the methods used by customers to communicate with businesses, as well as customer expectations of response time and availability (Shalmo, Williams and L. Boardman, 2020).

Digital transformation is defined as the initiative of companies to use new capabilities using digital technologies in order to transform organizational strategies and operations (Priyono et al., 2020). Digital transformation is "a change in all business and revenue generation strategies, the use of a flexible management model in the face of competition, rapid response to changing demands, the process of reconfiguring a business to digitize operations and formulate extensive supply chain relationships" (Pelletier, Kotier, 2019). Digital transformation is the deliberate and continuous digital evolution of a company, business model, idea process or method, both strategically and tactically (Mazon, 2014). Digital transformation describes the fundamental transformation of the entire business world through the deployment of new Internet-based technologies with a fundamental impact on the entire society (Shalmo, Williams and L. Boardman, 2020).

Based on the above definitions, it can be said that digital transformation includes the integration of digital technologies in all business activities, which creates final changes in the way organizations work and provide value to customers.

2-2. Digital transformation of the business model

A business model is the basic logic of a company that describes what benefits are offered to customers and partners. A business model answers the question of how the benefits provided are returned to the company through revenue. The created value provides the possibility of creating differentiation from competitors, consolidating customer relationships and achieving competitive advantage (Deluti, 2015).

The digital transformation of business models is defined as follows (Shalmo, Williams and L. Boardman, 2020):

"The digital transformation of business models is related to the elements of the individual business model, the whole business model, value added chains, as well as the network of different actors in a value-added network. "Digital transformation can affect business, partners, industry and competitors."

In the digital transformation of business models, enablers and technologies (e.g. big data) are used to generate new applications or services (e.g. demand forecasting). These enablers need skills that enable data collection and exchange, as well as the ability to analyze, calculate and evaluate options. The evaluated options are used to start new processes in the business model (Delotti, 2015).

2-3. Covid-19 pandemic and digital transformation

Before the emergence of Covid-19 around the world, the digitalization of businesses and their operational models was considered as one of the most powerful trends in the transformation of the global economy (Marks et al., 2021). Since the early 2000s, information and communication technologies began to develop, and their increasing growth rate is transforming the way organizations use data (Wu, 2020). The motivation to digitize processes with the strong assumption of achieving higher overall organizational performance and creating competitive advantages is as important as survival and growth (Nambisan et al., 2019).

But definitely, Covid-19 accelerates these existing trends regarding digital transformation (Nambisan et al., 2019) (Priyono et al., 2020) and today the survival of small and medium-sized companies often depends on whether entrepreneurs can improve their relationships with Customers rethink, find necessary digital solutions and automate business processes (Fletcher, J. and M. Griffiths, 2020). The pandemic has challenged companies in different sectors of activity. Many of these businesses are forced to adopt new ways of working in-house and feel intense pressure to deliver their products or services through digital channels. Companies have experienced deep changes and have implemented solutions based on digital technologies in a short period of time.

To survive in the age of digital transformation, businesses are striving to adopt agile organizations, effective methods of coordination, research and development, technology convergence and innovation. As a fact, most organizations are in chaos because they have no choice but to adopt digital transformation (Wong S, 2020).

2-4- Challenges of small and medium companies during the pandemic

In general, the specific characteristics of small and medium-sized companies should enable them to be more prepared in dealing with the Covid-19 crisis than other companies. But businesses don't always recognize the real threat, and most SMEs will be unprepared for events as large as Covid-19. However, lack of preparation can have significant consequences, especially for small businesses that are more vulnerable to such flows due to lack of access to capital for recovery and difficulties in accessing government aid (Kokertz et al., 2020).

In addition, the business model of an organization, especially in the era of Corona, as a process of making strategic decisions, is never complete, and the testing and evaluation of business models must be done continuously and repeatedly. Therefore, the regular evaluation of the business model can be a basis for continuous improvement of the business model and become a stimulus for making serious and innovative changes in the model (Lemuchi Deli, 1400).

According to previous studies, the reasons for the vulnerability and challenges of small and medium-sized companies in the Covid era are as follows:

1. SMEs are in industries directly affected by the pandemic, for example the tourism industry, retail trade and transport. Many of these businesses are forced to adopt new ways of working in-house and feel intense pressure to deliver their products or services through digital channels.

2. Compared to large companies, small and medium-sized companies generally have less cash and investment reserves and are therefore more affected by human resources and low capital.

3. Small and medium-sized companies are more dependent on global and national supply chains that have been disrupted by the crisis.

The pandemic has forced organizations to use new technologies, technological advancements for adaptability, agility, strength and innovation (Hossein, Z, 2021). These dramatic changes are especially significant in areas that are not sufficiently prepared for rapid digitalization due to various factors (Uvarva, Popel, 2021).

In a situation like Covid-19, the use of technology is the best solution to maintain the sustainability of small and medium enterprises. Some small and medium-sized companies do not know about digital skills related to business, so this situation forces them to learn online business (Priyono et al., 2020). The crisis caused by the Covid-19 pandemic has become an opportune moment for small and medium-sized companies to improve the quality of their products or services and develop different strategies to provide goods or services based on their business concerns. (Kuckertz, et al., 2020).

2-5. Literature review

Koshki et al. (2019) found that the challenges in the field of digital leadership and governance are in the first place, in the next ranks are the challenges in the field of planning and implementation, the challenges related to

digital skills and talent are in the third place, and the challenges in the field of technology and support are in the fourth place. , the challenges in the field of updating digital culture were ranked fifth and finally the challenges in the field of understanding the concept of digital transformation were ranked sixth (Koshki et al., 2019). In a study, Legzian and Islamkhah (2017) found that the most important challenges of digital transformation can be defined as organizational culture and digital strategy design and the support of senior managers, the level of digital awareness and expertise, budget and security issues and its risks, business model and organizational processes (Legzian, Mehdi, Islamkhah, Mohammad, 2017). In the same way, Marks et al. (2021) in examining the challenges of maturity of digital transformation in post-Covid-19 conditions in the higher education sector, show the lack of a comprehensive vision, the competence of digital transformation and the structure of data and their processing as the main challenges of digital transformation. gives (Marks et al., 2021). In another study, Grigorek et al. (2021) found out about how small and medium-sized companies operating in service industries deal with the disruptions caused by the Covid-19 pandemic, and 5 drivers for using digital technologies were identified. These drivers include organizational change drivers, customer change drivers, technology change drivers, financial change drivers, and social change drivers (Grigorek et al., 2021). Also, Priyono et al. (2020) analyzed how small and medium-sized companies deal with the environmental changes caused by the Covid-19 pandemic on the business model and found that the challenges of digital transformation include change initiatives, market changes, strategies for survival, financial problems, dealing with issues Finance is the underlying factor of digital transformation and new norms of the work environment (Priyono et al., 2020). Pelletier and Cottier (2019) in discovering digital transformation issues in small and medium-sized companies from the ecosystem point of view found that these factors include evaluation and support, understanding and use, competence development, digital strategy, attitude and behavior, relational capital and service and delivery. Relative importance and relative feasibility criteria for seven clusters show a significant statistical difference in ranking in subgroup profiles (Peltier, Cottier, 2019).

In general, a review of the research background shows that few researches in the country have addressed the issue of digital transformation and the challenges surrounding it; Also, due to the emerging nature of the Corona epidemic, research in this field is limited; Most of the conducted researches are based on review or qualitative methods, which, although they allow detailed and in-depth analysis, have little generalizability. To overcome this limitation, it is necessary for future research to ensure the generalizability of the results by using quantitative survey methods in different industries. In general, there is a theoretical and research gap in the field of research and examination of the challenges of small and medium-sized companies in the Corona era in Iran. According to the studies conducted to examine the challenges of digital transformation during the Covid-19 pandemic, Table No. (1) has fully reviewed these studies and compared them.

Table1. summary of reviewed literature, main components and sub components

Main components	Sub components	Lagzian, Mehdi, Islamkhah, Mohammad,) 2017),	(Koshki et al., 2019)	(Ebert and Duarte, 2018)	(Peltier, Coutier, 2019)	(Kokertz et al., 2020)	(Priyono et al., 2020)	(Uvara, Popel, 2021)	(Grigorek et al., 2021)	(Marks et al., 2021)
Change challenges	Lack of digital technology literacy	✓	✓	✓	✓		✓	✓		✓
	The failure rate of digital technology during the pandemic						✓	✓		
	The possibility of irrelevance of technology in the post-pandemic era						✓			
	Lack of intangible resources for digital transformation	✓	✓	✓	✓		✓	✓		✓
Market challenges	Changing customer demand during the pandemic						✓		✓	
	Uncertainty of customers' demands during the pandemic						✓		✓	
	Decrease in purchasing power during the pandemic						✓			
	High expectations of customers from digital services						✓		✓	
Financial challenges	Canceled orders during the pandemic						✓			
	Payment delay by customers during the pandemic						✓			
	Lack of funds and liquidity of the company during the pandemic			✓	✓	✓	✓	✓	✓	✓
	Lack of employee training for remote work						✓			
Organizational challenges	Lack of support from senior managers	✓	✓	✓	✓		✓		✓	
	Lack of a clear vision of digitalization	✓	✓	✓	✓		✓	✓		✓
	Lack of necessary infrastructure	✓		✓		✓	✓	✓	✓	✓
	Lack of flexibility culture	✓	✓	✓			✓			

	Lack of learning culture	✓			✓		
	Changing the nature of the work environment				✓		
	Increased stress due to job insecurity during the pandemic				✓		
Individual challenges	Employee resistance to change				✓		
	Loss of work-life balance due to remote work				✓	✓	
	Lack of government support during the pandemic			✓	✓	✓	✓
Environmental challenges	Intense competition in the industry during the pandemic				✓		
	Reduced support from business partners during the pandemic			✓	✓		

3. Research methodology

The current research is practical in terms of its purpose; In terms of the method of data collection, the research is of an exploratory type that was carried out with a survey strategy, in terms of the time of data collection, it is cross-sectional. In this research, first by using the literature review, the challenges of the business model of small and medium enterprises in the path of digital transformation during the Covid-19 epidemic have been identified and the initial research model has been designed. According to experts, fuzzy Delphi method was used, fuzzy logic as a method that includes both quantitative and qualitative components, can compensate for the gap in research methodology. The statistical population in this section includes experts, expert professors in the field of information technology management, as well as expert and experienced senior managers of small and medium-sized companies based in Tehran. 30 experts were selected through non-probability sampling. The judging criteria in this research are:

- Having a doctorate degree in the field of information technology management and being a member of the faculty of prestigious universities for professors
- Having managerial experience in small and medium-sized companies and familiarity with the concepts of digital transformation for managers
- Participation in digital transformation implementation projects in companies

The data collection tool in the fuzzy Delphi section is a questionnaire based on the findings extracted from the literature, which was distributed to experts in two rounds. After the completion of the fuzzy Delphi rounds, in order to ensure the factor structure and validity of the constructs, and the fitting of the model using the field method and the distribution of questionnaires, a survey of the senior managers of small and medium companies in Tehran was carried out. The statistical population includes senior managers of small and medium-sized companies in Tehran, which according to the statistics of Iran Small Industries and Industrial Towns Company, at the end of February 2019, 5319 small and medium-sized companies were registered. The minimum sample size for the structural equation modeling method is 5 times the number of questions and the maximum is 10 times the number of questions in the questionnaire. According to the 23-question research questionnaire, it seems that 200 samples are enough to conduct the research:

relationship (1)

$5q < n < 15q$

$230 > 200 > 115$

The sampling method in this random section is simple. Due to the conditions of Corona and the restrictions caused by it, some questionnaires were sent online and via email to the managers, and they were collected using phone calls and follow-ups by the researcher. Data collection tools: a questionnaire obtained from the fuzzy Delphi method, including change challenges (3 items), market challenges (5 items), financial challenges (2 items),

organizational challenges (8 items), individual challenges (2 items) and challenges It is environmental (3 items). The validity of this questionnaire was confirmed by face validity and reliability by Cronbach's alpha coefficient. SPSS 24 software and structural equation modeling method by Smart PLS were used for data analysis.

4. Research findings

The research findings are presented in two parts: fuzzy Delphi and quantitative part:

4-1. The steps of fuzzy Delphi method

The steps of the fuzzy Delphi method are presented with the participation of 30 experts in two rounds:

The first stage - identifying the research indicators using a comprehensive review of the theoretical foundations of the research: by reviewing the subject literature, a list of "challenges of the business model of small and medium-sized enterprises in the path of digital transformation during the Covid-19 pandemic" was extracted in 24 sub-criteria and 6 main criteria became

The second stage - collecting the opinions of the decision-making experts: in this step, after identifying the challenges from the literature, a decision-making group consisting of experts related to the research topic was formed and questionnaires were used to determine the relevance of the identified indicators to the main topic of the research and screening for They are sent where the linguistic variables of the table below are used to express the importance of each indicator. Also, an open question was included at the end of the questionnaire and the respondents were asked to state any effective factor that they think is important for the purpose of the research.

Table2. Linguistic expressions and fuzzy Delphi numbers

Language expressions	Triangular fuzzy numbers
very little	(0.25, 0, 0)
Little	(0.5, 0.25, 0)
medium	(0.75, 0.5, 0.25)
Much	(1, 0.75, 0.5)
very much	(1, 1, 0.75)

The third stage - verification and screening of indicators: this work is done by comparing the value of the acquired value of each indicator with the threshold value. The threshold value is calculated in several ways. In this research, the value of 0.7 is considered as the threshold value. After gathering the opinions of experts, the fuzzy value of each question is calculated. Assuming that the fuzzy value of each question is displayed as the low limit, middle limit and upper limit of this fuzzy number, we will have:

Relationship (2)

$$A_i = \left(a_1^{(i)}, a_2^{(i)}, a_3^{i}\right), i = 1,2,3, \dots, n$$

$$A_{ave} = (m_1, m_2, m_3) = \left(\frac{1}{n}\sum_{i=1}^{n} a_1^{(i)}, \frac{1}{n}\sum_{i=1}^{n} a_2^{(i)}, \frac{1}{n}\sum_{i=1}^{n} a_3^{(i)}\right)$$

Relationship (3)

In this regard, Ai represents the opinion of the 1st expert and AVE represents the average opinion of the experts. In the above relationships, the index i refer to the expert and the index j refers to the decision-making index.

After determining the number of answers given to each factor and after calculating the triangular fuzzy average for the factors, the determined fuzzy numbers are calculated for each component.

$(\alpha+\beta+m)/3$

Relationship (4)

Calculations related to fuzzy Delphi rounds are shown in table number (3).

Table3. Fuzzy average and de-fuzzification of each criterion

Questions	Defuzzied value	Fuzzy value of each question			Defuzzied value	Fuzzy value of each question		
		m	α	β		m	α	β
Lack of digital technology literacy	0.872	0.683	0.933	1.000	0.864	0.675	0.925	0.992
The failure rate of digital technology during the pandemic	Eliminated from the first round				0.517	0.308	0.517	0.725
The failure rate of digital technology during the pandemic	Eliminated from the first round				0.519	0.292	0.525	0.742
Lack of intangible resources (experience, knowledge, flexible manpower) for digital transformation	0.803	0.592	0.842	0.975	0.789	0.583	0.833	0.950
Foresight and the post-corona era	0.808	0.592	0.842	0.992	Added from the first round			
Changing customer demand during the pandemic	0.828	0.625	0.875	0.983	0.822	0.617	0.867	0.983
Uncertainty of customers' demands during the pandemic	0.814	0.608	0.858	0.975	0.772	0.550	0.800	0.967
Decrease in purchasing power during the pandemic	0.814	0.600	0.850	0.992	0.739	0.517	0.767	0.933
High expectations of customers from digital services	0.797	0.583	0.833	0.975	0.739	0.533	0.775	0.908
Lack of customer knowledge of digital technologies	0.794	0.583	0.833	0.967	Added from the first round			
Canceled orders during the pandemic	Eliminated from the first round				0.533	0.317	0.542	0.742
Payment delay by customers during the pandemic	0.803	0.592	0.842	0.975	0.736	0.517	0.767	0.925
Eliminated from the first round	0.797	0.583	0.833	0.975	0.764	0.550	0.800	0.942
Lack of employee training for remote work	0.806	0.592	0.842	0.983	0.797	0.600	0.842	0.950
Lack of support from senior managers	0.811	0.608	0.858	0.967	0.789	0.583	0.833	0.950
Lack of a clear vision of digitalization	0.797	0.592	0.842	0.958	0.811	0.617	0.858	0.958
Lack of necessary infrastructure	0.811	0.608	0.858	0.967	0.800	0.600	0.8502	0.950
Lack of flexibility culture	0.814	0.608	0.858	0.975	0.792	0.575	0.825	0.975
Lack of learning culture	0.800	0.583	0.833	0.983	0.769	0.558	0.808	0.942
Changing the nature of the work environment	0.811	0.600	0.850	0.983	0.747	0.533	0.783	0.925
Development of communication infrastructure	0.808	0.600	0.850	0.975	Added from the first round			
Increased stress due to job insecurity during the pandemic	0.797	0.592	0.842	0.958	0.753	0.542	0.792	0.925
Employee resistance to change	0.803	0.583	0.833	0.992	0.736	0.517	0.767	0.925
Loss of work-life balance due to remote work	0.808	0.592	0.842	0.992	0.483	0.275	0.483	0.692
Lack of government support during the pandemic	0.797	0.592	0.842	0.958	0.764	0.558	0.808	0.925
Intense competition in the industry during the pandemic	0.800	0.583	0.833	0.983	0.742	0.525	0.775	0.925
Reduced support from business partners during the pandemic	0.797	0.592	0.842	0.958	0.758	0.675	0.925	0.992

By examining the results of the first stage of the survey, the de-fuzzified averages, it can be seen that the criteria of "technology failure rate", "digital during the pandemic", "the probability of technology being irrelevant in the post-pandemic era", "cancelled orders during the pandemic" , "loss of balance between life and work due to remote

work" in the questionnaire with de-phased values less than 0.7 and therefore considered insignificant and removed from the questionnaire. In the questionnaire of the second stage, in addition to the average opinions of the experts in the first stage, new criteria that were presented by the experts in the first stage were also added. in this level. 3 other components were received from the experts in response to the open question of the questionnaire, "Foresight and the post-Corona era", "Customer's lack of knowledge of digital technologies" and "Communication infrastructure development". The fourth stage - consensus stage and completion of fuzzy Delphi: consensus means that the respondents have reached a general decision about the factors. At this stage, if the average difference of two consecutive rounds of fuzzy Delphi is less than 0.1, the fuzzy Delphi is finished.

4-2- Quantitative part

In a small part of the 200 distributed questionnaires, 162 complete questionnaires were collected and entered the analysis stage, of which 56.7% are women and 43.2% are men. 4.9% under 5 years, 19.8% between 5-10 years and 28.4% between 10-15 years, 25.9% between 20-15 and 21% over 20 years of work experience. 29% have a bachelor's degree, 55% have a master's degree, and 16% have a doctorate. 3.7% were under 30 years old, 48.8% were between 30-40 years old, 34% were between 41-50 years old and 13.6% were over 50 years old.

5-2-1- Structural equation modeling with partial least squares

The analysis of models in the method of structural equation modeling with partial least squares approach (PLS-SEM) performs "model fit check" in three parts: measurement model fit, structural model fit, and general model fit.

To check the fit of measurement models, three criteria of construct validity, composite reliability, convergent validity and divergent validity are used. The appropriateness criterion of factor loading coefficients is 0.4 (Holland, 1999). Also, 0.7 is suitable for composite reliability. According to Hir et al. (Hir et al., 2017), the criterion of convergent validity is that the average variance extracted (AVE) is greater than 0.5. These values are presented in the following table:

Table4. Results of factor loadings, convergent validity and composite reliability of research construct

Main components	Item	Factor loading	Composite Reliability	Convergent Validity	Main Components	item	Factor loading	Composite Reliability	Convergent Validity
Change challenges	CHANGE1	0.728	0.835	0.629	Organizational challenges	ORGANIZATION3	0.464	0.803	0.500
	CHANGE2	0.844				ORGANIZATION4	0.809		
	CHANGE3	0.803				ORGANIZATION5	0.684		
Market challenges	MARKET1	0.711	0.837	0.635		ORGANIZATION6	0.720		
	MERKET2	0.440				ORGANIZATION7	0.730		
	MARKET3	0.844				ORGANIZATION8	0.672		
	MARKET4	0.497			Individual challenges	INDIVIDUAL1	0.738		
	MARKET5	0.814				INDIVIDUAL2	0.904		
Financial challenges	FINANCIAL1	0.736	0.817	0.693	Environmental challenges	ENVIRONMENTAL1	0.657	0.892	0.510
	FINANCIAL2	0.919				ENVIRONMENTAL2	0.833		
Organizational challenges	ORGANIZATION1	0.678	0.808	0.680		ENVIRONMENTAL3	0.884		
	ORGANIZATION2	0.761							

As it can be seen, the model is at a very good level in terms of all three criteria mentioned above.

Divergent validity is the third criterion for the fit of measurement models. Divergent validity is measured by comparing the root of the AVE with the correlation between the measured variables and for each of the reflective constructs, the root of the AVE must be greater than the correlation of that construct with other constructs in the model (Forner and Larcker, 1981).

Table 5- Correlation matrix and divergent validity check by the method of Fornell and Larker (1981)

	Change challenges	Environmental challenges	Financial challenges	Individual challenges	Market challenges	Organizational challenges
Change challenges	0.793					
Environmental challenges	0.544	0.796				
financial challenge	0.473	0.371	0.832			
Individual challenges	0.362	0.579	0.211	0.824		
Market challenges	0.706	0.688	0.332	0.414	0.707	
Organizational challenges	0.671	0.569	0.366	0.476	0.710	0.714

4-3. Goodness of fitness of model

The goodness of fitness of the model using T coefficients is such that these coefficients must be greater than 1.96 in order to confirm their significance at the 95% confidence level. The second criterion for checking the fit of the structural model in a research is the R2 coefficients related to the hidden endogenous (dependent) variables of the model, Figure (1) and (2) show the model in a significant state and standard coefficients.

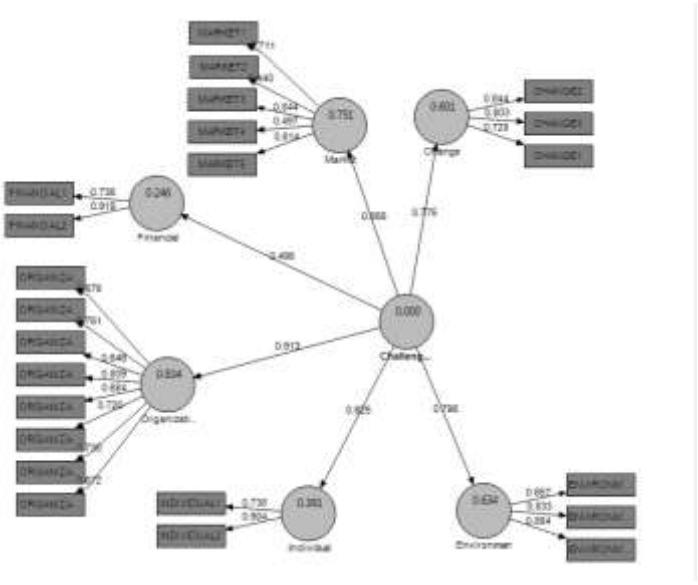

Figure 1- Model in the state of standard coefficients

The structural model in the mode of standard coefficients shows that 4 variables have criteria between 0.33 and 0.67 and 2 variables have values above 0.67, so the structural model has a good fit from the point of view of this criterion.

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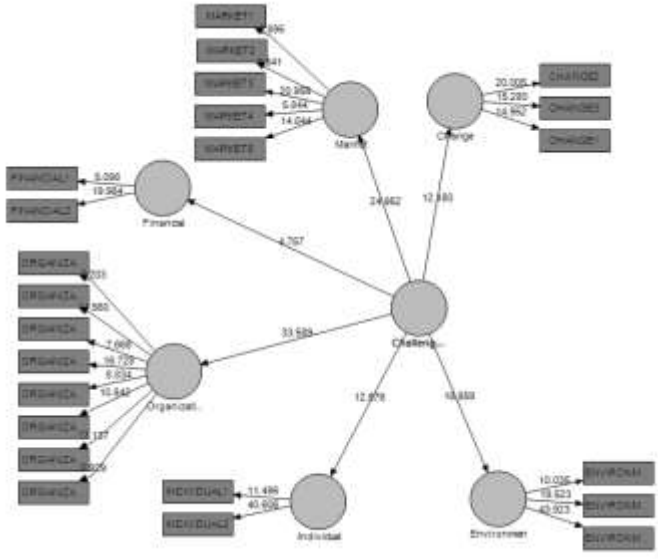

Figure 2- of the model in the case of significant coefficients

The t-statistic values of each path are presented in table (6).

Table 6- T-statistics and standard coefficients

Variables	R2	Standard coefficients	T-statistics
Change challenges	0.601	0.775	12.180
Market challenges	0.751	0.866	24.952
financial challenge	0.246	0.496	4.457
Organizational challenges	0.834	0.913	33.589
Individual challenges	0.391	0.625	12.676
Environmental challenges	0.634	0.796	16.589

4-4. Fitting the overall model

The overall model includes both measurement and structural model parts, and by confirming its fit, the fit check in a model is complete. To check the fit of the overall model, it is enough to measure a criterion called GOF:

GOF=√((Communalities)¯×(R^2)¯)

relationship (5)

The average of shared values is equal to 0.524.

Since there is a first-order endogenous hidden variable in this model, the value is equal to: 0.576

According to the three values of 0.01, 0.25 and 0.36 which are introduced as weak, medium and strong values for GOF (Wetzel, 2019). Obtaining a value of 0.549 for this criterion shows the appropriate fit of the overall research model.

4-5. Prioritizing challenges

In order to prioritize the components, Friedman's test is used in SPSS software.

Table 7- Prioritizing challenges

Challenges	***Average Ranking***	***Challenges***	***Average Ranking***
Lack of a clear vision of digitalization	12.74	*Lack of digital technology literacy*	13.68
Lack of necessary infrastructure	14.31	*Lack of intangible resources (experience, knowledge, flexible manpower) for digital transformation*	13.98
Lack of flexibility culture	10.67	*Foresight and the post-corona era*	13.00
Lack of learning culture	10.39	*Changing customer demand during the pandemic*	12.88
Changing the nature of the work environment	9.41	*Uncertainty of customers' demands during the pandemic*	10.91
Development of communication infrastructure	13.37	*Decrease in purchasing power during the pandemic*	13.46
Increased stress due to job insecurity during the pandemic	12.80	*High expectations of customers from digital services*	11.72
Employee resistance to change	10.63	*Lack of customer knowledge of digital technologies*	11.25
Lack of government support during the pandemic	14.20	*Payment delay by customers during the pandemic*	10.57
Intense competition in the industry during the pandemic	9.90	*Lack of funds and liquidity of the company during the pandemic*	10.71
Reduced support from business partners during the pandemic	10.46	*Lack of employee training for remote work*	12.55
		Lack of support from senior managers	12.42

Based on the average rating in the table above, the factor "Lack of necessary infrastructure" has the highest priority with an average rating of 14.31, "Lack of government support during the epidemic" ranks second with an average rating of 14.20, "Lack of intangible resources (experience, knowledge, manpower) flexible human) for digital transformation" is ranked third with an average rating of 13.98.

5. Conclusion

This research was conducted with the aim of identifying the challenges of the business model of small and medium companies in the path of digital transformation during the Covid-19 pandemic. In this regard, the "Challenges of Change" criterion including three sub-criteria of lack of digital technology literacy, lack of intangible resources (experience, knowledge, flexible manpower) for digital transformation and foresight and the post-corona era were identified. Therefore, the challenges of change are one of the challenges that small and medium-sized companies face in the path of digital transformation during the Covid-19 pandemic, because digital transformation itself is a big change and the combination of this change with the Covid-19 crisis. which has been an unforeseen crisis that has suddenly taken over the world, makes companies face such a challenge. This topic has been discussed in several researches such as Marks et al. Ebert and Duart (Ebert and Duart, 2018), Koshki et al. (Koshki et al., 2019) and Legzian and Islamkhah (Legzian, Mahdi, Islamkhah, Mohammad, 2017). has also been approved. What is going to happen in the post-corona period is also a challenge for companies, the post-corona world is unclear for companies, and therefore companies need "future perspective and post-corona era". This case was reviewed and approved as one of the suggestions of the expert panel, so no similar case was found in the past research.

In the following, "Market Challenges" includes five sub-criteria of changing customer demand during the pandemic, uncertainty about customers' wishes during the pandemic, reduced purchasing power during the pandemic, high expectations of customers from digital services, lack of customer recognition of digital technologies, as well as the title was identified as a challenge. It is not a secret that Covid-19 has affected all parts of the world and the behavior of consumers and the market have also undergone significant changes during this period, and this issue has led to changes in market demand, needs and priorities that companies has faced uncertainty in this field. In this context, Grigorek et al. (Grigorek et al., 2021) and Priyono et al. (Priyono et al., 2020) also mentioned this factor in their research. On the other hand, due to the suddenness of the Covid-19 crisis and the sudden occurrence of digital transformations, the customers themselves do not have enough familiarity with this market, and this lack of familiarity with their customers is a challenge for companies. This case was reviewed and approved as one of the suggestions of the expert panel, so no similar case was found in the past research.

In the following, "financial challenges" with two sub-criteria of delayed payment by customers during the pandemic and lack of funds and liquidity of the company during the pandemic were also identified as a challenge. Small and medium-sized companies, which are known for lack of resources, are facing more problems in this era. In this context, customers add to the financial problems of companies by delaying payments, and therefore companies will not have enough resources to realize digital transformation. With regard to the role of financial resources, this is the case in several researches such as Marks et al. (Marks et al., 2021), Grigorek et al. Priyono et al., 2020), Kuckertz et al. (Kuckertz et al., 2020), Pelletier and Coutier (Pelletier, Coutier, 2019) and Ebert and Duarte (Ebert and Duarte, 2018) have been reviewed.

In the continuation of "organizational challenges" with eight sub-criteria of lack of training of employees for remote work, lack of support from senior managers, lack of a clear vision of digitalization, lack of necessary infrastructure, lack of flexibility culture, lack of learning culture, changing the nature of the work environment and development of communication infrastructure as a challenge. is identified. Digital transformation to be realized in an era like Covid-19, which is faced with many uncertainties and uncertainties, requires a clear and clear vision and organizational factors aligned with the transformation, digital transformation requires changes in work procedures, virtual communication and purchasing processes. And the sale is through digital tools, for which the software and hardware required by the company should be provided. This factor was found in the research of Marks et al. (Marks et al., 2021), Grigorek et al. colleagues (Kokertz et al., 2020), Pelletier and Coutier (Pelletier, Coutier, 2019) and Koshki et al. (Koshki et al., 2019) were confirmed.

Next, "individual challenges" with two sub-criteria of increased stress due to job insecurity during the pandemic and employee resistance to change were identified as the next challenge. In the era of Covid-19, employees will have a lot of stress due to reasons such as fear of the epidemic, uncertainty about the future, health of themselves and their families, financial and social problems, etc. Also, the closure of companies and industrial units due to the quarantine of Kovid-19, retrenchment due to the lack of liquidity of companies and unemployment due to this crisis instills a sense of job insecurity to employees. Priyono et al. (Priono et al., 2020) also mentioned this in their research. In

addition, the resistance of employees to change as a reaction and response to change and transformation has long been discussed in the literature of transformation management. Due to the reasons mentioned in the previous component, uncertainty about the future of work and fear of accepting new ways of working, employees show resistance in the path of digital transformation, and this issue during the Covid-19, which requires rapid change to keep pace with There are changes, more happening. Priono et al. (Priyono et al., 2020) also mentioned this in their research.

And finally, "environmental challenges" were identified as challenges with three sub-criteria of lack of government support during the pandemic, fierce competition in the industry during the pandemic, and reduced support from business partners during the pandemic. In this era when many big businesses have failed in the big economies of the world, all companies are just trying to survive and in this way they use any competitive strategy, all companies rush towards digital transformation and this rush of companies leads to an increase in competition. Businesses in the era of Covid-19 have become digitalized markets, which makes success in this field simply not possible. On the other hand, due to the special conditions of Covid-19, problems in the supply chain, as well as changes in business procedures due to the change from the traditional model to the digital model, companies may face problems such as delays in delivery and orders in order to fulfill their obligations. This case requires support from business partners in this era. This factor has been confirmed in the research of Priyono et al. (Priyono et al., 2020) and Kokertz et al.

According to the results obtained from the analysis of the research data, according to the hypotheses that were confirmed, suggestions are made as far as possible.

5-1. Practical Recommendations and suggestions

With regard to the research conducted, small and medium-sized companies are suggested to take into account the following points in view of the changes made in the discussion of purchasing and using business services.

5-1-1. Practical suggestions in view of organizational challenges and digital developments

- It is suggested that according to the above research and the upward trend of digitalization of businesses in the corona and post-corona era, small or medium-sized companies should launch and localize communication systems with customers. They can also examine and test this software for more coordination of employees during remote working hours. Using this solution significantly changes the resistance of employees to change.

It is suggested that in order to increase the digital technology literacy of customers, due to the time-consuming nature of training and the lack of learning culture, the easier user interface of devices and gadgets in the Internet world, as well as the user-friendliness of websites, should be revised.

- It is suggested, according to the above research, in connection with small and medium-sized companies that have less turned to customer communication system software. For greater coordination of employees during remote working times and more efficiency, practice the common work language. One of the important tools is the use of CRM software. So that the productivity of employees does not decrease during remote working hours. The use of this tool visibly changes the resistance of employees to change. - It is suggested that companies, by analyzing the behavior of their customers before and during Corona, examine and analyze the challenges of reluctance to buy a product or service, as well as changes in customer demand (the number of face-to-face or online referrals). Also, verify their findings in each period to reach the optimal model for the post-corona era.

5-1-2. Practical proposals in view of environmental challenges

- Considering the role of government support, it is suggested that government institutions, policymakers and planners include support for small and medium enterprises in their work plan. It is suggested to provide consultations for these companies regarding the process of digital transformation by holding seminars and conferences.

5-1-3. Practical proposals in view of market challenges

- It is recommended to form working groups of successful senior managers in the field of digital transformation, to provide the possibility of gaining experience and learning in small and medium-sized companies. Since these managers accept digital transformation as an effective tool in the era of Covid-19. and will propose executive solutions according to organizational culture and market changes. Also, they have sufficient experience and ability to provide related tools and software such as office automation platforms, software for holding online meetings in Metaverse, online systems for managing communication with customers. In general, the digital transformation requires changes in working procedures, virtual communication, and conducting buying and selling processes through digital tools, which must be provided by the company with the necessary software and hardware.

5-1-4. Practical proposals in view of financial challenges

- It is suggested that organizations can provide the necessary infrastructure and platforms for digital transformation by providing appropriate financial resources and budget. For example, organizations have the duty to provide financial facilities for the purchase of software, platforms and equipment related to holding online meetings, resource integration system, customer communication system and office automation.

5-1-5. Practical proposals in view of the of change challenges

Considering that during the Covid-19 era, employees have suffered a lot of stress due to reasons such as fear of the epidemic, uncertainty about the future, health of themselves and their families, financial and social problems, etc., in relation to accepting new ways of working, they show resistance in the path of digital transformation. Organizational trainings along with appropriate information can be a suitable approach for better acceptance of digital transformation.

Finally, it should be mentioned that since the present research was conducted in small and medium-sized companies in Tehran, in order to generalize the model used in such researches, caution should be observed in order to match the subject with the model.

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Mahsa Akbari is currently working as an assistant professor at the Department of Industrial Management, Islamic Azad University-Karaj Branch, Iran. She also worked as a visiting professor in some international universities such as Jaen university of Spain and Pontificia Universidad Javeriana. Mahsa does research in Business Administration, Marketing, Consumer behavior, Digital Marketing, as well as Advertising and branding. She has published a number of research articles and conference contributions in collaboration with other colleagues, primarily in connection with her main research interest.

Fereshte Ahmadi is an MBA graduate of E-commerce major at the Islamic Azad University of Electronic branch-Iran. Her research interests are mainly on management, branding, Marketing strategy, and E-commerce. she has also published several papers on the mentioned fields.