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The Mediating Role of Work Engagement in the Relationship Between Digital Leadership and Innovative Behavior and Organizational Agility

Engin Karafakioglu^{1*}, Mine Afacan Findikli²

¹Social Sciences Institute, Beykent University, Istanbul, Turkey

²Faculty of Economics and Administrative Sciences, Istinye University, Istanbul, Turkey

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*Correspondence:

enginkarafakioglu@gmail.com

ABSTRACT

In parallel with the developments in information and communication technologies, the concept of digital leadership has emerged with the impact of current approaches such as Industry 4.0 and Society 5.0. Digital leadership is a phenomenal type of leadership that manifests itself in organizations in the dimensions of managing technological processes, innovation, and change. Technological processes make change and innovation inevitable for individuals and societies, which has encouraged innovative behavior, creativity, and agility. This study aims to determine the extent to which the mediating effect of work engagement on the dimension of digital leadership and innovative behavior will be reflected in organizational agility. In this context, questionnaire forms were prepared and sent to 494 people. The data obtained were analyzed and evaluated by using Structural Equation Modelling in IBM SPSS and IBM AMOS programs. As a result of the analysis, the partial mediation effect of work engagement on the effect of digital leadership on organizational agility was determined. The partial mediating effect of work engagement on the effect of innovative behavior on organizational agility was determined. In the modeling in which digital leadership and innovative behavior take place in the organization simultaneously, full mediation for digital leadership and partial mediation for innovative behavior were determined. The result obtained reveals the dominance of digital leadership. It is thought that this result can be explained in line with the Social Information Processing Theory and Role Theory.

With the spread of digital tools based on developing technology, significant changes have occurred in all areas of economic, cultural, and social life. The digital age, which emerged in Germany in 2011 as a result of Industry 4.0 and is regarded as digitalization or digital transformation, has significantly changed habits of life and ways of doing business in that businesses are becoming faster and more flexible in their structure and way of doing business, serializing their production and creating new digital business models (Oberer & Erkollar, 2018). Accordingly, the requirement for effective management of digital business models has brought out the concept of digital leadership. Digital leadership, which has gained momentum with Industry 4.0 and has become an important necessity in businesses, refers to the efforts that initiate, develop, and direct digital processes in creating digital business strategies (Sow & Aborbie, 2018). The fact that there are facilities in Velikoy Organized Industrial Zone that produce important components of the electrical, electronics, and informatics sectors has been effective in its selection. Such a choice was made due to the necessity of establishing the appropriate infrastructure in order to realize digital leadership. For example, an annual average of 300 billion dollars is expected to be spent on infrastructure investments in the Asia Pacific Region between 2020 and 2023 to ensure digital accessibility (Sagbas et al., 2023). From this point of view, the inclusion of organizations that produce these products and adopt digital leadership in the study will be in line with the purpose of the study. The study is important in terms of instantly testing whether the change stated in the literature is realized or not.

The motivation for the present study is to test digital leadership in the field to see whether it possesses the characteristics specified in the literature, compare the analysis with the literature, and contribute to a cumulative view. In this respect, the study is important in terms of testing instantly whether the change stated in the literature has occurred in a business in the manufacturing sector. Despite the fact that innovative behavior and digital leadership were frequently associated in previous studies, these concepts are examined in their simultaneous impact on organizational agility and the mediating effect of work engagement in the present study (Erhan et al., 2022; Sagbas et al., 2023). The results show that when innovative behavior is present together with digital leadership, digital leadership behavior is rendered passive by innovative behavior. Although the result obtained is compatible with the previous studies in the literature, it is different in terms of creating a new perspective.

Digital leadership is defined as a type of leadership that possesses innovative digital skills (Benitez et al., 2022) and can digitalize business processes with the help of mobile devices, software, and IT-connected devices and personalize them in accordance with the targets to be achieved (Abbasov & Tolay, 2021; Khaw et al., 2022). Social Information Theory (Salancik & Pfeffer, 1978) suggests that the attitudes and behaviors of the individuals working in the organization are influenced not only by their personal goals or needs but also by the social support they get from their managers.

In this regard, when a working individual experiences a dilemma with respect to making a choice or decision regarding their work, they seek help and support from managers. From this perspective, digital leaders are an important resource for their employees in solving problems effectively and acquiring information. One of the positive outcomes of social information exchange is that employees can increase their work performance by generating innovative ideas (Oberer & Erkollar, 2018).

When the effect of the digital leader on employee's attitudes and behaviors is evaluated in the context of role theory (Goffman, 1961), it is realized that employees follow the leader's behavior and are inspired by him. Leaders act as role models for their employees, guiding

them and achieving desired changes in their behavior (Decuyper & Schaufeli, 2020). In parallel with the assumption of Role Theory, digital leaders can lead to a positive change with their innovative attitudes and behaviors in line with the goals of the organization by being taken as role models by employees.

In light of this information, the present study mainly aims to investigate the effect of digital leadership and innovative behavior on organizational agility. The second purpose of the study is to test the mediating role of the employee's work engagement in these bilateral relationships. When previous studies in the literature are considered, it can be seen that there are limited studies on the dimensions of digital leadership, innovative behavior, work engagement, and organizational agility. The study conducted by Mihardjo and Sasmoko (2019) is among the studies revealing that digital leaders contribute to employees' creation of innovative business models. Agustina et al. (2020) found that digital leaders positively affected employees' engagement in work by increasing their self-confidence and self-efficacy.

This study aims to contribute to the scientific literature in two ways; the first is to include work engagement, which has been included in limited studies as a mediating variable, as a mediating variable in the model. We choose work engagement as a mediating variable because it has gone unnoticed in technology-focused studies such as digitalization in organizations, Industry 4.0, and Society 5.0. In this respect, the present study aims to contribute to a limited number of organizational behavior studies with digital leadership. The second contribution of the study is, as the aim achieved that digital leadership has generally been studied with concepts such as digital transformation (Khaw et al., 2022), technology (Brunner et al., 2023; Miller, 2018), and business performance (Susilawati, 2021), in previous studies, and therefore the variables of innovative behavior, engagement in work and organizational agility, which are much less studied in the literature, are included in the present study. In this regard, the study contributes to organizations and organizational behavior studies, where digitalization and its effects are increasing day by day in terms of the variables discussed.

Literature Review

Digital Leadership

When the literature is considered, it is realized that a clear definition of digital leadership has not been made yet. According to one definition, digital leadership is the combination of leadership skills with digital competencies to increase business performance in organizations (Wasono & Furinto, 2018). Digital leadership refers to the process of both providing human resources that demonstrate a clear vision within the process of digitalization and have the ability to realize strategies that will achieve the vision and directing and affecting them in accordance with the goals (Larjovuori et al., 2016; Zeike et al., 2019). These competencies of digital leadership can be transferred to employees through Social Information Processing Theory (Nauman et al., 2021; Salancik & Pfeffer, 1978; Wang et al., 2022). According to social information processing theory, the knowledge of how to achieve the goals and tasks given to employees by leaders and how to design the work environment occurs via the interaction between employees and leaders (Zalesny & Ford, 1990). Employees can get support from their managers during this process of learning and change. Previous studies on digital leadership have focused on the relationship between digital leadership and variables such as ChatGPT, artificial intelligence, digital transformation, digital entrepreneurship, and technology integration (Martins, 2019; Xia et al., 2023). When previous studies are examined, it is found that digital leadership does not focus on the human factor working within the

organization, which has a very important place in fulfilling its mission and vision. However, in this study, the effects of digital leadership and innovative behaviors on business behavior are discussed by considering the human factor, and in this way, both the gaps in the literature are closed, and a contribution is made to organizational behavior studies.

Innovative Behavior

Throughout the innovation process, first of all, innovative thoughts and ideas must be shared freely within the organization and supported by the leader in a way that turns into action in favor of the organization (Yopan et al., 2022). In light of these thoughts, innovative behavior triggers change and transformation in processes, products, and services and increases management and innovation in organizations, as well. It is a valuable skill that paves the way for creativity (Trott, 1998). When previous studies on innovative behavior are paid attention to, it is seen that Fan et al. (2023) focused on how a good leader in the leader-member relationship motivates employees' innovative behavior. In the study conducted by Iqbal et al. (2020), the relationship between servant leadership and employees' innovative behaviors was examined, the neglected mediating role of psychological safety and psychological development was investigated. In this regard, when previous studies are reviewed, the effects of innovative behavior in the education and health sectors, especially its interactions with variables such as psychological capital, entrepreneurship, and classical leadership, are dealt with (Agustina et al., 2020; Milner & Criticos, 2023). Moreover, it was also observed that many studies on innovative behavior focused on areas such as organizational behavior and classical leadership types. In this study, however, the innovative behavior variable is discussed together with the digital leadership variable, which emerges in organizations as a result of the digital age and is different from classical leadership types, which is thought to contribute by closing the gaps in the literature, organizational behavior studies and new business models such as organizational agility.

Work Engagement

Work engagement is a concept that finds its place in organizational management and is an important element that affects employee performance. It refers to a positive, emotional, motivational state of high energy that goes together with work engagement and a strong focus (Bakker & Albrecht, 2018). According to Maslach and Leiter (2008), work engagement refers to the energetic participation of working individuals in professional activities. Bakker et al. (2008) discussed work engagement in three sub-dimensions such as lively, committed, and devoted. Previous research shows that work engagement positively supports creativity, task performance, and organizational citizenship behavior (Bakker et al., 2014).

In this respect, in many studies on work engagement in the literature, it is observed that work engagement is discussed with variables such as classical leadership types, burnout and job stress, and organizational communication (Bader et al., 2023; Khan et al., 2021). The present study, however, discusses work engagement with digital leadership, a current variable with responsibilities in businesses within the digital transformation, and the innovative behavior that supports this concept. The fact that the work engagement variable does not act as a mediator in previous studies with current variables causes gaps in the literature regarding this concept. Bearing this in mind, work engagement is discussed in a mediating role with current variables and contributes to the literature by filling the gaps and studying organizational behavior.

Organizational Agility

The concept of organizational agility was first used in the field of production in 1990 and started to be used in different areas in the following years (Huang, 1999). Organizational agility refers to the ability to keep strategies constantly updated, delegate authority to employees in decision-making, and turn sudden changes into opportunities quickly and flexibly (Moreno, 2017). The concept of organizational agility is defined as the ability to foresee the changes brought about by opportunities and threats that are likely to occur in the internal and external environment of an organization and to restructure business processes, especially strategies, in line with this process, and to respond to the situation quickly by making a different arrangement (Aghina et al., 2015; Gangurly et al., 2009).

Considering other studies in the literature on organizational agility, it is realized that concepts such as industry 4.0, entrepreneurship, strategic agility, and digital transformation are discussed with the variable of organizational agility (Gong & Ribiere, 2023; Mrugalska & Ahmed, 2021). Therefore, it can be claimed that previous organizational agility studies were addressed with concepts such as industry 4.0, information technologies, and digital transformation rather than the human element. In the current study, however, organizational agility was discussed together with the concepts of digital leadership and innovative behavior; besides, the effects of the reflections of human attitudes and business behaviors within the organization on organizational agility were examined. In this respect, the present study contributes to the literature by filling the gaps in the literature and to studies on organizational behavior.

Research Model and Development of Hypotheses

The purpose of the study is to examine the effect of digital leadership and innovative behavior on organizational agility through work engagement meditation. Execution of technological processes is based on mutual information exchange between digital leaders and employees. Social Information Processing Theory and Role Theory assumptions can explain the quality of mutual communication between the digital leader and employees and how the digital leadership process influences the behavior of employees.

Social Information Processing theory was first proposed by Dodge in 1986 and redeveloped by Crick and Dodge in 1994. It assumes that the working individual processes and uses information in six stages in a social environment. These assumptions involve the stages of being aware of internal and external cues, interpreting the cues that are realized, establishing social goals, creating reactions, deciding on the response, and performing the behavior in the social information processing model when individuals cope with a social situation. Social information processing is a cyclical process in which individuals selectively focus on clues when facing a social situation. The clues interpreted in the next stage cause certain reactions to emerge by using social experiences. When the reaction chosen during the evaluation phase is accepted, it turns into behavior (Crick & Dodge, 1994). Within the scope of this theory, it can be argued that the working individual attributes some meaning to the attitudes and behaviors that he observes with his manager in the social environment at work. The employee who evaluates the clues obtained from the manager's attitudes and behaviors and regulates his reactions in this regard can transform his behavior positively if he regards his experience with his manager positively (Crick & Dodge, 1994). In terms of Social Information Processing Theory, employees may regard digital leaders as sources of information in their social environments.

In this respect, Social Information Processing Theory can explain that the goals set by digital leaders with their attitudes and behaviors are noticed, interpreted, accepted, and transformed into behavior by employees in a social environment.

On the other hand, according to Role Theory, roles within the organization are likely to be realized within the rules and norms of the organization (Vandenberghe et al., 2017).

At the same time, roles can be shaped within flexible and negotiable concepts in accordance with the support that employees get from their managers (Sluss et al., 2011). Therefore, employees accept the attitudes and behaviors of their admired managers as a learning process and can internalize the manager's attitudes and behaviors. Previous studies have suggested that employees can imitate leaders' attitudes and behaviors in the context of role theory (Goffman, 1961; Salancik & Pfeffer, 1978). Because digital leadership and innovative behavior that have been put forward in the research model in line with similar studies and theories explained are expected to have a positive and significant effect on organizational agility, the hypotheses created are presented below.

According to social information processing theory, the positive information exchange transferred from leaders to employees increases employees' job performance by changing their perceptions, attitudes, and behaviors (Walther, 2008). Previous studies on social information processing theory have confirmed the positive effects of this theory on organizational leadership and work engagement studies. There is a significant positive relationship between digital leaders and work engagement (Saputra & Hutajulu, 2020). In this respect, the first hypothesis of the research was created.

H₁: *Digital leadership has a positive and significant effect on Work Engagement.*

Social Information Processing Theory suggests that an individual's attitudes, behaviors, and beliefs are shaped by social contexts (Salancik & Pfeffer, 1978). The basic assumption of the theory indicates that individual perceptions, attitudes, and behaviors are influenced by information cues such as values, norms, and social expectations (Bhave et al., 2010). Based on this basic assumption of Social Information Processing Theory, innovative outputs within the organization are possible to be formed through innovative actions. Sending signals to the organizational culture as social cues regarding the fact that creativity is expected from employees, encouraged, and rewarded for innovative behaviors will have a positive effect on employees' commitment to work (Wang et al., 2013). Meanwhile, it has been determined that innovative behavior increases the level of work engagement of employees positively (Birdi et al., 2016). Other studies confirm that employees become more engaged at work as they participate in innovative tasks (Zhong et al., 2018). Based on this, it is predicted that there is a positive and significant relationship between innovative behavior and work engagement (Becan et al., 2013; Bhatnagar, 2012). Bearing this in mind, the second hypothesis of the research is as follows.

H₂: *Innovative Behavior has a positive and significant effect on Work Engagement.*

As stated in the previous part, managers are imitated by the employees who take them as role models in line with role theory. While successful leaders facilitate formal and informal social interaction, they begin to be followed by their subordinates, and some of their behaviors begin to be imitated. A similar process can be experienced in the process of the internalization of digital leaders' attitudes and behaviors. Mohan and Khuntia (2016) observed that business agility increased as a result of digital leaders supporting digital services. Similar

results were also obtained in the study by Artuz et al. (2021). This positive outcome is possible with the harmony between employee behaviors and leader behaviors. Within the framework of this understanding, H3 hypothesis was created.

H₃: *Digital Leadership has a positive and significant effect on Organizational Agility.*

The innovative roles expected from employees in the formation of an agile culture are realized in accordance with the stages in role theory. While innovative actions occur within a continuous and comprehensive flow of information, they are influenced by social norms through simultaneous information collection, information transfer, and feedback in accordance with roles. Innovative actions can lead to positive changes in the organizational structure by restructuring present business processes within the organization as innovative business processes (Ashrafi et al., 2019; Malibari & Bajaba, 2022; Petermann & Zacher, 2022). The H4 hypothesis, which predicts that innovative behavior will have a positive and significant effect on organizational agility, is as follows.

H₄: *Innovative Behavior has a positive and significant effect on Organizational Agility.*

Attitudes and behaviors of employees occur in a number of social categories in mutual interaction in the organizational environment. In accordance with role theory, employees who are lively, passionate, and engaged in their work also play a role in the change and transformation process of the organization (Matta et al., 2015). Change and transformation are directly related to the sub-dimensions of organizational agility. For instance, employees react to change in the flexibility sub-dimension of organizational agility to adapt to change by fulfilling the responsibilities of their roles in interaction with each other, whereas they react to change in the responsiveness sub-dimension (Lueg & Drews, 2021). Jeon et al. (2022) determined that engagement in the learning processes within the organization has a positive and significant effect on learning agility. Similar result was also obtained in the study by Jo and Hong (2022). In this respect, the H5 hypothesis was formed within the scope of the explained theory and studies.

H₅: *Work Engagement has a positive and significant effect on Organizational Agility.*

Within the scope of the first five hypotheses that have been put forward, it is emphasized that digital leadership and innovative behavior are influenced by social information processing theory and interact with other variables, such as work engagement and organizational agility. Studies conducted in this direction reveal that digital leadership and innovative behavior will have a positive and significant effect on other variables. Role Theory influences the variables of work engagement and organizational agility, and it is stated that employees are especially influenced by leaders and imitate them. Previous studies conducted in this context indicate that there will be a positive and significant relationship between the two concepts and other concepts. Work engagement, which is included in this study as a mediating variable, is expected to have a mediating effect on organizational agility in the effect of digital leadership and innovative behavior. With this expected result, it is possible to claim that digital leadership and innovative actions in organizations will increase organizational agility with the help of engaged employees.

Within the scope of the explained theories and studies, H6, H7, and H8 hypotheses were formed.

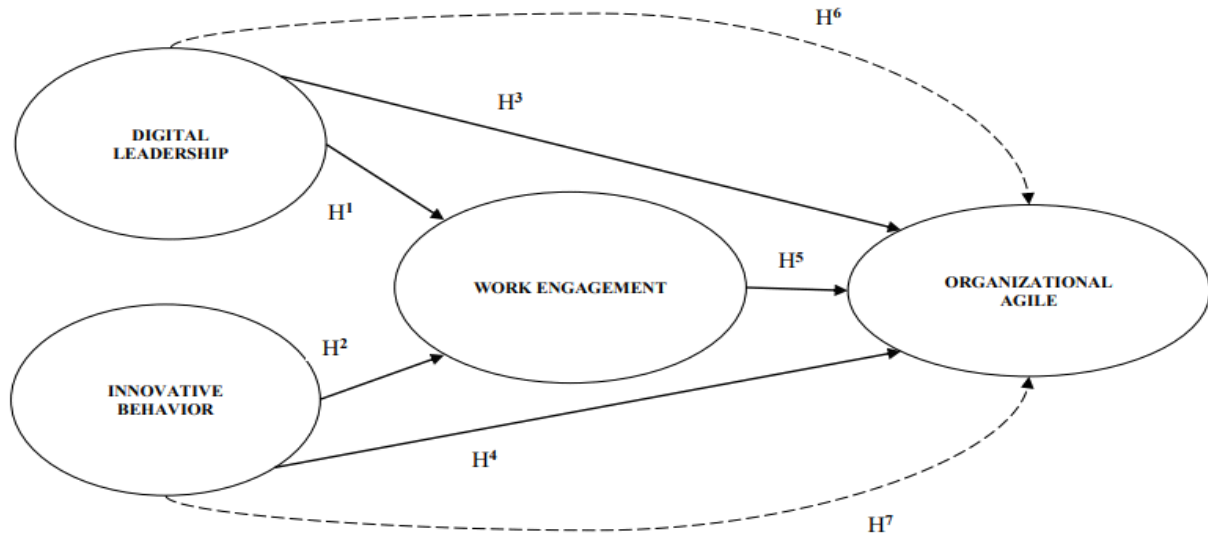
H6: Work engagement has a mediating role in the relationship between digital leadership and organizational agility.

H7: Work engagement has a mediating role in the relationship between innovative behavior and organizational agility.

H8: Work engagement has a mediating role in the effect of digital leadership and innovative behavior on organizational agility.

The research model is presented in Figure 1.

Figure 1
Research Model



Method

Sampling

The sample of the study consists of 87 enterprises and 3260 employees located in Cerkezkooy Velikoy Organized Industrial Zone. The reason for selecting Cerkezkooy Velikoy Organized Industrial Zone is that telecom companies and their employees are familiar with digital leadership, innovative behavior, work engagement, and organizational agility. In this regard, 494 people participated in the present study. The study benefitted from the convenience sampling method.

Instruments

The survey form to be used for data collection is structured in a way that consists of 5 parts. The first part consists of demographic variables with the categories of gender, marital status, education level, age, monthly income level, and work experience period.

In the second part, the Digital Leadership Scale, which was developed by Zeike et al. (2019) and adapted to Turkish by Oktaysoy et al. (2022), is included. It is a one-dimensional scale containing six items in the 5-point Likert form.

In the third part, the Innovative Behavior Scale is included, which was developed by Scott and Bruce (1994) and was adapted to Turkish by Çalışkan et al. (2019). It is a one-dimensional scale that contains six items in the 5-point Likert form.

In the fourth part, the Work Engagement Scale is included. The Utrecht Work Engagement Scale (UWES-17) was designed with 17 items (Schaufeli et al., 2002), and a short version with nine items was published in the ongoing process (Schaufeli et al., 2006). The 6-item (UWES-6) Scale was translated into Turkish by Güler et al. (2019), and the three-dimensional scale has a 5-point Likert form.

In the fifth part, the Organizational Agility Scale is included. The Organizational Agility scale is a four-dimensional, 17-item scale in the 5-point Likert form which was developed by Sharifi and Zhang (1999) and adapted into Turkish by Akkaya and Tabak (2018).

The survey form, consisting of a total of 35 questions, was applied digitally via Google Forms between August 7th and August 20th, 2023, and as a printed survey because the desired number was not reached. The survey forms were applied based on permission numbered 105926, dated June 1, 2023, from the Ethics Committee of Istanbul Beykent University.

Structural equation modeling was utilized to analyze the data, and the data was interpreted using the IBM AMOS program.

Findings

The demographic distribution of the participants is shown in Table 1.

Table 1

Demographic Variables

Demographic	Group	n	%
Gender	Female	284	57.50
	Male	210	42.50
Marital Status	Married	172	34.80
	Single	322	65.20
Age	Between 18-30	208	42.10
	Between 31-40	159	32.20
	Between 41-50	89	18.00
	Aged 51 and Above	38	7.70
Level of Education	High School	234	47.40
	Undergraduate	116	23.50
	Graduate	111	22.50
	Postgraduate	33	6.60
Years of Experience	5 Years and Below	263	53.20
	Between 6-10 Years	71	14.40
	Between 11-15 Years	57	11.50
	Between 16-20 Years	50	10.10
	21 Years and Above	53	10.80
Income	Between 10.000-15.000 Turkish Liras	120	24.30
	Between 15.001-20.000 Turkish Liras	116	23.50
	Between 20.001-25.000 Turkish Liras	96	19.40
	Between 25.001-30.000 Turkish Liras	70	14.20
	30.001 Turkish Liras and Above	92	18.60

The data showed normal distribution. Considering the Skewness and Kurtosis values, it is realized that the values are between +1.96 and -1.96. The information regarding normality distribution is presented in Table 2 (Hair et al., 2014).

Table 2

Normality Distribution

Items	Kolmogorov-Smirnov			Measurements of Central Tendency			
	Statistic	df	p	M	Median	Skewness	Kurtosis
Digital Leadership	.12	494	.000	3.25	3.00	.07	-.38
Innovative Behavioral	.17	494	.000	3.21	3.00	.01	-.36
Work Engagement	.17	494	.000	3.32	3.00	.18	-.26
Organizational Agile	.12	494	.000	3.29	3.11	.18	-.17

Other important criteria required for analysis are the multicollinearity problem and the validity and reliability of the scales. Correlation analysis of the scales is performed in order to

determine the multicollinearity problem, and if the values are above .90, the multicollinearity problem is examined. For validity and reliability, the most common method to be used is Cronbach's Alpha, which is required to be over .70 (Hair et al., 2014).

When Table 3 is considered, it is realized that the Cronbach's Alpha value of the digital leadership scale is .84, the Cronbach's Alpha value of the innovative behavior scale is .92, the Cronbach's Alpha value of the work engagement scale is .86, and the Cronbach's Alpha value of the organizational agility scale is .94. Due to the fact that there is no correlation relationship greater than .90 between the variables, it is found that there is no multicollinearity problem.

Table 3

Correlation, Validity and Reliability Table

Items	1	2	3	4
Digital Leadership	1 (.84)			
Innovative Behavioral	.69**	1 (.92)		
Work Engagement	.40**	.60**	1 (.86)	
Organizational Agile	.69**	.80**	.60**	1 (.94)

** . Correlation is significant at the 0.01 level (2-tailed).

The findings determined up to this part of the study include determining the minimum required features through the SPSS program. However, these analyses are insufficient for Structural Equation Modeling, and it is necessary to perform confirmatory factor analysis and calculate validity and reliability based on the factor load values obtained. Goodness of fit values for Confirmatory Factor Analysis are $X^2(df) < 5$; $p < .05$; RMSEA $< .08$; CFI $> .90$; GFI $> .85$; SRMR is expected to be $< .08$ (Byrne, 2011). Average Explained Variance (AVE $> .50$) and Composite Reliability (CR $> .70$) values are used for validity and reliability. Table 4 presents the factor load values, reliability, and validity values of the scales. In order to perform confirmatory factor analysis, the factor load values and reliability and validity values of the data collection tools must be within the reference range and at a sufficient level.

Table 4

Factor Load Values. Reliability and Validity

	β_1	β_2	Ss	t	p
Digital Leadership Scale					
Cronbach's Alpha = .84, CR = .85, AVE = .49					
Leader1	.54	1.01			
Leader2	.79	1.41	.12	11.74	< .001
Leader3	.55	0.98	.10	9.53	< .001
Leader4	.75	1.46	.12	11.47	< .001
Leader5	.76	1.38	.12	11.58	< .001
Leader6	.76	1.46	.12	11.53	< .001
Innovative Behavior Scale					
Cronbach's Alpha = .92, CR = .92, AVE = .67					
Innovative1	.72	1.01			
Innovative2	.67	0.89	.06	14.81	< .001
Innovative3	.88	1.25	.06	19.38	< .001
Innovative4	.81	1.13	.06	18.15	< .001
Innovative5	.92	1.34	.06	20.21	< .001
Innovative6	.88	1.23	.06	19.71	< .001
Work Engagement Scale					
Cronbach's Alpha = .86, CR = .92, AVE = .68					
Engage1	.86	1.01			
Engage2	.90	1.05	.04	23.37	< .001
Engage3	.92	1.02			
Engage4	.90	1.00	.03	27.41	< .001
Engage5	.85	1.02			
Engage6	.36	0.36	.06	6.16	< .001
Organizational Agility Scale					
Cronbach's Alpha = .94, CR = .95, AVE = .58					
Agility1	.78	1.00			
Agility2	.79	0.99	.05	19.01	< .001
Agility3	.77	0.95	.05	18.44	< .001
Agility5	.59	0.76	.05	13.51	< .001
Agility6	.71	0.89	.05	16.64	< .001

Agility7	.66	0.87	.05	15.14	< .001
Agility8	.73	0.91	.05	17.23	< .001
Agility1	.71	1.00			
Agility2	.77	1.07	.06	15.80	< .001
Agility3	.74	0.98	.06	15.25	< .001
Agility1	.74	1.05			
Agility2	.81	1.09	.05	18.89	< .001
Agility3	.86	1.15	.05	20.25	< .001
Agility1	.82	1.06			
Agility2	.83	1.02	.04	22.07	< .001
Agility3	.77	0.91	.04	19.70	< .001

Table 5 indicates that the goodness of fit index values and validity and reliability values of the confirmatory factor analysis of the scales are at sufficient levels.

Table 5

Confirmatory Factor Analysis Results

Items	X ² (df)	p	RMSEA	CFI	GFI	SRMR	AVE	CR
Digital Leadership	3.35	.000	.06	.98	.98	.02	.50	.85
Innovative Behavioral	3.80	.000	.07	.99	.98	.01	.67	.92
Work Engagement	4.10	.000	.07	.98	.98	.01	.68	.92
Organizational Agile	3.99	.000	.07	.94	.91	.03	.58	.95

Upon determining that all values were appropriate for hypothesis testing, analyses regarding Structural Equation Modeling were performed, which are presented in Table 6. As a result of the measurement model, it was found that a one-unit increase in digital leadership behavior would lead to a .49 increase in work engagement, whereas a one-unit increase in innovative behavior would cause a .66 increase in work engagement. On the other hand, it was realized that a one-unit increase in work engagement behavior would result in a .75 increase in organizational agility, while a one-unit increase in innovative behavior would cause a .85 increase in organizational agility. Moreover, it was determined that a one-unit increase in digital leadership behavior would cause a .66 increase in organizational agility. In the analyses, the measured effect was found to be significant because of $p < .05$ (Hair et al., 2014). Therefore, the hypotheses including H1: “Digital leadership has a positive and significant effect on work engagement.”, H2: “Innovative behavior has a positive and significant effect on work engagement.”, H3: “Work engagement has a positive and significant effect on organizational agility.”, H4: “Innovative behavior has a positive and significant effect on organizational agility.” and H5: “Digital leadership has a positive and significant effect on organizational agility.” were accepted.

Table 6

Hypothesis Test Results

Items			β_1	β_2	S.E.	C.R.	p	Hypothesis
Digital Leadership	---->	Engagement	.49	.43	.04	8.93	< .001	H ₁ Accepted
Innovative Behavioral	---->	Engagement	.66	.52	.03	13.33	< .001	H ₂ Accepted
Work Engagement	---->	Agility	.75	.69	.05	13.51	< .001	H ₃ Accepted
Innovative Behavioral	---->	Agility	.85	.71	.04	17.82	< .001	H ₄ Accepted
Digital Leadership	---->	Agility	.66	.68	.05	11.93	< .001	H ₅ Accepted

Following the acceptance of the first five hypotheses, it became possible to measure the mediation effect. The goodness of fit values were determined to be appropriate for testing the H₆ hypothesis, which states that work engagement has a mediating impact on the effect of digital leadership on organizational agility. As can be seen from Table 7, partial mediation was observed, and therefore, the H₆ hypothesis was accepted. As shown in Figure 2, the goodness of fit values is sufficient in the structural equation model analysis. Furthermore, the X²/sd, p, RMSEA, CFI, GFI, and p values obtained as a result of the measurement are observed to remain within acceptable values.

Figure 2
Mediation Analysis

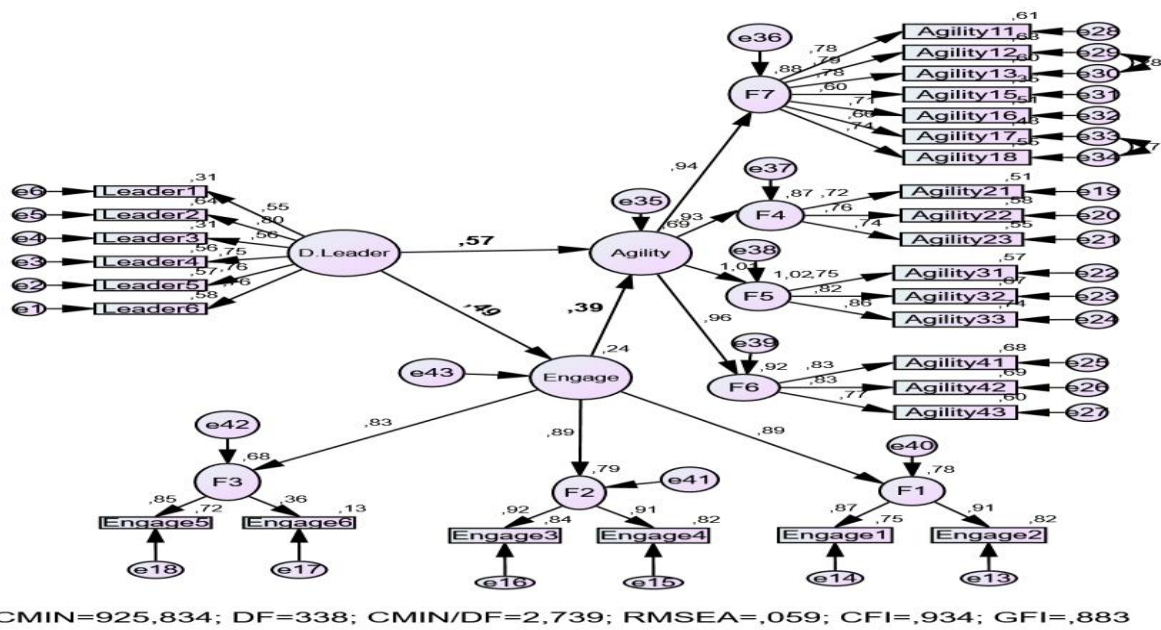
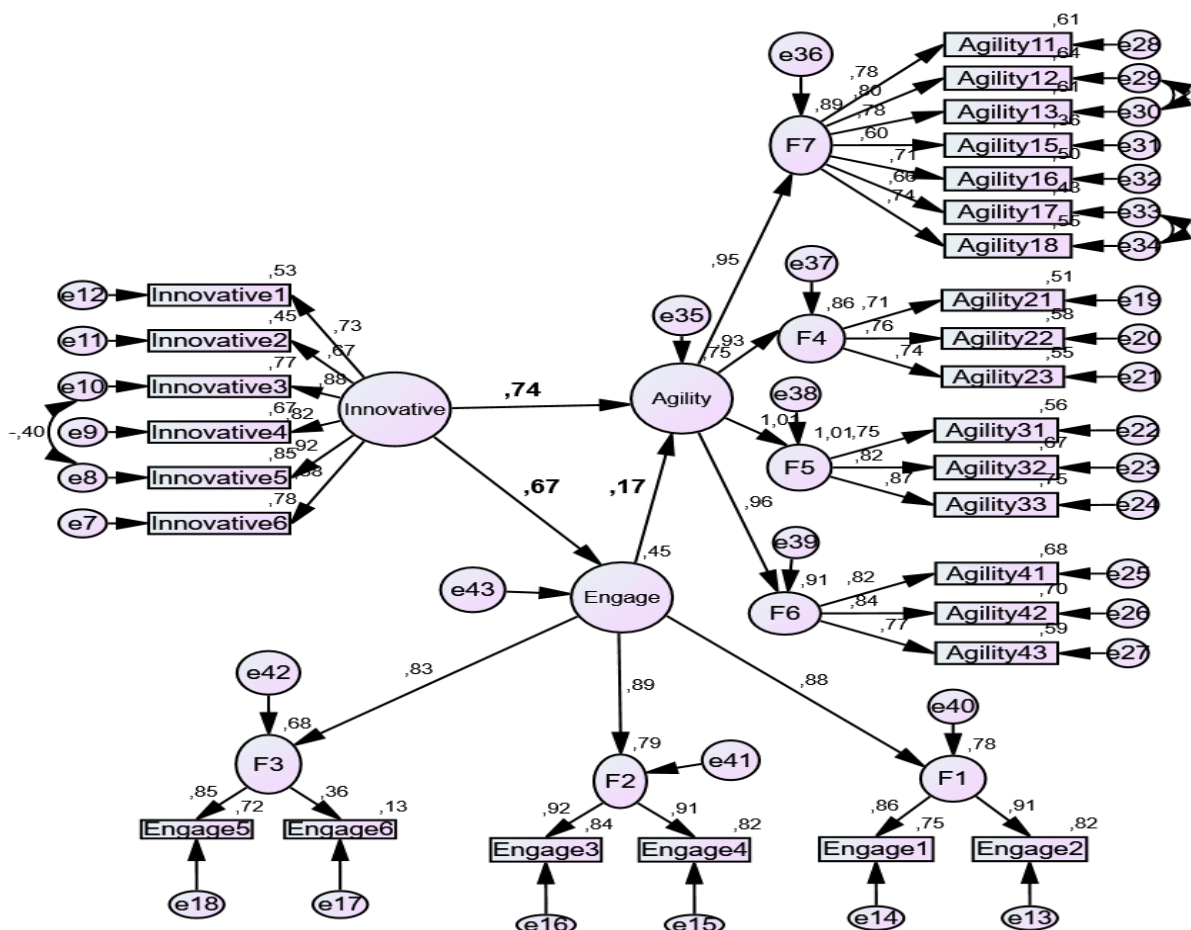


Table 7
Hypothesis Test Result

Items	Dependent Variables			
	Work Engagement		Organizational Agility	
	β	Ss	β	Ss
Digital Leadership (c2 way)			.75*	.05
R ²				.57
Digital Leadership (a2 way)	.49*	.05		
R ²		.24		
Digital Leadership (c2' way)			.56*	.05
Work Engagement (b way)			.39*	.04
R ²				.69
Indirect Effect			.19* (.14-.25)	

The goodness of fit values were found to be appropriate for testing the H7 hypothesis, which states that work engagement has a mediating impact on the effect of innovative behavior on organizational agility. As can be seen from Table 8, partial mediation was realized, and therefore, the H7 hypothesis was accepted. When Figure 3 is considered, it is realized that the goodness of fit values is at a sufficient level in the structural equation model analysis. Besides, the X2/sd, p, RMSEA, CFI, GFI, and p values obtained as a result of the measurement are observed to remain within acceptable values.

Figure 3
Mediation Analysis



CMIN=1047,699; DF=337; CMIN/DF=3,109; RMSEA=,065; CFI=,932; GFI=,871

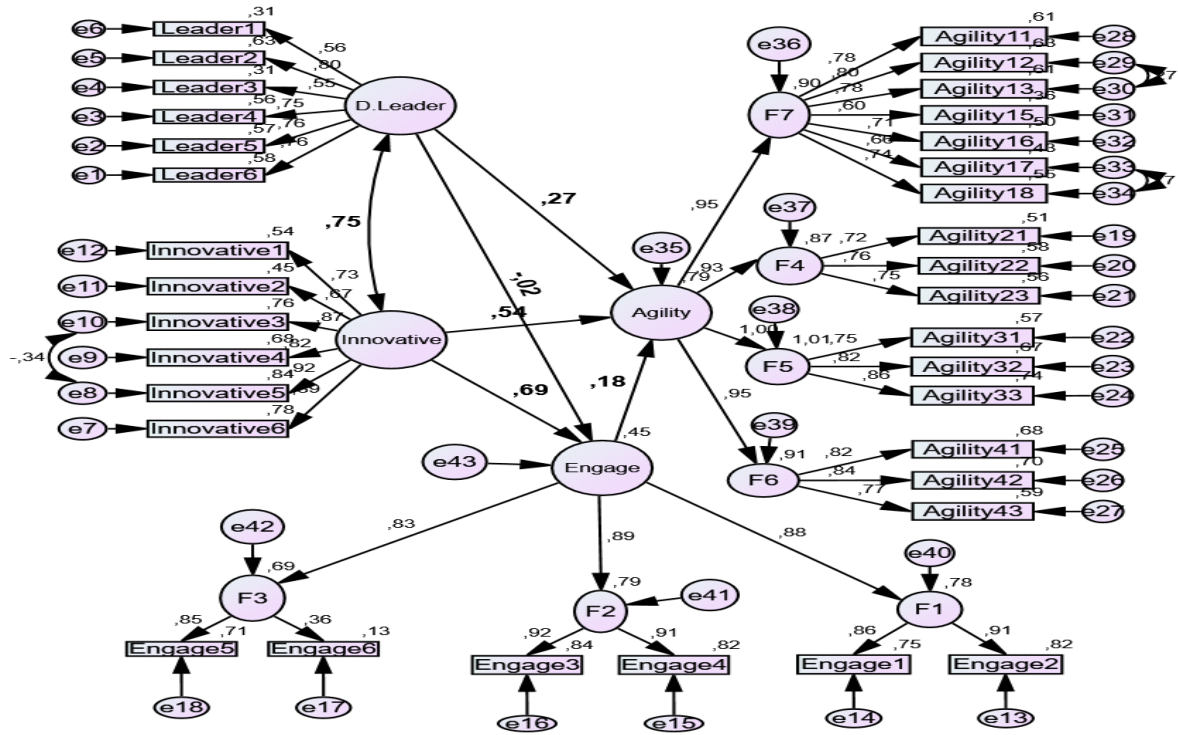
Table 8

Hypothesis Test Result

Items	Dependent Variables			
	Work Engagement		Organizational Agility	
	β	Ss	β	Ss
Innovative (c2 way)			.88*	.04
R2				.73
Innovative (a2 way)	.66*	.03		
R2		.44		
Innovative (c2' way)			.73*	.04
Work Engagement (b way)			.17*	.04
R2				.74
Indirect Effect			.11* (.05-.18)	

The goodness of fit values was observed to be appropriate for testing the H8 hypothesis, which states that Work Engagement has a mediating role in the effect of Digital Leadership and Innovative Behavior on Organizational Agility. Figure 4 illustrates that the goodness of fit values was sufficient in the structural equation model analysis. It is also observed that the X2/sd, p, RMSEA, CFI, GFI, and p values obtained as a result of the measurement remain within acceptable values.

Figure 4
Mediation Analysis



CMIN=1433,139; DF=511; CMIN/DF=2,805; RMSEA=,061; CFI=,923; GFI=,857

As can be seen from Table 9 regarding the analysis of work engagement in the effect of innovative behavior on organizational agility, partial mediation was found, and therefore, the H8 hypothesis was accepted. The mediating effect of work engagement on the effect of digital leadership on organizational agility, tested with H6 within the scope of the model, revealed a full mediation effect from partial mediation. Reducing the .49 effect between digital leadership and work engagement to -.02 was effective in the formation of full mediation.

Table 9
Hypothesis Test Result

Items	Dependent Variables			
	Work Engagement		Organizational Agility	
	β	Ss	β	Ss
Innovative (c2 way)			.65*	.04
R2				.76
Innovative (a2 way)	.68*	.03		
R2		.45		
Innovative (c2' way)			.53*	.04
Work Engagement (b way)			.17*	.13
R2				.78
Indirect Effect			.12* (.06-.19)	

Discussion

The study revealed the partial mediating effect of work engagement on the effect of digital leadership on organizational agility. Furthermore, a partial mediating effect of work engagement was determined on the impact of innovative behavior on organizational agility. In the modeling in which both digital leadership and innovative behavior take place in the organization at the same time, full mediation for digital leadership and partial mediation for

innovative behavior were observed. In the present study, digital leadership contributes to the organization in terms of being agile, triggering innovation by exhibiting innovative behaviors, and initiating a creative process through work engagement. With the acceptance of the first hypothesis, digital leaders have a positive impact on employees in the organization through their digital actions. It is suggested in the literature that digital leaders' attitudes and behaviors have a positive effect on organizational performance in that they can increase work engagement of an employee (Meng & Berger, 2019). Parallel to this, it is also stated that as digital leaders' use of technological devices increases, there is an increase in the level of work engagement of employees (Mäkineniemi, 2022). Accepting the second hypothesis, innovative behaviors occurring in the organization have a positive effect on employees who are committed to work. In the literature, it is pointed out that as the participation of leaders and employees involved in the technological transformation of organizations increases, both the organization's performance and innovation performance rise (Benitez et al., 2022). Moreover, it is stated that increasing innovative actions motivates the leader-member relationship (Fan et al., 2023). Acceptance of the third hypothesis points out that digital leaders have a positive influence on the performance and speed of the organization. The literature indicates that digital leaders are effective in the digital development of the organization and agility in the workplace environment by providing business support and employee motivation within the organization. It is suggested that digital leaders who support digital services contribute to organizational agility (Tanniru & Khuntia, 2016).

On the other hand, acceptance of the fourth hypothesis suggests that innovative behaviors positively affect organizational agility thanks to the positive changes they bring to the organization. In the literature, innovative actions are accepted as innovations in the organization. It is stated in the literature that when this situation is managed well, it has a positive effect on the organization's agility in all areas (Franco & Landini, 2022; Niu et al., 2022). With the acceptance of the fifth hypothesis, it is revealed that employees who are engaged in work have a positive effect on organizational agility thanks to their motivation within the organization; motivated employees are stated to contribute positively to organizational performance due to their high work engagement (Ludviga & Kalvina, 2023). In the present study, it was found that work engagement had a partial mediating role in organizational agility in models where digital leadership and innovative behavior were tested separately. In the single model where all variables are tested, work engagement has a partial mediating role for innovative behavior and a full mediating role for digital leadership. By indicating how digital and innovative actions are reflected in the organization in terms of human attitudes and behaviors in organizations, the present study contributes to organizational behavior studies and new studies within the scope of digital leadership and innovative behavior, which are less studied in the literature. According to Social Information Theory (Salancik & Pfeffer, 1978), working individuals can generally seek help and support from their managers when they have to make a behavioral choice. It becomes possible for the organization to innovate by generating innovative ideas under the leadership of digital leadership; as a result, to increase business performance through a social exchange of information, which is explained by Social Information Processing Theory.

Conclusion

The present study aimed to determine the mediating role of work engagement in the effect of digital leadership and innovative behavior on organizational agility in industrial enterprises.

Through the study in which 494 employees participated, many hypotheses were tested in accordance with the theoretical knowledge and literature review. The findings obtained by testing the hypotheses were discussed, and conclusions and suggestions were made. The study revealed the partial mediating effect of work engagement on the effect of digital leadership on organizational agility. A partial mediating effect of work engagement was observed in the effect of innovative behavior on organizational agility. In the modeling in which both digital leadership and innovative behavior take place in the organization at the same time, full mediation for digital leadership and partial mediation for innovative behavior were found. It has been realized that digital leadership and innovative behavior affect organizational agility positively and significantly. Moreover, the study showed that digital leadership and innovative behaviors, especially in companies which are interested in producing technology, played a partial mediating role in work engagement in terms of the speed and competitiveness of the organization, while innovative behavior played a dominant role. Given the studies on digital leadership, it can be realized that digital leadership is mainly concerned with innovation in organizations, digital transformation, and the performance of companies (Benitez et al., 2022; Fatima & Masood, 2023).

Although there are studies on human factors in the field of organizational behavior, it is observed that they are limited (Zeike et al., 2019). Digital leadership and innovative behavior have been shown to have a direct positive and significant effect on work engagement. An increase in employees' commitment to the organization is observed in the digital transformation, which is achieved by organizational leaders motivating employees in line with innovative strategies. Employees' acceptance of the created innovative culture has a positive effect on concentrating their efforts in line with the organizational goals (Hooi & Chan, 2023). The innovative culture created in the workplace accelerates the adoption of organizational goals emerging in the digitalization process of the organization. For this reason, the study showed that digital leaders and innovative behavior had a positive influence on employees and increased their commitment to work.

The results showed a positive and significant relationship between organizational agility, digital leadership, and innovative behavior. As a result of the innovative behavior of digital leaders, managing technological processes in the organization becomes effective in making the organization agile in the dimension of change and innovation. In this respect, the present study revealed that digital leadership and innovative behaviors partially mediated the speed and competitiveness of the organization, especially in technology-producing companies, whereas innovative behavior played a dominant role. These results are also supported by previous studies, which show that digital leadership and innovative actions have a positive impact on the organization. The present study differs from previous studies in that it focuses on the human element of digital leadership and innovative behavior within the organization and how the results give direction to the organization. The study is considered to provide a roadmap for future research by understanding the influence of digital leadership and expanding this effect to a wider area in the literature. For further studies, it is recommended that studying digital leadership specifically on issues such as sustainability, organizational climate, organizational culture, and organizational justice, will contribute to the literature.

Limitations

The study has been limited to companies serving in the telecommunication sector. It provides information, especially for company managers, leaders, and organizational professionals, on how to develop agile capabilities by quickly adapting innovative practices in the organization.

In particular, organizations should ensure an innovation climate by developing their digital leadership skills in line with digital information management. For this reason, businesses that prioritize their strategic capabilities will increase their learning agility through corporate communication and achieve financial efficiency (Gouda & Tiwari, 2021).

Declarations

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Ethics Approval

Not applicable.

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