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The Mediating Role of Occupational Stress in the Impact of Digital Leadership on Open Innovation Capability in the Aviation Sector

Ethem Topçuoğlu[1], Onur Oktaysoy[2], Yaşar Şahin[3*]

[1] Giresun University, Academy of Aviation Management, 28000, Merkez, Giresun, Türkiye. (ethem.topcuoglu@giresun.edu.tr)
[2] Kafkas University, Faculty of Economics and Administrative Sciences, 36000, Merkez, Kars, Türkiye. (onuroktaysoy@kafkas.edu.tr)
[3*]Trabzon University, Beşikdüzü Vocational School, 61800, Beşikdüzü, Trabzon, Türkiye. (yasarsahin@trabzon.edu.tr)

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Corresponding Author: *Yaşar Şahin*

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Abstract

In today's business world, where digitalization has become a strategic necessity, the impact of leadership styles on innovation capacity is becoming increasingly important. In particular, in the aviation industry, a sector characterized by low error tolerance and high information intensity, digital leaders must not only possess the ability to implement technology but also the competence to steer organizational innovation processes and manage employees' stress levels. In this context, the primary objective of this study is to empirically investigate how digital leadership influences open innovation capability and to examine the potential mediating role of occupational stress experienced by employees in this relationship. The study sample, which employs quantitative research methods, consists of 407 participants working in the aviation sector in Türkiye. The data obtained through the survey method were analyzed using structural equation modeling with the Smart-PLS 4.1.1 program. The findings indicate that digital leadership has a direct positive effect on open innovation capability and that occupational stress plays a partial mediating role in this relationship. These findings indicate that digital transformation processes should focus not only on technology but also on human resource strategies. The study presents a unique conceptual framework within the triangle of digital leadership, open innovation, and occupational stress, highlighting the impact of leadership on innovative and psychological outcomes in high-risk sectors such as aviation.

1. Introduction

The influence of digital technologies on the business world has significantly redefined the competitive landscape for organizations. This transformation has had a profound impact not only on technical infrastructure but also on leadership practices, organizational behavior, and innovation capacity. In today's rapidly digitizing world, the qualities required of leaders have changed, bringing the concept of digital leadership to the forefront (Borah et al., 2022). Digital leadership is defined as a multidimensional leadership style that encompasses not only the use of technological tools but also the strategic management of digital transformation processes, the development of agile decision-making skills, and the support of an organizational learning culture (Zeike et al., 2019). Another dimension of this transformation process is open innovation capability.

The open innovation approach, which extends beyond traditional R&D boundaries, aims to enhance the innovation capacity of organizations by systematically incorporating external knowledge sources. The literature frequently emphasizes that digital leadership serves as a strategic catalyst in the development of open innovation, playing a decisive role in many processes ranging from the integration of digital infrastructures to the management of cultural transformation (Sagbas et al., 2023; Turan-Torun et al., 2025). However, digital transformation and innovation processes are shaped not only by structural factors but also by individual and psychosocial factors. At this point, occupational stress, an inevitable element of organizational life, emerges as a critical variable. Especially in sectors where the pressure for change is intense, the level of stress experienced by employees can directly affect their innovative behavior and level of participation in transformation (Vasantha & Santhi, 2020). Stress can weaken creative and collaborative processes such as open innovation by depleting employees' cognitive resources and causing them to avoid taking risks. In this context, it has been suggested that occupational stress may play a mediating role in the relationship between digital leadership and open innovation capability.

These interactions are even more pronounced in highly regulated, technology-intensive, and stressful work environments such as aviation. Indeed, according to data from the International Civil Aviation Organization (ICAO), digitalization investments in the global aviation sector increased by more than 20% in 2023 (ICAO, 2024). However, the psychological effects of these technological investments on employees and their reflections on innovation processes are still poorly understood. This situation creates an important gap in the literature regarding the understanding of the relationship between digital leadership, occupational stress, and open

innovation capability, necessitating an examination of this relationship at both theoretical and empirical levels.

Based on this, the main objective of this study is to examine the effect of digital leadership on open innovation capability from the perspective of the aviation sector and to analyze the mediating role of occupational stress in this effect. The findings aim not only to contribute to the literature but also to provide practitioners with important insights into how leadership strategies, employee well-being, and organizational innovation capacity can be optimized in digital transformation processes.

2. Conceptual Framework

2.1. Digital Leadership

Digital transformation has become one of the fundamental dynamics of today's business world. However, this ongoing process requires organizations to fundamentally change their management approaches, business models, and leadership approaches. In particular, rapid advances in digital technologies are significantly affecting leaders' decision-making processes, management styles, and ability to adapt to change (Topcuoglu et al., 2023). These developments have brought the concept of digital leadership to the forefront, which differs from traditional leadership approaches. Digital leadership is a type of leadership that goes beyond the mere ability to use technology and involves the effective use of digital tools and methods in line with strategic objectives. While the opportunities provided by digital technologies facilitate the management of complex and dynamic processes, the mere existence of technology is not sufficient for organizational success. For success, leaders must be able to effectively use digital tools and technologies to achieve organizational goals (Zeike et al., 2019). Therefore, digital leadership encompasses the competencies of managing digital transformation processes, making data-driven strategic decisions, keeping up with technological innovations, and creating flexible organizational structures (Oktaysoy et al., 2022).

Various definitions of digital leadership can be found in the literature. Sağbaş and Erdoğan (2022) defines a digital leader as "a leader who anticipates, directs, and effectively uses digital platforms to achieve the organization's goals." Similarly, Borah et al. (2022) characterize digital leadership as a leadership approach that effectively utilizes digital tools in leadership tasks, while Zhu et al. (2022) explains digital leadership as a synthesis of various leadership approaches, including ideas, creativity, vision, curiosity, and wisdom. Considering these definitions, it is evident that digital leadership focuses on the ability to effectively integrate technology into organizational processes (Ly, 2024). Accordingly, digital leaders are considered to be individuals who possess the ability to coordinate employees' activities on digital platforms, manage strategic decision-making processes through digital data and platforms, and produce quick solutions to problems, thereby effectively utilizing digital technologies (Sagbas et al., 2023).

In this context, digital leadership stands out as a multidimensional leadership approach that is not limited to technical competence but also combines organizational vision with digital capabilities. Digital leaders are expected to not only use existing technologies but also position them in a way that increases the organization's capacity for innovation. Indeed, digital leadership plays a critical role in the processes of spreading digital culture within the organization, developing digital literacy, and aligning digital strategies with corporate goals (Ordu & Nayır, 2021). In this context, the abilities of digital leaders to pioneer change, overcome resistance to digital change, and encourage employees to actively participate in the digital transformation process have become a strategic necessity for contemporary organizational structures (Turan-Torun et al., 2025). Therefore, it should be emphasized that digital leadership is not merely a technology-focused concept but a holistic leadership paradigm that redefines people, strategy, and culture around digitalization.

2.2. Open Innovation Capability

Rapidly changing competitive conditions and increasing external information flow in recent years have caused a significant paradigm shift in companies' innovation strategies. Within the framework of this transformation, the concept of "open innovation capability," one of the key factors determining the applicability of the open innovation approach, has come to the fore. Open innovation capability refers to an organization's capacity to identify and access external knowledge sources and transform this knowledge into innovative outputs (Lazarenko et al., 2019). At the core of this capability lies the view that the limitations of traditional "closed innovation" models must be overcome and that innovation processes must be enriched with knowledge sources beyond organizational boundaries (Bogers et al., 2019). Especially in knowledge-based sectors, the strategic value of external collaborations has increased; firms' innovation performance has become dependent not only on internal resources but also on the quality of interactions established with external resources (Topçuoğlu et al., 2023).

Open innovation capability is defined as a multi-layered capacity consisting of a combination of factors such as strategic governance at the organizational level, cultural openness, knowledge management systems, and sustainable relationships with external stakeholders (Tsai et al., 2022). The dynamic capabilities framework stands out as the fundamental theoretical basis for the development of this capacity. This model, based on Teece's proposed steps of "sensing, capturing, and transforming," emphasizes organizations' abilities to recognize opportunities, strategically structure them, and reallocate their resources (Habicht et al., 2012). At the individual level, individuals' knowledge absorption capacity plays a critical role among the determinants of open innovation capability. Employees' prior knowledge, levels of interaction with external networks, and cognitive flexibility are among the key factors influencing access to external knowledge and its functional application (Hadi & Ali, 2025). Additionally, a linear relationship has been observed between employees' attitudes toward open innovation, their self-efficacy beliefs, and the level of internal support within the organization, and this capacity (Cepeda & Arias-Pérez, 2018).

Strong empirical evidence has been obtained indicating that external and internal factors affecting open innovation capabilities must be evaluated together. At the macro level, legal regulations, sectoral collaborations, and the rate of digitalization, and at the micro level, corporate knowledge infrastructure, governance structure, and organizational culture have been identified as determinants (Shi & Zhang, 2018). In particular, it has been found that cultural environments that are open to information sharing increase the speed and effectiveness of innovation processes. The contribution of open innovation capability to innovation performance has also been supported by quantitative data in various studies. It is known that binding, knowledge-absorbing, and creative capacities have direct and meaningful effects on innovation outputs (Cui & Song, 2022). On the other

hand, it has been determined that the effect of desorptive (external knowledge sharing) capacity is limited.

In light of all these findings, it is concluded that open innovation capability plays a central role in the processes of organizations gaining competitive advantage at both the theoretical and practical levels. In this context, organizations need to address their information access strategies not only through technology investments but also through human resources, cultural transformation, and strategic network management in a holistic manner (Han et al., 2020). Open innovation capability should not be viewed solely as a technology management issue; it should be positioned as a transformative capacity that requires strategic awareness, organizational learning, and organizational flexibility.

2.3. Occupational Stress

With the increasing demands of modern working life, rising levels of uncertainty, and accelerating technological change, occupational stress has become an inevitable part of organizational life. Conceptually, occupational stress is defined as a psychological tension that arises when the demands of the work environment exceed an individual's cognitive, emotional, or physical resources (Hart & Cooper, 2002). Within this framework, stress is recognized as a multidimensional phenomenon that exists not only at the individual level but also at the organizational level. Three main models stand out in the theoretical explanation of occupational stress. The first is the cognitive appraisal model developed by Lazarus and Folkman. According to this model, stress arises when an individual perceives environmental demands as threats and believes they cannot cope with these threats (Finkel et al., 2025). The second approach is the job demands-control model (Karasek, 1979), which explains the level of stress through the interaction between the structural demands of the job and the individual's decision-making autonomy. Thirdly, the effort-reward imbalance model (Siegrist, 1996) suggests that stress arises when there is an imbalance between the effort an individual expends on their work and the rewards they receive (Jovanović et al., 2006).

The causes of occupational stress have a multi-layered structure consisting of individual, work-related, and organizational factors. Task ambiguity, excessive workload, role conflicts, time pressure, and lack of organizational support are among the main triggers of stress (Yelkencıoglu & Yuksel, 2022). Additionally, structural elements such as toxic leadership behaviors, lack of organizational justice, and exclusion from decision-making processes are also identified as dynamics that increase psychological strain (Kaygin et al., 2023).

The effects of occupational stress on individuals are observed at physiological, cognitive, and behavioral levels. Chronic stress has been found to cause physiological disorders such as hypertension, cardiovascular diseases, and immune system weakness (Chen, 2023). At the psychological level, anxiety, depression, burnout syndrome, and concentration disorders are commonly reported. Behavioral effects include absenteeism, poor performance, withdrawal, and increased alcohol and substance use (Yavan & Pekkaya, 2017). At the organizational level, occupational stress leads to increased employee turnover, absenteeism, and low motivation, negatively affecting both productivity and employee loyalty (Thakre & Barua, 2015). Studies conducted in the service sector, in particular, have indicated that high stress levels directly affect customer satisfaction and service quality. In this context, it is necessary to develop multifaceted intervention strategies at the individual and organizational levels to effectively manage occupational stress. Among individual interventions, stress management training, mindfulness exercises, physical exercise, and psychological counseling stand out. At the organizational level, it is necessary to clarify job descriptions, adopt a participatory management approach, transform leadership styles, and structure the organizational culture in a supportive manner (Kinnunen-Amoroso & Liira, 2013). Indeed, it has become an inevitable necessity for managers and policymakers to adopt a holistic approach that systematically analyzes the origins of stress and to develop strategies aimed at enhancing both individual awareness and organizational resilience.

3. Interrelationships and Hypotheses

3.1. The Impact of Digital Leadership on Occupational Stress

The relationship between digital leadership and occupational stress is a prominent topic in the field of organizational behavior in today's world, where digital transformation increases psychosocial pressures on employees. Digital leadership is not merely the strategic use of digital technologies, but also the ability to guide employees, provide emotional support, and create a psychologically safe environment as they navigate the changes, uncertainties, and intense demands brought about by digitalization (Bregenzer & Jimenez, 2021). In this context, digital leadership has become a critical factor in regulating employees' stress perceptions. Theoretically, this relationship can be explained within the Job Demands-Control Model. The decision autonomy, access to resources, and meaningful communication environment provided by digital leaders to employees facilitate the perception of environmental demands as opportunities for development rather than threats, thereby reducing stress levels (Ertiö et al., 2024).

Empirical research supports this theoretical foundation. Ramakrishnan et al. (2024) demonstrated in their study conducted in the Malaysian public sector that digital leadership, together with organizational intelligence, reduces employee stress and has an indirect effect on digital service quality. Newton and Bish (2013) found that leaders who provide both near and far vision significantly reduce employees' stress levels. In a study conducted by Tran (2024) at private universities in Vietnam, it was found that relationship-focused leadership approaches balance stress responses arising from workloads and role conflicts. Similarly, a study conducted by Malik et al. (2025) determined that when leadership support was insufficient in digital work environments, employees' stress levels increased, negatively affecting their mental health and job performance. Based on the aforementioned theoretical and empirical framework, the first hypothesis of the study, H_1, was developed.

H_1: *Digital leadership has a significant negative effect on occupational stress.*

3.2. The Effect of Occupational Stress on Open Innovation Capability

Open innovation capability refers to an organization's capacity to generate innovation by interacting with external knowledge sources, and employees' contributions play a critical role in this process. However, organizational efforts to promote innovation also bring about stressors such as increased workload, time pressure, uncertainty, and decision complexity for employees (Yordam Dağıstan et al., 2024). This situation highlights the impact of occupational stress on open innovation capacity, functioning both as a potential barrier and a trigger under certain conditions (Haque &

Yamoah, 2021). Theoretically, this relationship can be explained by the Yerkes-Dodson Law. According to this approach, moderate levels of occupational stress may support creative thinking and innovative behavior by increasing cognitive arousal. In contrast, high levels of stress may weaken individual motivation and cognitive capacity, thereby acting as a barrier to innovation (Luis et al., 2020).

Empirical studies also support these theoretical assumptions. Luis et al. (2020) found an inverse U-shaped relationship between occupational stress and individual innovative behavior, indicating that both low and high stress levels negatively affect innovation, while moderate stress levels increase innovative behavior. Similarly, a study conducted among healthcare workers by Bunce and West (1994) suggested that employees developed innovative solutions as a method of coping with occupational stress, and that these strategies were effective. Haq et al. (2024) found, in their study on immigrants, that occupational stress has a significant impact on innovative entrepreneurship and innovative work behavior, suggesting that gender is a crucial variable in this relationship. Furthermore, Xu et al. (2024) found that challenging stressors positively affect an organization's innovation capacity through individual innovative behavior. Based on the theoretical and empirical framework above, the second hypothesis, H_2, was developed.

H_2: *Occupational stress has a significant effect on open innovation capability.*

3.3. The Impact of Digital Leadership on Open Innovation Capability

In the era of digital transformation, organizations must gain a competitive edge, adapt to technological advancements, and effectively leverage external information sources. In this context, the concepts of digital leadership and open innovation capability are considered two fundamental structures that have emerged as key frameworks in both strategic management and innovation literature. Digital leadership is defined as a type of leadership that views technology not merely as a tool, but rather as an integral part of integrating digital strategies with visionary leadership approaches (Wang et al., 2024). Open innovation capability, on the other hand, refers to an organization's capacity to produce innovative outputs by combining internal and external knowledge resources. There is a strong interaction between these two concepts, particularly in terms of knowledge sharing and innovation capacity. The relationship between these two concepts can be explained theoretically within the framework of the Resource-Based View and the Knowledge-Based View. The technology vision demonstrated by digital leaders, policies that encourage digital competencies, and an organizational climate that supports information sharing directly influence employees' innovative behaviors and facilitate the internalization of information obtained from external sources. In this context, digital leadership is both a prerequisite and a facilitator of open innovation (Nagano, 2020).

Empirical research also supports this theoretical framework. A study conducted by Fatima et al. (2021) demonstrated that the impact of digital leadership on open innovation is achieved through knowledge sharing and innovation capability. In a study conducted in the telecommunications and information technology sectors, it was emphasized that knowledge sharing supports open innovation by increasing internal interactions within organizations, and that digital leaders play a decisive role in the effectiveness of this process. Similarly, Benitez et al. (2022) examined the effects of digital leadership on innovation performance through platform digitalization capability. They found that digital leadership increases innovation performance by strengthening the digital platform infrastructure. Again, Majumdarr et al. (2024) found that digital transformational leadership has a significant effect on innovation capacity. Based on the theoretical and empirical framework above, the third hypothesis of the study, H_3, was developed.

H_3: *Digital leadership has a positive and significant effect on open innovation capability.*

3.4. The Mediating Role of Occupational Stress in the Impact of Digital Leadership on Open Innovation Capability

Digital leadership is a leadership style that not only strategically guides organizations' digital transformation processes but also encourages employees to think innovatively. This leadership style enhances open innovation capability by promoting information sharing, the effective use of digital technologies, and cultivating an organizational climate that supports innovation (Fatima et al., 2021). However, it is anticipated that this positive effect may be hindered by psychological processes experienced at the employee level. In particular, there is evidence that occupational stress may reduce innovative participation by suppressing employees' creative potential (Ramakrishnan et al., 2024). Within this framework, the fourth hypothesis of the study, H_4, was formulated based on the assumption that the effect of digital leadership on open innovation capability may vary depending on the level of occupational stress and that stress may play a mediating role in this relationship.

H_4: *Occupational stress plays a mediating role in the effect of digital leadership on open innovation capability.*

The research model, which presents the hypotheses developed within the scope of the research, is shown in Figure 1 below.

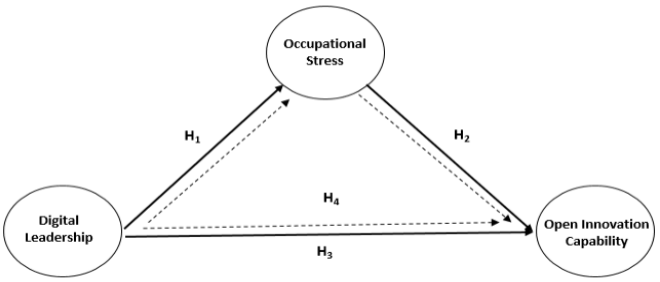

Figure 1. Research Model

4. Method

In this study, a quantitative research design was adopted to test the mediating role of occupational stress in the effect of digital leadership on open innovation capability. The research model includes digital leadership as the independent variable, open innovation capability as the dependent variable, and occupational stress as the mediating variable. The study population consists of employees working in the aviation sector. The sample was determined using convenience sampling, and data were collected from a total of 407 employees. According to the formula developed by Cochran (1977) for determining the sample size, the number of participants is considered sufficient as it exceeds 384. To document the scientific and ethical principles of the study, approval was obtained from the Giresun University Social Sciences Ethics Committee on May 28, 2025, with the

reference number 06/336. The data were collected digitally between June 02, 2025, and June 10, 2025.

To measure digital leadership perception in the study, a scale consisting of a single dimension and six questions, developed by Zeike et al. (2019) and adapted into Turkish by Oktaysoy et al. (2022), was used. The internal consistency coefficient of the scale was determined as Cronbach's alpha, with a value of 0.870, in the study conducted by Oktaysoy et al. (2022), indicating statistical reliability.

To measure the occupational stress levels of employees, the scale developed by Marcatto et al. (2023) was first translated into Turkish by the authors, followed by a meaning verification, and then translated back into English to adapt the Occupational Stress Scale. This scale, which measures individuals' subjective assessments of their stress levels in the workplace, has a single-dimensional structure and consists of 4 statements. In the study conducted by Marcatto et al. (2023), the Cronbach's Alpha value of the scale in question was determined to be 0.820.

To measure open innovation capability, the scale developed by Yao et al. (2020) was first translated into Turkish by the authors, who performed checks, and then translated back into English to adapt the Open Innovation Capability Scale. The adapted scale consists of a single dimension and four statements. In the data collection process, a 5-point Likert-type scale format was used for all three scales, with 1 = "Strongly Disagree" and 5 = "Strongly Agree."

This study, based on quantitative research methods, analyzed the direct effects between the variables in the research model and the mediating role of occupational stress using Structural Equation Modeling (SEM) with the Smart-PLS 4.1.1 software. Smart-PLS is a frequently preferred analysis tool in social sciences due to its ability to accommodate both predictive and explanatory models, simultaneously evaluate the multiple dependent relationships of latent variables, and work with small samples (Ringle et al., 2014). The structures predicted in the model were tested comprehensively, taking into account both the measurement model and the structural model components. All findings obtained from the tests are presented under the "Results" heading.

5. Results

The study reached 407 participants, and general information about the participants is presented in Table 1 below.

Table 1. Demographic findings regarding participants.

Demographic	Items	n	%
Gender	Female	183	45.00
	Male	224	55.00
Marital Status	Married	219	53.80
	Single	188	46.20
Age	18-20 years old	14	3.50
	21-30 years old	77	18.90
	31-40 years old	243	59.70
	41-50 years old	73	17.90
Educational Status	High school	28	6.90
	Associate degree	109	26.80
	Bachelor's degree	206	50.60
	Postgraduate	64	15.70
Income	50.000-70.000 TL	30	7.40
	70.001-90.000 TL	178	43.70
	90.001-110.000 TL	74	18.20
	110.001-130.000 TL	67	16.50
	130.001 TL and above	58	14.20

When evaluating the demographic profile of aviation sector employees participating in the study, as presented in Table 1, it can be observed that the sample exhibits a balanced and representative distribution across gender, age, education, and income levels. 55% of the participants are male and 45% are female, which is consistent with gender representation in the sector. The age distribution, with the 31–40 age group standing out (59.7%), indicates that the sample consists mainly of experienced and highly productive individuals. Data on educational attainment reveal that a significant portion of the participants (66.3%) have a bachelor's or postgraduate degree, which is consistent with the sector's high knowledge and skill requirements. In terms of income level, the majority of participants belong to the middle and upper income groups (72.4%), providing insight into the economic stability and employee well-being within the sector. The demographic structure obtained is considered an appropriate sample for effectively testing the variables examined in the study, such as digital leadership, occupational stress, and open innovation.

Reliability and validity analyses were conducted to determine Cronbach's Alpha, Composite Reliability (CR), and Average Variance Extracted (AVE) values, testing the structural validity and internal consistency of the scales used in the study. The results are presented in Table 2 below. Additionally, the criterion that each scale item's factor loading should be above 0.50 (Uygungil-Erdogan et al., 2025) was also considered, and these data are presented in Table 2.

Table 2. Validity and reliability analysis.

Items	Factor Loading	Mean	Standard Deviation	Kurtosis	Skewness	VIF
Digital Leadership Scale						
Cronbach's Alpha= 0.873, rho_A=0.881, CR=0.906, AVE=0.618						
DL1	0.646	4.025	0.895	1.394	-1.143	1.407
DL2	0.823	3.622	0.908	-0.616	-0.424	2.266
DL3	0.810	3.838	0.860	0.476	-0.773	2.030
DL4	0.703	3.280	1.045	-1.324	0.030	1.815
DL5	0.840	3.649	0.915	0.150	-0.812	2.579
DL6	0.871	3.572	0.953	-0.298	-0.456	2.780
Occupational Stress Scale						
Cronbach's Alpha= 0.910, rho_A=0.915, CR=0.937, AVE=0.788						
OS1	0.893	3.708	1.068	-0.664	-0.514	3.423
OS2	0.884	3.754	1.110	-0.583	-0.628	3.223
OS3	0.824	3.963	1.004	-0.071	-0.876	1.976
OS4	0.947	3.823	1.065	-0.569	-0.648	5.318
Open Innovation Capability Scale						
Cronbach's Alpha= 0.886, rho_A=0.899, CR=0.921, AVE=0.745						
OIC1	0.808	4.302	0.586	-0.596	-0.184	1.941
OIC2	0.893	4.150	0.661	-0.133	-0.327	2.561
OIC3	0.882	4.170	0.645	-0.659	-0.175	2.537
OIC4	0.868	4.130	0.665	-0.760	-0.153	2.384

As shown in Table 2, the analysis results indicate that the Cronbach's Alpha value for the digital leadership scale is 0.873, the composite reliability (CR) value is 0.906, and the average variance extracted (AVE) value is 0.618. The factor loadings of the items in this scale range from 0.646 to 0.871, with all items exceeding the acceptable threshold of 0.5. The results obtained indicate that the Digital Leadership Scale has a high level of internal consistency and structural validity. Similarly, for the occupational stress scale, Cronbach's Alpha value was found to be 0.910, CR value 0.937, and AVE value 0.788. The factor loadings of the items in the scale range from 0.824 to 0.947, indicating high structural validity. These values suggest that the occupational stress scale exhibits strong internal consistency. Finally, the Cronbach's Alpha value calculated for the open innovation capability scale is 0.886, the composite reliability (CR) value is 0.921, and the average variance extracted (AVE) value is 0.745. The factor loadings of the items in the scale range from 0.808 to 0.893, indicating that the scale has a very high measurement capacity.

In addition to these values, when the VIF values of the scales are examined, it is seen that the VIF value does not exceed 10 for any item. This finding indicates that there is no multicollinearity problem in the model (Hair et al., 2017). Furthermore, the skewness and kurtosis values of the scales were found to be within the range of -1.96 to +1.96 for all items. This indicates that the data are normally distributed (Yazıcıoğlu & Erdoğan, 2014).

The validity, reliability, and standard method bias analyses conducted within the scope of the research demonstrate that the scales used are scientifically adequate as measurement tools. However, it is necessary to examine the discriminant validity separately to assess whether these structures are significantly different from each other (Hair et al., 2017). Discriminant validity is considered a crucial criterion that evaluates the degree to which a construct exhibits a high correlation with its indicators while differing significantly from other constructs (Sarstedt et al., 2022). In this context, the Fornell-Larcker criterion (Fornell & Larcker, 1981) and the Heterotrait-Monotrait ratio (HTMT), considered the most widely used analyses of discriminant validity in the relevant literature, were employed in this study. The findings of the analysis are presented in Table 3 below.

Table 3. Discriminant validity values.

Fornell-Larcker Criterion and HTMT			
	1	2	3
Digital Leadership	0.786	0.489*	0.330*
Occupational Stress	-0.442	0.888	0.349*
Open Innovation Capability	0.299	-0.317	0.863

*HTMT

Divergence validity analyses were conducted to test whether the conceptual differences between the structures examined in the study were statistically distinct. In this regard, the Fornell-Larcker criterion was first discussed, and the root mean square error (RMSE) values of each construct were found to be higher than their correlation coefficients with the other constructs (Digital Leadership = 0.786, Occupational Stress = 0.888, Open Innovation Capability = 0.863). This finding indicates that each construct represents a unique conceptual structure (Fornell & Larcker, 1981). However, according to the Heterotrait-Monotrait ratio (HTMT) analysis, the HTMT values between digital leadership and occupational stress (0.489), digital leadership and open innovation capability (0.330), and occupational stress and open innovation capability (0.349) are below the generally accepted threshold value of 0.90 (Henseler et al., 2015). These values support the existence of strong conceptual differentiation among the structures used in the study. Therefore, the findings obtained from the analyses reveal that the measurement model has sufficient discrimination validity and that there is no overlap between the structures. In this regard, it can be stated that the model provides an appropriate theoretical basis for structural analysis.

In structural equation modeling, model fit indices are used to assess whether the theoretical structure established aligns with empirical data at a holistic level. In this context, indicators such as SRMR, d_ULS, d_G, χ^2, and NFI play a critical role in testing whether the model is valid not only in terms of linear relationships but also in terms of structural

integrity. Accordingly, an SRMR value below 0.08 indicates that the model contains a reasonable level of error related to residuals and exhibits good fit. In contrast, an NFI value of 0.90 or higher indicates that the estimated model has high explanatory power compared to the null model. These statistical indicators demonstrate that the model's structure, grounded in theoretical foundations, is also statistically supported (Byrne, 2016).

Table 4. Model fit goodness values.

	Model Fit	
	Saturated Model	**Estimated Model**
SRMR	0.059	0.059
d_ULS	0.361	0.361
d_G	0.141	0.141
Chi-Square	344.714	344.714
NFI	0.904	0.904

To assess the overall fit of the model, basic fit indices, including SRMR, d_ULS, d_G, χ^2, and NFI, were considered. According to the data presented in Table 4, the SRMR value was calculated as 0.059 for both the saturated and estimated models, indicating that the model exhibits good fit, as this value is below the 0.08 threshold (Hensler et al., 2014). Similarly, the d_ULS (0.361) and d_G (0.141) values indicate that the difference between the estimated model and the observed data is minimal. Additionally, the NFI value, which represents the explanatory power of the model, is 0.904, indicating a good model fit (NFI > 0.90). When all these indicators are evaluated together, it is concluded that the established structural model is consistent with empirical data and possesses a valid structure in terms of structural equation modeling.

To statistically validate the research model, a bootstrapping method with 5,000 samples was applied using Smart-PLS software. In this method, the sample, initially consisting of 407 participants, was expanded through random resampling, aiming to increase the reliability of the model's parameter estimates. Bootstrapping enables the accurate calculation of standard errors, confidence intervals, and statistical significance levels, particularly for path coefficients, and plays a crucial role in evaluating the robustness of the model's hypothesis structure (Hair et al., 2017). Within the scope of this analysis, the significance levels of the relationships predicted in the model were interpreted based on beta (β) coefficients, p-values, and t-statistics. Thus, both the direction and strength of the structural paths were determined, and the model's general validity was empirically tested.

The structural model diagram created for the research is shown in Figure 2.

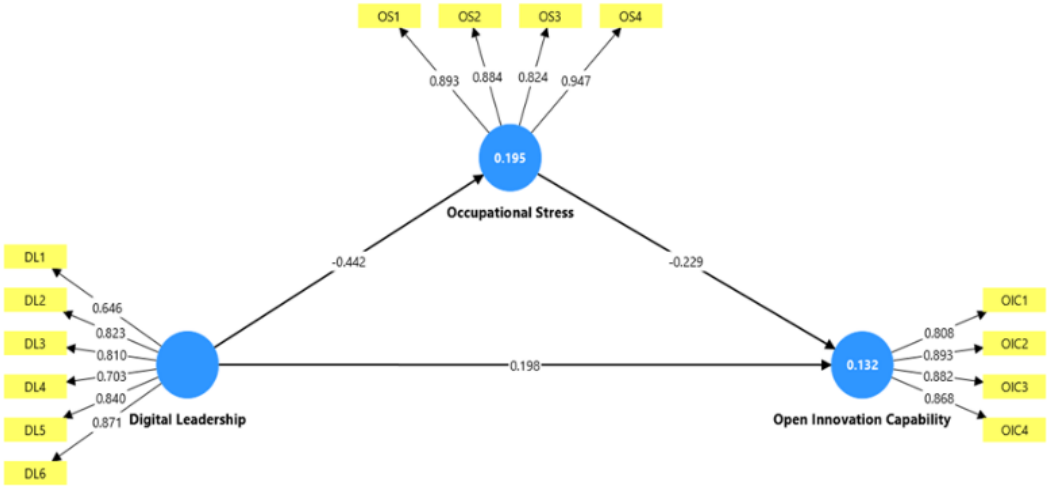

Figure 2. Structural model path diagram.

As a result of the structural model analysis, it was determined that all hypotheses tested within the scope of the research were statistically significant and supported in this direction. The direction and strength of the relationships predicted in the model were evaluated through path coefficients (β), p-values, and t-statistics, demonstrating that each hypothesis is consistent with the empirical data. Detailed findings regarding the hypothesis tests are presented in Table 5 below.

Table 5. Hypothesis test results.

Path	ß	Standard Deviation	t-Value	p	Hypothesis	f2-VAF
H_1	-0.442	0.039	11.193	0.000	Accept	0.242
H_2	-0.229	0.054	4.264	0.000	Accept	0.049
H_3	0.198	0.048	4.100	0.000	Accept	0.036
H_4	0.101	0.027	3.732	0.000	Accept Partial	VAF: %34

When examining the structural model path coefficients presented in Table 5, it is observed that digital leadership has a significant and negative effect on occupational stress (β = -0.442, t = 11.193, p < 0.001), which supports the H_1 hypothesis. Similarly, the effect of occupational stress on open innovation capability was also found to be negative and significant (β = -0.229, t = 4.264, p < 0.001); this result supports the acceptance of H_2. Furthermore, the direct effect of digital leadership on open innovation capability is statistically significant (β = 0.198, t = 4.100, p < 0.001), confirming H_3. However, the research data also revealed that occupational stress plays a mediating role in the effect of digital leadership on open innovation capability. The indirect effect coefficient calculated in the analysis of the mediating effect (β = 0.101, t = 3.732, p < 0.001) was found to be statistically significant, supporting the H_4 hypothesis. Additionally, the level of the existing mediating effect was determined through a VAF (Variance Accounted For) calculation (%0-%20 no mediation, %20-%80 partial

mediation, %80-%100 complete mediation). The calculated VAF value was found to be 33.8%, indicating that the mediation effect is at a partial (partial mediation) level (Hair et al., 2017). These findings reveal that digital leadership has a significant impact on open innovation capability, both directly and indirectly through occupational stress.

6. Conclusion and Discussion

This study analyzed the impact of digital leadership on open innovation capability, examined the mediating role of occupational stress in this impact, and evaluated all these relationships within the context of the aviation sector. The aviation sector is an area that creates intense stress on employees due to its complex technological systems, strict regulatory structure, and constant high-performance expectations, and requires a balance between innovation and operational safety. In this context, it is evident that strategic managerial skills such as digital leadership are critical not only for technological transformation but also for the psychological well-being of employees and the sustainability of organizational innovation capacity.

Hypothesis H_1, tested in the study, revealed that digital leadership has a significant and negative effect on occupational stress. This finding suggests that digital leaders can mitigate employee stress levels by fostering open communication, developing technological support skills, and cultivating trust-based relationships. This is particularly important in sectors such as aviation, where stress has a direct impact on decision quality, highlighting the importance of the people-oriented aspect of leadership.

The second hypothesis (H_2) of the study examined the effect of occupational stress on open innovation capability, concluding that stress has a significant negative impact on this capability. This finding indicates that the stress experienced by employees limits their participation in innovation processes, particularly in terms of openness to external information, creative thinking, and collaboration. Open innovation is not only related to technological infrastructure but also psychological trust, cognitive flexibility, and social interaction capacity (Vanni et al., 2024). However, occupational stress can create a barrier that prevents participation in innovative processes by directing the individual's attention toward internal anxieties (Vasantha & Santhi, 2020). This effect is even more pronounced in sectors such as aviation, where stress is experienced as a structural element (Rich, 2016). Psychologically supportive leadership approaches are needed to enable individuals working in environments with low error tolerance and high regulatory pressure to take an active role in innovation processes. In this context, digital leaders' stress-reducing practices are of strategic importance not only for employee well-being but also for the sustainability of organizational innovation.

Within the context of the third hypothesis (H_3) of the study, the effect of digital leadership on open innovation capability was examined, and it was found to be statistically positive and significant. This finding shows that digital leadership is not only a leadership style that directs technological transformation, but also a strategic management tool that supports open innovation. Digital leaders ensure the effective use of information technologies while also creating a culture that facilitates access to external information sources, collaborative learning processes, and multi-actor collaborations (Benitez et al., 2022; Fatima et al., 2021). This relationship is of particular strategic importance in the aviation sector. Structurally, the aviation sector is characterized by high safety standards, the need for continuous technological innovation, and intense competitive conditions. In this context, aviation companies must develop their innovation capacities not only through internal resources but also through external knowledge networks and collaborations. Digital leadership comes into play precisely at this point, facilitating both the integration of digital infrastructure and the establishment of sustainable, innovative relationships with external stakeholders. Therefore, the positive impact of digital leadership on open innovation capabilities serves as a strategic lever for sustaining innovation in high-tech sectors, such as the aviation industry. The ability of digital leaders to both identify technological opportunities and integrate them into organizational culture plays a key role in the success of external innovation processes.

The fourth and final hypothesis (H_4) of the study tested whether occupational stress plays a mediating role in the relationship between digital leadership and open innovation capability. The findings reveal that occupational stress exhibits a partial mediating effect in this relationship. In other words, digital leadership directly enhances open innovation capability, but this effect is shaped by the level of occupational stress experienced by employees. Digital leaders' use of practices such as open communication, empathetic governance, and digital infrastructure support helps reduce stress, enabling employees to participate more effectively and creatively in innovative processes (Ramakrishnan et al., 2024). This demonstrates that digital leadership is not merely a form of governance but also a psychosocial support mechanism that transforms the employee experience. The high risk, perfectionism, multi-actor, and variable environment inherent in the aviation sector are significant factors that contribute to increased occupational stress. This stress level has the potential to disrupt innovation processes based on collaboration with external knowledge sources, such as open innovation. Therefore, digital leaders must manage this stress load in a balanced manner, not only for the sake of employee health but also to maintain the organization's innovative capacity. In this context, the partial mediating effect revealed by the study suggests that employees' emotional and cognitive loads must be considered for digital leadership practices to be effective. The success of open innovation is closely related not only to technological infrastructure or strategic orientation but also to the psychological resilience of the individuals implementing these processes (Haque & Yamoah, 2021). Especially in fields such as aviation, which require intensive information and attention, the stress-reducing role of leaders has become a decisive factor in the sustainability of innovation.

Overall, this study contributes to the literature by examining the multidimensional relationships between digital leadership, occupational stress, and open innovation capability through a comprehensive model, while also providing valuable insights into the applicability of these concepts in the specific aviation sector context. The results indicate that digital leadership practices should not be limited to technological infrastructure and strategic orientation. Still, they should also be combined with a human-centered approach that prioritizes employee well-being. In particular, the sustainability of innovation in high-risk and high-demand environments is directly related to the stress-regulating role of leadership. In this respect, the study highlights a leadership approach that focuses on the human factor in digital transformation processes.

However, this research also has some limitations. First, the sample consists of 407 employees working in companies operating in the aviation sector in Türkiye, and the fact that the

sample has not been expanded in terms of sector and geography limits the generalizability of the findings. Furthermore, the study adopts an approach based solely on employee perceptions, and the assessments of managerial actors (leaders) are not included in the model. This may lead to a one-sided perspective, particularly in evaluating multidimensional phenomena such as leadership and innovation. Future studies are recommended to include multiple data sources (managers, customers, etc.). Similarly, applying similar models across different sectors (such as health, finance, and education) could enable cross-sectoral comparative analyses. Furthermore, integrating potential regulatory or mediating variables, such as psychological resilience, organizational support, and digital competence, into the model is crucial for filling conceptual gaps in the literature.

Ethical approval

To document the scientific and ethical principles of the study, approval was obtained from the Giresun University Social Sciences Ethics Committee on May 28, 2025, with the reference number 06/336.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

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The article was first written in Turkish by the authors and then translated into English. Grammarly Pro was used to check the English translation for language and grammar. Zotero was used to organize the references.

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