

# The Impact of Digital Transformation on Innovativeness in Airline Companies: The Role of Agility and Openness to Change

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## Abstract

This study aims to analyze the mediating role of organizational agility and the moderating role of openness to change by examining the impact of digital transformation on organizational innovativeness in airline companies. The airline industry, characterized by its dynamic nature and intense competitive conditions, necessitates continuous change and innovation. The dynamic nature of the airline industry due to intense competition, high safety standards and ever-changing technological requirements necessitates the rapid adaptation of digital transformation. In this context, understanding how digital transformation influences the innovative capacities of businesses, as well as the significance of organizational factors such as agility and openness to change in these processes, holds substantial theoretical and practical value. This research aims not only to generate theoretical insights but also to provide practitioners in the airline industry with recommendations for optimizing digital transformation processes, enhancing innovation capacities, and achieving competitive advantages. In line with the data collected from 421 airline employees through a questionnaire, it was determined that organizational agility plays a full mediating role in the relationship between digital transformation and innovation and openness to change strengthens this process. Research findings show that agile organizations benefit more from digital transformation, and firms open to change have higher innovation capacities. Accordingly, airline companies recommend strategies to increase organizational agility, encourage employees' openness to change and expand digital skills training to manage digital transformation processes effectively. Furthermore, it is emphasized that digitalization should be considered a strategic transformation in terms of operational efficiency and in the context of corporate governance, decision-making processes and customer experience.

## 1. Introduction

High costs, strong rivalry, and ever-changing market needs are challenges that the aviation industry, a significant part of the global economy, must contend with (Altuntaş & Kılıç, 2021). To address these problems and achieve long-term success, aviation companies are putting more emphasis on strategic factors like digitization (Meydan, 2023). Recent years have seen a dramatic shift in the aviation industry as a result of digitalization's rapid adoption and integration, which has improved operational efficiency, competitiveness, customer happiness, and employment (Yavaş, 2022). Turkey and Artar (2021) argue that in order to improve aviation operations, cater to passengers' demands and experiences, and boost non-aeronautical income, the aviation industry must increase its use of digital technology. Aiming to attain a more efficient and adaptable structure, aviation corporations are utilizing digital tools and enhancing their digital infrastructure in response to the rapid acceleration of technological breakthroughs. The necessity for adaptability and quick thinking has been accompanied by the benefits of

digitalization. Aviation companies must embrace digital technologies and have a framework that can swiftly adapt to new technology in order to stay ahead of the curve and create innovative solutions in the face of unpredictable global markets, external crises, and other challenges.

By automating more of their operational operations, airlines want to reduce the likelihood of human mistakes and make better use of their resources. Concurrently, technologies for optimizing customer experience that rely on data analytics, personalized apps, and AI-enabled services are proliferating. Airports are also leading the way in this change, reshaping the travel experience for passengers with innovations like contactless check-in, facial recognition technology, and self-service luggage drop-off. Travelers can enjoy faster and more convenient journeys and better security measures thanks to the digitization of touchpoints. Airline transportation is led towards a more environmentally and financially sustainable future by these advancements (Alıcı, 2023).

In the contemporary business environment, firms adopt agility as a strategic necessity due to the competitive pressure brought about by globalization, the need for fast market access,

and dynamic market conditions. Agile firms possess the capacity to proactively identify market opportunities, effectively mobilize their resources, and enhance their capacity to continuously create value through product, service, and market innovations (Sambamurthy, Bharadwaj, & Grover, 2003). A study conducted in 2022 revealed that the global digital transformation market has attained substantial economic value, with an estimated size of 588 billion dollars. Projections indicate that this market will reach \$3.4 trillion by 2026. This growth trend is supported by the fact that 74% of organizations consider digital transformation a strategic priority (Omol, 2024).

The aviation industry's digital transformation is seen as a key measure of its capacity to respond to innovation and change. Considering both internal and external variables, the industry demonstrates a structure distinct from others, and it incorporates cutting-edge digital solutions into its operations at a rapid pace. According to Meydan (2023), the aviation industry has emerged as a driving force behind digital transformation, with a heavy emphasis on digital applications. The idea of agility is also crucial during digital transformation. The ability to swiftly react to and adapt to shifting market situations is what makes agility such a valuable and vital system in contemporary management practices. One advantage of an agile management style is the speed and effectiveness with which it can adapt to changing market conditions and meet the demands of customers (Karaman, 2021). Employees' belief in the necessity and feasibility of change, as well as their willingness to go in this direction, are crucial to the effective implementation of change management procedures in organizations. The transformation of persons is generally seen as the primary means via which organizational changes can take place, even though these changes typically manifest in areas like structures, hierarchy, or technology (Çalışkan, 2022). In this light, it's fair to say that companies' abilities to adapt to new circumstances hinge on how well they can train their staff to embrace digital transformation and agility. Taking all of this into account, businesses can better adjust to changing market conditions and even acquire a competitive edge if they cultivate a change-ready workforce or hire people with these traits.

This study examines the mediating role of agility and the moderating role of openness to change in the effect of digital transformation processes on innovation in airline companies. It is known that digitalization practices provide a competitive advantage in the sector by increasing the innovation capacity of enterprises. However, the high costs of these practices may lead to differences in the speed and scope of airline companies' adaptation to digital transformation. This situation may require the development of strategies different from those of other companies, especially for airline companies following a low-cost plan. The study aims to address the effects of these differences on innovation in detail.

## 2. Theoretical Framework

### 2.1. Digital Transformation

Digitalization has grown into a major phenomenon that influences nearly every facet of modern life. By discussing the connection between technology and communication, McLuhan recognized the consequences of the fast proliferation of technology in various fields. The role of technology in the dynamics of organizations across sectors is significant. From this vantage point, it's clear that digital

transformation processes, quick innovation adaptation, and product usage are here to stay. It is anticipated that all employees will embrace this change and cultivate an adaptation process within the framework of digital culture if technology is utilized in accordance with the goals of the industry (Kırdar & Karaoğlu, 2023). Predicting the precise shape of future social structures is challenging due to the rapid growth of technology, which calls into question the ability of post-Industrial Revolutionary-era systems to handle new hazards. Changes in society are unavoidable since the technology for digital transformation tracks the trends in the digital economy with lightning speed. New ideas and technology can come into existence because of digital transformation, which is happening worldwide and is getting faster thanks to the industry 4.0 project (Türkay & Aktar, 2021).

Digital transformation denotes the processes of change and evolution within organizational cultures, enabling organizations to operate more efficiently and effectively in response to the demands of the digital era across social structures and industries. Digitalization now extends beyond cultures and organizations to cover an ecosystem that includes items and machines. This concept is defined by four fundamental elements: demands and mass customization, the significance of data and innovative business models, resource constraints and sustainability, and a focus on investment and a skilled workforce (Başar, 2023).

Part of a company's strategy for renewal should include digital transformation, a process that is always changing. Innovation and flexibility are fostered in the ever-changing digital ecosystem by combining information, communication, and networking technology. This allows for large-scale reforms in business models, collaborative approaches, and organizational culture. (Warner & Wager, 2019).

Embracing technological breakthroughs, digital transformation allows firms to acquire a competitive edge and boost productivity by completely revamping their labor processes, business models, and operational procedures. The shift from analogue to digital workflows and the incorporation of IT into every facet of a company's operations constitute this transformation. Through digital transformation, companies can create new business models, lower operating expenses, and offer clients more personalized services. In addition to boosting individual and company performance, it gives them a leg up in the market. Companies that want to make this change must be adaptable and put money into people and their education. The significance of digital technologies grows due to this change, which is linked to Industry 4.0, and it becomes essential for companies to endure in the long run (Akçay, 2024).

Since the 1990s, the airline industry has been undergoing a digital transition. An early driver of digital transformation was improving communication between airlines and their customers. In this setting, it is now feasible to access information like locations, aircraft routes, and timings through online platforms. Travelers can now make reservations and purchase tickets directly through the website. As a result of digitalization's improved communication, the aviation industry can do the following: better manage crises and disruptions; increase the number of service options and diversity; better utilize passenger support in marketing processes; facilitate integration with the external environment; boost brand value; create an efficient innovation process; increase resilience to market fluctuations; increase revenue

growth; strengthen brand image; and increase stock values. Among the significant outcomes of this process is the growth in income from supplementary services (Tamer, Şahin, & Kemik, 2024).

## 2.2. Organizational Agility

The concept of agility was first introduced in the 1990s to describe the ability of production organizations to respond quickly to changing customer demands and adapt to these changes. In the 2000s, this concept has expanded in meaning to include "the ability to anticipate and respond effectively to rapidly changing conditions" and "the ability to manage complex and interdependent relationships efficiently". Today, in an environment where the global economy is constantly changing and becoming increasingly complex, it is necessary for all organizations, including service sector organizations, government agencies and non-profit organizations, to keep their agility levels high (Bakan, Sezer, & Kara, 2017). Agility can be defined as an organization's ability to perceive, understand and anticipate changes occurring in the workplace; to respond quickly and effectively to sudden and unexpected changes; to seize environmental opportunities; and to both survive and grow in its environment (Sherehiy, 2008 as cited in Önalan, 2023, p.21).

The capacity of organizations to swiftly and effectively react to unanticipated changes in their internal and external contexts is known as organizational agility. For businesses to be considered agile, they must be able to respond rapidly and efficiently to shifting consumer preferences, technology developments, and other external factors to keep up with the competition and seize emerging market possibilities (Akkaya & Tabak, 2018). Worley and Lawler (2010) state that organizational agility is defined as the ability of an organization to outperform expectations in terms of production, to successfully navigate unexpected changes, and to adjust to variations in internal and external resources (Karamolla, 2024).

The characteristics of organizational agility have been categorized in various ways in literature. Using the taxonomy put out by Sharifi and Zhang (2001), this research examines the many facets of organizational agility. These include responding, flexibility, speed and competence. A key component in a company's survival and ability to retain its competitive advantage is its capacity to adapt to new circumstances. The fast technological advancements in the modern day mean that consumer wants and needs are ever evolving. Companies can keep their edge in the market if they can react to these changes quickly and correctly. The ability of businesses to react swiftly to signals from their surroundings is one way that responsiveness is defined by researchers (Zaheer & Zaheer, 1997). Being able to anticipate and act upon changes in one's immediate surroundings is another way of putting it (Zhang & Sharifi, 2000).

According to Shahaei (2008), as stated in Akkaya and Tabak (2018, p.188), flexibility is a key component of organizational agility. It is the ability of managers to successfully assess different processes and alternative ways to achieve goals while fostering agility within the firm. An adaptable business is one that can maintain output while cutting costs (Kundi & Sharma, 2015). Firms that can adapt to changing circumstances are better able to obtain the necessary skills (Nadkarni & Narayanan, 2007) and provide customers with a greater range of strategic options (Karamolla, 2024).

What we mean when we talk about speed is the capacity to finish operations as fast as possible. This includes things like being able to launch new products and services onto the market, making deliveries promptly, and getting things done as soon as possible (Sharifi & Zhang, 1999). An organization's speed is also determined by how quickly it can respond to market needs, adjust to changes in new goods, and schedule the transfer of products and services. Plus, it shows how long it takes to respond to outside forces (Kuleelung, 2015).

To be competent, an organization must fully use its organizational agility capabilities. Competence was described by Teece et al. (1997) as the ability to restructure organizational strategies in response to changes in the environment. The ability of an organization to support and balance the components of agility is known as organizational competence (Çörekçioğlu, 2024). One aspect of agility is competence, which indicates how well the other three aspects speed, flexibility, and responsiveness could collaborate. The capacity of organizations to adjust, update, and reorganize their current skill sets in response to shifting internal and external environmental situations is a key component of competence. According to Teece, Pisano, and Shuen (1997), organizations must not only continue their current activities but also enhance their basic capabilities and make them more dynamic to acquire a competitive advantage.

## 2.3. Organizational Innovation

Major societal shifts, the economy, and technology are currently reshaping international trade. Innovation, long-term growth, industrial competitiveness, and peak performance are essential in this setting for organizations to successfully adjust to changes (Gemici & Zehir, 2019).

The constant stream of new ideas in the digital era highlights how important it is to incorporate change and advancement into every industry. "Innovation" can indicate several things depending on context, however "change" and "development" are often used interchangeably. Sometimes, change just means going backwards rather than forwards. In this setting, the word "development" is more closely associated with innovation, but it is not a full substitute. Oğuzhan (2021) explains that development usually goes hand in hand with ideas like revision and innovation encompasses both subtle alterations and significant overhauls. The Oslo Guidelines (OECD, 2005) attempt to establish a common vocabulary in the scientific and technological fields, and innovation is defined as the introduction of a new or substantially improved product, process, marketing strategy, organizational method, or external relations, organizational structure, internal practices, or business procedures (Çağlıyan, Attar, & Külahlı, 2021).

One definition of organizational innovation is the capacity of an organization to bring new products or services to market or to establish new markets through the integration of innovative practices and procedures with strategic alignment. The idea here is the organization's ability to innovate as a whole and how well that ability meshes with long-term goals (Wang & Ahmed, 2004). Products, services, business processes, management, and marketing systems can all benefit from organizational innovation, which seeks to adopt new ideas for firms and provide more value to consumers. Business survival and competitive advantage depend heavily on new strategies, which is why researchers have long concentrated on organizational innovation. Nevertheless, research in this area tends to focus on innovation from just one angle, neglecting to



incorporate a comprehensive strategy encompassing all aspects of innovation (Onağ & Tepeci, 2016).

#### 2.4. Openness to Change

Organizations need to be nimble to keep up with the ever-changing business landscape and keep their competitive edge. Uncertainty and worries, such as the fear of failing, may arise due to this change since it impacts on the responsibilities that employees play. Some workers may resist change, while others may see it as a chance to improve and evolve. A key component for the success of organizational change is the level of openness to change among employees. Openness to change is influenced by both individual and contextual factors. Individual elements include self-esteem, perceived control, and optimism. Contextual ones include things like access to knowledge, involvement, and social support. One way to make change programs more successful is to encourage employees to be open and honest with one another (Wanberg & Banas, 2000).

The absence of a predetermined course of action, the ability for both forward and backward movement, and the absence of value judgment are all hallmarks of a change process. According to Helvacı (2015) and Çağlar (2013), there are quantitative and qualitative changes in the overall elements or their relationships as compared to the previous scenario, and this process happens as a departure from the previous situation or behavior. Managers need certain competencies to successfully oversee the change process. A good change manager can see into the future, develop alternatives, have a positive outlook, and start the change process rolling. The efficient execution of the change process also depends on self-management, prioritization, organization, authority sharing, identifying important roles and responsibilities, and time management (Demirtaş, 2012). To implement organizational change, one must forego long-established practices in favor of more creative approaches that will allow one to reach one's objectives more rapidly. The majority of organizational transformation projects fail, despite the fact that this topic has been studied extensively. Being open to change means being ready to help bring about change, having faith that change can only bring about good things, and having an inclination to adjust to new circumstances. If you want your planned change process to be successful, the authors say you need to be open to change. Put simply, when people are receptive to change, organizations have a far better probability of implementing change (Canbolat & Karagöz, 2023).

Openness to change is a notion that several scholars have approached and defined in different ways. Özdemir (2000) states that, at its most basic level, being open to change means that either an individual or an organization has a structure that can accommodate change and shows a willingness to embrace it (Kılıç & Yavuz 2021). A person who is open to change is one who welcomes and encourages organizational alterations while keeping a positive attitude toward the potential benefits of these changes. To successfully execute planned organizational changes, it is crucial to have an open mentality (Miller, Johnson & Grau, 1994). Negative attitudes towards change can be attributed to a variety of sources. Individuals face elements including the fear of change and the ambiguity around its implications, as well as the concern of losing competencies that will be required following the transition. Reasons why people fight change include sticking to old habits, being afraid of the unknown, not having the right abilities for the new environment, and worrying about being powerless (Agocs, 1997).

### 3. Literature Review and Establishment of Research Hypotheses

Digital transformation enables organizations to become more innovative and efficient by integrating digital technologies into their business processes. The literature emphasizes that digital transformation has a positive and significant effect on organizational innovation, and digital transformation triggers organizational innovation by creating changes in business models (Şahin, 2023). In addition, Kohli & Melville (2018) stated that digital technologies facilitate information sharing and increase cooperation among employees, supporting the development of innovative ideas. In addition, it has been shown that organizations that can effectively manage the digital transformation process can respond faster to changing customer demands and thus increase their capacity to develop innovative solutions.

Digital transformation increases the ability of organizations to adapt to rapidly changing environmental conditions. The literature states that digital technologies are critical in improving organizational agility. It is said that digital tools make decision-making processes more flexible by accelerating access to information, and this situation supports agility. It has shown that digitalization improves the capacity of organizations to respond quickly to changes and increases the ability to evaluate market opportunities. These findings indicate that digital transformation increases firms' chances to maintain their competitive advantage by supporting organizational agility (Özdemir, 2023).

Yılmaz, (2024) indirectly addressed the relationship between organisational agility and innovativeness and concluded that innovativeness is an important factor that shapes individuals' ability to adapt to change and their perception of agility. In the study, environmental innovativeness stands out as an important factor supporting the perception of organisational agility. In this context, it is suggested that organisations should create a culture that promotes innovation and develop strategies by analysing the emotional attitudes of individuals in change management. Över (2021) reveals that agile organisations positively impact factors such as innovation and employee motivation and that this effect strengthens both the internal processes and external reputation of organisations. Agile corporate culture offers an indispensable structure for modern organisations to survive and succeed in a volatile and complex environment.

The mediating role of organizational agility in the effect of digital transformation on organizational innovation is seen. Digital transformation enables organizations to increase innovation capacity by integrating digital technologies into their business processes. The literature states that digital transformation encourages organizational innovation by creating changes in business models and supports collaboration among employees by increasing knowledge sharing (Şahin, 2023; Kohli & Melville, 2018). In addition, digital transformation also plays a vital role in improving organizational agility, which is the ability to adapt to rapidly changing environmental conditions. In particular, it has been stated that digital technologies make decision-making processes flexible by providing fast access to information and increasing organizations' capacity to evaluate market opportunities (Özdemir, 2023).

This positive effect of digital transformation on organizational agility is combined with the direct contributions

of agility to innovation. Organizational agility is an element that strengthens individuals' ability to adapt to change and supports innovation (Yılmaz, 2024). All these findings show that the mediating role of organizational agility strengthens the effect of digital transformation on organizational innovation. Organizational agility is a critical factor contributing to achieving innovative outputs of the digital transformation process.

In this context, the first hypothesis of the research is established as follows.

H1: Organizational agility has a mediating role in the effect of digital transformation on organizational innovation.

Datta, Rajagopalan, & Zhang, (2003) examined how CEOs' openness to change affects their propensity to make strategic change in their organisations and analysed the moderating effect of industry characteristics on this relationship. According to the results, CEOs with a high level of openness to change make more incredible strategic changes in their organisations; however, this effect varies depending on their industry structure. From this point of view, it can be examined how openness to change directs the relationship between digital transformation and organisational innovation. If the organisation's openness to change is high, digital transformation is more effective and can support innovation processes. However, when openness to change is low, it is difficult for digital transformation to transform into organisational innovation, and the organisation may tend to maintain the status quo. As in the study of Datta et al., the effect of openness to change is not decisive alone; contextual factors (e.g. industry structure, competitive environment, cultural factors) also shape this process. Although the study by Datta et al. (2023) does not examine the same variables as the current study, it supports the idea that openness to change is a critical moderating variable in organisational transformation processes. While the survey reveals that the CEO's openness to change determines its impact on organisational strategy, your current hypothesis questions how it affects the relationship between digital transformation and innovation. Both studies show that openness to change is not a stand-alone effect but can enhance or limit the power of change depending on the organisational context and environmental factors.

In a study conducted by Ayar & Yıldız, (2023), the effect of organisational change cynicism on digital transformation was examined. The results show that organisational change cynicism negatively affects digital transformation. This finding implies that being open to change can positively affect digital transformation processes and support innovation. In another study, the impact of digital leadership on innovative work behaviours and organisational learning was examined. The results show that digital leadership positively affects innovative work behaviours and organisational learning. This finding suggests that leadership and openness to change are important in increasing innovation in digital transformation processes (Morgül & Ataç, 2024).

Gökcek, Erin, & Gölbaşı (2022), in a study titled "The moderating role of perceived risk in the relationship between innovativeness and satisfaction", investigated how the effect of perceived risk on consumer satisfaction is shaped by innovativeness. According to the study's main findings, although innovativeness is a factor that increases customer satisfaction, this effect is found to decrease when perceived risk is high. In other words, the level of risk perceived by the consumer in the online shopping process played a weakening role in the effect of innovativeness on customer satisfaction.

With this approach, it can be considered a factor determining the strength of the relationship between openness to change and perceived risk. An individual who is open to change may also have a high level of perceived risk. The impact of digital transformation on organisational innovation may vary depending on the level of openness to change within the organisation. Suppose employees and managers in an organisation are open to change. In that case, digital transformation processes can be adopted more quickly, innovative practices can be adapted faster, and organisational innovativeness can be strengthened. However, when openness to change is low, digital transformation processes may find it challenging to transform into organisational innovation, just as perceived risk dampens customer satisfaction. This is because employees' and management's reluctance to adopt new technologies, processes and business methods may hinder innovation.

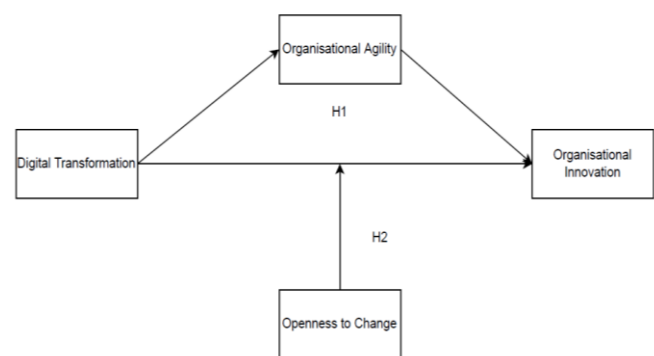
In this context, the second hypothesis of the research was established as follows.

H2: Openness to change has a moderating role in the effect of digital transformation on organisational innovativeness.

#### 4. Method and Findings

This section provides an overview of the research model, the scales used in the questionnaire, the population and sample that made up the research, the demographic findings from the data analysis, particularly the findings regarding reliability and validity, and the methodology used to develop these findings.

The theoretical model designed for the research is given in Figure 1.



**Figure 1.** Research Model

The study used the online survey technique as a data collection method. The questionnaire form was created through Google Forms and shared with the participants through professional platforms like LinkedIn. In addition, to reach the target group of the study, white-collar employees working in the airline industry, online groups and individual networks related to the sector were utilized. The questionnaires were prepared in a 5-point Likert scale format, and the participants were asked to assign a value ranging from 1 (strongly disagree) to 5 (strongly agree) to each item. In total, data were collected from 421 participants.

The study used the scale developed by Nadeem, Abedin, Cerpa, & Chew (2018) and adapted into Turkish by Sağlam (2021) to measure digital transformation levels. The scale consists of 8 items in total and evaluates the effects of digital transformation on business processes and organizational performance. A 10-item scale developed by Erdem, Gökdeniz,

& Mert (2011) was used to determine organizational innovativeness. This scale is designed to measure the capacity of organizations to adopt new ideas and technologies and their tendency to create an innovative culture. The 8-item organizational agility scale developed by Gürbüz & Hatunoğlu, (2022) was used to assess the ability of organizations to adapt to rapidly changing environmental conditions, flexibility, speed and efficiency. The 7-item scale developed by Çalışkan, (2022) was used to measure openness to change. This scale assesses individuals' attitudes towards change processes and their adaptation capacity. These scales were used as the primary data source to test the study's hypotheses and to understand the relationships between digital transformation, organizational innovation, agility and openness to change. Scale items are presented in Appendix 1. The reliability and validity of the scales have been supported

by previous studies in the literature and were re-evaluated in this study through statistical analyses. The data were analyzed using SPSS 23 and AMOS 23 software.

The research population consists of the employees of the companies operating in the airline sector in Turkey. The convenience sampling method was selected as the sampling method. The sample of the research consists of 421 aviation employees. For the research, permission was obtained with the decision of Kastamonu University Social and Human Sciences Scientific Research and Publication Ethics Board dated 07.01.2025 and numbered 1/50. Research data were collected between 15.01.2025-01.03.2025.

Findings including some demographic information of the aviation employees included in the study are presented in Table 1

**Table 1.** Demographic Findings

Gender	f	%
Female	179	42.5
Male	242	57.5
<b>Age</b>	<b>f</b>	<b>%</b>
18-25	38	9
26-35	150	35.6
36-45	138	32.8
46-55	83	19.7
56 +	12	2.9
<b>Education</b>	<b>f</b>	<b>%</b>
Secondary Education	11	2.6
Associate degree	52	12.4
License	267	63.4
Master / PhD	91	21.6
<b>Duration of Employment</b>	<b>f</b>	<b>%</b>
0-5 years	176	41.8
5-10 years	158	37.5
10+ years	87	20.7
<b>Position</b>	<b>f</b>	<b>%</b>
Flight Crew (Pilot/Aircraft Engineer)	10	2.4
Cabin Crew	131	31.1
Air Traffic and Flight Operations (Air Traffic Controller / Flight Operations Specialist - Dispatcher / Meteorological Specialist)	56	13.3
Ground Services (Passenger Services / Baggage Services / Apron Officer / Refueling Officer)	87	20.7
Maintenance and Technical Services (Aircraft Maintenance Technician / Aeronautical Engineer)	65	15.4
Air Cargo and Logistics (Air Cargo Operation Specialist / Logistics and Warehouse Management)	40	9.5
Airline Management (Manager / Coordinator / Financial and Administrative Affairs and Human Resources)	32	7.6
<b>Total</b>	<b>421</b>	<b>100</b>

Of the aviation employees participating in the study, 242 are male and 179 are female. 150 of them are between 26-35, 138 of them are between 36-45, 83 of them are between 46-55, 38 of them are between 18-25 and 12 of them are 56 and over. 267 of them have bachelor's degrees, 91 of them have master's/PhD, 52 of them have associate degrees and 11 of them have secondary education. When the working period is analyzed, 176 of them have been working in the sector for 0-5

years, 158 for 5-10 years and 87 for more than 10 years. Of the aviation employees, 131 work in Cabin Crew, 87 in Ground Services, 65 in Maintenance and Technical Services, 56 in Air Traffic and Flight Operations, 40 in Air Cargo and Logistics, 32 in Airline Management and 10 in Flight Crew.

Prior to evaluating the research hypotheses, the construct validity, convergent validity, reliability, and composite reliability of the scales included in the study were assessed. To

assess construct validity, exploratory component analyses were performed, particularly due to the adaption of foreign language measures into Turkish. The skewness and kurtosis values of the descriptive statistics were analyzed to ascertain if the scales satisfy the normal distribution criterion.

The results of exploratory factor analysis and descriptive statistics are presented in Table 2.

**Table 2.** Exploratory Factor Analysis and Descriptive Statistics Finding

Digital Transformation	Factor Load	Skewness	Kurtosis	Mean	Std. Deviation
DT1	0.785	-0.916	0.494	3.743	0.9835
DT2	0.871	-0.91	0.465	3.827	0.9884
DT3	0.805	-0.927	0.383	3.924	0.9899
DT4	0.865	-0.898	0.36	3.841	0.9956
DT5	0.813	-0.842	0.13	3.85	0.9923
DT6	0.778	-0.737	-0.272	3.774	1.0551
DT7	0.788	-0.883	0.324	3.798	1.0418
DT8	0.783	-0.834	0.136	3.789	1.0284

KMO: .939  $\chi$  Square:2164.478 df:28 sig.:.000 Tot. Variance Explained: %65.880

Organizational Agility	Factor Load	Skewness	Kurtosis	Mean	Std. Deviation
OA1	0.74	-0.612	-0.292	3.641	1.0175
OA2	0.77	-0.764	-0.059	3.881	0.9857
OA3	0.781	-0.869	0.361	3.86	0.9817
OA4	0.805	-0.77	0.121	3.834	0.9491
OA5	0.784	-0.898	0.297	3.784	1.0297
OA6	0.833	-0.759	0.208	3.846	0.9449
OA7	0.765	-0.861	0.382	3.798	0.9659
OA8	0.75	-0.79	0.318	3.734	0.9979

KMO: .913  $\chi$  Square:1813.490 df:28 sig.:.000 Tot. Variance Explained: %60.680

Organizational Innovation	Factor Load	Skewness	Kurtosis	Mean	Std. Deviation
OI1	0.776	-0.825	0.09	3.715	1.0069
OI2	0.79	-0.702	-0.353	3.838	0.9723
OI3	0.826	-0.636	-0.008	3.767	0.9325
OI4	0.797	-0.766	0.003	3.667	1.0182
OI5	0.788	-0.61	-0.447	3.805	0.9437
OI6	0.737	-0.865	0.359	3.798	0.9806
OI7	0.813	-0.887	0.443	3.822	0.9557
OI8	0.79	-0.759	0.186	3.791	0.9279

KMO: .914  $\chi$  Square:1938.855 df:28 sig.:.000 Tot. Variance Explained: %62.403

Openness to Change	Factor Load	Skewness	Kurtosis	Mean	Std. Deviation
OC1	0.698	-0.866	0.705	3.8741	0.93137
OC2	0.792	-0.833	1.334	3.8765	0.8389
OC3	0.81	-0.769	1.272	3.9002	0.82203
OC4	0.837	-1.005	1.722	4.1116	0.80438
OC5	0.819	-0.759	0.492	3.9549	0.91306
OC6	0.794	-0.792	0.441	3.7696	0.95948
OC7	0.772	-0.859	0.648	3.9026	0.93987

KMO: .879  $\chi$  Square:1663.659 df:21 sig.:.000 Tot. Variance Explained: %62.409

As a result of the analysis, factor loading values for all scale items were above 0.50. Kaiser-Meyer Olkin Sampling Adequacy Test (KMO) value was determined as 0.929 for

digital transformation, 0.913 for organizational agility, 0.914 for organizational innovation and 0.879 for openness to change. Barlette's Sphericity test was found to be significant

since the significance level obtained for the chi-square values was less than 0.05. The fact that the KMO values are greater than 0.70 and Barlette's test is significant indicates that the sample size is sufficient and appropriate for factor analysis. In addition, it was determined that the digital transformation scale explained 65,880% of the total variance, the organizational agility scale explained 60,680% of the total variance, the organizational innovativeness scale explained 62,403% of the total variance and the openness to change scale explained 62,409% of the total variance. When the skewness and kurtosis values of the scale items were analyzed, it was seen that they took values in the range of -2 and +2. Therefore, the data also meet the prerequisite of normal distribution for the analysis (Meidute-Kavaliauskiene et al., 2021).

Confirmatory factor analysis was conducted for both construct validity, convergent validity and component reliability. The goodness of fit values for the scales determined as a result of confirmatory factor analysis are reported in Table 3.

**Table 3.** Scales Goodness of Fit Values

Scale	$\chi^2/df$	GFI	CFI	TLI	NFI	RMSEA
Acceptable Criterion	$\leq 5$	$\geq .85$	$\geq .90$	$\geq .90$	$\geq .90$	$\leq .08$
Digital Transformation	3.244	0.961	0.979	0.971	0.97	0.073
Organizational Agility	3.531	0.965	0.976	0.961	0.967	0.078
Organizational Innovation	3.483	0.963	0.977	0.964	0.968	0.077
Openness to Change	2.706	0.979	0.986	0.971	0.981	0.073

Goodness of fit metrics, including  $\chi^2/df$ , GFI, CFI, TLI, NFI, and RMSEA, were determined to meet acceptable values by confirmatory factor analysis (Meidute-Kavaliauskiene et al., 2021).

Reliability analysis was conducted after confirmatory factor analysis. In addition, average variance explained (AVE) and composite reliability (CR) values were calculated to test convergent validity. The findings of the validity and reliability analyses are presented in Table 4.

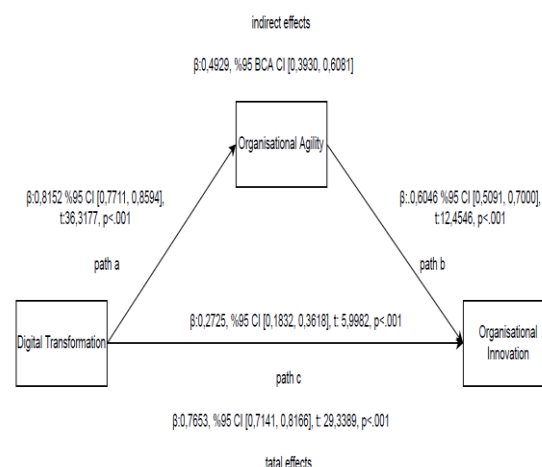
**Table 4.** Validity and Reliability

Scale	AVE	CR	Cronbach' Alpha	N of Items
Digital Transformation	0.61	0.98	0.925	8
Organizational Agility	0.54	0.9	0.907	8
Organizational Innovation	0.56	0.91	0.913	8
Openness to Change	0.54	0.89	0.897	7

All scales achieved Cronbach's Alpha coefficient values of 0.80 or higher as a consequence of the reliability investigation. The reliability of the scales is demonstrated by this finding. It is recommended that CR values be higher than 0.70 and AVE values be higher than 0.50. According to the results, the

reliability, composite reliability, and convergent validity requirements are met by the scales (Hayes, 2018).

Process Macro test was conducted to test the mediating role of organizational agility in the effect of digital transformation on organizational innovation. The related method was developed by Hayes (2018). The findings of the mediation test are given in Figure 2.



**Figure 2.** Mediation Test Findings

As a result of the Process Macro mediation test, firstly, the effect of the independent variable digital transformation, which is path a, on the mediating variable organizational agility was examined. As a result of the analysis, it was determined that the effect was significant. The fact that the effect is significant is also understood from the fact that both the t value is greater than 1-96 and the lower and upper values of the confidence interval do not contain zero values. The  $R^2$  value was found as 0.7589. This value shows that 75.89% of organizational agility is explained by digital transformation. Then, the effect of the mediating variable, organizational agility, which is path b, on the dependent variable, organizational innovativeness, was examined. As a result of the analysis, it was found that this effect was also significant. When the effect of the independent variable digital transformation on the dependent variable organizational innovativeness was examined, it was found that this effect was also significant. The  $R^2$  value was obtained as 0.7612. This finding shows that 76.12% of organizational innovativeness is explained by digital transformation and organizational agility.

This high level of explanatory power indicates that the effect of the variables in the model (especially digital transformation and agility) on organisational innovativeness is quite strong and that these relationships are consistently observed in the sample group. In practical terms, this finding suggests that supporting digital transformation strategies in airline companies with not only technological but also cultural and structural transformation efforts can significantly increase innovation capacity. In particular, companies that build agile structures and develop an organisational culture that is open to change can gain an advantage in sectoral competition by using the opportunities offered by digitalisation more efficiently.

To examine the significance of the total effects, the effect of the independent variable digital transformation, which is path c in the absence of mediating organizational agility, on the dependent variable organizational innovativeness was examined. This effect was also found to be significant. Then, to determine the significance of the indirect effects, the results



of the indirect effects when the mediator variable organizational agility was included in the model were examined. Indirect effects were also found to be significant. To see the strength of the mediation effect, the effect size ( $K^2$ ) value was examined. The value was obtained as 0.5281. Since this value is close to 0.25, it is concluded that there is a high effect. Therefore, organizational agility has a high mediation effect. As a result of the mediation test, hypothesis H1 was supported.

To test the moderating role of openness to change in the effect of digital transformation on organizational innovativeness, Process Macro analysis was conducted. The findings of the analysis are given in Table 5.

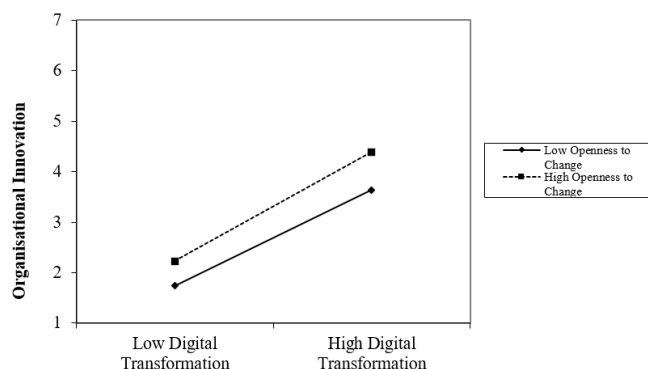
**Table 5.** Moderator Effect Analysis Findings

	B	se	t	p	%95CI (LLCI – ULCI)	
Constant	0.337	0.4804	0.7016	0.4834	-1.2812	0.6072
Digital Transformation	1.0164	0.1267	8.0202	0	0.7673	1.2656
Openness to Change	0.3101	0.122	2.542	0.0114	0.0703	0.5498
Interaction	0.0656	0.0321	2.0426	0.0417	0.1288	0.0025

R square:0.6798 F (3.417):295.0405 p:0.0000

As a result of the moderator analysis, it was found that digital transformation, openness to change and the interaction variable consisting of the product of both have a significant effect on organizational innovativeness at the same time. The fact that the effect is significant is understood from the fact that both the t value is greater than 1.96 and the lower and upper values of the confidence interval do not contain zero values. This finding shows that openness to change plays a moderating role that changes the effect of digital transformation on organizational innovativeness.

The moderator effect is shown in Figure 3.



**Figure 3.** Openness to Change Moderator Effect

Figure 3 shows that as digital transformation increases, organizational innovation also increases. At both low and high levels of openness to change, high digital transformation increases organizational innovation. In the case of high openness to change, the slope is greater, i.e. organizations that are open to change benefit more from digital transformation. Digital transformation promotes organizational innovation.

Openness to change is a moderating variable that strengthens this effect. Organizations that are open to change gain more innovation gains from digital transformation. Although digital transformation is effective in organizations with low openness to change, its impact is more limited.

As a result of the analysis, H2 hypothesis was supported.

## 5. Conclusion and Recommendations

According to Türkay and Artar (2021), the significance of digital transformation in the aviation industry is steadily growing. Businesses here and around the world are beginning to adapt to the new digital landscape. Companies work hard to make the most of the possibilities presented by ICTs so that they can meet the ever-evolving demands and expectations of their customers. To reach their growth ambitions, organizations are not satisfied with just meeting client expectations. They are restructuring their organizational structures and reinventing their business processes by integrating digital technologies. A rising number of countries and enterprises are participating in the integration process, which is opening up new possibilities in the realms of technology, digital transformation, and business. Here, companies must know where they are in terms of digital transformation if they want to do better; even a rudimentary degree of transformation gives companies a leg up in the marketplace (Tan, 2023). Cultural factors like agility, flexibility, and openness to change in organizations should also be considered during the digitalization process. This is especially true for employees and managers, who must be open to change for digital transformation to yield innovative outputs. Currently, organizational agility is a key mediator that helps bring about quick decision-making processes, adaptability, and a competitive edge.

This research aims to measure the moderating role of openness to change mediated by organizational agility in the effect of digital transformation processes on organizational innovativeness in airline companies.

Integrating digital technologies into business processes contributes to organizations becoming more innovative and efficient. In the literature, it is stated that digital transformation optimizes processes by creating changes in business models and encourages innovation by increasing knowledge sharing (Şahin, 2023). Innovation is a critical element for businesses to maintain their competitive advantage, and digitalization accelerates this process and enables organizations to develop innovative approaches.

Digitalization improves organizations' agility capabilities by enabling them to better adapt to rapidly changing market and environmental conditions. Existing studies show that digital technologies make decision-making processes flexible by accelerating access to information and thus contribute to the faster response of organizations to changes (Özdemir, 2023). This situation enables firms to gain a flexible and dynamic structure in a competitive environment.

By enhancing the capacity to swiftly react to evolving market circumstances and grab fresh opportunities, organizational agility bolsters the innovation process. According to the research, agile companies boost employee motivation, which in turn fosters an environment that is conducive to new ideas and inventions (Yılmaz, 2024). It is emphasized that agility helps organizations gain a strong reputation in the external environment as well as increase efficiency in internal processes.

While digital transformation increases the innovation capacity of organizations, organizational agility accelerates

this process and creates a more flexible and adaptable innovation environment. In the literature, it is stated that the integration of digital technologies into business processes accelerates the flow of information and facilitates organizations to adapt faster to changing environmental conditions (Şahin, 2023; Kohli & Melville, 2018). Organizational agility enables innovation to be sustainable by making it possible to make more effective use of the opportunities created by digital transformation.

Organizations that are open to change encourage innovation by managing digital transformation processes more effectively. In the literature, it is stated that the openness of leaders and employees to change is a critical factor in organizational transformation processes (Datta et al., 2003). While high openness to change strengthens the positive impact of digital transformation on innovation, low openness to change may limit innovation by causing organizations to tend to maintain their current situation. In addition, it is emphasized that leadership approaches and corporate culture are decisive in this process and the success of digital transformation largely depends on the degree of openness to change within the organization (Morgül & Ataç, 2024).

In this framework, the hypotheses put forward in the research comprehensively address the relationships between digital transformation, organizational agility, innovation and openness to change and provide an important framework for understanding how organizations are transformed in digitalization processes.

The research findings revealed that digital transformation positively affects organizational innovativeness, and organizational agility plays a mediating role in this process. Digital transformation can encourage organizations not only to make technological investments but also to develop new business models by creating an innovative business culture. In this direction, it can be seen that businesses that effectively manage digital transformation processes invest more in innovative strategies to maintain their competitive advantage. In addition, it can be said that digitalization not only accelerates processes but also creates an environment that encourages innovation by increasing the creativity of employees.

The findings show that organizational agility plays a positive role in the relationship between digital transformation and innovation. It can be seen that firms with high organizational agility respond more effectively to changing customer expectations by adapting faster to uncertain market conditions. Increasing agility is not only limited to making business processes flexible but also directly related to strengthening communication channels within the organization and making decision-making processes faster and more effective. This increases the effectiveness of digital transformation investments and can support the sustainable innovation performance of businesses.

A restraining element in the relationship between digital transformation and organizational innovativeness is readiness to change, according to the research. Companies that are more adaptable to new ideas and methods are better able to reap the benefits of digital transformation. The effect of leadership styles and company culture on digital transformation is further illustrated by this. The literature stresses that to successfully execute innovation, an organizational structure that is receptive to change must be in place. However, organizations that are resistant to change have less capacity to undergo digital transformation and innovate. These results indicate that investments in technological infrastructure are important, but that organizational culture, staff adaptability, and leadership

styles are equally crucial to successful digital transformation initiatives.

Both theoretical and practical research can benefit from the acquired results. While this helps shed light on the connection between digital transformation and innovation in theory, it becomes clear that in practice, companies must take organizational agility and change readiness into account when formulating digital transformation plans. In this light, businesses should view digital transformation as a process of strategic transformation as much as a process of technological adaptation. In addition to providing useful information for researchers in the future, the study's results lay the groundwork for a thorough investigation of how digital transformation techniques affect businesses in the long run.

In line with the findings of this study, the relationships between digital transformation, organizational agility, innovativeness and openness to change are discussed in the aviation sector and various suggestions are presented for both academic studies and stakeholders in the sector.

The aviation industry stands out with its high safety standards, dynamic operational processes and the need to adapt quickly to technological developments. In this context, effective management of digital transformation processes is important in terms of passenger satisfaction, flight safety and optimization of logistics processes while increasing operational efficiency. The findings of the study show that digital transformation increases organizational innovation in the aviation sector and agility plays a mediating role in this process. Accordingly, organizations operating in the aviation sector may need to develop strategies to increase their organizational flexibility while investing in digital technologies.

One could argue that the aviation sector places a premium on organizational agility, particularly when it comes to handling crises, responding to emergencies, and making quick decisions. Improved and quicker management of operational procedures is a direct result of digitalization's ability to speed up the flow of instant data, which in turn improves communication among pilots, air traffic controllers, ground services, and maintenance teams. Consequently, businesses in the aviation industry can boost their agility by making good use of digital technologies in HRM, training, and decision-making, in addition to operational operations.

The results show that a receptive attitude toward change enhances the correlation between digital transformation and innovation within organizations. Because of its structure, the aviation business must be able to quickly adjust to new security procedures, technological developments, and international legislation. Hence, the effectiveness of digital transformation initiatives can be altered by making workers more receptive to new ideas and approaches. Pilots, flight attendants, technicians, and air traffic controllers are among the most important professionals in the aviation industry. Therefore, it's crucial that they take part in ongoing training programs to help them adjust to the digital revolution. By making it easier for workers to adapt, digital tools like simulation-based training, AI-supported decision-making systems, and big data analytics can help increase the adoption of new solutions.

Leadership and corporate governance strategies in the aviation sector should also be conducive to digital transformation for these processes to be effective. To help people adjust to transformation processes, senior management should create a vision that promotes digitalization and innovation. Employees can be better educated about digital technologies and less resistant to change if there are participatory decision-making mechanisms, technology-based

internal communication platforms, and interactive training programs.

More research into the ways digital transformation has affected various aviation sector business lines is needed for future studies. Airport operations, flight planning, air traffic management, and customer relations are just a few areas that have seen digitalization-induced changes that can provide light on the industry's future demands. Human resource management strategies in the aviation sector can also benefit from more in-depth research on how digital transformation processes impact workers' happiness on the job, stress levels, and productivity.

Rules should be developed in accordance with international norms and laws if digital transformation activities are to be effectively implemented in the aviation sector. The aviation industry may speed up its digital transformation processes by revising its policies for the use of digital technology and by establishing incentive mechanisms to help businesses gain access to digital infrastructure.

Thus, the study's findings are useful for aviation industry managers and workers, and they also add to the body of scholarly literature. To further advance this area of study and aid in the growth of the aviation industry, future studies should investigate the far-reaching consequences of digital transformation on the industry and the interplay between its various players.

## Appendix 1 Scale Items

### Digital Transformation

Our company has the ability to explore and utilize new technologies. Digital transformation activities are included in the value creation of the company.

Improvements are made in the organizational structure, processes and competencies for digital transformation in our company.

Our company carries out strategic initiatives to create scalable, flexible and value-generating operations to realize digital transformation.

Our company is pursuing strategic initiatives to leverage digital information to enable better data optimization.

Our company continuously carries out strategic initiatives to research and follow the applications of digital media and technologies.

Our company creates its basic strategies digitally within the framework of corporate competencies.

Our company creates intensive interactive digital links with domestic and international organizations.

### Organizational Agility

Our company is constantly looking for new business opportunities.

Our company looks for new approaches to future market needs.

Our company reacts quickly to opportunities that arise in customer needs.

Our company reacts quickly to opportunities that arise in the markets.

Our company reacts quickly to emerging environmental opportunities (e.g. new regulations, globalization).

Our company quickly adapts existing business models to new conditions.

Our company quickly adapts the existing business process to new conditions.

Our company quickly adopts the best practices used by others.

### Organizational Innovation

Our company attaches great importance to new product/service development.

Our company often tries new ideas and tries to realize them.

Our company is very creative in finding new methods.

In our company, sufficient expenditure is made to develop new products/services.

In our company, new ways of doing things better are constantly sought.

In our company, innovation is not considered too risky and innovation is not resisted.

In our company, top management encourages innovation development efforts.

Our company always endeavors to serve with the latest technologies.

### Openness to Change

I think I am open to changes in my workplace.

The change will help to improve undesirable situations in the organization.

I think the change will positively affect my performance.

I think that my organization can achieve the desired goals through change.

I look forward to implementing the changes at my workplace.

I'll do my best to support change.

The change will benefit the organization.

### Ethical approval

Yes, Kastamonu University Ethics Committee Commission dated 07.01.2025 and numbered 1/50

### Conflicts of Interest

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

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