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# The Effects of The Pandemic Period on The Performance of Airline Pilots in Turkey

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## Abstract

The aviation industry is one of the sectors that have been adversely affected by the pandemic, both materially and morally. In the early stages of the pandemic, air transport came to a standstill for a long time. The airline industry's inability to do business has had some consequences. Pilots, who are the last link of flight safety, which is an indispensable priority of the airline industry, have been the professional group that directly confronts the material and moral consequences of interrupted flights. When the importance of the flight performance of the pilots is evaluated, the effect of these results on the aviation sector has become suitable to increase geometrically. In this study, it is aimed to reveal the extent to which the pilots are affected by the pandemic conditions and the main reasons for these effects. The method of the study was determined as a questionnaire and one-to-one interviews with flight instructors. 148 pilots participated in the survey and 3 flight instructors were interviewed. According to the results, it has been seen that the group most affected by the effects of the pandemic is the inexperienced first officers who have just started to work and have not gained enough experience yet. It has been seen that every time they come to the cockpit, they perform as if they are sitting in that seat for the first time. It was observed that the least affected were experienced captains. However, in general, since flight is a team job, it has been observed that the workload of experienced captains increases due to inexperienced first officers, which negatively affects flight performance. However, it is thought that it is not reflected in the statistics due to the decrease in the number of flights.

## 1. Introduction

The aviation industry has been moving with a fluctuating graphic model for years. Looking at the events in the last 20 years, the “Twin Towers” attack in the USA is one of the milestones of the aviation community. The resulting economic losses, the fact that the terrorists who carried out the attack had previously received pilot training in the USA, the air traffic stopped for 3 days and the decrease in the number of passengers caused some companies to go bankrupt and some companies to survive with difficulty (Cebeci, 2011). Therefore, many pilots were either re-investigated or unemployed.

One of the epidemic diseases that most affected the aviation industry is the SARS virus, which emerged just after the 9/11 Twin Towers attack. The spread of the uncontrollable SARS virus, which broke out heavily in Canada, was later seen in more than two dozen countries, including North America, South America and Europe. Airline bulletins have been issued by the authorities to raise awareness about SARS precautions since it is mostly transported and dispersed by air. The bulletins describe the precautions that airline personnel should take, how the virus spreads, and how individual protection should be done (CDC, 2005). Like SARS, Ebola and MERS crises also showed their effects in the following years and caused the aviation industry to be disrupted and travel demands to decrease (LePan, 2020). The aviation industry and aviation workers were adversely affected by the falling demands.

The economic crises experienced in the recent past have deeply affected the aviation and commercial air transportation sectors, as well as many other sectors, and even brought them to a standstill from time to time (ICAO, 2021). With the 2008 global crisis, a decrease was observed in the demand for aviation, and people tended to travel with more economical vehicles instead of the aviation sector in this period. In this process, many airline companies in the world either had to close or downsized (John & Franke, 2011). Air transport, which showed a steady growth, experienced a sharp decline in 2008-2009. This decrease was reflected as an economic loss to airline companies. Therefore, it was reflected on the pilots (Argun, 2018).

Germanwings accident that took place in 2015 weighed heavily on Germanwings financially and as a result, they could not get out of this situation. They declared bankruptcy and transferred their aircraft to Eurowings Airline. The financial

burden and loss of prestige brought about by the accident put the airline in a difficult position (Martinez Garbuna, 2020). Nearly 300 pilots of the sinking company were left unemployed. On the other hand, the way the accident occurred became an important example in aviation history and caused some safety changes. Pegasus Airlines came to the fore with 1 run-off event in 2018 and 2 in 2020, and 3 deaths occurred in the last incident. These incidents were not major accidents, but despite this, the company's share values fell. These declines caused both a loss and a loss of prestige for Pegasus Airlines (Tursun & Şahin, 2020).

In total, companies that suffered losses either had to lay off their staff or had to resort to economic restrictions. This had a negative impact on their staff.

Coronavirus epidemic (COVID-19) has been defined by the World Health Organization as an infectious disease caused by the SARS-CoV-2 virus. It has been stated that people infected with the virus will mostly be affected by the respiratory tract, and this effect will result in serious illness or death. It has been announced that the elderly or people of all ages with chronic diseases such as diabetes, diabetes, respiratory and cancer will be more affected by the virus (WHO, 2022). As of January 24, 2022, the number of people infected with COVID-19 infectious disease worldwide was announced as 349.641.119, and the number of people who died from the disease as 5.592.266 (WHO, 2022). In Turkey, serious declines were experienced in the tourism sector, which directly affects aviation. Compared to 2019, revenue from the tourism sector decreased by 52% in 2020. The number of tourists coming to Turkey in 2019 decreased from 52 million to 12 million in 2020 (TC Ministry of Culture and Tourism, 2020). Country borders closed due to the pandemic and travel bans have caused a decrease in flight frequencies (ICAO, 2021). Since the decreasing flights and the intensity of the airline pilots' flight schedules are parallel, the monthly flight hours of the pilots have decreased, even to zero in some months. Due to the decrease in economic income, some airline companies have closed completely, some have laid off their pilots, some have taken unpaid leave, and some have applied the part-time working method. This situation caused job loss stress on the pilots.

All crises in the history of aviation have directly or indirectly affected pilots. Pilots have been affected by the crisis in psychological, economic, employment and performance aspects. From this point of view, it is clear that the COVID-19 pandemic will also affect the performance of pilots.

As a matter of fact, according to a report published by Qantas Airlines, it was stated that an increase was observed in the mistakes made, including experienced pilots, upon the return of the pandemic. The shape of the errors, on the other hand, reveals that although there are simple errors, the pilots are surprisingly rusty. According to the published report, it was understood that the pilots started to make basic mistakes such as trying to move with the parking brake installed or confusing the altitude and speed indicators while in the air (AFB-SBS, 2022). Observing that errors have increased in many procedures, from errors made in pre-flight cockpit preparation to external control errors, Qantas Airlines has stated that many more error events have been reported to ASRS (Pallini, 2020).

So much so that at the very beginning of the pandemic, an Airbus A320 plane belonging to Pakistan Airlines crashed near Karachi Airport. Air traffic, which was closed on the day of the accident due to COVID-19, has been a few days since it opened. When the CVR records were examined, it was revealed that the pilots argued with each other about how they were affected by the pandemic throughout the flight and including the final approach, which is the riskiest part of the flight. They are so distracted by this issue that they approach the airport far above the altitude they should be. Even as they try to fix the altitude, their conversation about the pandemic continues and they forget to turn on the landing gear. The engines that hit the runway are damaged and both engines stall after taking off again (Euronews, 2020). This event has been a harbinger of the damage the pandemic will cause to aviation.

Looking at the number of active aircraft in the fleets of airline companies, a 6% increase was recorded in the number of active cargo aircraft compared to 2020 and 2019, and it rose from 546 to 673 worldwide. However, the number of active passenger jets decreased from 2863 to 1639, with a great decrease of 44.3% in jet-powered passenger aircraft only (ICAO, 2021). Economic losses incurred by airline companies due to these decreases are quite heavy. Looking at Europe in general, airline companies have experienced losses of up to 107 billion USD when compared to 2020 and 2019. Worldwide, this number has reached 372 billion USD ( ICAO, 2021). The COVID-19 pandemic, which is considered to be the most severe economic crisis after the Great Depression, has caused the entire aviation industry to shrink by 50% on average (OECD, 2020). The decrease in the number of flights, the shrinkage of the sector and the unemployment of 13% of the flight personnel working in the sector adversely affected the aviation personnel (Sobieralski, 2021).

Safety is always the first priority in aviation. However, it is the experience of the pilots that makes safety the first priority and the training that forms the cornerstone of this experience (Haslbeck, Eichinger & Bengler, 2013). Therefore, airline pilots should establish solid foundation stones in the pilot training phase so that they can manage their professional performance well (Mevlütoğlu, 2022). An Airbus A300-605R flight AA587 was caught in the wing turbulence of the B747 aircraft taking off in front of it and started to swing. The first officer, who had the vertical stabilizer fully maneuvered in opposite directions to get rid of the turbulence, could not withstand the pressure created by the air flow on the vertical stabilizer and caused it to break. The aircraft, whose control was lost as a result of the broken piece, crashed into a residential area (FAA, 2010). In research after the accident, it has been revealed that American Airlines encourage its pilots to use aggressive vertical stabilizer control against turbulence. After this result, American Airlines made changes to their training and tried to correct mistakes. Many such training-related accidents have occurred in the history of aviation (The Flight Channel, 2019).

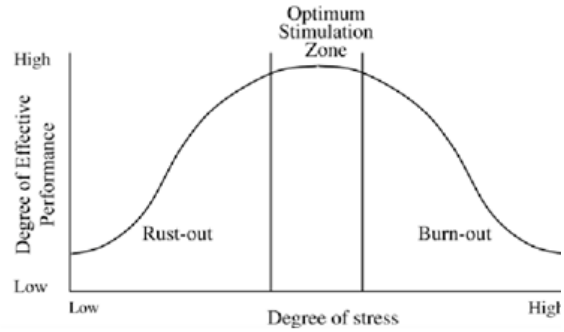


**Figure 1**. Stress-Performance Graphic

Airline piloting is a professional profession. With the professional infrastructure created as a result of the trainings he received, the pilots can perform the performance management professionally. However, sometimes human factors can come into play and prevent the person from managing his performance. Many other factors such as stress, sleep, private life, economic anxiety are some of the human factors that pilots are exposed to while managing their performance. It is possible to minimize these factors by working efficiently, improving efficiency and providing feedback (Akalın, 2019). Airline pilots are exposed to various stressors due to their work. These stressors may be related to the professional work life of the pilots or, when the human factor is considered, their private lives. In both possibilities, as in Figure 1, pilots who know these thresholds and keep the stress level at an optimum level are managing their performance (Schermerborn, Hunt & Osborn, 1988).

From another point of view, it can be looked at how far the pilots are from the standards and limits set in order to manage their performance. Aircraft always operate within certain limits. Exceeding the specified limits or breaking the standards by exceeding the safety barriers can create dangerous situations. Therefore, standards and limits can be looked at in order to understand the level of flight performance of the aviators and to make the necessary management (Stein, 1984).

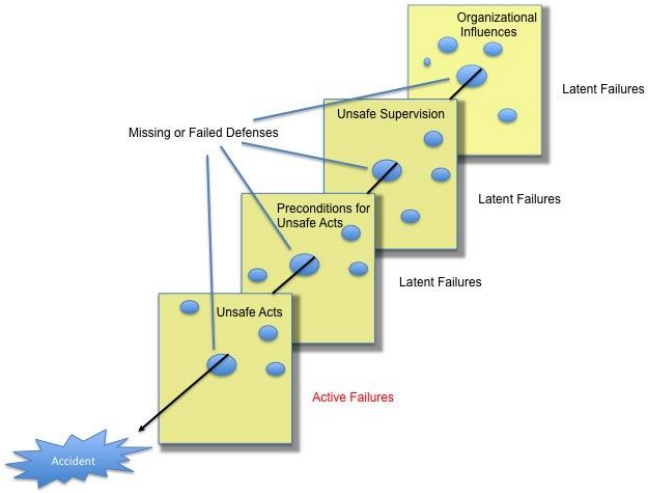


**Figure 2.** Swiss Cheese Model

The Swiss Cheese model shown in Figure 2 is one of the most effective models used for the resolution of accidents or incidents. According to this model, the cheese rings represent safety barriers. Examples of these barriers are checklists, ground attendants, tower attendants, limits, rules, procedures, and aids that reduce the error rate, such as documents. However, the last link of these barriers is the pilots. Pilots are the last authority to intervene in a problem that will endanger flight safety by overcoming all barriers (Reason, 1991). Therefore, the performance of pilots as the final authority is of vital importance in terms of flight safety.

The performance of pilots in a flight operation is one of the main factors that directly affect flight safety. Considering the human factors, the performance of the pilots; It is directly affected by factors such as lack of communication, lack of theoretical knowledge, complacency, distraction, lack of teamwork, physical and mental fatigue, time pressure, stress, lack of awareness and lack of initiative (FAA Safety, 2022).

In a flight operation, the intensity of the stress created by the flight on the pilots can be considered in direct proportion to the capability of the aircraft, the type of flight operation and the meteorology. According to studies, 19% of fatal accidents are caused by stress. Therefore, stress before and during the flight is an issue that needs to be managed (Soran, 2004). Pilots may have to make instant decisions during the flight. A pilot with a high situational awareness can make an important decision more confidently because he or she follows the previous step, anticipates the next step, and is aware of the events around him. This situation reduces the margin of error of the decisions taken (Kao & Jian Lin, 2010).

One of the factors that cause errors during flight operation is distraction. Mental problems such as absentmindedness, economic situation, family life, personal issues can cause distraction; Factors such as physical changes in working conditions and the use of masks can also cause distraction (FAA Safety, 2022).

Soran (2004) examined that even successful pilots are affected by stressors such as family life, economic conditions, working conditions and ways to cope with them. According to the research, 43% of the stressors mentioned the existence of organizational stress sources (Soran, 2004). Aydın (2019) mentioned that the human factor is effective in aviation and that the human factor should be examined from the perspective of technical and non-technical skills (Aydın, 2019). Erikçi (2020), in his research to determine the correct decision-making processes of pilots, found that the pilots base their sudden decisions on knowledge, experience and self-confidence. On the other hand, he concluded that he benefited from his teammates, operation teams, ATC, procedures and checklists in matters without time restrictions (Erikci, 2020). Kubal Güler (2014) stated in his research that the piloting profession is one of the three most stressful occupational groups and that the resulting stress can cause accidents. The researcher, who examined the preventability of the stress caused by the working conditions of the pilots and the factors that reduce the stress, suggested that it would be beneficial for the pilots to receive psychological counseling in order to prevent them from making the wrong decision under stress (Güler, 2014). Stein (1984), in his research that tried to measure the performance of pilots, found that the performance of pilots was proportional to their experience and workload. He stated that experienced pilots should focus on flying by undertaking less workload, while inexperienced pilots should reduce the workload on the experienced pilot, allowing the experienced pilot to make the right moves (Stein, 1984).

When these studies are evaluated, it is revealed that, together with the reality of COVID-19, airline pilots can be affected by crises today. With this study, it is aimed to examine the size of the effect and to reduce the effect of the next crises.

### 1.1. The aim of the study

The safety culture in aviation and the effort to optimize flight are the elements that come from the blood-writing of the rules in aviation and always progress cumulatively. Pilots are the final decision mechanism of flight operations in this important sector. It should not be forgotten that the pilots, who are the final decision to be made and the authority to take this decision into action, are human beings, not machines. Although the pilots are professional, when the human factor is involved, some measures need to be taken to prevent their performance from decreasing. However, when the human factors affecting decisions and actions are revealed, problems can be grasped more successfully and accidents or undesirable events can be prevented by making proactive moves (Mannan, 2005).

Pandemic and travel bans have caused a decrease in flight frequencies (ICAO, Operational Impact on Air Transportation, 2021). Since the decreasing flights and the intensity of the airline pilots' flight schedules are parallel, the monthly flight hours of the pilots have decreased, even to zero in some months. It is thought that it would be beneficial for the aviation industry to examine the factors such as how the decrease in flight hours affects the piloting abilities of the pilots and whether the flight experience of the pilots has an effect on the infrequent flight schedule. Decreasing flight frequency has caused economic losses on airline companies. This situation had a direct negative impact on the income of the pilots. It should be examined whether the decreasing economic income has an effect on the job performance of the pilots in a psychological sense. Due to the decrease in economic income, some airline companies have closed completely, some have laid off their pilots, some have taken unpaid leave, and some have applied the part-time working method. This situation caused job loss stress on the pilots. It is of great importance to investigate the effect of this stress on the flight performance of the pilots who continue their work.

In this study, the effects of the effects of the pandemic on the performance of the pilots were investigated. While the effects of the pandemic were taken as the independent variable in the study, the performance of the pilots was evaluated as the dependent variable. The research questions were determined as follows:

- Does the fact that pilots fly less as a result of the decrease in flights due to the pandemic have an effect on the piloting ability?
- Experienced pilots and inexperienced pilots are compared, is there a difference between the levels of being affected by the pandemic?
- Did the economic concerns and job loss stress caused by infrequent flying affect the flight performance of the pilots?
- Did the decrease in flight hours allow the pilots to rest more and get rid of the health problems caused by the flight, or did it cause them to lose their abilities (flying abilities) by getting away from the flight?
- Did flying infrequently increase the workload of pilots, causing disruptions in procedural work and procedural skipping problems?

## 2. Materials and Methods

This research covers a total of 11.840 civilian pilots working in 10 civilian airline companies operating in Turkey as the main mass (SHGM, 2021). Since it was not possible to reach all of the main mass, it was aimed to participate in the surveys of approximately 300 pilots.

A questionnaire scale was applied to the pilots participating in the study within the scope of the quantitative research. This scale is applied to evaluate the self-perceived performance of the pilots, to measure how their performance has changed compared to the pre-pandemic period, and what the underlying reasons are for these changes. The scale method applied is easy sampling (Büyüköztürk Ş. v., 2010).

For the purpose of evaluating the performance of pilots by the authority within the scope of qualitative research, the results obtained by teacher pilots in simulator lessons, control flights and refresher exams were compared before and after the pandemic. This study was carried out as an interview study with teacher pilots. Data in the form of a voice recording was created and decoded (Büyüköztürk Ş. v., 2010).

### 2.1. Data and Collection

In this study, which used quantitative and qualitative research methods, data were collected by questionnaire method and interview method. These data cover the pandemic period and are made to measure the overall performance of pilots. For the survey method, related questions were taken from 5 different surveys and a new survey scale of 25 questions was created by adding new questions. The new questionnaire created was called the “Perceived Pilot Performance Scale”. Ethics committee approval was obtained for the new questionnaire scale created.

### 2.2. Validity and Reliability

Reliability of the scale, which consists of statements about the determination of the problems experienced by the participants during the pandemic period, was determined to be 0.94. The coefficient shows that the scale is reliable enough to be considered quite sufficient (Karagöz, 2016). After the reliability analysis, factor analysis was applied to the scale in order to test the construct validity.

It has been determined that the scale consists of five sub-dimensions. These dimensions were named as psychological impact, impact on flight performance, economic impact, job stress and anxiety, and organizational commitment. The KMO sample adequacy coefficient calculated in the factor analysis was determined as 0.91. The coefficient indicates that n=148 questionnaires will be sufficient to reveal the factor structure. In addition the dimensions, shown in Table 1, obtained according to the result of the Bartletsphericity test, in which the significance of the factor structures were tested, were structurally valid (Barlet'sX 2=1525.11, p=0.01).

**Table 1.** Evaluation of Dimensions

| Dimensions | x ±ss |
|---|---|
| Psychological Impact | 3.33±0.83 |
| Effect on Flight Performance | 2.39±0.57 |
| Economic Impact | 4.36±0.64 |
| Job Loss Stress | 3.44±0.84 |
| Corporate Commitment | 3.11±0.56 |

## 3. Findings and Discussion

### 3.1. Demographic Findings

Demographic characteristics of the participants are as in Table 2.

**Table 2.** General Characteristics of the Participants

| | | n | % |
|---|---|---|---|
| Gender | Male | 128 | 86.5% |
| | Woman | 20 | 13.5% |
| How many years have you been flying? | 0-5 Years | 78 | 52.7% |
| | 6-10 Years | 45 | 30.4% |
| | 11-20 Years | 12 | 8.1% |
| | 21 Years and Over | 13 | 8.8% |
| Task | Captain pilot | 38 | 25.7% |
| | First Officer | 110 | 74.3% |
| Age | 20-29 | 42 | 28.4% |
| | 30-39 | 68 | 45.9% |
| | 40-49 | 25 | 16.9% |
| | 50-59 | 13 | 8.8% |
| Flight Time | 0-1000 Hours | 13 | 8.8% |
| | 1001-2000 Hours | 28 | 18.9% |
| | 2001-3000 Hours | 44 | 29.7% |
| | 3001-4000 Hours | 35 | 23.6% |
| | 4001-5000 Hours | 13 | 8.8% |
| | 5001 Hours and Over | 15 | 10.1% |
| Institution | Sunexpress | 79 | 53.4% |
| | Turkish Airlines | 46 | 31.1% |
| | Pegasus | 12 | 8.1% |
| | Other | 11 | 7.4% |

### 3.2. Quantitative Research Results

According the Table3, the psychological impact levels of the pilots are different according to their flight experience, and the difference is due to the fact that the pilots flying between 11-20 years are less psychologically affected during the pandemic process. (p=0.02).

It is stated that the psychological impact levels of the pilots are not different according to their seniority levels, and that the captain and first officers were affected psychologically at a similar level during the pandemic process (p=0.74).

It was determined that the psychological impact levels of the pilots were different according to their ages, and the difference was due to the fact that the pilots aged between 50-59 were more psychologically affected during the pandemic process (p=0.01).

It was determined that the psychological impact levels of the pilots were different according to the flight hours, and the difference was due to the fact that the pilots with 4001 hours or more flight experience were more psychologically affected during the pandemic process (p=0.01).

**Table 3.** Determining the Level of Psychological Impact of COVID-19 on Pilots According to the Characteristics of the Participants

| Pilot Features | | Psychological Impact | |
|---|---|---|---|
| | | X±ss | p |
| Gender | Male | 3.34±0.86 | 0.68 |
| | Woman | 3.25±0.68 | |
| How many years have you been flying? | 0-5 Years | 3.37±0.86 | 0.02 * |
| | 6-10 Years | 3.43±0.77 | |
| | 11-20 Years | 3.08±0.71 | |
| | 21 Years and Over | 3.55±0.99 | |
| Task | Captain pilot | 3.38±0.82 | 0.74 |
| | First Officer | 3.31±0.84 | |
| Age | 20-29 | 3.27±0.73 | 0.01 * |
| | 30-39 | 3.23±0.90 | |
| | 40-49 | 3.37±0.76 | |
| | 50-59 | 3.98±0.70 | |
| Flight Time | 0-1000 Hours | 3.12±0.65 | 0.01 * |
| | 1001-2000 Hours | 3.14±0.96 | |
| | 2001-3000 Hours | 3.37±0.85 | |
| | 3001-4000 Hours | 3.27±0.83 | |
| | 4001-5000 Hours | 3.63±0.52 | |
| | 5001 Hours and Over | 3.63±0.87 | |
| Institution | Sunexpress | 3.30±0.82 | 0.01 * |
| | Turkish Airlines | 3.50±0.86 | |
| | Pegasus | 2.82±0.79 | |
| | Other | 3.44±0.74 | |

*Significant difference at 0.05 level

As shown in the Table 4, it can be stated that there is no difference in the level of the effect of the pandemic on the flight performance of the pilots according to the flight years, and the flight performances of the pilots who are experienced in different years are similar during the pandemic process(p=0.23).

It can be stated that the effect of the pandemic on the flight performance is not different according to the seniority of the pilots, and the flight performances of the captain or first officers are similar during the pandemic process. (p=0.56).

Flight performances of the pilots flying between the ages of 50-59 were more affected during the pandemic process (p=0.01).

It can be stated that there is no difference in the level of the effect of the pandemic on the flight performance according to the flight hours of the pilots, and that the flight performances of the pilots who have different flight hours are similar during the pandemic period. (p=0.33).

**Table 4.** Determining the Level of Effect of COVID-19 on Flight Performance of Pilots According to the Characteristics of the Participants

| | | Effect on Flight Performance | |
|---|---|---|---|
| | | X±ss | p |
| Gender | Male | 2.40±0.59 | 0.74 |
| | Woman | 2.35±0.46 | |
| How many years have you been flying? | 0-5 Years | 2.37±0.58 | 0.23 |
| | 6-10 Years | 2.39±0.49 | |
| | 11-20 Years | 2.43±0.61 | |
| | 21 Years and Over | 2.55±0.75 | |
| Task | Captain pilot | 2.36±0.59 | 0.56 |
| | First officer | 2.41±0.57 | |
| Age | 20-29 | 2.39±0.51 | 0.01* |
| | 30-39 | 2.37±0.60 | |
| | 40-49 | 2.34±0.44 | |
| | 50-59 | 2.63±0.78 | |
| Flight Time | 0-1000 Hours | 2.37±0.42 | 0.33 |
| | 1001-2000 Hours | 2.40±0.63 | |
| | 2001-3000 Hours | 2.37±0.55 | |
| | 3001-4000 Hours | 2.37±0.54 | |
| | 4001-5000 Hours | 2.45±0.61 | |
| | 5001 Hours and Over | 2.49±0.72 | |
| Institution | Sunexpress | 2.32±0.61 | 0.01* |
| | Thy | 2.63±0.51 | |
| | Pegasus | 2.12±0.38 | |
| | Other | 2.24±0.34 | |

*Significant correlation at the 0.05 level

It has been determined that, as stated in Table 5, the economic impact levels of the pandemic are different according to the years of flight of the pilots, and the level of economic impact of the pilots who have served for 21 years or more during the pandemic process is less than the other pilots(p=0.01).

It has been determined that the economic impact levels of the pandemic are different according to the seniority of the pilots, and the economic impact levels of the first officers are higher in the pandemic process(p=0.01).

It has been determined that the economic impact levels of the pandemic are different according to the ages of the pilots, and the economic impact levels of the pilots between the ages of 20-29 are higher in the pandemic process(p=0.03).

It has been determined that the economic impact levels of the pandemic are different according to the flight hours of the pilots, and the economic impact levels of the pilots who have flown 5001 hours or more during the pandemic process are lower in the study (p=0.01).

**Table 5.** Determining the Level of Economic Impact of COVID-19 on Pilots According to the Characteristics of the Participants

| | | Economic Impact | |
|---|---|---|---|
| | | X±ss | p |
| Gender | Male | 4.36±0.65 | 0.89 |
| | Woman | 4.36±0.58 | |
| How many years have you been flying? | 0-5 Years | 4.49±0.45 | 0.01* |
| | 6-10 Years | 4.27±0.72 | |
| | 11-20 Years | 4.27±0.53 | |
| | 21 Years and Over | 3.90±1.08 | |
| Task | Captain pilot | 4.13±0.75 | 0.01* |
| | First officer | 4.44±0.58 | |
| Age | 20-29 | 4.41±0.52 | 0.03* |
| | 30-39 | 4.42±0.60 | |
| | 40-49 | 4.19±0.60 | |
| | 50-59 | 4.15±1.10 | |
| Flight Time | 0-1000 Hours | 4.54±0.27 | 0.01* |
| | 1001-2000 Hours | 4.47±0.46 | |
| | 2001-3000 Hours | 4.48±0.51 | |
| | 3001-4000 Hours | 4.24±0.77 | |
| | 4001-5000 Hours | 4.35±0.54 | |
| | 5001 Hours and Over | 3.90±0.97 | |
| Institution | Sunexpress | 4.35±0.65 | 0.01* |
| | Turkish Airlines | 4.49±0.45 | |
| | Pegasus | 4.38±0.52 | |
| | Other | 3.82±1.04 | |

*Significant correlation at the 0.05 level

As a result of the regression analysis in the Table 6 below, it is seen that the level of being affected by the flight performance of the pilots is related to the stress of job loss, psychological impact and organizational commitment levels.

**Table 6.** Regression Analysis

| The Dependent Variable | Independent Variables | | | | | |
|---|---|---|---|---|---|---|
| | Job Loss Stress (β) | Psychological Impact (β) | Corporate Commitment (β) | F Model | RR ² | DD.W |
| Effect on Flight Performance(Y) | 0.27<br>t = 12.44<br>p =0.01 | 0.24<br>t = 9.72<br>p =0.01 | -0.22<br>t =8,181<br>p =0.01 | 24.46<br>(p=0.01) | 0.54 | 1.99 |

* Regression analysis performed

When the results are examined, the levels of psychological exposure are affected by the increase in the levels of work stress and anxiety and the increase in the level of corporate commitment.

### 3.3. Qualitative Research Results

Participants were coded as P1, P2 and P3. Each participant works as an instructor pilot in a different airline company and they are experienced captain pilots with competencies in their fields. Participants were selected by non-random purposeful criterion sampling method (Büyüköztürk, Kılıç Çakmak, Akgün, Karadeniz, & Demirel, 2020).

#### The Effect of Infrequent Flying on Pilot Performance in the Pandemic

As in every job done professionally, doing something infrequently in piloting skills causes a decrease in competence in that job. Decreasing flight frequencies during the pandemic process reduced the flight hours of the pilots and affected their performance.

P1's statements on this subject are as follows; "*At first there was some shyness. Compared to before the pandemic, that warmth, you can see that the mastery of the procedures turns into shyness after a long time. Your friends themselves are already explaining this. Since they do not fly very often, cooling and shyness occur. They say that it is difficult to concentrate and work during the pandemic." "The pilots lost their flight skills. He forgot the procedures. Everything blurred. We are all human, there is the human factor."*

P2 is; "The low *motivation caused by the pandemic was seen in the piloting profession. As teachers, we intervene in a way that does not hinder flight safety." "I repeat, flying is a business again. The training will need to be increased a little more." and "Because we are teachers, we were able to overcome this. But the motivation of the newcomers was to fly. When they couldn't fly, their performance was affected as well."* expressed as.

When the above statements are evaluated together with the quantitative research results, according to the result;

- H1: The effects of the pandemic negatively affected the performance of the pilots,

hypothesis is supported.

#### The Effect of Flight Experience on Pilot Performance in Pandemic Conditions

Pilots are divided into experience classes according to their flight hours. Inexperienced pilots felt the effect of the break in flight during the pandemic period in their performance due to their lack of experience.

P1 used the following statements about how inexperienced pilots were affected by the pandemic; "*Both the captain and first officers have it, but the copilots have it more. Captains also have stress, though not as much as first officers.","Everyone was affected by the pandemic. But the beginner first officers, the inexperienced first officers, were most affected."*

P2 expressed his thoughts on this issue as follows; "*I can say that they were less impressed by the first officers because the captains had more competencies, but if we do not include the age factor. Flight is a training job. Lack of experience will cause anxiety and poor performance. These are the observed elements. A copilot who has made 2000-3000 ILS approaches is less affected than a beginner copilot."*

P3: "*Experience is very important, but besides experience, it is necessary to know." He emphasized* that inexperience is more affected by pandemic conditions.

When the above statements are evaluated together with the results of the quantitative research, according to the result;

- H1a: The change in institutional commitment caused by the pandemic has varied according to the experiences of the pilots,

hypothesis is supported.

#### Pandemic on Flight Performance

The pandemic has affected almost every sector economically. The aviation industry and pilots are in the group negatively affected by the pandemic. The resulting economic losses have turned into a source of stress for the pilots and mentally occupied their thoughts even in flight.

Regarding the effect of economic concerns on the performance of pilots, P1 stated the following; First *officers were most affected. They have debts both to the company and abroad. Managing that level of stress and waiting for him to come to the cockpit without commercial concerns is very immaterial. Cockpit chats have also changed. "What are we going to do, captain?", "What will it be?" Unspoken topics began to be discussed. The primary reason for motivation is money. It has to be preserved."*

P2, on the other hand, said the following about the economic concerns of the pilots; "*A pilot with debt will force his economic conditions due to the pandemic", "We are not machines, we have feelings. Being economically affected affects people's performance. We work to live. A person who cannot pay his child's school tuition is affected by surgery, even if he is a doctor. Being a pilot is also affected in flight."*

P3; "*In today's conditions, everything revolves around the economy. Affected rates increased from top to bottom, from instructor pilots to inexperienced copilots. It has been a great burden for our friends who have just started to work. During the flight, the person should be mentally comfortable and focus his brain on the flight. This situation caused problems for the friends and I think that this affected their flight performance."* He supported that the economic anxiety experienced by the pilots had an effect on their flight performance.

When the above statements are evaluated together with the quantitative research results, according to the result;

- $H_{1c:}$ The economic effects of the pandemic affected inexperienced pilots more than experienced pilots.
- $H_{1d:}$ The psychological effect caused by the pandemic has affected the performance of the pilots,

hypotheses are supported.

## 4. Conclusion and Recommendations

Safety always comes first in aviation. The architect of this ranking is the fact that the rules in aviation are written in blood. Throughout the history of aviation, the study of accidents has become a culture. The source of this culture is to reveal the factors that cause accidents with all its transparency and to prevent it from causing another accident.

An accident that has occurred is examined in all its details. Not only the aircraft, but also all the data that may have an impact on the accident, such as the human factor, the weather, the history of the aircraft and the pilots, are investigated.

According to the statistics kept in the accidents that have occurred until today, around 70-80% of the accidents are caused by the human factor. The source of a malfunction in the aircraft may actually be a human factor. Accident investigation authorities analyze these factors to reveal the cause of the accident and develop new procedures and rules to prevent the same mistakes. However, this is not exactly a proactive approach. In order to reduce the accidents to zero, it is necessary to take a proactive approach and make risk analyzes to reveal and eliminate the factors that may cause the accident before the accident.

Pilots receive numerous trainings to avoid mistakes. Their attention should be on the work they are doing, their minds should not be preoccupied with matters that do not concern flight. It is obvious that a pilot who had an argument with his wife and came to flight depressed cannot give 100% of his potential to the flight. A pilot who has problems with his economic problems cannot fully focus on the flight. Concerned about the future of his job, a pilot comes to the cockpit for fear of making a mistake. Many more such examples can be cited. In short, the pilots, who form the last link of the safety barrier, must be able to leave all the problems outside the door as soon as they enter the cockpit door. But pilots are a human, not a machine.

Looking at the results, it is possible to divide the effects of the pandemic on the performance of pilots into three. The first of these is the low performance caused by the pilots taking a break from flying, the second is the effect of the pilots' experiences on the rate of being affected by the pandemic, and the third is the effect of the economic and mental conditions brought by the pandemic on the performance of the pilots.

For experienced pilots, the negative effect of the pandemic on flight performance was seen as slight. For a pilot who had enough flight experience before the pandemic and whose mentality was imprinted in his engine memory, it took a few flights to return to his old performance in the cockpit after months of deprivation of flight. However, for a pilot who has just started his flight life, has not seen a winter or summer operation yet, and has not had any experience with abnormal situations, it cannot be said that flying is ingrained in the engine's memory. As a result of the break in the pandemic, the skills of inexperienced pilots have atrophied and they have turned into pilots who start over with each flight. This low performance left the experienced one of the two pilots in the cockpit alone and caused one of the firewalls to be disabled. This situation increases the workload of experienced pilots flying with inexperienced pilots. Therefore, inexperienced first officers can be shown as the most risky group. However, this does not change the fact that all pilots are adversely affected by the pandemic in terms of performance.

It is a fact that the aviation industry enters into crises from time to time and the results of these crises negatively affect the performance of pilots. It has an important place in protecting the performance of pilots, preventing accidents and preventing greater material and moral losses. Measures to be taken can be divided into individual and corporate. As a professional, pilots must keep their lifestyle, economy, know-how and piloting skills ready for the worst-case scenario. He should keep himself ready to minimize the effects of the crisis by foreseeing that a new crisis will come after the end of the crisis. On the other hand, companies should always be in a transparent communication with their personnel in order to reduce the question marks in the minds of their employees in times of crisis. They should present the picture in front of them transparently to the employees so that the pilots can reduce their unknown equations. In addition, it can be a comforting factor for pilots to reduce the economic burden on their personnel by establishing economic funds to be used in times of crisis and to be saved at times of high income. With a proactive approach, increasing the number of simulators available, thus ensuring that pilots maintain their skills can also be considered as a solution. Finally, the civil aviation authorities, by organizing seminars and lectures while the pilots are still in the training stage, and explaining how to prepare for the crises that may occur in the future, based on the past events, will help to be prepared for the crises. In addition, during the selection stages of student pilot candidates, new models can be developed to be used in interviews by targeting the selection of candidates with the capacity to manage such long-term crises. Finally, in order to solve the problems when they are young, the units where the pilots can get psychological support (peering pilot) with peace of mind should be expanded, and the support given should be kept confidential in order for the meetings to be productive and sincere.

Regardless of the conditions, it should not be forgotten that the piloting is a professional occupation, and it is always necessary to go forward by closing the gaps. Aviation culture requires putting safety before all personal and corporate interests. In future studies, it can be considered to investigate the factors that negatively affect the performance of pilots in a professional sense and to carry out studies to eliminate these factors.

## Ethical Approval

This study protocol received ethical approval from Maltepe University's Ethics Committee by the Decision Number 2021/33-13 (2021/12/06).

## Conflicts of Interest

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

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