

Gender Discrimination in the Flight Deck: An Analysis on the Experiences of Ab-initio Pilots

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Abstract

Gender-related issues among pilots are increasingly recognized as a serious, worldwide safety concern. A considerable amount of literature has been published on gender discrimination in commercial aviation and general aviation. However, to the best of authors' knowledge, no research has been found that examined the gender-related issues among ab-initio pilots in Turkey. The aim of this research project has therefore been to investigate the gender discrimination among ab-initio pilots. With consideration in mind, a survey was developed by using previously published two questionnaires in the field of gender-related issues in aviation and conducted to collect data. By the end of the survey period, data had been collected from 104 ab-initio pilots. It has been concluded that female ab-initio pilots face gender discrimination. Furthermore, it has been found that female ab-initio pilots had the need to prove themselves in the workplace. The results of this study provided an understanding on gender-related issues among ab-initio pilots. The findings of this study may provide important implications in the field of crew resource management training for ab-initio pilots and increase overall safety in aviation.

Keywords: Ab-initio pilot, Gender Stereotype, Pilot Training, Human Factors, Gender Discrimination

1. Introduction

Over the past century, there has been a dramatic increase in the number of women in male-dominated industries such as aviation [1]. In the recent decades, women's employment and gender discrimination in aviation have been one of the major interesting research subjects [2]. Gender-related issues among pilots are of great importance [3]. A considerable amount of literature has been published on gender stereotype and gender

discrimination among airline pilots [4]. In 2012, Germain et al. reported that female student pilots face several challenges such as flight instructors, self-efficacy, stereotyping, and lack of acceptance [5]. The experiences of ab-initio pilots in United Kingdom was explored by McCarthy [6]. More recently, Thatchatham and Peetawan examined the perspective of female student pilots in Thai towards gender stereotype in aviation [7] In another study,

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Citation/Alıntı: Kiliç B. (2021). Gender Discrimination in the Flight Deck: An Analysis on the Experiences of Ab-initio Pilots J. Aviat. 5 (1), 45-52.

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DOI: <https://doi.org/10.30518/jav.896067>

Received: 12 March 2021 **Accepted:** 28 June 2021 **Published (Online):** 30 June 2021

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Matthews examined the gender-based attitude toward military pilots [8]. To the best of authors' knowledge, no previous study has investigated the gender discrimination of female ab-initio pilots in Turkey. The aim of this research is to investigate the gender-related issues (e.g., gender discrimination, gender stereotype, and perception of students towards piloting profession) that female ab-initio pilots face.

This paper has been divided into five sections. The first section provides a brief overview. In second section, a literature review is presented. The next section presents the methods used in this work. The fourth section discusses the findings which emerged from statistical analysis. Our conclusions are drawn in the final section.

2. Literature Review

2.1. Gender-related issues

Women faces several challenges (e.g., discriminative attitudes, sexual harassments, and bullying behaviors) in traditionally male-dominated industries such as health care [9], construction [10], management and business [11], sports media [12] and aviation [4]. Gender discrimination is still a significant problem for female employees in aviation [3]. It is claimed that the military culture is accounted for the male domination in aviation [13]. Another significant issue in aviation is the underrepresentation of women [3]. It has been suggested that lack of support and role models result in the underrepresentation of female pilots in aviation [14]. Table 1 highlights the number of worldwide airline female pilots by region. Nowadays, the female airline pilots account for almost 10 percent of airline pilots in the world [15].

There are numerous studies on gender issues in aviation that suggest the difference between male and female pilots with regard to factors such as ability, learning, confidence, communication structure, interpersonal relationships, leadership style, flight performance [2][16]. Flying skills and standards of female pilots may be eroded due to gender-related obstacles such as perception of flight instructors, confronting gender, and sexist remarks and behavior [17][18].

Table 1. The stats of female airline pilots around the World [15]

Region	Total # Pilots	Total # Female Pilots	% Female Pilots
USA	97.285	5182	5.27%
Canada	10433	718	6.78%
Europa	23779	1510	5.61
Russia	2800	62	2.20%
Iceland	640	70	10.90%
Middle East	9789	223	2.05
India	8797	1092	12.41%
Asia	23237	359	1.55%
Australia/ New Zealand	7281	435	5.65%
Africa	1102	95	9.78%
Worldwide	185143	9744	5.26%

It is highly likely that female ab-initio pilots may feel isolated and unsupported when they face gender stereotype and gender discrimination. It has been reported that ab-initio pilots are prone to make failures when they feel stressed [19][20]. Subsequently, it may affect non-technical skills (e.g., decision-making, crew resource management, communication, and stress management) of pilots which is of great importance for flight safety [21][22][23]. Furthermore, student pilots may feel fatigued when they fly with an inconsiderate disrespectful instructor. [24]. It has been shown that poor non-technical skills of pilots contributed to various unwanted occurrences in aviation including navigational errors, incidents, accidents, and near-misses [25][26][27][28]. Based on the issues mentioned above, we posited following hypotheses in three categories that are aimed to tested in this study.

- Category-1: Gender stereotype

H₀: There is no significant difference in gender stereotype experienced by ab-initio pilots between male and female peers.

H₁: There is significant difference in gender stereotype experienced by ab-initio pilots between male and female peers

- Category-2: Gender discrimination

H₀: There is no significant difference in experience of gender discrimination (discriminative attitudes) between male and female ab-initio pilots.

H₁: There is significant difference in experience of gender discrimination (discriminative attitudes) between male and female ab-initio pilots.

- Category-3: The need to prove themselves in the workplace

H₀: There is no significant difference in the need for ab-initio pilots to prove themselves in the workplace between male and female peers

H₁: There is significant difference in the need for ab-initio pilots to prove themselves in the workplace between male and female peers.

3. Method

3.1. Survey

For this study, a novel survey was developed by using previously published two questionnaires in the field of gender-related issues in aviation [4],[18]. The survey is composed of 18 items and organized into 4 subgroups. The first four of the 18 questions were asked demographic information (e.g., age, gender, flying experience, and type of pilot license). The remaining 14 questions were divided into 3 groups and asked to answer on a 5-point Likert-type Scale (1. Strongly Disagree- 5. Strongly Agree). The questions in the first group (Q5,7,8,9,10, and 12) were asked examine the gender stereotype among ab-initio pilots. The second group comprised five questions (Q6, 15,16,17, and 18) which were asked to analyze the experience of gender discrimination of ab-initio pilot. The last group is composed of 3 questions (Q11,13 and 14). The questions in the last group were asked to examine the need to prove themselves (ab-initio pilots) in the workplace.

3.2. Statistical analysis

The test of the hypotheses was carried out by using SPSS 25 (Statistical Package for Social Sciences) The null hypothesis (H₀) and alternative hypothesis (H₁) were used. The descriptive statistics of the responses of the participants are highlighted in Table 3.

For the analysis of the data, in addition to the descriptive statistical methods (frequency, percentage, mean and standard deviation values) the independent sample t-test was employed to analyze the dimension scores according to gender and age of participants, and the analysis of variance test was used to examine the flying hours experience and pilot license type. Sidak binary comparison test was applied to determine the group that caused the difference in results of analysis of variance (ANOVA). The correlation analysis was performed to determine the relationships between the sub-dimensions. P values less than 0.05 were considered significant.

Cronbach's alpha test was performed to test the reliability of 14 expressions and factor analysis was used to determine the consistency. KMO levels, internal consistency, explained variance rates and Tukey summability levels were examined.

4. Findings

4.1. Demographic Findings

The on-line survey was delivered to approximately 300 ab-initio pilots at 5 Turkey-based flight training organizations. 104 ab-initio pilots completed and returned to the survey. The response rate was %35 after two weeks. All ab-initio pilots had at least a valid pilot license (e.g., SPL: student pilot license, PPL: private pilot license, or CPL: commercial pilot license) and most of the participants (65,4%, N=68) had PPL. Of the respondents, 65 (62,5%) were male, 39 (37,5%) were female. In this sample, most respondents (67,3%, N=70) were 17-23 years of age. Relatively few respondents (6,7%, N=7) were older than 30. The demographics of the respondents was demonstrated in Table 2.

4.2. Results

The Cronbach's alpha coefficient was determined as 0.88. The coefficient obtained demonstrated that the scale was quite reliable. As a result of the reliability analysis, it was determined that there were three sub-dimensions as a result of factor analysis in the scale. The Kaiser-Meyer-Olkin (KMO), the sampling adequacy value, was found to be 0.83 which showed that the number of n=104 questionnaires is sufficient to reveal the factor structure. The dimensions obtained were determined as gender stereotype, gender

discrimination, and the need to prove themselves in the workplace. It was determined that the total explained variance rate was 76%. As a result of Barlett's Test, it was seen that the 3 sub-dimensional structures were significant ($p < 0.05$). (Table-1).

Higher dimension scores indicated high levels of gender stereotype, gender discrimination among ab-initio pilots the need to prove themselves (female ab-initio pilots) in the workplace. As a result of the Tukey summability test, it was found that that all expressions in the scale were not collected at a single level and should be examined based on sub-dimensions ($p = 0.21$, $p > 0.05$)

It was observed that the level of gender stereotype among the participants was 3.26 ± 0.67 , the levels of gender discrimination were 3.38 ± 0.71 and the need to prove themselves in the workplace were 2.94 ± 0.94 . (Table-3)

As Table 4 shows there is significant difference in gender stereotype experienced by ab-initio pilots between male ($M = 3.43 \pm 0.63$) and female ab-initio pilots ($M = 2.97 \pm 0.65$) ($p < 0.05$). It demonstrates that for the category-1 the alternative hypothesis (H_1) of was accepted and the null hypothesis (H_0) was rejected.

Table 4 also illustrates that there is significant difference in gender discrimination faced by ab-initio pilots between male ($M = 3.26 \pm 0.70$) and female ab-initio pilots ($M = 3.57 \pm 0.69$) ($p < 0.05$). It demonstrates that for the category-2 the alternative hypothesis (H_1) of was accepted and the null hypothesis (H_0) was rejected.

Furthermore, Table 4 proves that there is significant difference in the need for ab-initio pilots to prove themselves in the workplace between male ($M = 2.75 \pm 0.83$) and female ab-initio pilots ($M = 3.27 \pm 1.03$) ($p < 0.05$). It demonstrates that for the category-3 the alternative hypothesis (H_1) of was accepted and the null hypothesis (H_0) was rejected.

Furthermore, it was found that the age and type of pilot licenses of participants had no positive relationship with sub-dimensions (e.g., gender discrimination, gender stereotype, and the need for ab-initio pilots to prove themselves in the workplace) ($p > 0.05$).

5. Discussion

Most striking finding of this study was that female ab-initio pilots faced negative behavior and attitudes of male peers and flight instructors. It was also suggested that female ab-initio pilots were subject to the gender prejudice. This is well in-line with previous findings [6],[7].

The results of this study show that female ab-initio pilots faced gender discrimination. These results are consistent with Thatchatham's (2020) findings [7].

Another important finding was that there was a need for female ab-initio pilots to prove themselves in the workplace. These findings are well in-line with previous studies [4].

The current findings add to a growing body of literature on the gender discrimination among ab-initio pilots. Furthermore, we believe that our results provide considerable insight into the gender biases and attitudes towards female ab-initio pilots. Based on the results of this study, organizations (e.g., flight training departments of universities and private flight schools) and individuals (e.g., faculty members, flight instructors, and ground course instructors) shall take preventive measures to support the female ab-initio pilots' career planning and development.

6. Conclusions

The purpose of the current study was to examine the gender discrimination among ab-initio pilots. To the best of the authors' knowledge, there have been no reports which investigate the gender-related issues faced by female ab-initio pilots in Turkey.

This study has shown that female ab-initio pilots experienced gender discrimination which may affect negatively their cognitive functions and performance. It was also shown that female ab-initio pilots had the need to prove themselves in the workplace.

This paper provides an exciting opportunity to advance our knowledge of gender discrimination and stereotype among ab-initio pilots. Furthermore, this study will make several noteworthy contributions to the implementations to increase the number of female pilots attracted to career in aviation.

The current study was limited in several ways. First, the response rate was low. The second limitation is the findings might not be representative of ab-initio pilots who pursue a career in military aviation.

Further research might specifically explore flight instructors' perception towards female ab-initio pilots. We are in the process of investigating gender-related challenges of female ab-initio pilots in military aviation.

Organizations (e.g., flight training departments of universities and private flight schools) and individuals (e.g., ground course instructors, academic members of faculties, and flight instructors) should identify the sources of gender discrimination and prejudice to prevent negative stereotyping and discrimination. These subjects should be included into the syllabi of CRM training and human factors training for ab-initio pilots in order to advance flight safety.

Table 1. Reliability and Validity Tests

Questions	Eigenvalue	Sub-dimension	Explained Variance	Reliability	KMO
Q7	0,627				
Q5	0,664				
Q8	0,672	Gender Stereotype	%32	0,81	
Q9	0,721				
Q10	0,685				
Q12	0,691				
Q6	0,471				
Q16	0,506	Gender Discrimination	%28	0,76	0,83
Q15	0,545				
Q18	0,767				
Q17	0,796	The need to prove themselves (female pilots) in the workplace	%16	0,71	
Q14	0,622				
Q11	0,746				
Q13	0,822				

Table 2. Demographic Findings

	Frequency	Percent	Valid Percent	Cumulative Percent
S1-Gender				
Female	39	37,5	37,5	37,5
Male	65	62,5	62,5	100
Total	104	100		
S2-Which of the following categories describes your age?				
17-23	70	67,3	67,3	67,3
24-30	27	26	26	93,3
31 and older	7	6,7	6,7	100
Total	104	100	100	
S3-Holding type of license				
PPL	68	65,4	65,4	65,4
SPL	30	28,8	28,8	94,2
CPL	6	5,8	5,8	100
Total	104	100	100	
S4-How many flying hours experience do you have?				
0-50 hours	44	42,3	42,3	42,3
51-100 hours	35	33,7	33,7	76
101-150 hours	4	3,8	3,8	79,8
151-200 hours	13	12,5	12,5	92,3
More than 200 hours	8	7,7	7,7	100
Total	104	100	100	

Table 3. Examination of the sub-dimensions

Sub-dimensions	X±s.s.
Gender Stereotype	3,26±0,67
Gender Discrimination	3,38±0,71
The need to prove themselves in the workplace	2,94±0,94

Table 4. Examination of factors affecting sub-dimensions

Properties		Gender Stereotype (1)	Gender Discrimination (2)	The need to prove themselves in the workplace (3)	P ₁	P ₂	P ₃
		X±s.s.	X±s.s.	X±s.s.			
Gender	Male	3,43±0,63	3,26±0,70	2,75±0,83	0,01*	0,03*	0,02*
	Female	2,97±0,65	3,57±0,69	3,27±1,03			
Age	17-23	3,24±0,57	3,28±0,63	2,89±0,90	0,75	0,06	0,38
	24>	3,29±0,85	3,58±0,82	3,06±1,02			
Type of license	CPL	3,56±1,23	3,76±1,09	3,00±1,21	0,17	0,23	0,27
	PPL	3,09±0,63	3,29±0,80	3,19±0,85			
	SPL	3,28±0,57	3,36±0,60	2,84±0,93			
Flying hours	0-50	3,13±0,62	3,19±0,72	3,11±0,90	0,14	0,04*	0,28
	51-100	3,28±0,59	3,43±0,58	2,82±0,76			
	101>	3,46±0,81	3,63±0,78	2,81±1,20			

* significant on the level of 0,05

Acknowledgment

The authors gratefully acknowledge student pilots for participating the survey with outstanding professionalism.

Ethical Approval

Prior commencing the study, ethical clearance was obtained from the Özyeğin University’s Human Research Ethics Board (2020/1).

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