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Examining Job Satisfaction and Its Sub-Dimensions in Air Traffic Control

Hava Trafik Kontrolde İş Tatmini ve Alt Boyutlarının İncelenmesi

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Abstract Job satisfaction is a crucial factor that directly affects the performance and job commitment of critical human elements in aviation, such as air traffic controllers. The aim of the study was to examine the job satisfaction levels of controllers along with their sub-factors according to demographic variables. For this purpose, a descriptive survey method was used, and data were collected from 205 controllers through an online questionnaire. Minnesota Satisfaction Questionnaire, based on a 5-point Likert scale, was utilized as the measurement tool. The findings showed that controllers were generally moderately satisfied with their jobs (M= 3.48). The average score for intrinsic satisfaction (M= 3.89) was higher than the overall satisfaction, while the average score for extrinsic satisfaction (M= 2.86) was lower. Additionally, it was found that job satisfaction did not significantly differ by gender, experience, or operational unit, with professional identity emerging as a more dominant factor in determining job satisfaction. Intrinsic satisfaction was achieved through personal meaning and satisfaction related to the profession, whereas extrinsic satisfaction reflected dissatisfaction with factors such as salary, promotion opportunities, and managerial processes. The results highlighted the critical importance of actions aimed at enhancing extrinsic satisfaction for both flight safety and aviation efficiency. It is recommended that future studies consider job satisfaction in conjunction with variables related to stress and organizational processes.

Öz İş tatmini, hava trafik kontrolörleri gibi havacılığın kritik insan unsurlarının performansını ve işe bağlılıklarını doğrudan etkileyen önemli bir faktördür. Çalışmanın amacı, kontrolörlerin iş tatmin düzeylerinin alt faktörleriyle birlikte demografik değişkenlere göre incelenmesidir. Bu amaçla, çalışmada betimsel tarama yöntemi kullanılmış ve çevrimiçi anket yoluyla 205 kontrolörden veri toplanmıştır. Ölçme aracı olarak 5'li Likert derecelendirmesine dayalı Minnesota İş Tatmini Ölçeği kullanılmıştır. Bulgular, kontrolörlerin genel olarak işlerinden orta düzeyde tatmin olduklarını (Ort.= 3.48), iç tatmin (Ort.= 3.89) ortalamasının genel tatminden daha yüksek, dış tatminin (Ort.= 2.86) ise genel tatmin ortalamasından daha düşük olduğunu göstermektedir. Ayrıca, iş tatmininin cinsiyet, tecrübe ve operasyonel birime göre anlamlı bir farklılık göstermediği, mesleki kimliğin iş tatminini belirlemede daha baskın olduğu ortaya çıkmıştır. İç tatmin, kontrolörlerin mesleğe dair kişisel anlam ve tatmin boyutlarında sağlanmakta; dış tatmin ise ücret, terfi imkanları ve yönetimsel süreçler gibi faktörlerden memnuniyetsizliği yansıtmaktadır. Sonuçlar, dış tatmini artırıcı eylemlerin hem uçuş emniyeti hem de havacılık verimliliği açısından kritik olduğunu vurgulamaktadır. Gelecekteki çalışmalarda iş tatmini, stres ve örgütsel süreçlere ilişkin değişkenlerin birlikte ele alınmasını önerilmektedir.

Keywords Air traffic controller · aviation · job satisfaction · flow experience

Anahtar Kelimeler Havacılık · hava trafik kontrolörü · iş tatmini · akış deneyimi

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Examining Job Satisfaction and Its Sub-Dimensions in Air Traffic Control

Job satisfaction refers to the feeling of contentment employees have towards their jobs. It can be defined as the extent to which the expectations of individuals are met by the rewards and opportunities afforded to them by their roles (Azash & Thirupalu, 2017). Job satisfaction positively impacts employee performance (Bryson et al., 2017; Latif et al., 2013). Organizational support, a positive organizational culture, and effective management policies significantly enhance job satisfaction (Akkoç et al., 2012). The critical factors determining job satisfaction include job security (Hur, 2022; Raza et al., 2015), career prospects (Lydon & Chevalier, 2002), and salary (Groot & Brink, 1999). A high level of job satisfaction contributes to greater job commitment (Swarnalatha & Prasanna, 2012; Vorina et al., 2017; Yalabik et al., 2017), improved performance (Petty et al., 1984; Wood et al., 2012), and more positive workplace atmosphere (Kasemsap, 2017; Satuf et al., 2018).

Job satisfaction consists of two primary components: intrinsic satisfaction and extrinsic satisfaction. Intrinsic satisfaction is based on the personal meaning created by the job, reflecting situations where individuals feel their work is meaningful and valuable. It encompasses satisfaction related to the job content and personal development. Extrinsic satisfaction, on the other hand, relates to material and social rewards, such as salary, promotions, and job security (Herzberg et al., 1959).

Air traffic controllers play a pivotal role in the management of airspace, with the responsibility of ensuring the safe and orderly operation of flights. It is the responsibility of these professionals to ensure the safety and efficiency of flight operations. The job satisfaction of air traffic controllers is directly correlated with the safety of flights and the overall efficiency of the aviation industry. Those controllers who are more satisfied in their roles tend to demonstrate greater focus and performance (Kuang et al., 2019). A number of studies have demonstrated a correlation between high job satisfaction and reduced stress levels (George et al., 2018; Rachman, 2021; Shin & Jung, 2014) as well as a reduction in turnover intentions (Vermeir et al., 2017; Wazir & Jan, 2020). Furthermore, research on air traffic controllers indicated that job satisfaction plays a mediating role in the relationship between job stress and turnover intention. It was found that higher job stress levels are associated with lower job satisfaction, which in turn increases the likelihood of turnover among controllers (Jou et al., 2013).

A high level of job satisfaction among air traffic controllers is associated with a reduction in stress exposure, which in turn supports the retention of experienced personnel and contributes to the safety of flight operations. Furthermore, it encourages collaborative work among controllers, thereby facilitating effective workload management (Kuang et al., 2019). A positive correlation has been identified between job satisfaction and the occurrence of psychiatric symptoms among air traffic controllers (Kavanagh et al., 1981). Conversely, low job satisfaction has been demonstrated to have a detrimental impact on the performance of controllers, leading to diminished motivation, increased stress levels, and heightened turnover intentions (Kuo et al., 2012). An increase in stress levels has been demonstrated to result in errors in air traffic control (Feng & Luo, 2013; Zhang et al., 2019). The potential consequences of low job satisfaction for air traffic controllers include the possibility of incorrect decisions being made in critical situations, which could ultimately compromise flight safety. It is, therefore, evident that enhancing job satisfaction among air traffic controllers is of paramount importance for the safety of flights and the overall efficiency of the aviation industry. In order to enhance job satisfaction, it is critical to optimize working conditions, achieve a balanced workload, and facilitate enhanced professional development opportunities (Davidescu et al., 2020). Such improvements can enhance job satisfaction, thereby improving the performance of controllers, flight safety, and efficiency.

A review of the literature revealed a limited number of studies that have undertaken a comprehensive examination of the job satisfaction levels of air traffic controllers. It is notable that there is a significant gap in the existing literature, particularly with regard to comprehensive analyses of job satisfaction levels. This gap in the literature highlights the need for a comprehensive investigation into the job satisfaction of air traffic controllers.

The aim of the study is to examine the job satisfaction levels air traffic controllers in detail, considering demographic variables. The study focuses on determining the job satisfaction levels of controllers to contribute to the existing literature and address knowledge gaps in the field. This research aims to provide valuable insights into understanding job satisfaction levels and expanding the data on this subject. Furthermore, it offers critical information to understand better the impact of job satisfaction on air traffic control and the overall workplace atmosphere.

Methodology

This study used a descriptive survey model to assess the job satisfaction levels of air traffic controllers (ATCs). The descriptive survey model is designed to describe a situation as it exists, either in the past or present, and includes all processes used to facilitate learning and the development of desired behaviors. In this model, an examination is conducted on either the entire population or a representative sample to form a general conclusion about the population (Karasar, 2011).

Objective

The aim of the study was to analyze the job satisfaction levels of air traffic controllers, including their sub-dimensions, in relation to various demographic variables. Demographic variables such as age, gender, experience, and operational unit were considered to understand their impact on job satisfaction.

Problem Statement

The problem statement of this study was: “To what extent do job satisfaction levels of air traffic controllers, including their intrinsic and extrinsic dimensions, occur, and do these levels vary according to demographic variables?”

Sample

The study population consisted of air traffic controllers working at airports and air traffic control units across Türkiye. An online survey was conducted between the days of 1 - 12 August 2024, in which 1,902 members of the Türkiye Air Traffic Controllers Association (TATCA) were invited to participate. A total of 205 responses were collected. Data privacy measures were implemented, and responses were anonymized to maintain confidentiality. The online method was chosen to facilitate rapid data collection from diverse locations and to enhance participation rates (Teo, 2013). For this known population ($n > 1{,}000$), a sample size of ($n > 200$) was deemed sufficient, with a 95% confidence level and a ±5% margin of error (Krejcie & Morgan, 1970; Yamane, 1967).

Data Collection Tool

Minnesota Satisfaction Questionnaire (MSQ) was utilized to measure job satisfaction levels among ATCs. This tool, developed by Weiss et al. (1967) and adapted into Turkish by Baycan (1985), includes 20 items designed to assess overall job satisfaction. Twelve items measure intrinsic satisfaction, such as achievement, recognition, the nature of the job, and opportunities for advancement. Eight items measure extrinsic satisfaction, including organizational policies, supervision, relationships with supervisors, colleagues, and

working conditions. The scale utilizes a 5-point Likert format, allowing participants to choose from the following five options: 1- Completely dissatisfied, 2- Dissatisfied, 3- Neutral, 4- Satisfied, and 5- Completely satisfied.

Ethical Approval

Ethical approval for the research was obtained (International Science and Technology University, July 30, 2024/202407-02). Participants were informed that their participation was voluntary and that their responses would remain confidential.

Findings

Demographic Findings

Based on the demographic information presented in Table 1, it was found that the 205 air traffic controllers who participated in the study consisted of 62.93% males and 37.07% females. The distribution of participants based on their years of experience was as follows: 20.98% had less than five years of experience, 20.49% had between six and ten years, another 20.49% had between 11 and 15 years, 18.04% had between 16 and 20 years, and 20.00% had more than 20 years of experience. With regard to operational units, it was established that 33.17% of the participants were working in the Aerodrome Control Tower (TWR), 25.85% in the Approach Control Unit (APP), and 40.98% in the Area Control Centre (ACC).

This diverse demographic composition was considered to provide a comprehensive basis for analyzing how different factors might influence job satisfaction among air traffic controllers. The inclusion of controllers with varying levels of experience and from different operational units was seen as offering valuable insights into the specific challenges and satisfaction drivers within each group. Consequently, the study was positioned to identify specific needs and preferences to enhance overall job satisfaction and performance in the field of air traffic control.

Table 1

Demographic Information

		n	%
Gender	Female	76	37.07
	Male	129	62.93
Experience	< 5 years	43	20.98
	6-10 years	42	20.49
	11-15 years	42	20.49
	16-20 years	37	18.04
	> 20 years	41	20.00
Unit	Aerodrome control tower (TWR)	68	33.17
	Approach control unit (APP)	53	25.85
	Area control center (ACC)	84	40.98
Total		205	100.00

Job Satisfaction (JS) Findings

Kaiser-Meyer-Olkin (KMO) value was found to be 0.838, with a p-value for Bartlett's test of sphericity of 0.000 (χ^2 = 1707.510; df = 190; $p < 0.001$), indicating that the scale items were suitable for factor analysis. The factor loadings ranged from 0.380 to 0.900, and the Cronbach's Alpha value was found to be 0.886, indicating an

acceptable level of internal consistency. The normality test confirmed that the assumption of normality was met, as evidenced by the findings of George and Mallery (2003) and Tabachnick and Fidell (2019).

As shown in Table 2, the overall job satisfaction score for air traffic controllers was 3.4751 (SD = 0.56563). The mean score for intrinsic factors was 3.8662 (SD = .58449), while the mean score for extrinsic factors was 2.8585 (SD = .65943). These findings indicated that the job satisfaction of controllers was generally moderate, with intrinsic factors rated higher than extrinsic factors.

Table 2

ATC JS and Sub-factors

	Mean	Sd.
Job satisfaction	3.4751	.56563
Intrinsic Factors	3.8862	.58449
Extrinsic Factors	2.8585	.65943

As shown in Table 3, the mean job satisfaction score for female controllers was 3.4355, while the mean score for male controllers was 3.4984. The results of the t-test indicated that there was no statistically significant difference between the genders (t = -.708, p = .481). With regard to intrinsic factors, the mean score was 3.8092 for females and 3.9315 for males (t = −1.338, p = .184). No significant difference was identified in extrinsic factors either (t = .260, p = .795). These findings suggest that job satisfaction and its constituent factors are comparable between genders.

Table 3

ATC JS Findings Based on Gender (t-test)

	Gender	Mean	Sd.	t	df	p
JS	Female	3.4355	.67862	-.708	121.158	.481
	Male	3.4984	.48846			
Intrinsic Factors	Female	3.8092	.69693	−1.338	121.621	.184
	Male	3.9315	.50426			
Extrinsic Factors	Female	2.8750	.74442	.260	133.229	.795
	Male	2.8488	.60670			

As shown in Table 4, the analysis of job satisfaction based on years of experience showed no significant differences among experience groups (F = .159, p = .959). Intrinsic satisfaction factors were also not significantly affected by the duration of experience (F = .805, p = .523). Similar results were observed for extrinsic satisfaction factors (F = .701, p = .592). These findings indicated that job satisfaction levels did not vary based on years of experience.

Table 4

ATC JS Findings Based on Experience (ANOVA)

		Mean	Sd.	F	p	Dif.
JS	< 5 years	3.4512	.51019	.159	.959	-
	6-10 years	3.4833	.59630			
	11-15 years	3.4929	.60502			
	16-20 years	3.5230	.59285			
	> 20 years	3.4305	.54519			
Intrinsic Factors	< 5 years	3.8740	.54048	.805	.523	-
	6-10 years	3.9563	.59219			

		Mean	Sd.	F	p	Dif.
	11-15 years	3.9504	.63199			
	16-20 years	3.8941	.60847			
	> 20 years	3.7541	.55307			
Extrinsic Factors	< 5 years	2.8169	.55457	.701	.592	-
	6-10 years	2.7738	.73056			
	11-15 years	2.8065	.67974			
	16-20 years	2.9662	.66969			
	> 20 years	2.9451	.66324			

As shown in Table 5, the analysis revealed no statistically significant differences in job satisfaction scores between the units where controllers worked (F = .263, p = .769). Similarly, no significant differences were observed between units for intrinsic satisfaction factors (F = .633, p = .532) and extrinsic satisfaction factors (F = .244, p = .784). These results indicated that job satisfaction and its sub-factors were not influenced by the unit of operation.

Table 5

ATC JS Findings Based on Unit (ANOVA)

		Mean	Sd.	F	p	Dif.
JS	Aerodrome control tower (TWR)	3.4485	.54403	.263	.769	-
	Approach control unit (APP)	3.4547	.53334			
	Area control center (ACC)	3.5095	.60597			
Intrinsic Factors	Aerodrome control tower (TWR)	3.8701	.58242	.633	.532	-
	Approach control unit (APP)	3.8255	.54652			
	Area control center (ACC)	3.9375	.61112			
Extrinsic Factors	Aerodrome control tower (TWR)	2.8162	.64083	.244	.784	-
	Approach control unit (APP)	2.8986	.63410			
	Area control center (ACC)	2.8676	.69485			

Discussion

The levels of job satisfaction among air traffic controllers were assessed using the Minnesota Satisfaction Questionnaire in the study. The findings indicated that the overall level of job satisfaction was moderate. Notably, intrinsic satisfaction was observed to be higher than extrinsic satisfaction. This finding indicates that air traffic controllers derived greater satisfaction from intrinsic aspects of their roles, such as personal fulfillment and motivation related to their tasks. In contrast, their satisfaction with extrinsic factors, including salary, promotion opportunities, and managerial support, was relatively low.

The high intrinsic satisfaction observed was attributed to factors such as the opportunity for independent work, the sense of conscientious responsibility, and opportunities for personal development. However, the inherent stress associated with the profession was identified as a factor that negatively affected overall job satisfaction (Borghini et al., 2020; Finkelman & Kirschner, 1980; Shouksmith & Taylor, 1997). A significant negative correlation is observed between job stress and job satisfaction among controllers (Iqbal & Waseem, 2012). The effective management of stress may play a pivotal role in enhancing intrinsic satisfaction. The capacity of controllers to identify personal meaning in their work and align with individual elements of their role contributes to this intrinsic satisfaction. Prior studies have indicated that air traffic controllers

frequently exhibit higher levels of motivation and commitment compared to other professions due to the demanding nature of their work (Irving et al., 1997).

The concept of flow, as developed by Mihaly Csikszentmihalyi, provides an explanation for the high level of intrinsic satisfaction experienced by controllers. Flow theory describes the intense focus, sense of control, and loss of time experienced during activities where skills are matched with challenges (Csikszentmihalyi, 1990). The nature of air traffic control, which requires high responsibility, constant attention, and rapid decision-making, may facilitate a flow state, which in turn may lead to high job satisfaction. Controllers engaged in flow experience deep meaning and satisfaction from their work, which can contribute to long-term professional commitment and intrinsic job satisfaction (Csikszentmihalyi, 1998; Eisenberger et al., 2005).

The relatively low level of extrinsic satisfaction in comparison to the overall scale average indicates that the expectations of controllers regarding external job factors were not fully met. This indicates the necessity for improvements in areas such as salary, promotion opportunities, and managerial support. The existing literature frequently highlights the impact of salary and promotion opportunities on employee satisfaction (Pandey & Asthana, 2017). Inadequate salaries or limited promotion opportunities have been demonstrated to have a negative impact on motivation and overall satisfaction (Butt et al., 2015; Hee et al., 2018). To enhance job satisfaction among controllers, organizations should prioritize the improvement of external factors. Updating salary policies, expanding career development opportunities, and establishing transparent and supportive managerial processes are essential steps in this direction.

The study also revealed no significant differences in job satisfaction based on gender, experience, or operational unit. This finding aligns with existing literature, which suggests that demographic factors such as gender, age, and working experience do not have significant effects on job satisfaction (Beyene & Gituma, 2017). This indicates that the professional identity of air traffic controllers is a more dominant factor in determining job satisfaction, independent of individual demographic or professional characteristics. The emphasis on professional standards, such as independent work, responsibility, and personal development, appears to mitigate the impact of external factors like gender or operational unit. These findings highlight that the high level of professionalism and intrinsic satisfaction among air traffic controllers are key determinants of their job satisfaction.

Conclusion

This study provides valuable insights into job satisfaction among air traffic controllers. It highlights that while intrinsic satisfaction factors are vital, there is a pressing need to improve extrinsic satisfaction factors. Work conditions, management policies, career advancement opportunities, job stress, and salary are fundamental determinants of job satisfaction. Enhancing these factors is crucial for increasing employee satisfaction and organizational commitment. It is recommended that organizations make salaries competitive, provide clear and fair career development opportunities, improve working conditions, and implement support programs for stress management. Such improvements are expected to boost overall job satisfaction among controllers and positively influence their professional performance and organizational commitment. Furthermore, the impact of job satisfaction on overall performance in the aviation sector should be acknowledged. Future research should explore job satisfaction in conjunction with stress and organizational processes, as this is essential for enhancing sector efficiency and ensuring employee satisfaction.

The findings of this study are based on the current working conditions and experiences of air traffic controllers. It should be noted that job satisfaction levels are directly related to factors such as workload, stress levels, and managerial support. Since the study reflects the professional and working conditions of

controllers at the time of the research, the results may change over time. In future studies, the consistency of these findings could be better assessed through long-term research conducted across different time periods.

Ethics Committee Approval	Ethical approval for the research was obtained (International Science and Technology University, July 30, 2024/202407-02).
Informed Consent	Participants were informed that their participation was voluntary and that their responses would remain confidential.
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