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# Flying Towards Equality: The Role of Female Employees in Enhancing Airline Performance

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## Abstract

This study empirically investigates the impact of the proportion of female employees on firm performance in the airline industry. Panel data analysis was conducted using data from 25 globally operating airline companies for the period from 2019 to 2023. The primary objective of the study is to measure the effect of the proportion of female employees (EMPFEM) on the profitability of airline companies. In this context, EMPFEM is identified as the main independent variable, while profitability performance is evaluated through three key dependent variables: return on assets (ROA), return on equity (ROE), and return on sales (ROS). The analysis results reveal that EMPFEM has a positive and statistically significant effect on ROA and ROS, while no significant relationship was found with ROE. These findings suggest that gender diversity can be a strategic factor enhancing performance of the airline companies. The study is evaluated within the frameworks of the resource-based view and corporate social responsibility perspectives, highlighting that diversity policies may contribute to financial performance. The results indicate that increasing female employment is important not only from a gender equality standpoint but also in terms of sustainable profitability and competitive advantage in the airline industry.

## 1. Introduction

Global air transport demand is expected to more than double over the next two decades. The International Air Transport Association's (IATA) projection report demonstrates that the number of passengers will increase at an average annual growth rate of 3.7% during this period (IATA, 2024). This growth will naturally lead to a significant increase in employment demand within the sector. Moreover, according to predictions by the International Civil Aviation Organization (ICAO), over the coming years, there will be a need for more than 350,000 new pilots and over 480,000 maintenance technicians (ICAO, 2025). This growth trend facing the sector is increasing the need for multidisciplinary and highly skilled human resources not only for technical positions but also in areas such as ground services, digitalization, sustainability, customer experience, and management. This rapid growth and increasing employment needs make the resolution of diversity and gender equality issues, already on the agenda in the aviation sector, even more urgent (Ferla & Graham, 2019; Lutte & Morrison, 2022; McCarthy et al., 2015).

Women's participation in the workforce has increased significantly worldwide in the 20th century. However, the representation of women in both leadership and operational roles in the aviation sector remains low. This situation forms the basis for criticism of the lack of diversity and gender equality in the sector (Corazza, 2024). International data reveals that the proportion of women in flight crews and maintenance personnel remains in single digits. For example, according to ICAO, as of 2021, only 4.7% of commercial pilots worldwide were women. Additionally, 3.1% of maintenance engineers and 21.1% of air traffic controllers are women (IATA, 2024).

The inadequate representation of women in the aviation sector negatively affects both the sectoral growth potential and the financial and operational performance of airline companies. The low participation of women, especially in technical staff and senior management, causes the synergy provided by innovative perspectives and diversity to be missed (Ferla & Graham, 2019). Therefore, global initiatives aimed at increasing and supporting diversity in the sector need to be expanded. Initiatives such as the "25by2025" campaign launched by IATA play an important role by supporting the goal of increasing the proportion of women in the sector (IATA, 2023). The effective implementation of such policies will directly contribute to the sustainable growth and competitiveness of the aviation sector.

This study focuses on an important research area, given that the impact of the proportion of female employees in the airline industry on business performance has not yet been fully understood. In this context, the aim of the study is to empirically demonstrate the effect of the proportion of female employees on the profitability of airline companies. As a method, a comprehensive panel data analysis will be conducted on a panel data set consisting of annual data of 25

global airlines between 2019 and 2023. Thus, the effect of gender balance on performance indicators will be examined using statistical models that simultaneously evaluate both time and airline company differences.

In this context, the research question that the study seeks to answer is as follows:

RQ: Does the share of female employees of airline companies have a significant impact on the airlines' profitability?

To address this research question, the study employs a panel data analysis covering 25 international airlines over the 2019–2023 period. The female employee ratio is taken as the main explanatory variable, while profitability is measured through three indicators: return on assets (ROA), return on equity (ROE), and return on sales (ROS). By integrating both cross-sectional and time-series dimensions, the research design allows for a robust examination of the relationship between gender diversity and airline profitability.

This study contributes to the literature and the industry in multiple ways. First, it jointly models key profitability indicators within a single panel-data framework, offering a holistic view of firm performance. Second, it introduces a harmonized, cross-national dataset and comparative analysis across 25 international airlines, enabling policy-relevant inference beyond single-carrier or single-country studies. In practice, this study demonstrates the critical role that the female workforce can play in addressing the hundreds of thousands of qualified personnel shortages that ICAO will face in the coming years, supported by numerical data. It also supports IATA's diversity goals, such as "25by2025," with concrete business justifications. In addition, it guides airline managers to better understand the impact of the female employee ratio on business performance and provides regulatory institutions with insights on how incentive policies focused on gender balance can be shaped based on efficiency. Thus, the study adds original empirical findings to academic discussions and offers an action plan that is directly applicable to the industry.

In the following sections, first, the literature on the relationship between gender balance and business performance will be examined in detail. Then, the research design (data set, performance indicators and panel data methods) will be explained in detail. This will be followed by the presentation and discussion of empirical findings in light of the dynamics of the global airline industry. The final section will summarize the main results, discuss theoretical and managerial implications, and provide suggestions for future research.

## 2. Literature Review

This section examines the existing academic literature addressing the relationship between gender diversity and business performance in the airline industry. The literature generally consists of studies that explore the relationship between the proportion of female employees in businesses and their financial and operational performance. A significant portion of these studies indicate that increasing gender diversity in businesses has positive effects on financial results.

### 2.1. Female Employment in the Airline Industry

The aviation industry has historically been a male-dominated industry, and the percentage of female employees has remained at very low levels for many years. Particularly in operational and leadership roles such as pilots, technicians and senior managers, female representation has been extremely limited. As of 2021, only 4.7% of commercial airline pilots worldwide are women. In addition, 3.1% of aircraft maintenance technicians and 21.1% of air traffic controllers are women. A similar picture is observed regionally; for example, while the female pilot ratio in the US remains around 5%, it is around 4–5% in the UK. In contrast, India has managed to increase the female pilot ratio in civil aviation to 12–14%, reaching the highest share in the world in this field. While women constitute the majority in cabin crew positions, the representation of women in technical positions such as pilots and maintenance engineers is still in single-digit percentages. Although there have been partial improvements in recent years (e.g., the proportion of female pilots in the USA increased from 5.6% to 8.2% between 2018 and 2023), the growth in female employment in the sector has been very slow (IATA, 2024).

The picture is similar when looking at the representation of women in managerial and leadership positions in the aviation sector. Approximately one-fifth of senior management positions in global airline companies are held by women. For example, as of 2021, the proportion of women in senior management positions in airline companies was 23% in North America, 18% in Europe, and 15% in Asia-Pacific (Statista, 2021; Suau-Sanchez et al., 2025). When IATA's 25by2025 initiative was launched, only three CEOs were women among its more than 290 member airlines, and it was estimated that only 19% of senior roles were held by women. These figures demonstrate the gender gap in aviation and the urgent need for action to reduce inequality in a meaningful timeframe (IATA, 2024). When looking at overall employment rates, it is seen that the share of women in the total workforce of airline companies can be relatively high in some regions. For example, women constitute 42% of employees in the aviation sector across the European Union. This general ratio does not mean that the imbalances in roles mentioned above have been eliminated. While women are more concentrated in areas such as ground services, customer services, or cabin crew in the sector, the majority of men continue to be in piloting, maintenance-technical, flight operations, and senior management positions (Corazza, 2024). Despite various efforts to change this situation, the aviation sector still faces a significant gender imbalance (Costa et al., 2020; Durbin et al., 2016; Ferla & Graham, 2019; McCarthy et al., 2015). The importance of efforts to increase women's employment in the sector in terms of both equality and corporate performance is increasingly understood (Sengur, 2025).

### 2.2. The Relationship Between Female Employment and Business Performance

There are numerous studies in the academic literature examining the relationship between the proportion of female employees in businesses and financial and operational performance. A significant portion of these studies reveal that increasing gender diversity in businesses has positive and significant effects on financial results. For example, Post and Byron's (2015) meta-analysis of 140 empirical studies reveal that financial indicators increase significantly as the proportion of women on boards of directors rises. The study is based on a broad literature review examining the relationship between female representation on boards and the financial performance of businesses. The results from these 140 studies were statistically combined to examine whether they varied according to the legal, regulatory, and socio-cultural contexts of businesses. The findings suggest that female representation

on boards of directors is positively related to financial returns and that this relationship is stronger in countries with stronger shareholder protection. Similarly, Conyon and He (2017) using quantile regression method examined the relationship between corporate performance and board gender diversity. Based on annual data from moreover than 3000 US companies between 2007 and 2014, this study confirms that the presence of women on the board of directors has a positive effect on corporate performance and that this effect varies across different segments of the performance distribution. Quantile regression results revealed that female directors have a greater positive effect in high-performing companies compared to low-performing companies. The study emphasized that the effect of board gender diversity is not homogeneous as assumed in previous studies. Morever, Reguera-Alvarado et al. (2017), which focuses on Spain, examined the relationship between board gender diversity and the economic performance of businesses. The study is based on a sample of 125 non-financial companies listed on the Madrid Stock Exchange between 2005 and 2009. The findings highlight that the mandatory quota regulation implemented in Spain increased the number of female directors by approximately 98% and that the increase in the rate of female directors positively affected the economic performance of businesses. In addition, it was stated that regulatory interventions that ensure gender balance can be not only an ethical requirement but also a value-creating governance mechanism.

In a global study, Noland et al. (2016) analyzed a dataset of 21,980 companies from 91 countries and showed that the presence of women in senior management is positively correlated with firm profitability. This study revealed that the presence of women in senior management is correlated with increases in firms' financial performance (e.g., return on assets). It is emphasized that this positive correlation could stem from productivity gains resulting from reducing workplace discrimination or from the diversity of skills that women managers bring to the company.

The academic literature examining the relationship between the rate of female employees in businesses and financial and operational performance goes beyond the representation of women in management positions and addresses the effects of spreading gender diversity throughout businesses. In addition to the findings on the positive effects of diversity in management ranks, there are studies indicating that the overall rate of female employees can also contribute to business performance. For example, Laskar et al. (2024) investigated the impact of gender diversity at both board and workforce levels on business performance in the Indian context. The study is based on annual data of 200 companies listed on the Bombay Stock Exchange for the period 2012-2019. The panel data analysis conducted by the authors on 200 companies indicates that gender diversity at both board and workforce levels statistically significantly improves business performance.

In the context of Japan, Kodama's (2016) study analyzed the correlation between the female workforce ratio and business performance. He argued that existing studies indicate a positive correlation between the level of female employment and business performance. However, he also emphasized that this does not mean a direct causality between the increasing female workforce and high corporate performance. Therefore, he argued that in order to increase performance, businesses should not only increase female employment but also implement structural transformations such as flexible working hours, work-life balance initiatives and inclusive corporate culture. Some studies in the literature have also reached conclusions that the relationship between the female workforce ratio and financial performance may not be positive. For example, in their study of 159 businesses in France, Ferrary and Deo (2019) found that profit margins peaked in businesses where the female ratio reached 40–60% in middle managers and general staff, but performance relatively declined when the female ratio was lower or higher than this band. This finding reveal that the level of gender diversity should be in perfect balance and that the best performance can be achieved with this balance. Therefore, the goal for businesses should not only be to increase the number of female employees, but also to ensure a balanced gender distribution.

Similarly, sector-based studies on public enterprises provide important insights into the relationship between female representation and performance. For example, Moreno-Enguix et al. (2025) analyzed Spanish state-owned enterprises using panel data for the 2014–2021 period and found that the presence of female board members positively impacted financial performance. However, this effect became apparent when female representation exceeded a certain threshold, consistent with Rosabeth Moss Kanter's classic "critical mass" theory. The study concluded that a certain number of female board members (e.g., three or more) had a significant positive impact on profitability, but that female presence in companies with a single female board member did not produce a statistically significant difference.

### 2.3. Gender Diversity Studies in the Airline Sector

Studies examining the relationship between female employment and business performance in the airline sector are limited in number compared to the general management literature. However, significant research has been conducted in this area in recent years. Suau-Sanchez et al. (2025) investigated the impact of gender diversity at the board and executive levels on productivity using data from 45 global airline companies for the period 2019-2022. For this purpose, they analyzed a dataset of airlines from different continents. They used a Network Data Envelopment Analysis (DEA) to evaluate the performance of airlines regarding gender diversity in board and executive roles. The analysis results highlight that airline with greater gender diversity in their boards and executive teams in the pre- and post-COVID-19 periods exhibited higher productivity.

Lu et al. (2025) demonstrates that the proportion of women on boards of directors plays an important role in their research covering 40 international airline companies. The research examined the moderating role of board gender diversity in the relationship between environmental and business performance in the airline industry. The findings revealed that the positive relationship between environmental performance and profitability was stronger and more significant in businesses with high female representation. In addition, a biplot analysis was conducted to determine the advantages and disadvantages of airlines according to their efficiency. The findings obtained from the analysis of 40 airlines indicate that environmental performance has a more significant effect on profitability than operational efficiency. In addition, it was understood that relational capital does not always improve the relationship between environmental and business performance. It was concluded that it moderates the relationship between environmental performance and profitability/efficiency in businesses with high board gender diversity. Corazza (2024) investigated the benefits of increasing female representation in the aviation sector for airline companies. Scenarios adapted from various industries were applied to aviation and subjected

to multiple analyses. The study examined the gender pay gap, assessed the existing gender imbalance, and explored how addressing these issues could contribute to the sustainability and operational success of the sector. The results indicate that increased female participation in air transport operations leads to improvements in both financial performance and operational efficiency. Moreover, Abdi and Mohammadi (2025) examined the impact of board diversity on environmental, social and governance (ESG) performance of airline companies. The study is based on data from 34 international airline companies. The findings revealed various correlations between different variables. First, it was demonstrated that increasing the number of female directors can positively affect ESG performance. Second, it was found that the environmental performance of airlines can be improved with the presence of a special corporate social responsibility (CSR) committee. The study also examined the differences between traditional and low-cost airlines, emphasizing the role of strategic ownership in board effectiveness. These findings indicate the importance of board diversity and strategic ownership in the airline industry.

The studies summarized above reveal that female representation in both general businesses and the airline industry generally has positive and significant effects on financial, operational and ESG indicators. However, it is seen that the majority of the existing literature focuses on a single performance dimension and limited geographical samples or cross-sectional designs. In particular, studies examining the female employee ratio and business profitability indicators within a panel data framework and over multiple years are extremely limited. Therefore, studies that examine this relationship holistically through a longitudinal panel data analysis covering global airline companies indicate an important gap in the literature. This study aims to fill this gap and empirically evaluate the impact of female employment on airline performance by simultaneously addressing differences across time and indicators.

## 3. Data and Methodology

In this study, the female employee ratio and financial data of 25 airlines operating on a global scale for the period 2019–2023 were examined through panel data analysis. The data were obtained from Refinitiv Eikon. The female employee ratio was taken from the annual reports of the airlines. In order to measure the effect of the female employee ratio on profitability in the study, the return on assets (ROA), return on equity (ROE) and return on sales (ROS) variables related to the profitability of the airlines were used as dependent variables. These variables are the most commonly used variables in the literature to measure profitability. The female employment ratio was used as the independent variable by determining the female employee ratio in the total number of employees for each airline. Asset turnover ratio, tangibility ratio, cash ratio, long-term debt ratio, market leverage ratio and asset per employee were used as control variables in the study. The financial data used in the study can be obtained from the Refinitiv Eikon database. The female employee ratio was obtained by examining the annual reports of the airlines by the researchers. Table 1 shows the details of the dependent, explanatory and control variables used in the study.

**Table 1.** Summary of variables and measurement

| Variable | | Formula / Definition | Explanation |
|---|---|---|---|
| Dependent Variable | ROA | Net Income / Total Assets | Indicates how efficiently a company uses its assets to generate profit. |
| | ROE | Net Income / Stockholders' Equity | Shows the return generated on shareholders' investments. |
| | ROS | Operating Profit / Revenue | Measures profitability in terms of sales efficiency. |
| Independent Variable | EMPFEM | Female Employees / Total Employees | Represents the share of female employees in the workforce, the main explanatory variable of the study. |
| Control Variable | TATO | Net Sales / Total Assets | Reflects how effectively a company uses its assets to generate sales. |
| | TANGTC | Tangible Assets / Total Assets | Indicates the proportion of physical assets, showing the capital intensity of the firm. |
| | CASH | Cash and Equivalents / Total Assets | A measure of liquidity, showing the firm's ability to cover obligations with available cash. |
| | LTDTA | Long-Term Debt / Total Assets | Indicates leverage by showing how much of the firm's assets are financed by long-term debt. |
| | MVOI | Market Value of Equity / Total Debt | Reflects the relationship between market capitalization and debt, showing financial stability and investor confidence. |
| | TAEMP | Total Assets / Number of Employees | Captures capital intensity per employee, reflecting workforce productivity and asset utilization. |

In the study, three research models were created where return on assets (ROA), return on equity (ROE), and return on sales (ROS) are the dependent variables. The research models in this study are as follows.

$$ROA_{it} = \beta_0 + \beta_1 EMPFEM_{it} + \beta_2 TATO_{it} + \beta_3 TANGGTC_{it} + \beta_4 CASH_{it} + \beta_5 LTDTA_{it} + \beta_6 MVOI_{it} + \beta_7 TAEMP_{it} + \varepsilon_{it} \quad (1.1)$$

$$ROE_{it} = \beta_0 + \beta_1 EMPFEM_{it} + \beta_2 TATO_{it} + \beta_3 TANGGTC_{it} + \beta_4 CASH_{it} + \beta_5 LTDTA_{it} + \beta_6 MVOI_{it} + \beta_7 TAEMP_{it} + \varepsilon_{it} \quad (1.2)$$

$$ROS_{it} = \beta_0 + \beta_1 EMPFEM_{it} + \beta_2 TATO_{it} + \beta_3 TANGGTC_{it} + \beta_4 CASH_{it} + \beta_5 LTDTA_{it} + \beta_6 MVOI_{it} + \beta_7 TAEMP_{it} + \varepsilon_{it} \quad (1.3)$$

Panel data analysis is widely used to estimate economic and financial relationships by employing models constructed with cross-sectional data observed over time (Yerdelen Tatoğlu, 2012). Panel data combines the advantages of both time series and cross-sectional analyses. As a result, panel data analysis yields a larger number of observations than either time series or cross-sectional data alone, enabling more robust and reliable statistical inferences. A panel data equation can be defined as follows:

$$Y_{it} = \beta_{it} + \beta_{it} X_{it} + \varepsilon_{it} \quad (1.4)$$

where; $Y_{it}$ denotes the dependent variable, $\beta_{it}$, the constant term, $X_{it}$, the independent variables, and $\varepsilon_{it}$, the errors terms.

## 4. Empirical Findings

In this study, three models were created to determine the effect of the female employee ratio on profitability. Return on assets (ROA), return on equity (ROE) and return on sales (ROS) variables related to the profitability of airlines were used as dependent variables. The descriptive statistics of the study are presented in the table below.

Table 2 presents descriptive statistics for the variables used in the study. The ROA (Return on Assets) value of the airlines varies between a minimum of -0.335 and a maximum of 0.136. ROE (Return on Equity) is observed as a minimum of -0.941 and a maximum of 3.712. The ROS (Return on Sales) variable varies between -0.822 and 0.234, and its standard deviation is higher than ROA and ROE. This indicates that fluctuations in sales profitability occur due to external shocks, especially changes in passenger demand due to Covid-19.

**Table 2.** Descriptive statistics

| Variable | Obs. | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| ROA | 125 | -0.0245 | 0.0855 | -0.3346 | 0.1357 |
| ROE | 125 | -0.0138 | 0.3763 | -0.9414 | 3.7120 |
| ROS | 125 | -0.1114 | 0.2614 | -0.8223 | 0.2335 |
| EMPFEM | 125 | 44.570 | 7.7124 | 30.000 | 63.300 |
| TANGTC | 125 | 1.0484 | 0.9102 | -8.4867 | 2.0497 |
| CASH | 125 | 0.6648 | 0.1639 | 0.0770 | 0.9173 |
| TATO | 125 | 0.5119 | 0.2393 | 0.1015 | 1.4051 |
| LTDTA | 125 | 0.3786 | 0.1317 | 0.0653 | 0.6871 |
| MVOI | 124 | -0.0003 | 0.0294 | -0.2633 | 0.1210 |
| TAEMP | 125 | 668.42 | 292.39 | 305.39 | 2146.8 |

The EMPFEM variable, which confirm the proportion of female employees, is between a minimum of 30% and a maximum of 63.3%, and the average is approximately 44.57%. The standard deviation observed in this variable is 7.71, indicating that there are differences in the employee structure. The TANGTC variable, which indicates the ratio of tangible fixed assets to total assets, has a minimum of -8.49 and a maximum of 2.05, and this wide range indicates that there are significant differences in asset structures in some companies. The average of the CASH (Cash and Equivalents / Total Assets) variable used as a liquidity indicator is 0.66, ranging from a minimum of 0.077 to a maximum of 0.92. The average of the TATO (Net Sales / Total Assets) variable, which measures asset efficiency, is 0.51, and its minimum and maximum values are 0.10 and 1.41, respectively. This ratio reflects the differences in the efficiency of companies in sales production. The LTDTA variable, which is the ratio of long-term debt to assets, indicates a moderate debt structure with an average of 0.38, ranging from a minimum of 0.07 to a maximum of 0.69. The minimum value of the MVOI (Market Value / Total Debt) variable is -0.26, and its maximum value is 0.12. Finally, the TAEMP variable, which indicates the amount of assets per employee, varies widely between 305.4 and 2146.8, with an average of approximately 668.4, indicating significant differences among companies in terms of workforce and asset structure.

**Table 3.** Correlation among the variables

| | EMPFEM | TANGTC | CASH | TATO | LTDTA | MVOI | TAEMP |
|---|---|---|---|---|---|---|---|
| **EMPFEM** | 1 | | | | | | |
| **TANGTC** | -0.0599 | 1 | | | | | |
| **CASH** | 0.1365 | 0.0043 | 1 | | | | |
| **TATO** | 0.0901 | 0.1274 | -0.1272 | 1 | | | |
| **LTDTA** | -0.1112 | -0.0777 | -0.0361 | -0.3881 | 1 | | |
| **MVOI** | -0.0141 | 0.0251 | -0.1073 | 0.2057 | -0.0727 | 1 | |
| **TAEMP** | 0.1247 | -0.0556 | 0.3232 | -0.3865 | 0.0965 | -0.1894 | 1 |

Table 3 shows the correlation matrix between variables. The high correlation coefficients between independent variables may indicate a multicollinearity problem. The existence of high correlation may cause the regression model to become unstable and the predictive power to be weakened. The correlation coefficients among the independent variables used in this study are low and there is no multicollinearity problem. Moreover, high multicollinearity can often bias the standard errors of the estimated coefficients. Therefore, the variance inflation factor (VIF) was applied. Supplementary Table 1 shows that the VIF does not exceed 10. It confirms that there is no significant multicollinearity problem among the variables. Therefore, it proves the reliability of the panel regression analysis. In the study, unit root analysis was performed, and the non-stationary series were made stationary by taking the first difference. Moreover, the Hausman test was applied to determine the model, and it was confirmed that the fixed effects model was appropriate[1].

**Table 4.** Summary of panel regression analysis

| Variable | ROA Coef. (SE) | ROA p-val | ROE Coef. (SE) | ROE p-val | ROS Coef. (SE) | ROS p-val |
|---|---|---|---|---|---|---|
| **EMPFEM** | 0.00507 (0.00219) | 0.0290 | 0.00277 (0.00582) | 0.6380 | 0.02358 (0.00609) | 0.0010 |
| **TANGTC** | 0.01607 (0.00196) | 0.0000 | -0.39912 (0.00520) | 0.0000 | -0.00879 (0.00350) | 0.0190 |
| **CASH** | -0.00344 (0.04591) | 0.9410 | -0.26519 (0.12827) | 0.0500 | -0.28237 (0.13914) | 0.0540 |
| **TATO** | 0.31774 (0.03771) | 0.0000 | 0.53789 (0.08892) | 0.0000 | 1.11215 (0.10264) | 0.0000 |
| **LTDTA** | -0.03864 (0.06386) | 0.5510 | -0.33028 (0.15049) | 0.0380 | 0.32215 (0.19738) | 0.1160 |
| **MVOI** | 0.04860 (0.10828) | 0.6580 | -0.01299 (0.16889) | 0.9390 | -0.14812 (0.28322) | 0.6060 |
| **TAEMP** | 0.00015 (0.00003) | 0.0000 | 0.00014 (0.00008) | 0.0930 | 0.00046 (0.00010) | 0.0000 |
| **Constant** | -0.51062 (0.11156) | 0.0000 | 0.21803 (0.29055) | 0.4600 | -1.96620 (0.30072) | 0.0000 |

Table 4 present the panel regression analysis results. In these models, return on assets (ROA), return on equity (ROE) and return on sales (ROS) variables are used as dependent variables. Coef. expresses the estimated effect of the independent variable on the dependent. SE (Standard Error) in parentheses is the standard error of this coefficient and confirm the uncertainty in the estimation of the coefficient. p-val is the p-value indicating whether the coefficient is statistically significant or not. Panel regression analysis results reveal that some variables have significant effects on the financial performance indicators of the firms. The female employee ratio (EMPFEM) has a positive and significant effect on ROA and ROS, indicating that gender diversity can contribute to business performance. This is extremely valuable for airlines because the increase in the female employee ratio can positively contribute to financial performance by strengthening elements such as service quality, operational efficiency and corporate reputation of airlines. Asset turnover (TATO) has statistically positive and significant effects on all performance measures, ROA, ROE and ROS. Therefore, it reveal that how efficiently airlines use their most important resources, aircraft, is a determinant of profitability. While the tangible fixed asset ratio (TANGTC) has a positive effect on ROA, it has a negative and significant effect on ROE and ROS. High fixed asset density may negatively affect profitability indicators depending on the level of efficient use of resources. The negative effect of long-term debt (LTDTA) on ROE indicates that debt can reduce equity return. Moreover, the amount of assets per employee (TAEMP) has a significant and positive effect on ROA and ROS. Therefore, the findings support the positive relationship between employee productivity and profitability.

## 5. Discussion

This study examined the impact of the female employee ratio on business profitability in the global airline industry and revealed significant findings. The analysis results indicate that the female employee ratio has a positive and statistically significant effect on return on assets (ROA) and return on sales (ROS). However, no significant relationship was found on return on equity (ROE). These findings prove that in a service-intensive and operational efficiency-critical industry such as aviation, the composition of human resources is a strategic factor that influences financial performance.

In our study, the finding of a positive and significant relationship between the female employee ratio and business profitability (ROA and ROS) is consistent with the results of many studies in the literature. For example, Post and Byron (2015) found a positive relationship between female executive

[1] The Hausman test results indicate that the fixed effects model is appropriate in the first model (ROA as the dependent variable, $\chi^2 = 31.197$, $p = 0.0001$) and the third model (ROS as the dependent variable, $\chi^2 = 35.804$, $p = 0.0000$), while the random effects model is more suitable in the second model (ROE as the dependent variable, $\chi^2 = 13.729$, $p = 0.0562$).

representation and accounting-based financial returns. Ferrary and Déo (2023) also reported similar results, emphasizing that gender diversity in middle and lower-level management is a strategic resource that increases corporate performance. In addition, it is seen in the literature that gender diversity exhibits complex relationships with different performance measures. In the study of Laskar et al. (2024), while female diversity positively affects market value-based performance, negative findings were found in accounting-based profitability. This situation confirm that the results may vary depending on the differences in the sample and performance indicators. Suau-Sánchez et al. (2025) also revealed that the number of female executives at the senior level in the airline industry increases operational efficiency, for example, 25% representation can provide a 1.9% improvement in capacity efficiency and a 3.2% improvement in operational indicators. Our findings generally confirm a positive relationship between female employment and profitability; however, the lack of a significant relationship with ROE suggests a weak link in this measure, similar to Post and Byron's market return. On the other hand, our divergence from Laskar's negative relationship with accounting profitability may be explained by differences in industry and country context. Overall, our findings support the positive diversity–performance relationship in the literature by validate that a female workforce can support profitability in the airline industry.

Our research results are consistent with the "resource-based view" perspective, where gender diversity can be seen as a strategic resource that increases firm performance. According to the resource-based view, an organization's human resources provide inimitable, valuable competencies (Clardy, 2008; Wright et al., 1994); in this context, the new knowledge, experience, and values that women bring create a competitive advantage. Post and Byron (2015) also stated that using different knowledge and experiences of each member can improve performance. These findings are parallel to Ferrary and Déo's argument that a balanced gender composition at the middle and staff level provides a corporate competitive advantage. When considered from a CSR (Corporate Social Responsibility) perspective, increasing the employment of women is a practice that meets the social expectations of businesses and their sensitivity towards stakeholders (Kaur, 2013; Vilkė et al., 2014). For example, Chang et al. (2024) indicates that the characteristics of female managers such as compassion and empathy support the creation of policies that consider the well-being of stakeholders and lead to a stronger CSR performance. In this respect, it is possible for companies to increase both financial success and achieve social responsibility goals while ensuring gender diversity. Finally, it is suggested that mixed teams can make more creative decisions and better understand different customer needs (Ferrary & Déo, 2023; Hoogendoorn et al., 2011). In our data, the increase in the proportion of women has a positive contribution to profitability after a threshold value (which could be the 35-45% band in this study). In summary, in the light of current theoretical approaches, as the proportion of women employees increases, the rare and valuable resources of the companies increase, which leads to positive results in both performance and social responsibility dimensions.

Beyond RBV and CSR, our findings also align with gender theories that warn against seeing the "female ratio" as sufficient for inclusion. Tokenism theory shows that when women are few in number, they face visibility, stereotyping, and isolation. This limits both their effectiveness and the organization's gains. It also emphasizes not only "how many" women are employed, but also "where" they work and "what authority" they hold. (Kanter, 1977). Social role theory suggests that social expectations push women into "communal" roles and away from leadership or technical positions. Thus, performance outcomes depend more on role fit, seniority, authority, and task importance than on the number of women employed (Eagly et al., 2002; Eagly et al., 2012). In this light, future research should not only examine the overall female-employment share but also analyze distributions by function (e.g., flight operations, maintenance), hierarchy (supervisory, executive), and qualifications. This may explain why our models show significant effects on ROA and ROS but not on ROE.

Our study also has several limitations. First, the sample is limited to 25 international airlines, which, although representing a significant portion of the industry, limit the generalizability of the results. Second, our analysis focuses on the overall proportion of female employees but does not distinguish between organizational levels or departments. It is possible that the performance impact of gender diversity is more pronounced at certain levels (e.g., in leadership or technical roles) than at others. Finally, the study period (2019–2023) includes the period when the COVID-19 pandemic severely affected the industry. Although we controlled for time effects, the crisis may have introduced unique dynamics that do not represent normal operations. Future research could build on these findings in various ways. Extending the analysis to a longer time period (before and after the pandemic) or to other industries would reveal whether the positive impact of female employment holds true under different conditions.

## 6. Conclusion

The purpose of this study is to empirically examine the effect of the female employee ratio on profitability in the airline industry. To this end, data from 25 airlines covering the period 2019–2023 were analyzed. Return on assets (ROA), return on equity (ROE), and return on sales (ROS) were employed as dependent variables to measure airline profitability. These variables were chosen because they are the most commonly used indicators in the profitability literature and help capture various aspects of airline profitability. The female employee ratio served as the independent variable. Asset turnover ratio, tangibility ratio, cash ratio, long-term debt ratio, market leverage ratio, and asset per employee were included as control variables. A panel data analysis method was applied. This study contributes to the literature both in terms of the period examined and the models developed.

The findings of this study demonstrate that the female employee ratio exerts a significant and positive influence on key profitability indicators, namely Return on Assets (ROA) and Return on Sales (ROS). The statistically significant impact of female workforce representation (EMPFEM) on both ROA and ROS suggests that gender diversity constitutes a critical factor in enhancing financial performance within the airline industry. This result is particularly salient for airline companies, where variables such as service quality, operational efficiency, and corporate image are closely linked to organizational performance. Female employees contribute substantially across various operational domains—including customer relations, in-flight services, ground operations, and managerial roles—thereby enhancing passenger satisfaction and elevating the overall service quality. Moreover, a workforce characterized by gender diversity fosters a more inclusive and innovative organizational culture, benefiting from varied perspectives and problem-solving approaches. This, in turn, not only improves internal dynamics but also

positively shapes stakeholder perceptions and reinforces brand equity. From a strategic standpoint, increasing the proportion of female employees can yield a dual benefit: it enhances internal performance while simultaneously bolstering external reputation. Gender equality policies, when embedded within broader corporate social responsibility frameworks, may further serve as a source of competitive advantage by strengthening investor and consumer confidence. In this context, promoting female employment in the airline sector emerges not merely as a social imperative but as a strategic determinant of long-term profitability and sustainable financial performance.

This study, which investigates the impact of the female employee ratio on airline profitability, has several limitations. First, although the financial data of the 25 airlines with the highest passenger volumes globally were analyzed, this sample may not fully represent the entire airline industry. The study included only those airlines for which complete financial and female employee ratio data were available, based on an extensive database and financial report review. Second, the analysis covered the period from 2019 to 2023. While this timeframe is critically important for understanding the current landscape, different results may emerge with an alternative analysis period. Nonetheless, the findings provide significant insights into the present situation. Future research should involve a more in-depth analysis of the female employee ratio. In particular, identifying how profitability varies based on the positions held by female employees could offer valuable contributions to the literature. Therefore, it is recommended that future studies conduct similar empirical analyses by classifying female employees according to their representation in senior, middle, and lower-level management positions.

## Conflicts of Interest

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

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