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Validation of a job satisfaction scale for predicting employee churn in commercial airlines in Portugal

António Pimenta de Brito, Ana Palma-Moreira and Maria José Sousa

Abstract

Purpose – *The purpose of this study is to validate a job satisfaction scale that can predict employee churn for Portuguese commercial airline companies.*

Design/methodology/approach – *A total of 369 subjects voluntarily participated in this study, all of whom worked for commercial air transport companies. An exploratory and confirmatory factor analysis was carried out to test the instrument.*

Findings – *The results of the psychometric qualities of this instrument indicate that it can be used in future empirical studies. This instrument assesses various dimensions of job satisfaction: leadership, safety, work/life balance, career and pay.*

Research limitations/implications – *One of the limitations of this study is the small sample size and the data collection process. Another limitation is that the questionnaire is self-administered and consists of closed questions.*

Practical implications – *This turnover, satisfaction and performance assessment can be critical, especially when companies struggle with high employee turnover like aviation companies. Aviation professionals are a very skilled profession, with high qualification costs.*

Social implications – *By providing a reliable tool to measure and improve job satisfaction, the research can help reduce employee turnover, leading to more stable employment in the airline industry in Portugal and other countries.*

Originality/value – *By presenting a validated job satisfaction scale tailored for predicting employee churn specifically within Portuguese commercial aviation companies. This concern benefits employees' mental health, job security and enhances service quality for passengers.*

Keywords *Airlines, Employee churn, HR analytics, Job satisfaction, Quantitative study, Scale*

Paper type *Research paper*

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1. Introduction

The topic of talent retention is central to today's business environment. The search for qualified talent is a strategic measure that aims to create competitive advantages for organizations. That is why when a valued employee leaves a company, it represents a high cost. When an employee leaves voluntarily from a company, an employee "churns". This concept also exists in the marketing/management realm, "customer churn." It is an indicator that measures the level and impact that a company has when a customer abandons the use of a product/service (Hassouna *et al.*, 2015). This dropout rate is often measured, and an attempt is made to predict when it will occur using statistical methods and mathematical algorithms. Human resource management has adopted this metric and the "employee churn" indicator. Nowadays, it is widely studied, especially to measure the financial impacts a valuable employee causes in the company if he voluntarily leaves it (Pirrolas *et al.*, 2022). It is estimated that the costs of recruiting a new employee are 1.5 times the annual salary of the employee who leaves the company (Isson and Harriott, 2016). So, employee churn is commonly used for the voluntary abandonment of an employee, different from the concept

of turnover, which represents the entire rate of professional abandonment, whether voluntary or not. Predicting who leaves voluntarily from a job and when it leaves is valuable because the company can act on its consequences with time. It can also understand more deeply the factors that impact that intention or action. In this way, with the help of data analysis, the manager can make evidence-based decisions for value creation in strategic human resource management (Margherita, 2022; Marler and Boudreau, 2016; Tursunbayeva *et al.*, 2018). The study and use of this HR data using statistical methods and artificial intelligence for decision-making is the area of HRM (human resources management) called "HR Analytics". For example, an HR Analytics manager knows the high likelihood of someone leaving the company. In that case, he may conclude that increasing the employee's salary, promoting feedback, replacing the boss, or even investing in new training will be reasonable measures. The study of employee churn can also focus on the factors influencing churning in any professional context. Companies have a deeper understanding of the drivers that motivate people to leave and stay with companies. In that case, they can create better human resources policies suited to the needs of employees and the company.

In sectors with a high churn rate and a significant lack of professionals, human resource management can be a critical strategic tool to support decision-making. The aviation sector exemplifies this (Chen, 2006; Efthymiou *et al.*, 2021; Kiernan, 2018). This study aims to create and validate an instrument that measures employee churn in the aviation sector, with the goal of better not only measuring churn and job satisfaction but also understanding the phenomena. Secondly, it is intended to issue human resources management recommendations for this sector in talent retention.

The study started by reviewing the literature on existing churn prediction models and principal concepts. The factors most related to predicting churn were extracted from the literature review. This summary will create an instrument for measuring churn, namely a new scale for the commercial aviation sector in Portugal.

2. Literature review

2.1 Employee churn

The concept of "Employee churn" refers commonly to the voluntary departure of an employee and primarily focuses on the financial implications of losing that employee (Pirrolas, Correia and Nascimento, 2022). While typically associated with marketing and customer relationship management as "Customer churn," this concept has gained traction in HR management, particularly with the rise of HR Analytics (HRA) as a significant trend (Margherita, 2022; Marler and Boudreau, 2016; Tursunbayeva *et al.*, 2018).

The key to employee retention is recognizing and understanding at-risk workers and anticipating their potential departure dates and reasons. Analytics make it easier to combine market, company and personnel data while providing forecasts on the actions of high performers (Isson and Harriott, 2016). For forward-thinking organizations, this pillar offers crucial elements that help them retain top personnel, maintain their competitiveness and proactively create value through an engaged workforce. This issue affects the bottom line of many industries, including the telecom and technology sectors. Absenteeism and turnover are significant in the commercial airline industry (Chen, 2006; Efthymiou *et al.*, 2021; IATA, 2018; Kiernan, 2018). The commercial airline industry, which addresses this problem and has received less attention than the banking and technology industries, is examined in this paper.

2.2 Factors influencing employee churn

The variables in the literature that most affect attrition/churn are listed in Table 1. The following standards were used to perform a literature review for this investigation. Using the

Table 1 Literature review on employee churn predictive models (2011–2022)

S.no.	Authors	Factors influencing employee churn
1	Saradhi and Palshikar (2011). *Employee churn prediction*	■ age ■ designation ■ gender ■ department ■ qualification ■ Past experience in years ■ Employee location ■ Experience in parent organization ■ Experience in client organization ■ Billed or not billed ■ on-site/off-site ■ Designation in client organization
2	Yiğit, and Shourabizadeh (2017). *An Approach for Predicting Employee Churn by Using Data Mining*	■ Education, ■ Education field, ■ Environment satisfaction, ■ Gender, ■ Job involvement, ■ Job level, J ■ Job role, ■ Job satisfaction, ■ Marital status, ■ Over-Time, ■ Performance rating, ■ Relationship satisfaction, ■ Stock option level, ■ Years since last promotion, ■ Years with current manager
3	Dolatabadi and Keynia (2017). *Designing of Customer and Employee Churn Prediction Model Based on Data Mining Method and Neural Predictor*	■ Age, ■ Marital status, ■ Level of education, ■ Work experience (total) ■ Area of expertise, ■ Average number of services given per year, ■ Average time assigned to each service, ■ Sex, ■ Relating certificate to employee service ■ Duplicate service or not, ■ Miss call service or not, ■ Number of duplicate service ■ Resolved service on the first day or not, ■ Service class, ■ Request channel, ■ Scope of service ■ Service time, ■ Service type ■ Referring to the software development team or not, ■ Year, ■ Resolved service on the first calling or not – Several features of customers and employees should be examined
4	Sisodia, *et al.* (2017, November). *Evaluation of Machine Learning Models for Employee Churn Prediction*	■ Employee's salary ■ Current position ■ promotion ■ (? ineligible)

(*continued*)

Table 1

S.no.	Authors	Factors influencing employee churn
5	Yahia *et al.* (2021). *From Big Data to Deep Data to Support People Analytics for Employee Attrition Prediction*	■ Age ■ Marital status ■ Tenure ■ Grade ■ Rewards ■ Job involvement ■ Training ■ Business travel ■ Job satisfaction ■ Job performance ■ Environment satisfaction
6	Srivastava and Eachempati (2021). *Intelligent Employee Retention System for Attrition Rate Analysis and Churn Prediction: An Ensemble Machine Learning and Multi-Criteria Decision-Making Approac*h	■ Employee_Satisfaction ■ Appraisal_rating ■ Employee_CTC_level ■ Number of projects/tasks assigned per quarter. ■ Time spent per project per quarter. ■ Safety measure ■ Promotion
7	Jain *et al.* (2021). *A novel scheme for employee churn problem using multi-attribute decision making approach* *And machine learning*	■ Satisfaction level ■ Last evaluation ■ Number project average monthly hour time spent ■ Work accident ■ Left ■ Promotion last 5 year ■ Department ■ Salary
8	Pirrolas *et al.* (2022). *The Scale of Causes of Churning: Elaboration and Validation for Portuguese Human Resources*	■ Work environment ■ Salary ■ Recognition ■ Leadership ■ Work schedule

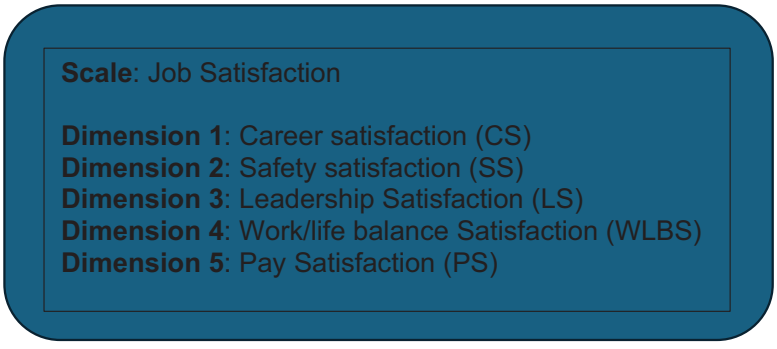
Source: Authors' own work

search word "EMPLOYEE CHURN" present in the title of academic publications; the most recent academic papers in the business and management field on employee churn prediction models were found using the SCOPUS and WEB of SCIENCE academic archives. The publications were published in English. Thirteen papers were found; eight were validated, displayed in Table 1, and then returned following search debugging.

Yiğit and Shourabizadeh (2017) found that there aren't many studies in the literature that analyse and predict employee churn. Moreover, not many use "turnover intentions" as a dependent variable, despite being a better predictor of churn – particularly when it comes to what can be done in advance of the phenomenon. There are rules and procedures that can be put in place to stop staff turnover.

Following the literature review on the most common factors that influence churn, the next phase was to retrieve from the repository the factors most associated with employee churn. From this literature review, the most relevant and mentioned ones were removed, and the following dimensions were created (Figure 1).

Figure 1 Dimensions of job satisfaction



Source: Authors' own work

2.3 Turnover intentions

The costs associated with an employee leaving a company extend beyond mere training expenses, including finding a replacement of equal value, losing knowledge to competitors and overall devaluation. Research on predictive models of employee churn and turnover intention often relies on survey data or real company data, with longitudinal data being beneficial for assessing employee departures over time. Alternatively, turnover intention, indicating an employee's inclination to leave their organization, serves as a predictive factor for actual turnover (Ali *et al.*, 2022; Rombaut and Guerry, 2018; Hussain *et al.*, 2020).

When it occurs, the phenomenon "turnover intention" preceeds the employee's departure of a company. Instead of the act itself, the variable "turnover intention" indicates the employee's inclination to leave their company (Ali *et al.*, 2022; Rombaut and Guerry, 2018). Before actually leaving the organization, a process of introspection and awareness known as "turnover intention" takes place (Hussain *et al.*, 2020). The best predictor of actual turnover is turnover intention (Griffeth *et al.*, 2000; Joseph *et al.*, 2007). The term "withdrawal cognition process" is used to characterize it (Jano *et al.*, 2019, p. 2). It consists of the following components: initially, the worker contemplates quitting the company. The next course of action is to decisively look for work at another organization. The ultimate intention to leave or resign is the last stage (Mobley *et al.*, 1979). Organizations often struggle to identify this process unless the individual shares it with other staff members (Jano *et al.*, 2019).

2.4 Turnover in aviation

Turnover within the aviation sector presents a multifaceted issue. While turnover rates can vary, the industry consistently grapples with pilot shortages, a challenge not diminished by events like the COVID-19 pandemic (CAE, 2023; Lambeth *et al.*, 2022). The financial impact of turnover and absenteeism among flight crew is considerable (Chen, 2006), especially considering the costs of recruitment, training and compliance with aviation regulations. Factors influencing retention among pilots, such as lifestyle, economic incentives and roster arrangements, play significant roles (Efthymiou *et al.*, 2021).

2.5 Job satisfaction and job performance

The literature on job satisfaction is extensive but lacks a universally accepted definition. Nevertheless, commonly addressed dimensions include emotional and cognitive aspects, which are influenced by individual perceptions and feelings. Job satisfaction is often described as an attitude reflecting how favorably employees view their work (Wyrwa and Kaźmierczyk, 2020).

Various factors contribute to job satisfaction, including both individual (intrinsic) and external (extrinsic) elements. Positive correlations exist between job satisfaction and performance, organizational citizenship behavior and customer satisfaction, while negative correlations are observed with absenteeism, turnover and workplace deviance (Robbins and Judge, 2009).

Pay satisfaction significantly influences turnover intentions (Danish *et al.*, 2017; Motshegwa, 2010; Vandenberghe and Tremblay, 2008), as do leadership styles (Gan and Voon, 2021; Wee *et al.*, 2020; Wells and Welty Peachey, 2011; Yang *et al.*, 2019), career-related factors (Gu *et al.*, 2010; Huang *et al.*, 2017; Mosadeghrad *et al.*, 2008) and work/family satisfaction (Chen *et al.*, 2015; Shu *et al.*, 2018). Safety satisfaction also plays a crucial role in turnover intentions, particularly within the transportation sector (Huang *et al.*, 2016; Smith, 2018; Siu *et al.*, 2015; Zhang *et al.*, 2023). Job dissatisfaction is consistently identified as a strong predictor of intention to leave an organization (Hom *et al.*, 2017; Mowday *et al.*, 1982; Mulki *et al.*, 2006; Rubenstein *et al.*, 2018).

In the field of commercial aviation, research consistently demonstrates a relationship between job satisfaction and turnover intentions (Chen, 2006; Jou *et al.*, 2013; Suifan *et al.*, 2017). Finally, research indicates that one of the most reliable indicators of turnover intentions an organization is work discontent (Hom *et al.*, 2017; Mowday *et al.*, 1982; Mulki *et al.*, 2006; Rubenstein *et al.*, 2018).

A complex association between job performance and intentions to leave the commercial aviation industry has been shown in the literature (Bishop, 1990; Hancock *et al.*, 2013; Trevor *et al.*, 1997).

Depending on several variables, job performance affects turnover intentions in different ways (Jackofsky *et al.*, 1986; Luna-Arocas and Camps, 2007; Rahim and Cosby, 2016; Zimmerman and Darnold, 2009).

3. Method

3.1 Data collection procedure

This study aims to validate a new instrument, and data were collected in two stages. At the first moment of data collection, 78 participants working for commercial airlines voluntarily responded to the questionnaire, with whom a pre-test was carried out. In the second phase of data collection, 369 subjects voluntarily participated in this study, all of whom worked for commercial air transport companies. Although 418 responses to the questionnaire were posted online on the Google Forms platform, 49 responses were not considered valid because the subjects needed to meet the conditions for working in the commercial air transport sector. The questionnaire link was distributed to members of the Portuguese Airline Pilots' Association (APPLA) and through LinkedIn to various airline professionals. Data collection took place between September 2023 and January 2024. The sample was non-probabilistic, intentional and snowball (Trochim, 2000). The first part of the questionnaire informed participants of the purpose of the study and guaranteed the confidentiality of their answers. As for informed consent, after the initial instructions, the participants answered a question about whether they wanted to take part in the study voluntarily. If they said no, they were sent to the final page (thank you). The questionnaire consisted of 7 sociodemographic questions and 15 items that make up an instrument designed to measure employee churn prediction.

As this is a new instrument, face validity was carried out after formulating the items that make up the scale. In this first phase, the questionnaire was evaluated by 10 participants, to check that the items were well formulated and in understandable language. This was followed by expert evaluation, which was conducted by 5 experts in the field. These evaluations resulted in the reformulation of item 3.

3.2 Participants

The pre-test sample consisted of 78 participants, 25 (32.1%) female and 53 (67.9%) males. In terms of age, 10 (12.8%) were aged between 20 and 29, 13 (16.7%) were aged between 30 and 39, 28 (35.9%) were aged between 40 and 49, 23(29.5%) were aged between 50 and 59 and 4 (5.1%) were aged between 60 and 69. In terms of academic qualifications, 23 (29.5%) had up to the 12th grade, 2 (2.6%) had a bachelor's degree and 53 (67.9%) had a degree or higher. Among the participants, 18 (23%) had been with the organization for three years or less, 13 (16.6%) between 4 and 9 years, 18 (23.1%) between 10 and 19 years and 29 (37.2%) 20 years or more.

The study's sample consisted of 369 participants, 139 (37.7%) female and 230 (62.3%) males (Table 2). In terms of age, 59 (16%) were aged between 20 and 29, 99 (26.8%) were aged between 30 and 39, 143 (38.8%) were aged between 40 and 49, 59 (16%) were aged between 50 and 59 and 9 (2.4%) were aged between 60 and 69 (Table 2). As for their profession, 78 (21.1%) belong to the Technical Crew (TC), 66 (17.9%) belong to the Cabin Personnel (CP), 67 (18.2%) belong to the Maintenance, Repair and Overhaul (MRO), 112 (30.4%) to the Ground Personnel and 46 (12.5%) perform other functions (Table 2). In terms

Table 2 Sample descriptive statistics

Variable	*Frequency*	*%*
Gender		
Female	139	37.7
Male	230	62.3
Age		
20–29 years	59	16
30–39 years	99	26.8
40–49 years	143	38.8
50–59 years	59	16
60–69 years	9	2.4
Profession		
Technical crew	78	21.1
Cabin personnel	66	17.9
Maintenance, repair and overhaul	67	18.2
Ground personnel	112	30.4
Other functions	46	12.5
Academic qualifications		
Up to the 12th grade	88	23.8
Bachelor's degree	46	12.5
Degree or higher	235	63.7
Organization seniority		
Three years or less	95	25.7
4–9 years	100	27.1
10–19 years	95	25.7
20 years or more	79	21.4
Working hours per month		
40–80 h	93	25.2
81–160 h	160	43.4
161–240 h	106	28.7
More than 240 h	10	2.7
Promotion in the past five years		
Yes	157	42.5
No	202	54.7
Not applicable	10	2.7

Source: Authors' own work

of academic qualifications, 88 (23.8%) had up to the 12th grade, 46 (12.5%) had a bachelor's degree and 235 (63.7%) had a degree or higher (Table 2). Among the participants, 95 (25.7%) had been with the organization for three years or less, 100 (27.1%) between 4 and 9 years, 95 (25.7%) between 10 and 19 years and 79 (21.4%) 20 years or more (Table 2). About working hours, 93 (25.2%) work between 40 and 80 h a month, 160 (43.4%) between 81 and 160 h, 106 (28.7%) between 161 and 240 h and 10 (2.7%) more than 240 h (Table 2). When asked if they had been promoted in the last five years, 202 (54.7%) said no, 157 (42.5%) said yes and 10 (2.7%) said not applicable (Table 2).

3.3 Data analysis procedure

The first step was to import the data into SPSS Statistics 29 software (IBM Corp., Armonk, NY., USA). The 78 participants in the first phase sample were used for the pre-test to check the factorial validity, sensitivity of the items and internal consistency of the instrument. An exploratory factor analysis was also carried out to test the factor validity. Exploratory factor analysis aims to discover and analyse the structure of a set of interrelated variables to construct a measurement scale for (intrinsic) factors that somehow (more or less explicitly) control the original variables (Marôco, 2021). The KMO value was calculated, which should be greater than 0.70 (Sharma, 1996). Bartlett's sphericity test must be significant to indicate that the data comes from a multivariate normal population (Pestana and Gageiro, 2003). The total variance explained was also calculated, which should be greater than 50%. As for the factor weights of each item, all items with factor weights greater than 0.50 were considered. Internal consistency was tested for each of the dimensions that make up the instrument by calculating Cronbach's alpha, which assesses the ratio between the variance of each item and the entire dimension. Its values vary between 0 and 1, with no negative values (Hill and Hill, 2002) and, in organizational studies, it should be higher than 0.70 (Bryman and Cramer, 2003).

The second-moment sample was then randomly divided into two parts, one with 106 participants and the other with 263 participants. An exploratory factor analysis was carried out on the 106 participants, and the internal consistency of each of the instrument's dimensions was tested.

With the other part, two confirmatory factor analyses were carried out, one factor and six factors. The confirmatory factor analyses were carried out using AMOS Graphics software for Windows (IBM Corp., Armonk, NY, USA). The procedure followed a "model generation" logic (Jöreskog and Sörbom, 1993). Following the established recommendations (Hu and Bentler, 1999), six fit indices were combined: Chi-square ratio/degrees of freedom (χ^2/gl); Tucker–Lewis Index (TLI); Goodness-of-fit Index (GFI); Comparative *et al.* (CFI); root mean square error of approximation (RMSEA); root mean square residual (RMSR). The chi-square/degrees of freedom ratio (χ^2/gl) is considered an acceptable value if it is below 5. For the CFI, GFI and TLI, values above 0.90 indicate a good fit and above 0.80 indicate an acceptable fit. As for RMSEA, values below 0.08 indicate a good fit (McCallum *et al.*, 1996). The lower the RMSR, the better the fit (Hu and Bentler, 1999). The construct reliability for each scale's dimensions was then tested, whose value should be higher than 0.70. Convergent validity was tested by calculating the average variance extracted (AVE), which should be greater than 0.50 (Fornell and Larcker, 1981). As for discriminant validity, it was tested by comparing the root value of the AVE value with the correlation values between the factors. The square root of the AVE value must be greater than the correlation between the factors whose discriminant validity is being analysed.

Finally, with all the participants, the sensitivity of the items and their respective dimensions was tested. The items must have responses at all the response points, the median must not be close to one of the extremes and the absolute values of asymmetry and kurtosis must be below 2 and 7, respectively (Finney and DiStefano, 2013).

3.4 Pre-test

The exploratory factor analysis carried out in the pre-test suggested that the instrument has 5 dimensions, a KMO of 0.79, and a total variance explained of 76.26%. All the items have factor weights above 0.50.

For internal consistency, Cronbach's alpha values ranged from 0.68 (career satisfaction and safety satisfaction) to 0.92 (leadership satisfaction). Only the career satisfaction and safety satisfaction dimensions have Cronbach's alpha values slightly below 0.70, although this may be due to the small size of the sample. According to Hair *et al.* (2019), as this is a pre-test, Cronbach's alpha values below 0.70 can be accepted.

As far as the sensitivity of the items is concerned, only item 6 does not have responses at all points, and no item has a median close to one of the extremes. All the absolute values of asymmetry and kurtosis are below 2 and 7, respectively, which indicates that they do not grossly violate normality (Finney and DiStefano, 2013).

The items were then semantically analysed, and each factor was given the following names: pay satisfaction (factor 1); leadership satisfaction (factor 2); work/life balance satisfaction (factor 3); safety satisfaction (factor 4); career satisfaction (factor 5).

3.5 Instrument

This instrument was created based on a literature review (Table 1). It consists of 15 items that assess career satisfaction (items 1, 2 and 3), safety satisfaction (items 4, 5 and 6), leadership satisfaction (items 7, 8 and 9), work/life balance satisfaction (items 10, 11 and 12) and pay satisfaction (items 13, 14 and 15) (Table 3). The items are rated on a five-point Likert scale (from 1 "Strongly Disagree" to 5 "Strongly Agree"). Items 3, 6, 9, 12 and 15 are formulated in the negative concerning the other items, so they should be reversed.

Table 3 Job satisfaction scale items

Dimension	*Item*	*Source*
Career satisfaction	My career progression meets my expectations My organization is concerned with developing employees' skills to progress in their careers Career progression is complicated in my organization	Sisodia *et al.* (2017); Yiğit and Shourabizadeh (2017); Yahia *et al.* (2021); Srivastava and Eachempati (2021); Jain *et al.* (2021)
Job safety satisfaction	I feel safe in my work environment My organization cares about employee safety My organization often has accidents due to a lack of safety	Jain *et al.* (2021); Srivastava and Eachempati (2021);
Satisfaction with the leaders	My manager gives me every support in carrying out my duties My manager cares about the well-being of his employees My manager gives me zero support	Yiğit and Shourabizadeh (2017); Pirrolas *et al.* (2022)
Satisfaction with work/life balance	My organization is concerned with reconciling employees' work and personal lives My organization promotes initiatives that make reconciling work and personal life more manageable My organization is not concerned with reconciling employees' work and personal lives	Pirrolas *et al.* (2022);
Satisfaction with remuneration	My remuneration is in line with my performance appraisal	Yiğit and Shourabizadeh (2017); Sisodia *et al.* (2017); Yahia *et al.* (2021); Srivastava and Eachempati (2021); Jain *et al.* (2021); Pirrolas *et al.* (2022);

Source: Authors' own work

Table 4 Factors and factor weights obtained in the exploratory factor analysis

Item	Factor 1	2	3	4	5
My career progression meets my expectations	0.34	0.35	0.14	0.34	0.51
My organization is concerned with developing employees' skills to progress in their careers	0.42	0.33	0.28	0.24	0.53
Career progression is complicated in my organization	0.17	0.13	0.16	0.12	0.87
I feel safe in my work environment	0.49	0.13	0.27	0.58	0.23
My organization cares about employee safety	0.49	0.15	0.39	0.56	0.20
My organization often has accidents due to a lack of safety	0.17	0.17	0.13	0.88	0.11
My manager gives me every support in carrying out my duties	0.82	0.27	0.27	0.23	0.11
My manager cares about the well-being of his employees	0.83	0.32	0.30	0.07	0.12
My manager gives me zero support	0.78	0.18	0.18	0.19	0.26
My organization is concerned with reconciling employees' work and personal lives	0.31	0.18	0.79	0.07	0.24
My organization promotes initiatives that make reconciling work and personal life more manageable	0.21	0.23	0.79	0.10	0.31
My organization is not concerned with reconciling employees' work and personal lives	0.21	0.14	0.72	0.23	0.06
My remuneration is in line with my performance appraisal	0.16	0.86	0.10	0.16	0.14
I am satisfied with my remuneration	0.22	0.87	0.17	0.17	0.16
My remuneration does not reflect my professional performance, as it is too low	0.24	0.81	0.25	0.04	0.08

Source: Authors' own work

4. Results

4.1 Exploratory factor analysis

As the authors of this study constructed this instrument, an exploratory factor analysis was initially carried out with 106 participants to analyse its factor structure. A KMO value of 0.91 was obtained, which can be considered very good (Sharma, 1996). Bartlett's test of sphericity was significant at $p < 0.001$, which is an acceptable value for continuing the analysis, as well as an indicator that the data comes from a normal multivariate population (Pestana and Gageiro, 2003). It was found that the factor structure of this scale is based on five factors, as expected, which explain 79% of the total variability of the scale. The remaining items have weights equal to or greater than 0.50, as shown in the Table 4. The structure obtained in the pre-test is thus confirmed.

4.2 Internal consistency

The internal consistency of each dimension of this instrument was tested by calculating Cronbach's alpha. Cronbach's alpha values vary between 0.77 and 0.91, which indicates that all the dimensions have good internal consistency, except career satisfaction, which has reasonable internal consistency (Table 5). This indicates that each dimension consistently and reproducibly measures what it intends to measure (Marôco and Garcia-Marques, 2006).

4.3 Confirmatory factor analysis

Two confirmatory factor analyses were conducted with 263 participants, one and five factors. The fit indices were inadequate in the one-factor confirmatory factor analysis

Table 5 Internal consistency of the dimensions

Dimension	No. of items	α
Career satisfaction	3	0.77
Job safety satisfaction	3	0.82
Satisfaction with the leaders	3	0.91
Satisfaction with work/life balance	3	0.81
Satisfaction with remuneration	3	0.90

Source: Authors' own work

Table 6 Factor weights obtained in the confirmatory factor analysis

Dimension	*Item*	*Factor weights*
Career satisfaction	My career progression meets my expectations	0.79
	My organization is concerned with developing employees' skills to progress in their careers	0.85
	Career progression is complicated in my organization	0.51
Job safety satisfaction	I feel safe in my work environment	0.74
	My organization cares about employee safety	0.91
	My organization often has accidents due to a lack of safety	0.56
Satisfaction with the leaders	My manager gives me every support in carrying out my duties	0.90
	My manager cares about the well-being of his employees	0.91
	My manager gives me zero support	0.82
Satisfaction with work/life balance	My organization is concerned with reconciling employees' work and personal lives	0.85
	My organization promotes initiatives that make reconciling work and personal life more manageable	0.84
	My organization is not concerned with reconciling employees' work and personal lives	0.67
Satisfaction with remuneration	My remuneration is in line with my performance appraisal	0.87
	I am satisfied with my remuneration	0.95
	My remuneration does not reflect my professional performance, as it is too low	0.76

Source: Authors' own work

Table 7 Construct reliability of the dimensions

Dimension	*No. of items*	*CR*
Career satisfaction	3	0.77
Job safety satisfaction	3	0.78
Satisfaction with the leaders	3	0.91
Satisfaction with work/life balance	3	0.83
Satisfaction with remuneration	3	0.90

Source: Authors' own work

(χ^2/gl = 9.66; CFI = 0.66; GFI = 0.65; TLI = 0.60; RMSR = 0.15; RMSEA = 0.18). The five-factor confirmatory factor analysis obtained adequate fit indices (χ^2/gl = 1.27; CFI = 0.99; GFI = 0.95; TLI = 0.99; RMSR = 0.05; RMSEA = 0.03), which indicates a good fit between the theoretical measurement model and the correlational structure observed between the manifest variables (items). These results indicate that the five dimensions extracted in the exploratory factor analysis have been confirmed. All the items have factor weights greater than 0.50 (Table 6).

4.4 Construct reliability

The construct reliability value was calculated for each of the scale's dimensions and found that the construct reliability values ranged from 0.76 to 0.91 (Table 7), which is higher than the minimum acceptable in organizational studies (0.70). These results indicate that the

Table 8 Convergent validity of the dimensions

Dimension	*No. of items*	*AVE*
Career satisfaction	3	0.53
Job safety satisfaction	3	0.56
Satisfaction with the leaders	3	0.77
Satisfaction with work/life balance	3	0.62
Satisfaction with remuneration	3	0.74

Source: Authors' own work

items in each dimension of this instrument are consistent manifestations of the latent factor (Fornell and Larcker, 1981).

4.5 Convergent validity

Regarding convergent validity, the AVE values ranged from 0.51 to 0.77 (Table 8), which indicates that there is good convergent validity since, according to Fornell and Larcker (1981), for there to be good convergent validity, the AVE values must be greater than 0.50 (Table 8). The values obtained indicate that the items that reflect each of the dimensions are strongly saturated in that same dimension, i.e. the behaviour of these items is essentially explained by that dimension, and they converge on the measure of that dimension (Fornell and Larcker, 1981).

4.6 Discriminant validity

For discriminant validity, the square root of the AVE value for each of the dimensions was calculated, and as can be seen in Table 9, all the values are higher than the correlation between the factors whose discriminant validity is being tested. The results show that the items that reflect one dimension are not correlated with other dimensions, i.e. the dimensions defined by each set of items are distinct, and their measures differ (Anderson and Gerbing, 1988; Fornell and Larcker, 1981).

Table 9 Discriminant validity of the dimensions

	1	*2*	*3*	*4*	*5*
1. Career satisfaction	*0.73*				
2. Job safety satisfaction	0.54**	*0.75*			
3. Satisfaction with the leaders	0.53**	0.63**	*0.88*		
4. Satisfaction with work/life balance	0.50**	0.52**	0.55**	*0.79*	
5. Satisfaction with remuneration	0.59**	0.41**	0.51**	0.46**	*0.86*

Notes: ** $p < 0.01$; The square root values of the AVE are shown in italics
Source: Authors' own work

Table 10 Sensitivity of items

	Median	*Skewness*	*Std. Error of Skewness*	*Kurtosis*	*Std. Error of Kurtosis*	*Min.*	*Max.*
SL1	3.00	−0.03	0.13	−1.18	0.25	1	5
SL2	3.00	0.09	0.13	−1.10	0.25	1	5
SL3R	3.00	0.14	0.13	−0.86	0.25	1	5
SL4	4.00	−0.77	0.13	−0.02	0.25	1	5
SL5	4.00	−0.78	0.13	−0.01	0.25	1	5
SL6R	5.00	−1.38	0.13	1.11	0.25	1	5
SL7	3.00	−0.34	0.13	−0.71	0.25	1	5
SL8	3.00	−0.25	0.13	−0.87	0.25	1	5
SL9R	4.00	−0.63	0.13	−0.80	0.25	1	5
SL10	3.00	0.12	0.13	−0.96	0.25	1	5
SL11	2.00	0.36	0.13	−0.69	0.25	1	5
SL12R	3.00	0.08	0.13	−1.06	0.25	1	5
SL13	2.00	0.29	0.13	−1.01	0.25	1	5
SL14	3.00	0.21	0.13	−1.16	0.25	1	5
SL15R	3.00	0.03	0.13	−1.41	0.25	1	5

Source: Authors' own work

4.7 Sensitivity of items and dimensions

The median, minimum, maximum, skewness and kurtosis were calculated to test the items' sensitivity. As can be seen in Table 10, none of the items has a median that is close to one of the extremes, all the items have responses at all points, and their asymmetry and kurtosis values are below 2 and 7, respectively, which indicates that they do not grossly violate normality (Finney and DiStefano, 2013).

The normality of the dimensions that make up the instrument was then tested. None of the dimensions follow a normal distribution ($p < 0.05$) (Table 11). However, the results indicate that none of the dimensions grossly violate normality since their absolute values of asymmetry and kurtosis are below 2 and 7, respectively (Table 10) (Finney and DiStefano, 2013).

4.8 Descriptive statistics of the variables under study

Descriptive statistics were carried out on the variables under study to understand the position of the answers given by the participants in this study. To this end, a one-sample student's *t*-test was carried out. The results show that the participants in this study are not very satisfied with their careers, work/life balance and Pay since the average of these dimensions is significantly below the scale's central point (3) (Table 12). Concerning satisfaction with security and management, the average of these dimensions is significantly above the midpoint of the scale (3) (Table 12), indicating that they are satisfied with security and management. Finally, the various coefficients of variation (Cv) (Table 12) demonstrate that the Mean is a good estimator for this example, as the values are all below 50% (Table 12).

Finally, a table with all the items in this instrument in Portuguese and English is presented. It should be noted that among the items that make up this instrument, items 3, 6, 9, 12 and 15 should be inverted as they are formulated in the negative (Table 13).

Table 11 Sensitivity of the dimensions

	Kolmogorov–Smirnov				
Dimension	*Statistic*	*df*	p	*Skewness*	*Kurtosis*
Career satisfaction	0.07	369	<0.001	0.01	−0.64
Job safety satisfaction	0.16	369	<0.001	−1.00	0.69
Satisfaction with the leaders	0.11	369	<0.001	−0.45	−0.69
Satisfaction with work/life balance	0.10	369	<0.001	0.09	−0.59
Satisfaction with remuneration	0.11	369	<0.001	0.17	−1.05

Source: Authors' own work

Table 12 Descriptive statistics of the variables under study

Dimension	t	*df*	p	*d*	*Mean*	*SD*
Career satisfaction	−3.22	368	<0.001	0.17	2.82	1.05
Job safety satisfaction	18.57	368	<0.001	0.97	3.90	0.93
Satisfaction with the leaders	6.55	368	<0.001	0.34	3.39	1.15
Satisfaction with work/life balance	−6.75	368	<0.001	0.35	2.64	1.03
Satisfaction with remuneration	−3.96	368	<0.001	0.21	2.75	1.21

Source: Authors' own work

Table 13 Job satisfaction scale in Portuguese and English

	Portuguese version					*English version*				
Item	*1 Discordo totalmente*	*2 Discordo*	*3 Não concordo nem discordo*	*4 Concordo*	*5 Concordo totalmente*	*1 Strongly disagree*	*2 Disagree*	*3 Neither agree nor disagree*	*4 Agree*	*5 Strongly agree*
	Satisfação com a carreira					*Career satisfaction*				
SL1	A progressão da minha carreira vai ao encontro das minhas expetativas					My career progression meets my expectations				
SL2	A minha organização preocupa-se com o desenvolvimento de competências dos colaboradores, de modo a progredirem na carreira					My organization is concerned with developing employees' skills to progress in their careers				
SL3R	Na minha organização, é muito difícil a progressão de carreiras					Career progression is complicated in my organization				
	Satisfação com a segurança					*Job safety satisfaction*				
SL4	Sinto-me seguro no meu ambiente de trabalho					I feel safe in my work environment				
SL5	A minha organização preocupa-se com a segurança dos colaboradores					My organization cares about employee safety				
SL6R	Na minha organização é frequente haver acidentes por falta de segurança					My organization often has accidents due to a lack of safety				
	Satisfação com a chefia					*Satisfaction with the leaders*				
SL7	A minha chefia dá-me todo o apoio no desempenho das minhas funções					My manager gives me every support in carrying out my duties				
SL8	A minha chefia preocupa-se com o bem-estar dos colaboradores					My manager cares about the well-being of his employees				
SL9R	O apoio dado pela minha chefia é nulo					My manager gives me zero support				
	Satisfação com a conciliação trabalho/ vida pessoal					*Satisfaction with work/life balance (SWFB)*				
SL10	A minha organização preocupa-se com a conciliação entre o trabalho e a vida pessoal dos colaboradores					My organization is concerned with reconciling employees' work and personal lives				
SL11	Na minha organização promovem-se iniciativas que facilitem a conciliação entre o trabalho e a vida pessoal					My organization promotes initiatives that make reconciling work and personal life more manageable				
SL12R	Na minha organização não há preocupação com a conciliação entre o trabalho e a vida pessoal dos colaboradores					My organization is not concerned with reconciling employees' work and personal lives				
	Satisfação com a remuneração					*Satisfaction with remuneration*				
SL13	A minha remuneração está de acordo com a minha avaliação de desempenho					My remuneration is in line with my performance appraisal				
SL14	Estou satisfeito com a minha remuneração					I am satisfied with my remuneration				
SL15R	A minha remuneração não reflete o meu desempenho profissional, pois é muito baixa					My remuneration does not reflect my professional performance, as it is too low				

Source: Authors' own work

5. Discussion and conclusions

The primary aim of this study was to validate a job satisfaction scale to predict employee churn among Portuguese commercial aviation professionals. Based on a review of the literature, an instrument was constructed consisting of 15 items, the aim being to distribute them across five dimensions.

As this was a new instrument, the data was collected in two stages. In the first instance, 78 individuals took part. With this sample, we carried out a pre-test to test the behaviour of the items and see if any adjustments were necessary. The exploratory factor analysis carried out on this sample suggested the existence of five factors. We obtained a KMO of 0.79 and a total explained variance of 76.26%. After carrying out the semantic analysis of the items that make up each of the five dimensions, was given the following names: career satisfaction, safety satisfaction, leadership satisfaction, work/life balance satisfaction and pay satisfaction. Regarding reliability, only the career satisfaction and safety satisfaction dimensions have Cronbach's alpha values slightly below 0.70. However, as this is a pre-test, we can consider the values acceptable (Hair *et al.*, 2019). About the sensitivity of the items, it was found that no item grossly violates normality.

The sample collected at the second stage (369 participants) was randomly divided into two parts: one with 106 participants, for which an exploratory factor analysis was carried out; the other with 263 participants, for which two confirmatory factor analyses were carried out (one factor and five factors).

An exploratory factor analysis was carried out on part of the sample (106 participants) and obtained a KMO of 0.91, which suggested the existence of five factors, meeting our expectations. All the dimensions showed good internal consistency with Cronbach's alpha values between 0.77 (satisfaction with career) and 0.91 (leadership satisfaction), values higher than 0.70, the minimum acceptable in organizational studies (Bryman and Cramer, 2003).

Two confirmatory factor analyses (one factor and five factors) were carried out. The results confirmed the five factors' existence, as only the fit indices of the five-factor confirmatory factor analysis proved adequate. The fit indices obtained were adequate and could even be considered very good, according to Hu and Bentler (1999). The construct reliability values ranged from 0.77 (career satisfaction) to 0.91 (leadership satisfaction), which indicates that the items in each dimension of this instrument are consistent manifestations of the latent factor (Fornell and Larcker, 1981). As for convergent validity, the AVE values ranged from 0.53 (career satisfaction) to 0.77 (leadership satisfaction), values higher than 0.50, indicating that the items that reflect each of the dimensions are strongly saturated in that same dimension, i.e. the behaviour of these items is essentially explained by that dimension, and they converge on the measure of that dimension (Fornell and Larcker, 1981). Discriminant validity was also confirmed as the square root of the AVE values for each of the dimensions was higher than the correlation values between the factors, indicating that the items that reflect one dimension are not correlated with other dimensions, i.e. the dimensions defined by each set of items are distinct, and their measures differ (Anderson and Gerbing, 1988; Fornell and Larcker, 1981).

None of the items' sensitivity grossly violates normality, which indicates that they discriminate between subjects. Neither do the dimensions of the scale grossly violate normality.

The descriptive statistics for the variables under study showed that the participants in this study were not very satisfied with their careers, work/life balance and pay. On the other hand, they are satisfied with their manager and the commercial airline's safety. The dimension with the highest average is precisely safety satisfaction, a significant factor for those working for a commercial airline.

5.1 Implications for practice

Recommendations for management may be to place human resources as a strategic partner of airline management and to focus people management on the use of data for decision-making. Based on information, better decisions can be made, such as knowing the status of people management indicators and acting on them. The human resources area in the aviation sector in Portugal could focus its efforts on four areas: creating better career paths for its employees; develop initiatives and policies that facilitate the reconciliation of the family with the work of aviation professionals; review the wage conditions of its workers; and use the example of good safety perception and good managers as a benchmark for other sectors, namely, by promoting good practices and for example creating training in these areas for the sector and for other areas of activity.

5.2 Implications for theory

The results of the psychometric qualities of this instrument indicate that it can be used in future empirical studies aimed at commercial airline employees. This instrument assesses satisfaction with management, satisfaction with safety, satisfaction with management, work/life balance satisfaction and satisfaction with safety among commercial airline employees. This assessment can be critical, especially when companies struggle with high employee turnover. If a company has satisfied employees, their performance will improve, and their intentions to leave the organization will decrease (Moreira *et al.*, 2022).

5.3 Limitations

One of the limitations of this study is the small sample size and the data collection process. It should be noted that getting people to answer the questionnaire was very difficult, especially for flight personnel. Another limitation is that the questionnaire is self-administered and consists of closed questions, which may have biased the results. Several methodological and statistical recommendations were followed to reduce the impact of common method variance (Podsakoff *et al.*, 2003).

5.4 Further research

To increase the conclusions' generalizability, more studies might be carried out in different industries and regions. Aviation encompasses a wide range of activities, of which commercial aviation (or "airlines") is just one. Not much research has been done on the relationship between job satisfaction, industry turnover intentions and the performance of other aviation professionals, including those in ground handling, maintenance & engineering, aircraft manufacturing, defense, airport staff, ATC (air traffic controllers), pilot training activities, aviation professionals in firefighting, agriculture, rescue and medical aircraft operations, flight catering, safety and security professionals, regulators, cleaning professionals, etc.

References

Ali, S., Yongjian, P., Shahzad, F., Hussain, I., Zhang, D., Fareed, Z. and Wang, C. (2022), "Abusive supervision and turnover intentions: a mediation-moderation perspective", *Sustainability*, Vol. 14 No. 17, p. 10626, doi: 10.3390/su141710626.

Anderson, J. and Gerbing, D. (1988), "Structural equation modeling in practice: a review and recommended two-step approach", *Psychological Bulletin*, Vol. 103 No. 3, pp. 411-423, doi: 10.1037/0033-2909.103.3.411.

Bishop, J.H. (1990), "Job performance, turnover, and wage growth", *Journal of Labor Economics*, Vol. 8 No. 3, pp. 363-386, available at: www.jstor.org/stable/2535161

Bryman, A. and Cramer, D. (2003), "Análise de dados em ciências sociais", Introdução às técnicas utilizando o SPSS para Windows. Celta, available at: http://id.bnportugal.gov.pt/bib/bibnacional/1287710

CAE (2023), "The global pilot shortage is a challenge to the world's airlines", CAPA. (2024, Jan. 11), available at: https://centreforaviation.com/analysis/reports/the-global-pilot-shortage-is-a-challenge-to-the-worlds-airlines-658033

Chen, C.F. (2006), "Job satisfaction, organizational commitment, and flight attendants' turnover intentions: a note", *Journal of Air Transport Management*, Vol. 12 No. 5, pp. 274-276, doi: 10.1016/j.jairtraman.2006.05.001.

Chen, I.H., Brown, R., Bowers, B.J. and Chang, W.Y. (2015), "Work-to-family conflict as a mediator of the relationship between job satisfaction and turnover intention", *Journal of Advanced Nursing*, Vol. 71 No. 10, pp. 2350-2363, doi: 10.1111/jan.12706.

Danish, R.Q., Gohar, A., Ahmad, A. and Shaukat, S. (2017), "Mediating role of work engagement in the relationship between job satisfaction and turnover intention: empirical evidence from hospitals in lahore, Pakistan", *International Journal of Management Research and Emerging Sciences*, Vol. 7 No. 1, doi: 10.56536/ijmres.v7i1.29.

Dolatabadi, S.H. and Keynia, F. (2017), "Designing of customer and employee churn prediction model based on data mining method and neural predictor", 2017 2nd International Conference on Computer and Communication Systems (ICCCS), pp. 74-77, IEEE, doi: 10.1109/CCOMS.2017.8075270.

Efthymiou, M., Usher, D., O'Connell, J.F., Warnock-Smith, D. and Conyngham, G. (2021), "The factors influencing entry level airline pilot retention: an empirical study of ryanair", *Journal of Air Transport Management*, Vol. 91, p. 101997, doi: 10.1016/j.jairtraman.2020.101997.

Finney, S.J. and DiStefano, C. (2013), "Nonnormal and categorical data in structural equation modeling", in Hancock, G.R. and Mueller, R.O. (Eds), *Structural Equation Modeling: A Second Course*, 2nd ed., pp. 439-492, IAP Information Age Publishing.

Fornell, C. and Larcker, D.F. (1981), "Evaluating structural equation models with unobservable variables and measurement error", *Journal of Marketing Research*, Vol. 18 No. 1, pp. 39-50, doi: 10.2307/3151312.

Gan, E. and Voon, M.L. (2021), "The impact of transformational leadership on job satisfaction and employee turnover intentions: a conceptual review", *SHS Web of Conferences*, Vol. 124, p. 8005, doi: 10.1051/shsconf/202112408005.

Griffeth, R.W., Hom, P.W. and Gaertner, S. (2000), "A meta-analysis of antecedents and correlates of employee turnover: update, moderator tests, and research implications for the next millennium", *Journal of Management*, Vol. 26 No. 3, pp. 463-488, doi: 10.1177/014920630002600305.

Gu, Q., Wang, L., Sun, J.Y. and Xu, Y. (2010), "Understanding China's post-80 employees' work attitudes: an explorative study", *Journal of Chinese Human Resources Management*, Vol. 1 No. 2, pp. 74-94, doi: 10.1108/20408001011117635.

Hair, J.F., Risher, J.J., Sarstedt, M. and Ringle, C.M. (2019), "When to use and how to report the results of PLS-SEM", *European Business Review*, Vol. 31 No. 1, pp. 2-24, doi: 10.1108/EBR-11-2018-0203.

Hancock, J.I., Allen, D.G., Bosco, F.A., McDaniel, K.R. and Pierce, C.A. (2013), "Meta-analytic review of employee turnover as a predictor of firm performance", *Journal of Management*, Vol. 39 No. 3, pp. 573-603, doi: 10.1177/0149206311424943.

Hassouna, M., Tarhini, A., Elyas, T. and Abou Trab, M.S. (2015), "Customer churn in mobile markets: a comparison of techniques", *International Business Research*, Vol. 8 No. 6, pp. 224-237, doi: 10.5539/ibr.v8n6p224.

Hill, M. and Hill, A. (2002), *Investigação Por Questionário*, Edições Sílabo, Lisboa.

Hom, P.W., Lee, T.W., Shaw, J.D. and Hausknecht, J.P. (2017), "One hundred years of employee turnover theory and research", *Journal of Applied Psychology*, Vol. 102 No. 3, pp. 530-545, doi: 10.1037/apl0000103.

Hu, L.T. and Bentler, P.M. (1999), "Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives", *Structural Equation Modeling: A Multidisciplinary Journal*, Vol. 6 No. 1, pp. 1-55, doi: 10.1080/10705519909540118.

Huang, S., Chen, Z., Liu, H. and Zhou, L. (2017), "Job satisfaction and turnover intention in China: the moderating effects of job alternatives and policy support", *Chinese Management Studies*, Vol. 11 No. 4, pp. 689-706, doi: 10.1108/CMS-12-2016-0263.

Huang, Y.H., Lee, J., McFadden, A.C., Murphy, L.A., Robertson, M.M., Cheung, J.H. and Zohar, D. (2016), "Beyond safety outcomes: an investigation of the impact of safety climate on job satisfaction, employee engagement and turnover using social exchange theory as the theoretical framework", *Applied Ergonomics*, Vol. 55, pp. 248-257, doi: 10.1016/j.apergo.2015.10.007.

Hussain, K., Abbas, Z., Gulzar, S., Jibril, A.B. and Hussain, A. (2020), "Examining the impact of abusive supervision on employees' psychological wellbeing and turnover intention: the mediating role of intrinsic motivation", *Cogent Business & Management*, Vol. 7 No. 1, p. 1818998, doi: 10.1080/23311975.2020.1818998.

IATA (2018), "IATA aviation human resources report", IATA. Retrieved from (2024, Jan 14), available at: www.iata.org/en/training/pages/aviation-human-resources-report/

Isson, J.P. and Harriott, J.S. (2016), *People Analytics in the Era of Big Data: Changing the Way You Attract, Acquire, Develop, and Retain Talent*, John Wiley & Sons, NJ.

Jackofsky, E.F., Ferris, K.R. and Breckenridge, B.G. (1986), "Evidence for a curvilinear relationship between job performance and turnover", *Journal of Management*, Vol. 12 No. 1, pp. 105-111, doi: 10.1177/014920638601200109.

Jain, N., Tomar, A. and Jana, P.K. (2021), "A novel scheme for employee churn problem using multi-attribute decision making approach and machine learning", *Journal of Intelligent Information Systems*, Vol. 56 No. 2, pp. 279-302, doi: 10.1007/s10844-020-00614-9.

Jano, R., Satardien, M. and Mahembe, B. (2019), "The relationship between perceived organisational support, organisational commitment and turnover intention among employees in a selected organisation in the aviation industry", *SA Journal of Human Resource Management*, Vol. 17 No. 1, pp. 1-8.

Jöreskog, K.G. and Sörbom, D. (1993), *LISREL8: Structural Equation Modelling with the SIMPLIS Command Language*, Scientific Software International.

Joseph, D., Ng, K.Y., Koh, C. and Ang, S. (2007), "Turnover of information technology professionals: a narrative review, meta-analytic structural equation modeling, and model development", *MIS Quarterly*, Vol. 31 No. 3, pp. 547-577.

Jou, R.C., Kuo, C.W. and Tang, M.L. (2013), "A study of job stress and turnover tendency among air traffic controllers: the mediating effects of job satisfaction", *Transportation Research Part E: Logistics and Transportation Review*, Vol. 57, pp. 95-104, doi: 10.1016/j.tre.2013.01.009.

Kiernan, K.M. (2018), "Calculating the cost of pilot turnover", *Journal of Aviation/Aerospace Education & Research*, Vol. 27 No. 1, doi: 10.15394/jaaer.2018.1737.

Lambeth, D., Lei, Z. and Cheung, T. (2022), "Airline pilot remuneration: a conceptual framework and empirical analysis of airlines in Australia", *Transport Policy*, Vol. 126, pp. 34-42, doi: 10.1016/j.tranpol.2022.07.002.

Luna-Arocas, R. and Camps, J. (2007), "A model of high-performance work practices and turnover intentions", *Personnel Review*, Vol. 37 No. 1, pp. 26-46, doi: 10.1108/00483480810839950.

Margherita, A. (2022), "Human resources analytics: a systematization of research topics and directions for future research", *Human Resource Management Review*, Vol. 32 No. 2, doi: 10.1016/j.hrmr.2020.100795.

Marler, J.H. and Boudreau, J.W. (2016), "An evidence-based review of HR analytics", *The International Journal of Human Resource Management*, Vol. 28 No. 1, pp. 3-26, doi: 10.1080/09585192.2016.1244699.

Marôco, J. and Garcia-Marques, T. (2006), "Qual a fiabilidade do alfa de cronbach? Questões antigas e soluções modernas?", *Laboratório De Psicologia*, Vol. 4 No. 1, pp. 65-90.

Marôco, J. (2021), *Análise Estatística Com o SPSS Statistics*, ReportNumber, Lda.

Mobley, W.H., Horner, S.O. and Hollingsworth, A.T. (1979), "An evaluation of precursors of hospital employee turnover", *Journal of Applied Psychology*, Vol. 63 No. 4, pp. 408-414, doi: 10.1037/0021-9010.63.4.408.

Moreira, A., Sousa, M.J. and Cesário, F. (2022), "Competencies development: the role of organizational commitment and the perception of employability", *Social Sciences*, Vol. 11 No. 3, p. 125, doi: 10.3390/socsci11030125.

Mosadeghrad, A.M., Ferlie, E. and Rosenberg, D. (2008), "A study of the relationship between job satisfaction, organizational commitment and turnover intention among hospital employees", *Health Services Management Research*, Vol. 21 No. 4, pp. 211-227, doi: 10.1258/hsmr.2007.007015.

Motshegwa, B. (2010), "Comparative analysis of teachers' perception of equity, pay satisfaction, affective commitment and intention to turnover in Botswana", *Journal of Management Research*, Vol. 3 No. 1, doi: 10.5296/jmr.v3i1.501.

Mowday, R.T., Porter, L.W. and Steers, R.M. (1982), *Employee–Organization Linkages – the Psychology of Commitment, Absenteeism and Turnover*, Academic Press, New York, NY.

Mulki, J.P., Jaramillo, F. and Locander, W.B. (2006), "Effects of ethical climate and supervisory trust on salesperson's job attitudes and intentions to quit", *Journal of Personal Selling & Sales Management*, Vol. 26 No. 1, pp. 19-26, doi: 10.2753/PSS0885-3134260102.

Pestana, M.H. and Gageiro, J. (2003), *Análise De Dados Para Ciências Sociais – A Complementaridade Do SPSS*, Edições Sílabo.

Pirrolas, O.A.C., Correia, P.M.A.R. and Nascimento, J.L. (2022), "The scale of causes of churning: elaboration and validation for Portuguese human resources", *Social Sciences*, Vol. 12 No. 1, p. 1, doi: 10.3390/socsci12010001.

Podsakoff, P.M., MacKenzie, S.B., Lee, J.Y. and Podsakoff, N.P. (2003), "Common method biases in behavioral research: a critical review of the literature and recommended remedies", *Journal of Applied Psychology*, Vol. 88 No. 5, pp. 879-903, doi: 10.1037/0021-9010.88.5.879.

Rahim, A. and Cosby, D.M. (2016), "A model of workplace incivility, job burnout, turnover intentions, and job performance", *Journal of Management Development*, Vol. 35 No. 10, pp. 1255-1265, doi: 10.1108/JMD-09-2015-0138.

Robbins, S.P. and Judge, T. (2009), *Organizational Behavior*, Pearson Prentice Hall, NJ.

Rombaut, E. and Guerry, M. (2018), "Predicting voluntary turnover through human resources database analysis", *Management Research Review*, Vol. 41 No. 1, pp. 96-112, doi: 10.1108/MRR-04-2017-0098.

Rubenstein, A.L., Eberly, M.B., Lee, T.W. and Mitchell, T.R. (2018), "Surveying the Forest: a meta-analysis, moderator investigation, and future-oriented discussion of the antecedents of voluntary employee turnover", *Personnel Psychology*, Vol. 71 No. 1, pp. 23-65, doi: 10.1111/peps.12226.

Saradhi, V.V. and Palshikar, G.K. (2011), "Employee churn prediction", *Expert Systems with Applications*, Vol. 38 No. 3, pp. 1999-2006, doi: 10.1016/j.eswa.2010.07.134.

Sharma, S. (1996), *Applied Multivariate Techniques*, John Wiley and Sons.

Shu, X., Gong, Y.Y., Xiong, J. and Hu, X. (2018), "Job satisfaction, turnover intention and work performance in Chinese family enterprises", *Management International*, Vol. 22 No. 2, pp. 84-95, doi: 10.7202/1058163ar.

Sisodia, D.S., Vishwakarma, S. and Pujahari, A. (2017), "Evaluation of machine learning models for employee churn prediction", 2017 international conference on inventive computing and informatics (icici), pp. 1016-1020, IEEE, doi: 10.1109/ICICI.2017.8365293.

Siu, O.L., Cheung, F. and Lui, S. (2015), "Linking positive emotions to work well-being and turnover intention among Hong Kong police officers: the role of psychological capital", *Journal of Happiness Studies*, Vol. 16 No. 2, pp. 367-380, doi: 10.1007/s10902-014-9513-8.

Smith, T.D. (2018), "An assessment of safety climate, job satisfaction and turnover intention relationships using a national sample of workers from the USA", *International Journal of Occupational Safety and Ergonomics*, Vol. 24 No. 1, pp. 27-34, doi: 10.1080/10803548.2016.1268446.

Srivastava, P.R. and Eachempati, P. (2021), "Intelligent employee retention system for attrition rate analysis and churn prediction: an ensemble machine learning and multi-criteria decision-making approach", *Journal of Global Information Management (JGIM)*, Vol. 29 No. 6, pp. 1-29, doi: 10.4018/JGIM.20211101.oa23.

Suifan, T.S., Diab, H. and Abdallah, A.B. (2017), "Does organizational justice affect turnover-intention in a developing country? The mediating role of job satisfaction and organizational commitment", *Journal of Management Development*, Vol. 36 No. 9, pp. 1137-1148, doi: 10.1108/JMD-02-2017-0048.

Trevor, C.O., Gerhart, B. and Boudreau, J.W. (1997), "Voluntary turnover and job performance: curvilinearity and the moderating influences of salary growth and promotions", *Journal of Applied Psychology*, Vol. 82 No. 1, p. 44, doi: 10.1037/0021-9010.82.1.44.

Tursunbayeva, A., Di Lauro, S. and Pagliari, C. (2018), "People analytics—A scoping review of conceptual boundaries and value propositions", *International Journal of Information Management*, Vol. 43, pp. 224-247, doi: 10.1016/j.ijinfomgt.2018.08.002.

Vandenberghe, C. and Tremblay, M. (2008), "The role of pay satisfaction and organizational commitment in turnover intentions: a two-sample study", *Journal of Business and Psychology*, Vol. 22 No. 3, pp. 275-286, doi: 10.1007/s10869-008-9063-3.

Wee, K.H., Bang, W.S. and Park, J. (2020), "A study on effect relationships of coaching leadership job satisfaction, organizational commitment, turnover intention", *International Journal of Social Welfare Promotion and Management*, Vol. 7 No. 1, pp. 1-8, doi: 10.21742/ijswpm.2020.7.1.01.

Wells, J.E. and Welty Peachey, J. (2011), "Turnover intentions: do leadership behaviors and satisfaction with the leader matter?", *Team Performance Management: An International Journal*, Vol. 17 Nos 1/2, pp. 23-40, doi: 10.1108/13527591111114693.

Wyrwa, J. and Kaźmierczyk, J. (2020), "Conceptualizing job satisfaction and its determinants: a systematic literature review", *Journal of Economic Sociology*, Vol. 21 No. 5, pp. 3-18, doi: 10.17323/1726-3247-2020-5-138-168.

Yahia, N.B., Hlel, J. and Colomo-Palacios, R. (2021), "From big data to deep data to support people analytics for employee attrition prediction", *IEEE Access*, Vol. 9, pp. 60447-60458, doi: 10.1109/ACCESS.2021.3074559.

Yang, J., Pu, B. and Guan, Z. (2019), "Entrepreneurial leadership and turnover intention in startups: mediating roles of employees' job embeddedness, job satisfaction and affective commitment", *Sustainability*, Vol. 11 No. 4, p. 1101, doi: 10.3390/su11041101.

Yiğit, İO. and Shourabizadeh, H. (2017), "An approach for predicting employee churn by using data mining", 2017 International Artificial Intelligence and Data Processing Symposium (IDAP), IEEE, pp. 1-4, doi: 10.1109/IDAP.2017.8090324.

Zhang, F., Lin, C., Li, X., Li, M., Jia, R., Guo, X. and Bai, H. (2023), "The relationships between burnout, general wellbeing, and psychological detachment with turnover intention in Chinese nurses: a cross-sectional study", *Frontiers in Public Health*, Vol. 11, p. 1216810, doi: 10.3389/fpubh.2023.1216810.

Zimmerman, R.D. and Darnold, T.C. (2009), "The impact of job performance on employee turnover intentions and the voluntary turnover process: a meta-analysis and path model", *Personnel Review*, Vol. 38 No. 2, pp. 142-158, doi: 10.1108/00483480910931316.

Further reading

Ekawati, A.D. (2019), "Predictive analytics in employee churn: a systematic literature review", *Journal of Management Information and Decision Sciences*, Vol. 22 No. 4, pp. 387-397, available at: www.abacademies.org/articles/predictive-analytics-in-employee-churn-a-systematic-literature-review-8724.html

Lim, T.L., Omar, R., Ho, T.C.F. and Tee, P.K. (2021), "The roles of work–family conflict and family–work conflict linking job satisfaction and turnover intention of academic staff", *Australian Journal of Career Development*, Vol. 30 No. 3, pp. 177-188, doi: 10.1177/10384162211068584.

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