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PREDICTING THE EMPLOYEE TURNOVER INTENTION: HOW ORGANIZATIONS LEVERAGE DATA-DRIVEN HR PREDICTIVE ANALYTICS FOR TALENT MANAGEMENT DECISION-MAKING

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ABSTRACT

Turnover intention is an ongoing issue of interest to many organizations. High employee turnover intention can cause numerous negative effects to organizations, including decrease in productivity, increase training expenses and contribute to low employee morale. Thus, this study aimed to predict the employee turnover intention. Using Microsoft Excel and RStudio software, a logistic regression model is used to make predictions and analysed the relationship between variables in this quantitative research, which is based on a secondary dataset that was obtained from Kaggle. The study concluded that age, education field, department, business travel, overtime, total working years, years at company, number of companies worked, job involvement, interpersonal relationship satisfaction, work-life balance, job satisfaction and work environment satisfaction effected the employee turnover intention. However, the Hosmer-Lemeshow goodness-of-fit test indicated that the logistic regression model in this study is poorly fitted due to small sample sizes. For the theoretical contribution, this study provided different perspectives on variables that affect employee turnover intention and minimized the research gap caused by inconsistent results in previous literatures. Meanwhile, for the practical contribution, this study's predictive analytics using logistic regression model aimed to assist organizations to leverage data-driven Human Resource (HR) analytics to strategically manage their talent.

Keywords: *data-driven decision-making; employee turnover intention; human resource analytics; predictive analytics; talent management.*

INTRODUCTION

The most valuable resource for the organizations is its employees. Employees provide the best and most efficient service possible to the client in order to compete in the market. Employee satisfaction determines employee performance (Anhar & Mollah, 2015). According to research by Oloyede and Soyemi (2022), companies' overall performance and productivity can be negatively impacted by high employee turnover intention. Today, however, many organizations are worried about employee turnover, which can be disastrous for the organizations, especially when high-performing employees leave (Belete, 2018). It may result in decrease productivity, increase training expenses, and low morale among the existing employees.

Turnover intention is thought to be the best predictor of actual employee turnover, which is a person's reported willingness to leave a company within a certain time frame (Lazzari et al., 2022). Turnover intention refers to an employee's probability of leaving their current job (Belete, 2018). The likelihood that someone will switch jobs within a specific period and ultimately leave their current position is known as turnover intention (Kaur et al., 2013). The complex phenomenon of turnover intention depends on numerous variables (Kaur et al., 2013). There are many different causes for the high turnover rate, including those that are personal, environmental, or even corporate. The various variables that may result in employee turnover are identified by a sizable body of theoretical and empirical literature (Low & Panatik, 2019). For example, work-life imbalance and job dissatisfaction are two variables that contribute to job turnover, which, in some cases, results in actual turnover as well as employee intention to leave (Kabir & Tirno, 2018). The COVID-19 pandemic has also resulted in an unprecedented wave of resignations. For instance, between February 2020 and November 2021, the healthcare industry in the US lost a net 460,000 employee (Poon et al., 2022). The fact that they continued to work throughout the pandemic was one of the reasons they left, according to a survey of 1,000 senior U.S. health professionals (Poon et al., 2022). A significant portion of the dramatic increase in resignation rates among Singapore's health employee in 2021 was caused by both emigrating foreigners and extremely burned-out locals (Poon et al., 2022). Furthermore, with an 8.4% voluntary turnover rate, the Fast-Moving Consumer Goods (FMCG) sector has the highest rate in 2020. The imbalance between work and life is one of the reasons Malaysians change jobs (Hosen, 2022).

Employees who can balance all life roles experience have higher job satisfaction and fewer plans to quit their jobs (Tavassoli & Sune, 2018). High-performing employees who rarely leave make it easier to create and maintain a successful organization in this unstable economic climate because skilled and qualified employees can be retained and hired to support company growth. However, in a highly competitive and rapidly changing environment, organizations struggle to satisfy and retain qualified employees. According to researcher, Belete (2018), turnover is the most expensive and seemingly intractable human resources issue that organizations face globally. Consequently, if organizations want to retain experienced and skilled employees, they must recognize employee turnover intention and the variables that influence them. According to Jha (2009), there are numerous variables that affect employee turnover intention, so it is best to take a holistic approach to discovering these variables (Belete, 2018).

Nevertheless, today, some companies still emphasize the employee's contribution to the company's performance and productivity, thereby neglecting whether the employee is content with the job, the work environment, and the work-life balance. As a result, these actions increase the probability of an employee's turnover intention. Hence, turnover intention is a

global issue of interest to researchers and organizations across the industries (Oloyede & Soyemi, 2022). Furthermore, some published research literature has found inconsistent findings on the factors that affect employee turnover intention. Some existing research literature indicates that some of these variables have positive and significant effects on employee turnover intention, but the results of some research literature are not so. For instance, for work environment satisfaction variables, Al Sabei et al. (2020) and Tetteh et al. (2021) found that work environment satisfaction has a positive impact on individual turnover intention (Sazili et al., 2022). However, according to the study by Kurniawaty et al. (2019), they discovered that the work environment satisfaction has a negative impact on employee turnover intention (Sazili et al., 2022).

Therefore, this study aimed to predict the employee turnover intention. Thus, the research question for this study is "What contributing factors that affect the employee turnover intention?". According to Mobley's (1977) in turnover theory, the desire to leave a job is the result of employee dissatisfaction, which drives people to seek other employment (Gebregziabher et al., 2020). In addition, Organizational Equilibrium Theory (TOE) is often regarded as the first formal theory of turnover tendency. The concept behind TOE is that when deciding whether to leave a company, employees weigh their own lives value against that of the company (Pauline, 2017). Furthermore, according to Herzberg's Two-Factor Theory (1966), various variables may have an impact either directly or indirectly on employee turnover intention (Low & Panatik, 2019).

The researchers discovered that the three aforementioned theories all have as a common element how employee turnover intention is either directly or indirectly impacted by their perceived equilibrium and satisfaction. Hence, this study offers a different viewpoint for some of the variables that influence employee turnover intention in previous research literature. The proposed model in this study is able to make it easier for managers and human resource departments to pinpoint specific elements that significantly affect employee turnover intention. This study aims to help any organization, particularly those with intention of having a high employee turnover rate, in retaining talented employees, saving on employee training costs, sustaining organizational growth, and other aspects. However, the independent and dependent variables used in this study's secondary Kaggle data, updated in 2018 are restricted to focusing on the general situation rather than the exceptional situation, such as the COVID-19 pandemic.

The remaining part of this study is organized as follows: The development of the research model and hypotheses is covered in the following section after a description of the literature review. Then, the research methodology used in this study is covered in detail in the next section. The development of quantitative research findings and secondary data analysis follows. The study's findings are then further discussed. The last section contains the conclusions, implications, limitations, and recommendations for further research.

LITERATURE REVIEW

The theoretical framework that this research used is crucial for examining the relationship between the different variables and employee turnover intention. The researchers discovered that three theories were introduced and researched, namely Mobley's (1977) model of employee turnover, Theory of Organization Equilibrium (TOE) and Herzberg's Two-Factor Theory (1966). However, this study will focus on Herzberg's Two-Factor Theory (1966) as it is the most well-known and widely used theory in research.

Herzberg's Two-Factor Theory (1966)

Herzberg's Two-Factor Theory and employee turnover intention are investigated through a comprehensive literature review in the current study. According to Herzberg's Two-Factor Theory, there are two distinct groups of factors in an organization: "motivation factors", which contribute to job satisfaction, and "hygiene factors", which contribute to job dissatisfaction (Pauline, 2017). Employee satisfaction variables (motivation factors in the workplace) and employee dissatisfaction variables (hygiene factors in the workplace) are identified and examined by Herzberg's two-factor theory (Low & Panatik, 2019). Herzberg (1966) believed that when motivation and hygiene factors complement each other, employees will achieve job satisfaction (Mustafa et al., 2022). In accordance with Herzberg's Two-Factor Theory, Mustafa et al. (2020) state that the hygiene and motivation factors are categorized as indicated in Table 1.

Table 1: Herzberg's two-factor theory

Hygiene Factors	**Motivation Factors**
Company Policy and Administration	Achievement
Supervision	Recognition
Interpersonal Relation	Job Advancement Opportunities
Working Conditions	Responsibility
Personal Life	Personal Growth Opportunity
Salary	Work Itself
Status	
Job Security	

Employees have a higher turnover intention when one of the two factor theories is insufficient, according to psychologist Herzberg (1966) (Thanuja et al., 2016). Kolarova (2010) notes that Herzberg argued that hygiene related factors cannot guarantee job satisfaction because they do not really promote a sense of personal development (Thanuja et al., 2016). Furthermore, Herzberg (1966) claimed that when an employee has a high need for satisfaction, dissatisfaction declines, preventing subpar performance; however, only the satisfaction of motivational factors lead to enhanced productivity (Holston-Okae & Mushi, 2018). Nevertheless, from another point of view, although motivators directly affect employee motivation and satisfaction, employee dissatisfaction is not always the result of their absence. On the other hand, hygienic factors cannot stimulate employee motivation and satisfaction, but their absence will directly impact employee dissatisfaction (Oktosatrio & Suhendro, 2018).

In short, according to Herzberg's two-factor theory, employees must adhere to hygiene factors as the fundamental and important conditions for maintaining job satisfaction levels and excluding intention and feelings of job dissatisfaction (Low & Panatik, 2019). However, in theory, motivators can be considered as drivers and stimuli that motivate and motivate employees to increase their output, maintain good behaviors within the company and further increase job satisfaction. Herzberg's theory broadly encompasses virtually every factor that may increase or reduce employee turnover in addition to focusing on a particular aspect of

employee turnover intention (Low & Panatik, 2019).

Employee Turnover Intention

Vandenberg and Nelson (1999) defined turnover intention as a person's own predictable likelihood that they will eventually leave their company (Chin, 2018). The tendency or intent of a person to leave a job voluntarily and independently is referred to as employee turnover intention (Singh & Sant, 2021). Furthermore, Simon, Müller, and Hasselhorn (2010) defined turnover intention as an employee's intention or thoughts regarding leaving a job (Singh & Sant, 2021). Additionally, Tett and Meyer (1993) defined turnover intention as "an employee's conscious and intentional intention of leaving the company" (Chin, 2018). Wong et al. (2015) state that researchers measure turnover intention using time-specific intervals and perceive it as a decision involving a person leaving a current company (Skelton et al., 2020).

Numerous researchers perceive employee turnover as an issue and look into potential causes of employee turnover intention in an effort to determine "what really determines employee turnover intention" (Gebregziabher et al., 2020). Employees with the intent to move or leave their company in search of better employment are considered to have turnover intention (Lestari & Margaretha, 2021). Furthermore, the dissatisfaction of the employee leads to forced job searching, which is the beginning of the turnover intention (Gebregziabher et al., 2020).

Belete (2018) points out that decline in employee's work performance and productivity are a sign of turnover intention, which resulted in unfavorable behaviors like lateness, increased absenteeism, a lack of self-initiative, and a lack of enthusiasm on the part of the workforce (Lestari & Margaretha, 2021). According to Kaur, Mohindru, and Pankaj (2013), high levels of turnover intention negatively affect companies and are linked to labour market stability, ultimately leading to higher expenses of employee needs like training and recruitment (Lestari & Margaretha, 2021). Therefore, Zeffane (1994) pointed out that companies must understand employee turnover intention and the variables influencing this phenomenon in order to retain qualified employees (Singh & Sant, 2021).

Hypotheses Development

This study provides a hypothesis to support and strengthen the hypothesis that has already been supported by previous researchers. Additionally, this study offers the hypotheses to address the research gap resulting from the inconsistent findings of previous research literature on various variables that influence employee turnover intention. Fig. 1 demonstrates the hypothetical framework concept.

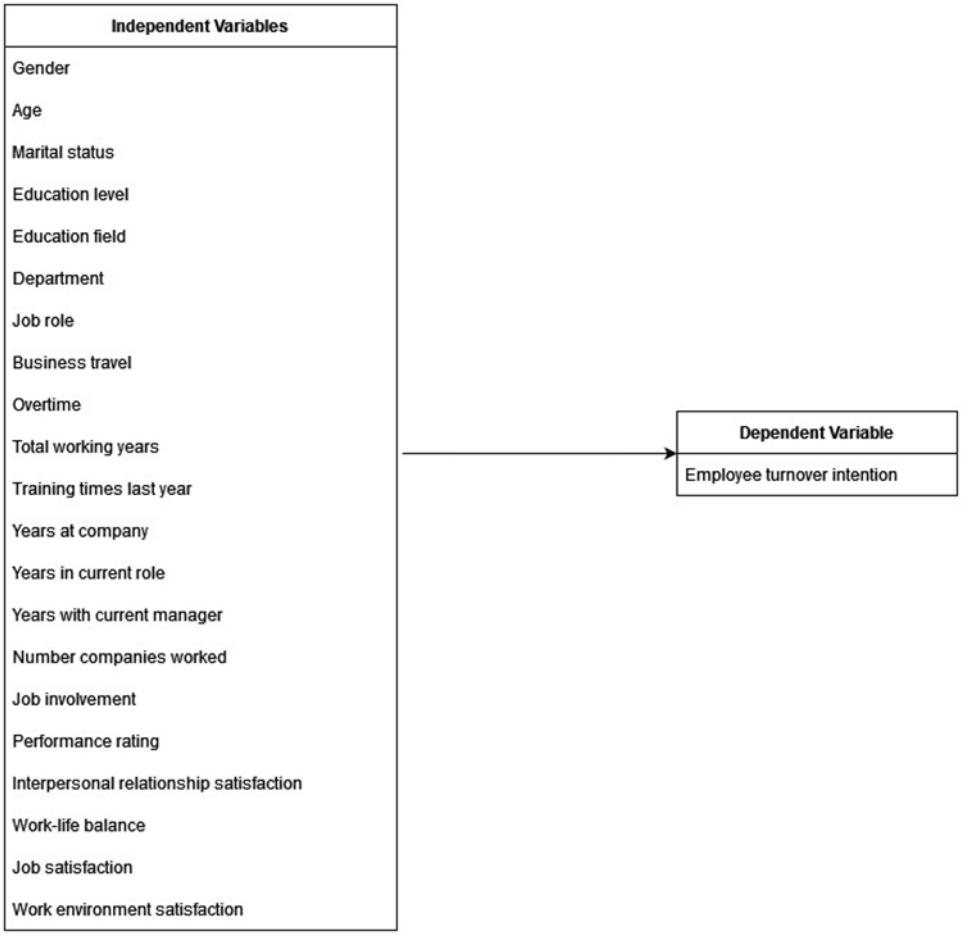

Fig. 1: conceptual framework

H1. There is an effect of gender on employee turnover intention.
H2. There is an effect of age on employee turnover intention.
H3. There is an effect of marital status on employee turnover intention.
H4. There is an effect of education level on employee turnover intention.
H5. There is an effect of education field on employee turnover intention.
H6. There is an effect of department on employee turnover intention.
H7. There is an effect of job role on employee turnover intention.
H8. There is an effect of business travel on employee turnover intention.
H9. There is an effect of overtime on employee turnover intention.
H10. There is an effect of total working years on employee turnover intention.
H11. There is an effect of training times last year on employee turnover intention.
H12. There is an effect of years at company on employee turnover intention.
H13. There is an effect of years in current role on employee turnover intention.
H14. There is an effect of years with current manager on employee turnover intention.
H15. There is an effect of number of companies worked on employee turnover intention.
H16. There is a negative effect of job involvement on employee turnover intention.
H17. There is an effect of job performance on employee turnover intention.
H18. There is a negative effect of interpersonal relationship satisfaction on employee turnover intention.
H19. There is a negative effect of work-life balance on employee turnover intention.
H20. There is a negative effect of job satisfaction on employee turnover intention.

H21. There is a negative effect of work environment satisfaction on employee turnover intention.

METHODOLOGY

This section presents the methodology used in this research.

Research Design

This study conducts quantitative research based on deductive research and cross-sectional secondary data. This study predicts the employee turnover intention. Therefore, the type of quantitative research design in this study is correlational research. Correlational research uses statistical data to measure the significance of a relationship between two or more variables. This type of research design investigates and interprets various facts from relationships between variables. Furthermore, correlational research can identify trends and patterns in the data, however, it cannot explain why these patterns were discovered. Therefore, a theory in the literature review that supported the hypothesis is crucial because it will either confirm or reject the hypothesis and findings by providing an explanation.

Flow of Research

This study conducts quantitative research that is based on deductive research. Since Kaggle datasets are open-sourced, the secondary dataset obtained by Kaggle is utilized in this study for quantitative research, which uses the relationship between the variables to make predictions. Although the dataset was initially published on the website of International Business Machines Corporation (IBM) has been removed, the dataset is still accessible on Kaggle. As this study is not focused on the after COVID-19 pandemic, hence, in this study will make use of secondary data that was obtained from Kaggle updated in 2018. Therefore, the data collected for this study is secondary data from the Kaggle website. The reliability of secondary data obtained from Kaggle can be assessed through reviewing the dataset's upvotes or shared notebooks. Therefore, the secondary data that was obtained from Kaggle has an upvote per notebook ratio of 8.73 (refer Appendix A). There are 35 columns and 1470 rows in the dataset. The dataset contains information on variables such as age, gender, work-life balance, years in current role, overtime, job role satisfaction, and work environment satisfaction. By using these variables, IBM created a comprehensive overview that includes information from a full engagement survey in addition to the data from the average Human Resources Information System (HRIS). In addition, the original IBM file contained a second worksheet titled "Data Definitions." Since it was removed, these data definitions have been added to the file description in Kaggle (refer Appendix B).

According to Tavassoli and Sune (2018), employees who have higher job satisfaction and fewer turnover intentions are those who can manage most of their responsibilities. In this uncertain economic climate, it is easier to establish and maintain a successful organization with high-performing employees who rarely leave because qualified employees can be hired and retained to support the growth of the company. The researcher Belete (2018) claims that the turnover is the costly and seemingly unsolvable human resources problem that organizations face globally. As a result, turnover intention is an issue that affects all industries globally and is of interest to researchers and organizations (Oloyede & Soyemi, 2022). Furthermore, a lot of companies are concerned today about employee turnover, which can be harmful for companies, particularly when talented employees leave (Belete, 2018).

Nevertheless, some companies today continue to place a premium on how much an employee contributes to the performance and productivity of the company, disregarding whether the employee are satisfied with their job, their working environment, and the ability to balance work-life balance. These actions consequently raise the likelihood that an employee will intend to quit. Oloyede and Soyemi's research (2022) found that an organization's overall performance and productivity may suffer from high employee turnover rates. This may result in lower productivity, higher hiring and training expenses, and low employee morale. The intention of employees to quit and the variables influencing them must therefore be understood by organizations if they are to keep experienced and skilled employees.

Therefore, this study predicted the employee turnover intention. Next, the researcher develops a hypothesis based on Herzberg's Two-Factor Theory in literature review before conducting prediction to test the hypothesis. Then, employee respondents were selected from all secondary dataset obtained in this study. Next, the research conducts the prediction to test the hypothesis. The development of secondary data analysis by using Microsoft Excel and RStudio and the quantitative research findings are as follows. The findings of the study are then further discussed. Therefore, the last part of the study is where the conclusions and recommendations are drawn. An overview of the research flow is shown in Fig. 2.

Data

Table 2 presents the data summary used in this research. The secondary dataset was adopted from Kaggle via following link:

https://www.kaggle.com/datasets/pavansubhasht/ibm-hr-analytics-attrition-dataset. In total, there are 22 variables.

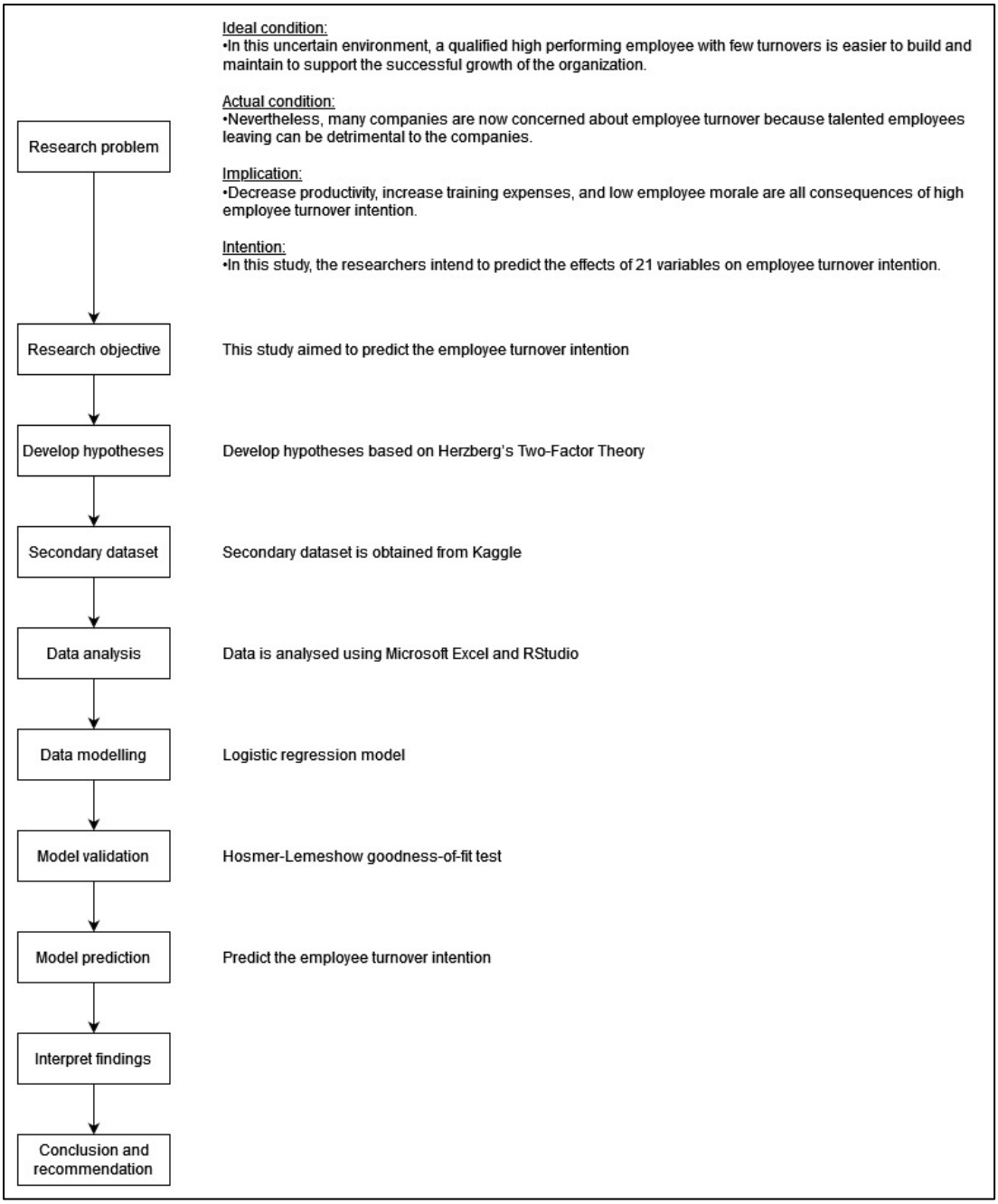

Fig. 2: flow of research

Table 2: Data summary

Variable	Data type	Scale/Coding
Gender	Nominal	Female=0 and Male=1
Age	Ratio	"18-27"= 1, "28-37"= 2, "38-47"= 3, "48-57"= 4, "> 57"= 5
Marital status	Nominal	Divorced=0, Single=1, Married=2
Education level	Nominal	Below College=1, College=2, Bachelor=3, Master=4, Doctor=5
Education field	Nominal	Human Resources=1, Technical Degree=2, Marketing=3, Medical=4, Life Sciences=5, Other=6

Department	Nominal	Human Resources=1, Sales =2, Research and Development=3
Job role	Nominal	Human Resources=1, Research Director=2, Sales Representative=3, Manager=4, Healthcare Representative=5, Manufacturing Director=6, Laboratory Technician=7, Research Scientist=8, Sales Executive=9
Business travel	Nominal	Non-Travel =0, Travel Rarely =1, Travel Frequently =2,
Overtime	Nominal	Yes=1 and No=0
Total working years	Ratio	"0-9"=1,"10-19"=2,"20-29"=3,"30-40"=4
Training times last year	Ratio	"0-1"=1,"2-3"=2,"4-6"=3
Years at company	Ratio	"0-9"=1,"10-19"=2,"20-29"=3,"30-40"=4
Years in current role	Ratio	"0-5"=1,"6-11"=2,"12-18"=3
Years with current manager	Ratio	"0-5"=1,"6-11"=2,"12-17"=3
Number companies worked	Ratio	"0-2"=1,"3-5"=2,"6-9"=3
Job involvement	Interval	Likert 4-point scale, from 1 = Low to 4 = Very High
Job performance	Interval	Likert 4-point scale, from 1 = Low to 4 = Outstanding
Interpersonal relationship satisfaction	Interval	Likert 4-point scale, from 1 = Low to 4 = Very High
Work-life balance	Interval	Likert 4-point scale, from 1 = Bad to 4 = Best
Job satisfaction	Interval	Likert 4-point scale, from 1 = Low to 4 = Very High
Work environment satisfaction	Interval	Likert 4-point scale, from 1 = Low to 4 = Very High
Employee turnover intention	Nominal	Yes=1 and No=0

Data Analysis Method

The most basic form of the statistical model known as logistic regression uses a logistic function to model a binary dependent variable. Therefore, the technique of data analysis in this study is logistic regression, which is a model that predicts the value of a binary dependent variable based on the independent variables.

In this study, Microsoft Excel and RStudio are two of the software used to assist the data analyses. Data cleaning can be done using Microsoft Excel before importing the dataset in RStudio. Step data cleaning facilitates the next steps. Nevertheless, RStudio can be used to fit a logistic regression model. The fitting procedure is similar to that used in generalized linear regression and the function to call is "*glm()*".

The five steps of data analysis are as follows: Step 1: Get Dataset. The researcher can load data into Microsoft Excel and RStudio for data analysis. Step 2: Data Cleaning. Data cleaning must be performed to improve the analysis's precision. Data cleaning includes review the information and eliminate any mistakes, inconsistencies, or missing values. This pre-processing step is frequently crucial for the fitting process to produce a good fit of the model

and improved predictive ability. Step 3: Fit the Logistic Regression Model. The generalized linear model function, *glm()* will be used by the researcher to make RStudio fit a logistic regression model to the dataset. Step 4: Model Diagnostics. A statistical test to determine whether the logistic regression model fits well is called the Hosmer and Lemeshow goodness-of-fit test. The researcher will utilize the *hoslem.test()* function from the *ResourceSelection* package in RStudio. Step 5: Use the Model to Make Predictions. The researcher can use the fitted logistic regression model to predict how the dependent variable and independent variables are related.

RESULTS

This section presents the main findings of this research.

Respondents' Demographic Profile

Table 3 shows the demographic profiles of the 1470 respondents that were obtained through descriptive analysis (refer Appendix C). For gender, 588 respondents (40.00%) were female, and 882 (60.00%) respondents were male. For age, all of the respondents were over 18 years of age. Table 3 shows that among the respondents, 29 (1.97%) belonged to the minority group with an age range greater than 57, while the majority, 638 (43.30%), were between the ages of 28 and 37.

For marital status, there are three categories: 327 were divorced (22.24%), 470 were single (31.97%), and 673 were married (45.78%). For education level, Table 3 presents four levels of education. Of the 1470 respondents, 170 (11.56%) were minority respondents with a degree below college, while 572 (38.91%) were the majority respondents with a bachelor's degree. For education field, there are six categories of education field data from the 1470 respondents. Among the respondents, 27 (1.84%) were minority respondents concerned with human resources, whereas 606 (41.22%) are the majority respondents concerned with life sciences.

For department, Table 3 indicates data from 1470 respondents across three departments: 63 (4.29%) respondents were employed by the human resources department, 446 (30.34%) respondents by the sales department, and 961 (65.37%) respondents by the research and development department. For job role, the nine different job roles held by the 1470 respondents were stated in Table 3. 52 (3.54%) were minority respondents for human resources representatives, while 326 (22.18%) were majority respondents for sales executive representatives.

Table 3: Respondents' demographic profile

Demographic Profile	**Count**	**Percentage**
Gender		
Female	588	40.00%
Male	882	60.00%
Age		
18-27	210	14.29%
28-37	638	43.40%
38-47	406	27.62%
48-57	187	12.72%
>57	29	1.97%

Marital status		
Divorced	327	22.24%
Single	470	31.97%
Married	673	45.78%
Education level		
Below college	170	11.56%
College	282	19.18%
Bachelor	572	38.91%
Master	398	27.07%
Doctor	48	3.27%
Education field		
Human resources	27	1.84%
Technical degree	132	8.98%
Marketing	159	10.82%
Medical	464	31.56%
Life sciences	606	41.22%
Other	82	5.58%
Department		
Human resources	63	4.29%
Sales	446	30.34%
Research & development	961	65.37%
Job role		
Human resources	52	3.54%
Research director	80	5.44%
Sales representative	83	5.65%
Manager	102	6.94%
Healthcare representative	131	8.91%
Manufacturing director	145	9.86%
Laboratory technician	259	17.62%
Research scientist	292	19.86%
Sales Executive	326	22.18%
Grand Total	**1,470**	**100.00%**

Respondents' Job Feedback

Table 4 presents the 1470 respondents' job feedback that were analyzed through descriptive analysis (refer Appendix D). For business travel data for 1470 respondents are shown in Table 4 in three categories. Of the respondents, 150 (10.20%) respondents were non-travel, 277 (18.84%) respondents travel frequently, and 1043 (70.95%) respondents travel rarely. For overtime, Table 4 reveals that 416 (28.30%) of the 1470 respondents claimed to have worked overtime, indicating that 1054 (71.70%) respondents did not. For total working years, Table 4 shows that out of the 1470 respondents, a majority of 721 (49.05%) had worked between 0 and 9 years, while the minority of 53 (3.61%) had worked between 30 and 40 years. For training times last year, Table 4 presents that out of the 1470 respondents, a minority of

125 (8.50%) claimed that the number of trainings last year was between 0 and 1, while a majority of 1038 (70.61%) claimed that the number of trainings last year was between 2 and 3. For years at company, according to Table 3, out of the 1470 respondents, a majority of 1104 (75.10%) represented years of employment at company from 0 to 9, while a minority of 17 (1.16%) represented years of employment at company from 30 to 40.

For years in current role, Table 4 reveals that among 1470 respondents, a majority of 948 (64.49%) respondents who represented the range of years in current role in the company from 0 to 5, while a minority of 56 (3.81%) respondents who represented the range of years in current role in the company from 12 to 18. For years with current manager, according to Table 4, out of the 1470 respondents, a majority of 954 (64.90%) respondents who represented the range of years with current manager in the company from 0 to 5, while a minority of 51 (3.47%) respondents who represented the range of years with current manager in the company from 12 to 17. For number companies worked, according to Table 4, out of the 1470 respondents, a majority of 864 (58.78%) who represented the range number of companies worked by the respondents between 0 to 2, while a minority of 245 (16.67%) who represented the range number of companies worked by the respondents between 6 to 9.

For job involvement, Table 4 displays that among the 1470 respondents, 83 (5.65%) were minority respondents who indicated "Low", followed by 375 (25.51%) who indicated "Medium", 868 (59.05%) were majority respondents who indicated "High", and 144 (9.80%) who indicated "Very High". For job performance, Table 4 shows that out of the 1470 respondents, there were none who rated their performance as "Low" or "Good". However, most participants rated their performance as "Excellent" or "Outstanding," with 1244 (84.63%) and 226 (15.37%), respectively.

For interpersonal relationship satisfaction, Table 4 demonstrates among1470 respondents, 276 (18.78%) were minority respondents who rated their relationship satisfaction as "Low", followed by 303 (20.61%) respondents who rated it as "Medium" and 432 respondents (29.39%) rated it as "Very High". Meanwhile, 459 (31.22%) were majority respondents who rated their relationship satisfaction as "High". For work-life balance, according to Table 4, out of the 1470 respondents, 80 respondents (5.44%) gave their work-life balance a "Bad" rating, 344 respondents (23.40%) gave it a "Good" rating, and then 893 respondents (60.75%) gave it a "Better" rating, and 153 respondents (10.14%) gave it a "Best" rating. For job satisfaction, Table 4 shows that among the 1470 respondents, 289 (19.66%) respondents rated their job satisfaction as "Low", followed by 280 respondents (19.05%) and 442 (30.07%) respondents who rated it as "Medium" and "High", respectively. Meanwhile, 459 respondents (31.22%) were the majority who rated their job satisfaction as "Very High". For work environment satisfaction, Table 4 indicates that among 1470 respondents, there were 284 (19.32%) respondents who rated their work environment satisfaction as "Low," 287 (19.52%) respondents who rated it as "Medium," 453 (30.82%) respondents who rated it as "High," and 446 (30.34%) respondents who rated it as "Very High." For employee turnover intention, according to Table 4, 1233 (83.88%) respondents indicated "No", while 237 (16.12%) respondents indicated "Yes".

Table 4: Respondents' job feedback

Job Feedback	Count	Percentage
Business Travel		
Non-travel	150	10.20%
Travel frequently	277	18.84%

Travel rarely	1043	70.95%
Overtime		
Yes	416	28.30%
No	1054	71.70%
Total working years		
0-9	721	49.05%
10-19	512	34.83%
20-29	184	12.52%
30-40	53	3.61%
Training times last year		
0-1	125	8.50%
2-3	1038	70.61%
4-6	307	20.88%
Years at company		
0-9	1104	75.10%
10-19	273	18.57%
20-29	76	5.17%
30-40	17	1.16%
Years in current role		
0-5	948	64.49%
6-11	466	31.70%
12-18	56	3.81%
Years with current manager		
0-5	954	64.90%
611	465	24.63%
12-17	51	3.47%
Number companies worked		
0-2	864	58.78%
3-5	361	24.56%
6-9	245	16.67%
Job involvement		
Low	83	5.65%
Medium	375	25.51%
High	868	59.05%
Very high	144	9.80%
Job performance		
Low	0	0.00%
Good	0	0.00%
Excellent	1244	84.63%
Outstanding	226	15.37%
Interpersonal relationship satisfaction		
Low	276	18.78%
Medium	303	20.61%
High	459	31.22%
Very high	432	29.39%
Work-life balance		
Bad	80	5.44%

Good	344	23.40%
Better	893	60.75%
Best	153	10.41%
Job satisfaction		
Low	289	19.66%
Medium	280	19.05%
High	442	30.07%
Very high	259	31.22%
Work environment satisfaction		
Low	284	19.32%
Medium	287	19.52%
High	453	30.82%
Very high	446	30.34%
Employee turnover intention		
Yes	237	16.12%
No	1233	83.88%
Grand Total	**1,470**	**100.00%**

Correlation

The correlation between the study's variables is analyzed using RStudio before analyzing the Logistics Regression Model's findings. Table 5 shows the results of the correlation analysis. The correlation analysis results indicate that the following factors are weakly negatively correlated with employee turnover intention: age, marital status, education level, education field, department, total working years, training times last year, years at company, years in current role, and years with current manager, job involvement, interpersonal relationship satisfaction, work-life balance, job satisfaction, and work environment satisfaction are weak and negatively correlated with employee turnover intention. Nonetheless, the correlation analysis results indicate that gender, job role, business travel, overtime, number companies worked, and job performance are weak positively correlated with employee turnover intention.

Table 5: Correlation coefficient

Variable	**Correlation coefficient (*r*)**
Gender	0.0295
Age	-0.1320
Marital status	-0.0112
Education level	-0.0314
Education field	-0.0864
Department	-0.0774
Job role	0.0279
Business travel	0.1270
Overtime	0.2461
Total working years	-0.1454
Training times last year	-0.0257

Years at company	-0.0761
Years in current role	-0.1160
Years with current manager	-0.1083
Number companies worked	0.0336
Job involvement	-0.1300
Job performance	0.0029
Interpersonal relationship satisfaction	-0.0459
Work-life balance	-0.0639
Job satisfaction	-0.1035
Work environment satisfaction	-0.1034

Logistics Regression Model

Table 6 displays the Logistics Regression Model's findings, which is the third step for data analysis. Table 6 shows that a variety of variables, including age, education field, department, business travel, overtime, total working years, years at company, number of companies worked, job involvement, interpersonal relationship satisfaction, work-life balance, job satisfaction and work environment satisfaction, significantly affect the employee turnover intention.

Table 6: Logistics Regression Model

Variable	**Estimate**	**Std. error**	**p-value**	**Significance**
(Intercept)	4.1880	1.1299	0.0002	***
Gender	0.3105	0.1668	0.0627	.
Age	-0.2990	0.1124	0.0078	**
Marital Status	-0.0116	0.1020	0.9092	
Education level	-0.0006	0.0788	0.9942	
Education field	-0.1921	0.0738	0.0092	**
Department	-0.3024	0.1453	0.0375	*
Job role	0.0095	0.0353	0.7888	
Business travel	0.8385	0.1553	0.0000	***
Overtime	1.6679	0.1686	0.0000	***
Total working years	-0.6097	0.1854	0.0010	**
Training times last year	-0.1311	0.1554	0.3988	
Years at company	0.5455	0.2344	0.0199	*
Years in current role	-0.3635	0.2411	0.1317	
Years with current manager	-0.2244	0.2473	0.3642	
Number companies worked	0.3849	0.1110	0.0005	***
Job involvement	-0.5913	0.1101	0.0000	***
Job performance	0.0048	0.2210	0.9826	
Interpersonal relationship satisfaction	-0.1946	0.0745	0.0090	**
Work-life balance	-0.2820	0.1102	0.0105	*
Job satisfaction	-0.3637	0.0725	0.0000	***
Work environment satisfaction	-0.3525	0.0739	0.0000	***

Significance: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1 AIC: 1067.5

Table 6 indicates that lots of variables have negative estimates. Those variables are total working years (-0.6097), job involvement (-0.5913), job satisfaction (-0.3637), years in current role (-0.3635), work environment satisfaction (-0.3525), department (-0.3024), age (-0.2990), work-life balance (-0.2820), years with current manager (-0.2244), interpersonal relationship satisfaction (-0.1946), education field (-0.1921), training times last year (-0.1311), marital status (-0.0116) and education level (-0.0006). This indicates that employee turnover intention is negatively correlated with these variables, especially the job involvement, interpersonal relationship satisfaction, work-life balance, job satisfaction, and work environment satisfaction.

Nevertheless, Table 6 also indicates that some variables have positive estimates. Those variables are job performance (0.0048), job role (0.0095), gender (0.3105), number companies worked (0.3849), years at company (0.5455), business travel (0.8385), overtime (1.6679). This indicates that employee turnover intention is positively correlated with these variables,

Next, Table 6 further indicates that the employee turnover intention is highly statistically significant (p-value < 0.001) influenced by the following six variables: business travel, overtime, number companies worked, job involvement, job satisfaction, and work environment satisfaction. Furthermore, the employee turnover intention is very significantly influenced (p-value 0.01) by the following four variables: age, education field, total working years, and interpersonal relationship satisfaction. Additionally, the employee turnover intention is significantly (p-value 0.05) influenced by the following three variables: department, years at company, and work-life balance. Meanwhile, the gender variable has a slightly significant (p-value < 0.1) effect on the employee turnover intention.

However, according to Table 6, the employee turnover intention is not significant (p-value >= 0.1) influenced by the following seven variables: marital status, education level, job role, training time last year, years in current role, years with current manager and job performance. Therefore, all the significant variables indicated in Table 6 are taken into consideration to develop the overall best-fitting logistic regression model as shown below.

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + ... + \beta_n x_n$$

Let

$x_1 = Age$
$x_2 = Education\ field$
$x_3 = Department$
$x_4 = Bu\sin ess\ travel$
$x_5 = Overtime$
$x_6 = Total\ working\ years$
$x_7 = Years\ at\ company$
$x_8 = Number\ companies\ worked$
$x_9 = Job\ involvement$
$x_{10} = Interpersonal\ relationship\ satisfaction$
$x_{11} = Work - life\ balance$
$x_{12} = Job\ satisfaction$
$x_{13} = Work\ environment\ satisfaction$

Thus,

$$y = 4.1880 - 0.2990x_1 - 0.1921x_2 - 0.3024x_3 + 0.8385x_4 + 1.6679x_5 - 0.6097x_6 + 0.5455x_7 + 0.3849x_8 - 0.5913x_9 - 0.1946x_{10} - 0.2820x_{11} - 0.3637x_{12} - 0.3525x_{13}$$

Next, to evaluate how well the best-fitting logistic regression model fits—the fourth step in data analysis—researcher carryout the Hosmer-Lemeshow goodness-of-fit test by using the *hoslem.test()* function from the *ResourceSelection* package in RStudio. However, the results of the Hosmer-Lemeshow GOF test showed that the X^2 value was large (X^2= 22.482) and the p-value < 0.05 was small (p = 0.004097), which indicates a poor fit between the model and data. As the Hosmer-Lemeshow goodness-of-fit test is evaluated with overall calibration, the smaller sample sizes result in poor logistic regression model fit (Baden, 2018).

Predictive Model

For the purpose of prediction, the fifth step in data analysis, researcher used the best-fitted logistic regression model to substitute the rating for the main independent variables. Additionally, two prediction examples are shown below.

Example 1:

$$When\ x_1 = x_2 = ... = x_8 = 1\ and\ x_9 = x_{10} = ... = x_{13} = 4$$
$$y = 4.1880 + \left[-0.2990(1)\right] + \left[-0.1921(1)\right] + \left[-0.3024(1)\right] + \left[0.8385(1)\right] + \left[1.6679(1)\right] + \left[-0.6097(1)\right] + \left[0.5455(1)\right] + \left[0.3849(1)\right] + \left[-0.5913(4)\right] + \left[-0.1946(4)\right] + \left[-0.2820(4)\right] + \left[-0.3637(4)\right] + \left[-0.3525(4)\right]$$
$$y = 0.4798$$

Example 2:

$$When\ x_1 = x_2 = ... = x_{13} = 1$$

$$y = 4.1880 + \left[-0.2990(1)\right] + \left[-0.1921(1)\right] + \left[-0.3024(1)\right] + \left[0.8385(1)\right] + \left[1.6679(1)\right]$$
$$+ \left[-0.6097(1)\right] + \left[0.5455(1)\right] + \left[0.3849(1)\right] + \left[-0.5913(1)\right] + \left[-0.1946(1)\right]$$
$$+ \left[-0.2820(1)\right] + \left[-0.3637(1)\right] + \left[-0.3525(1)\right]$$

$$y = 4.4375$$

As a result, these two predictive examples show that, the higher the ratings for job involvement, interpersonal relationship satisfaction, work-life balance, job satisfaction, and work environment satisfaction, respectively, correspond with a lower employee turnover intention, and vice versa. From these predicted results, job involvement, interpersonal relationship satisfaction, work-life balance, job satisfaction and work environment satisfaction are negatively correlated with employee turnover intention, and vice versa. Therefore, the results of the analysis are consistent with hypothesis H16, H18, H19, H20, and H21.

DISCUSSION

The data analysis and findings section demonstrate that this study was completed with 1470 rows of respondents and 22 variables in the dataset due to some variables in the dataset are irrelevant. The objective of this study is to predict the employee turnover intention. According to the findings, it is possible that employee turnover intention is correlated with age, education field, department, business travel, overtime, total working years, years at company, number of companies worked, job involvement, interpersonal relationship satisfaction, work-life balance, job satisfaction and work environment satisfaction. Additionally, a logistics regression model analysis was conducted to develop a fitted model for prediction.

In light of the findings' analysis, there are five findings worth discussing. First, job involvement. Employee turnover intention was directly impacted negatively by job involvement (Yu & Lee, 2018). According to Danial and Rika (2019), research demonstrate that job involvement can foster positive teamwork among employees and has a significant negative effect on employees' turnover intentions. Additionally, according to earlier research by Blau (1889) in Robbins (2003), high levels of job involvement is associated with lower absenteeism and lower downtime (Amalia et al., 2020). Meanwhile, Sumarto (2009) discovered that a high level of job involvement demonstrated a reduction in the intention of employee turnover (Amalia et al., 2020). According to Faslah (2010), employee turnover intention was significantly and negatively impacted by job involvement (Amalia et al., 2020). Furthermore, job involvement significantly and negatively affects employee turnover intention (Danial & Rika, 2019). Therefore, the result of the analysis supports H16, and prior research reinforces and is consistent with this hypothesis.

Second, employee turnover intention is influenced by numerous of variables, including interpersonal relationship satisfaction. According to the analysis of the findings, H18 is supported. Interpersonal relationships satisfaction includes professionalism, leader-subordinate relationships, and problematic workplace relationships (Wrench et al., 2020). Relationship between coworkers and supervisors were found to have a greater impact on employee turnover intention in China than in Korea, according to the comparison of the two countries (Kim et al., 2013). Nevertheless, Adil and Ayesha (2016) discovered that employee turnover intention has been found to be significantly positively correlated with interpersonal

relationships.

Third, work-life balance is one of the main variables effecting employee turnover intention. Therefore, this study also considers other variables, including business travel and overtime that impact work-life balance and employee turnover intention. Employee turnover intention was found to be statistically significantly positively impacted by both business travel and overtime. This could be explained by similar findings from previous research literature that working continuously overtime can interfere with leisure time and prevent employees from having enough time to recover (Tan et al., 2020). Furthermore, according to Chiang and Liu (2017), a lack of work-life balance and an increase in employee fatigue will cause a higher rate of employee turnover intention (Tan et al., 2020). Additionally, Lee et al. (2016) state that employee turnover intention tends to be higher in companies where employees are stuck with a lack of work-life balance for longer (Tan et al., 2020). Thus, according to the analysis of the findings, H19 is supported. The result of studies by Hosen (2022) supports the findings, which states that a positive work-life balance significantly lowers employees' turnover intention.

Fourth, job satisfaction is one of the main variables effecting employee turnover intention. To further investigate the relationship between job satisfaction and employee turnover intention, this study also takes into consideration other variables, which include job involvement and interpersonal relationships satisfaction. This study discovered that both job involvement and interpersonal relationships satisfaction had a significant negative impact on employee turnover intention. A significant relationship exists between job satisfaction and job involvement (Gopinath & Kalpana, 2020). This study also provides evidence in support of Herzberg's Two-Factor Theory, which stands that hygiene factors—interpersonal relationships have more effect on job satisfaction than motivators (Thant & Chang, 2021). A number of employees stated that mutual understanding and positive relationships with co-employees, superiors, and subordinates were important variables in their job satisfaction (Thant & Chang, 2021). Employee turnover intention can be influenced by a variety of variables, including job satisfaction (Skelton et al., 2020). Thus, according to the analysis of the findings, H20 is supported. The results of this hypothesis are reinforced by research conducted by Li et al (2019), Dewi and Nurhayati (2021) discovered job satisfaction has a negative and significant impact on employee turnover intention (Sazili et al., 2022). Furthermore, the research conducted by Dwiningtyas (2015) and Renny Rakhman Tsani (2016) supports the results of this hypothesis by highlighting that job satisfaction has a negative and significant impact on the employee turnover intention (Christina et al., 2019).

Fifth, work environment satisfaction is one of the main variables effecting employee turnover intention. According to the analysis of the findings, H21 is supported. This finding is consistent with the studies of Sazili et al. (2022) and Kurniawaty et al. (2019), which states that work environment satisfaction has a significant negative effect on employees' turnover intention. Furthermore, Retno Khikmawati (2015), Ridwan Suryo Pranowo (2016), and Widayati and Yunia (2016) have conducted research that supports this hypothesis by proving the negative and significant effect of the work environment satisfaction on employee turnover intention (Christina et al., 2019).

The findings of the prediction are consistent with the findings of previous research literature, supporting the hypothesis of H16, H18, H19, H20, and H21. However, as the Hosmer-Lemeshow goodness-of-fit test indicates, the logistic regression model in this study is poorly fitting. The small sample size of dataset leads to a poorer logistic regression model fit because the Hosmer-Lemeshow goodness-of-fit test is evaluated with overall calibration (Baden, 2018).

CONCLUSION

In conclusion, the findings of the prediction show that job involvement, interpersonal relationship satisfaction, work-life balance, job satisfaction, and work environment satisfaction are negatively correlated with employee turnover intention, and vice versa. Employee turnover intention decreases with increasing job involvement, interpersonal relationship satisfaction, work-life balance, job satisfaction, and work environment satisfaction ratings, respectively. Conversely, employee turnover intention increases with decreasing job involvement, interpersonal relationship satisfaction, work-life balance, job satisfaction, and work environment satisfaction ratings, respectively. Therefore, the previous literature review reinforces and supports the findings that all the study's hypotheses. However, the Hosmer-Lemeshow goodness-of-fit test shows that the logistic regression model in this study is poorly fitted due to the small sample sizes.

In terms of theoretical contribution, this study offers a different viewpoint on other variables that have impacted employee turnover intention in previous research literature. Additionally, to minimize the research gap caused by the inconsistency of previous research findings, this study also offers a consistent theoretical contribution by proposing hypotheses to support and reinforce previous research literatures. However, as for the contributions to practice, the logistic regression model proposed in this study intends to assist organizations, managers, and especially human resources departments in more effectively identifying the specific variables that significantly affect employee turnover intention. This will assist in retaining highly skilled employees, save employee training costs, sustain organizational growth, and other aspects. Firms nowadays must strategically adapt predictive analytics as a change management initiative to transform the workforce in Human Resource Management (HRM) decision-making (Fauzi et al., 2023).

Next, this study has a limitation. A small sample sizes of the secondary dataset used in the study is the study's limitation, which prevented this research from fitting the logistic regression model well. Therefore, to enhance the logistic regression model's fit and the analytical precision of the hypotheses and findings, researchers should consider enlarge the sample size of datasets with more respondents and data in future studies, especially by including independent variables or significant interactions in the model (Allison, 2014).

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APPENDIX A: Secondary Data from Kaggle

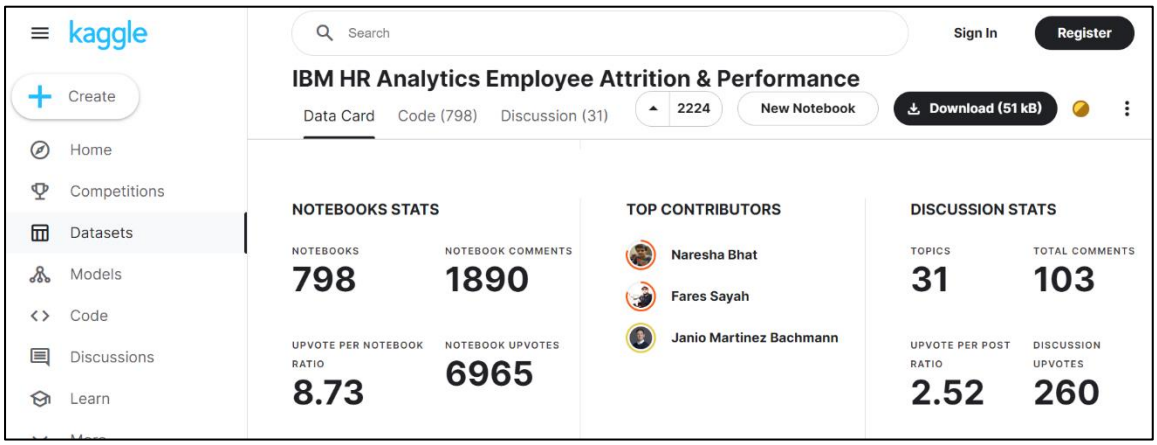

Fig. 3: Upvote per notebook ratio of secondary data obtained from Kaggle

APPENDIX B: Kaggle's Data Definition

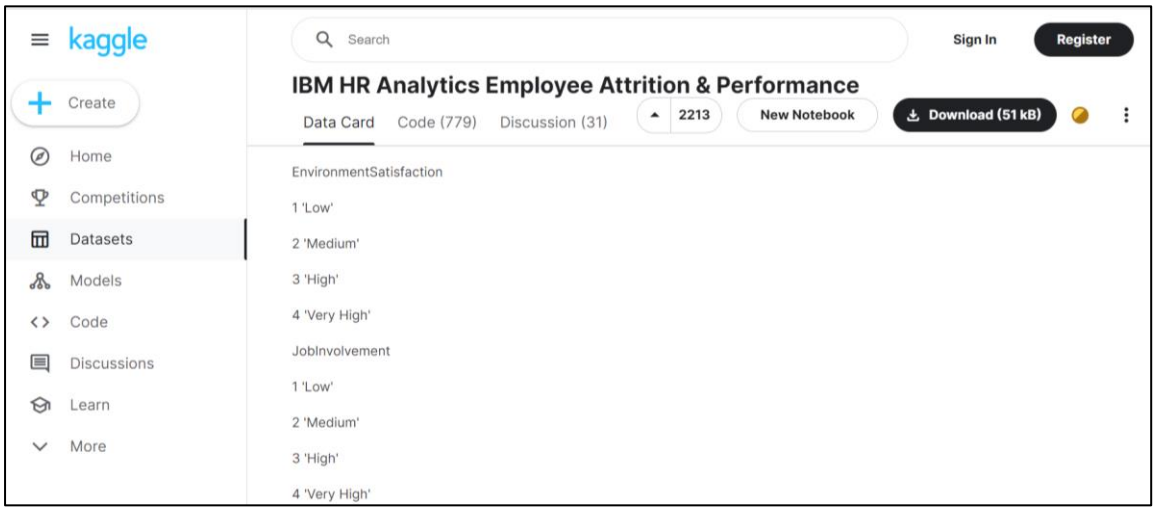

Fig. 4: Kaggle's data definition

APPENDIX C: Respondents' Demographic Profile

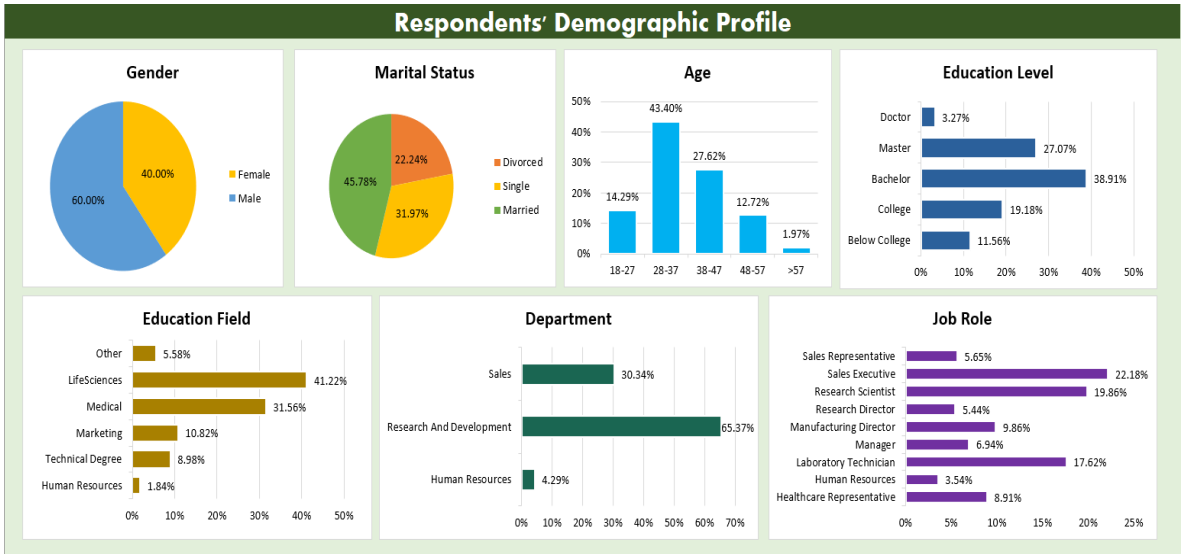

Fig. 5: Respondents' demographic profile

APPENDIX D: Respondents' Job Feedback

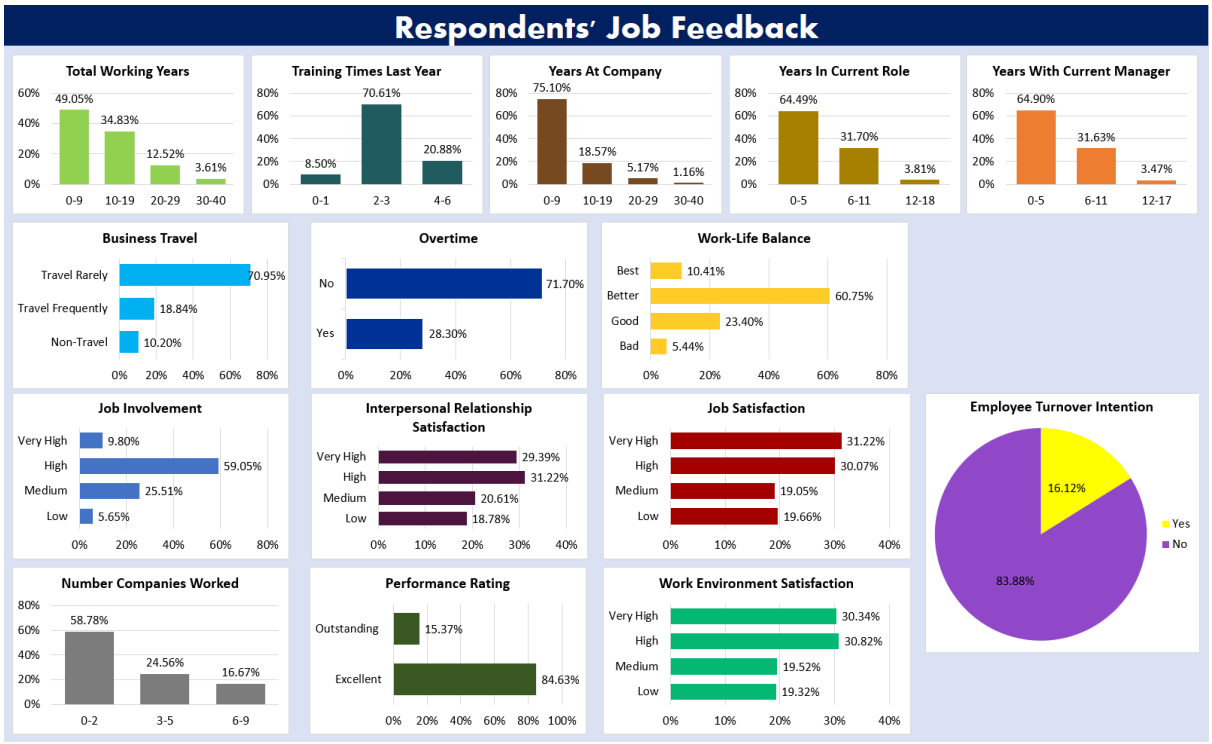

Fig. 6: Respondents' job feedback