

Multiple Regression Model for The Prediction of Employee Retention in The Construction Firms in Egypt

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Abstract: The construction industry has a high workforce turnover rate all over the world, which has a negative effect on productivity and performance of the construction firms as well as the economy of the countries. The Egyptian construction industry is one of the industries that suffer from the turnover problem in the recent decades. In this respect, this research attempts to predict employee retention based on HRM practices and organizational factors which affect employee retention. A questionnaire was conducted with engineers working in various disciplines in the construction firms and with HR departments to explore the impact of various practices and factors on employee retention. Based on a data set of 132 questionnaires, Multiple regression model is developed to detect the significant variables that will be utilized to predict employee retention. The results reveal that four variables: compensation and recognition, promotion and career development, training, and empowerment appeared as significant variables in the regression model. The Model was validated on random sample of the collected data and another case study and the calculated percentage errors in both datasets are within 10% indicating that the developed model achieved a good level of accuracy in predicting employee turnover.

Keywords: Human Resources Management Practices, Organizational Factors, Prediction Regression Model, Employee Retention.

1. INTRODUCTION

Employees are valuable assets and the backbone of any company. In competitive environment, the retention of employees is crucial for the successful accomplishment of organizational goals and maintaining the organization heading in the right direction. Employee turnover has a great attention within the construction industry in the recent years due to the industry's relatively unsafe and stressful job conditions [1]. Turnover happens due to two reasons, according to the human resource management point of view: voluntary staff turnover which is decided by the employee, and involuntary staff turnover which happens by the decision of the employer [2]. Human resource management practices and organizational factors affecting human resources play an important role in order to retain employees and every organization attempts to introduce

different techniques for this purpose. In recent years, increased interest in investigating the effect of HRM practices on employee retention in a variety of industries around the world [3]. Common practices and factors that are used in this study are Workforce planning, recruitment and selection, training and development, performance appraisal, compensation and recognition, promotion and career development, empowerment, communication, leadership style, work-life balance and collaboration. Studying the impact of these practices and factors on employee retention in the Egyptian construction industry will help companies to enhance employees' retention, which consequently will reduce the risk of employee turnover and mitigate its negative impacts on companies. This paper aims to build a regression model to predict staff turnover and test the

impact of HRM practices and organizational factors on employee retention in the Egyptian construction firms.

2.LITERATURE REVIEW

Human Resources Management is a strategic way to manage employment relations that focuses on exploiting people's strengths to generate a competitive advantage and it includes all management decisions and practices that immediately impact people. HRM practices serve as an organization's backbone and assist in the achievement of organizational goals [4].

Several researches have studied the effect of various factors on the retention of employees in construction companies in different countries, and the factors that most influence employees have varied from one country to another.

In India, the impact of satisfaction regarding fairness in performance management, compensation, and employees' relations on engineers' retention in the Indian construction firms was examined and the results showed that employee relation practices strongly predict engineers' retention [5].

Another research in Thailand focused on construction related small-medium enterprises and investigated the relationship between entrepreneurial intention, agile working, reward and recognition and employee retention and the results showed that agile working among employees significantly affect employee retention [6].

In Malaysian construction projects, the effect of organizational justice, employee engagement and sustainable HRM practices on employee retention were examined and the results revealed that the sustainable HRM practices including proper selection of staff, training, employee engagement, empowerment and compensation have vital role on employees' retention [7].

Also, the determinants of employee turnover in the Nigerian construction sector were explored. The study examined compensation packages, job satisfaction, work environment and leadership style and the results showed that the most effective factor on employee retention is leadership style [8].

In South Korean construction companies, the impact of organizational factors, job attitudes and HRM practices on the intention of turnover was evaluated and the results showed that Communication, immediate leaders, organizational commitment, and organizational pride significantly influence employee turnover [9].

Another study in USA revealed that there is a significant relation between construction laborers' internal and external job satisfaction and employee turnover intention [10].

The problems in manpower management in the Indian construction sector were discussed and the findings revealed that the majority of workers leave their work within six months due to many obstacles that include short-term contracts, worker family problems, and projects with low

profit margins. In terms of the factors that motivate workers to stay at work; they are good salary, a pleasant working environment, and a positive work culture [11].

It is shown from the literature review that the research area on HRM practices and employee retention in the construction industry has been discussed in some countries. In the Egyptian construction industry, the influence of HRM practices and organizational factors on employee retention has received little attention, so conducting a study in this context and developing a prediction model for employee turnover could obviously derive valuable findings and fill in the gap in this subject.

3.ASSUMPTIONS

The research assumptions of this study are as follows:

1. There is a positive relationship between HRM practices and employee retention in the construction firms.
2. There is a positive relationship between the organizational factors and employee retention in the construction firms.

4.METHODOLOGY

An excessive and comprehensive literature review has been conducted for HRM practices and organizational factors affecting employee retention. A questionnaire is designed to collect data about the current situation of HRM practices and organizational factors that affect human satisfaction in the Egyptian construction industry. Analysis of data is done through a correlational methodology that is used to investigate the relation between HRM practices, organizational factors and employee retention in construction firms. Then, multiple regression model is developed to predict employees' retention in the construction firms. Model validation is done to assure the accuracy of the developed model. The framework of the research is shown in Fig. 1.

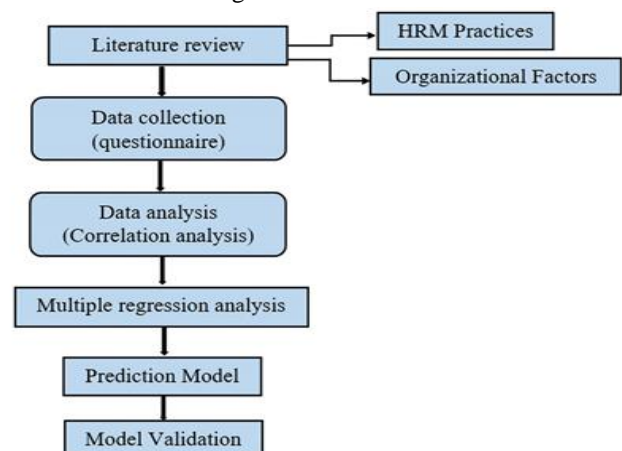


Fig 1. Research Methodology

TABLE 1. Summary of the factors affecting employee retention in the literature

Employee Retention Factor	Relevant reference
Workforce Planning	[12], [13],
Compensation and recognition	[14], [15], [16], [6], [7], [8], [5, 17], [3], [11], [18], [19], [20], [21], [22], [23] ,
Promotion-Career development	[18], [24], [25], [19], [20], [23]
Training and development	[3], [7], [21], [26], [23]
Performance appraisal	[3], [5], [19]
Recruitment and selection	[5], [3], [7]
Employee empowerment	[5], [7], [23]
communication	[9], [19], [23]
Leadership style	[8], [9], [25], [27]
Work- Life balance	[28], [29], [30], [31]
Collaboration	[19], [20], [21]
Job stress	[20], [23]
work environment	[8], [21], [23]
Supervisor Support	[21]
Level of technology used	[1], [32], [33]
number of professional seniors	[34], [35], [35]
Orientation	[36], [37], [38]
Commuting distance between work and home	[39], [40], [41]
Job characteristics	[42], [43], [44]
entrepreneurial intention	[6]
agile working	[6]
Type of contract	[11]

5. DATA COLLECTION

As shown in table 1, several factors affect employee retention in the literature. Therefore, interviews with 10 experts in the construction firms were conducted to find out the most important factors on employee retention in Egypt from the 23 factors in table 1 and eleven factors were selected to study their impact on employee retention. The HRM practices included in this study are Workforce planning, recruitment and selection, training and development, performance appraisal, compensation and recognition, promotion and career development and the organizational factors included are empowerment, communication, leadership style, work-life balance and collaboration. The questionnaire is designed for this study having two sections, Section A is directed to engineers in construction firms and consists of two parts, the first part includes the demographic information about respondents as age, gender, the grade of the organization working for, the

current position, No. of experience years, previous job, and No. of companies he/ she worked for from graduation till now and the second part regards statements about the current practices of human resource management and organizational factors which may have an effect on employee retention. The questions in the first part are open ended questions but in the second part, for each HRM practice and organizational factor, the respondents will answer from three to five questions which were measured by a five point Likert scale as follows: 1- strongly disagree; 2 - disagree; 3 - neutral; 4 – agree; and 5 – strongly agree. Following the stated scale, the respondents were asked to rate the potential score for each statement. Section B is directed to HR employees in the construction firms and consists of three parts, the first part includes the demographic information about respondents as age, gender, the grade of the organization, the current position, No of experience years in the current position. The second part is about how they implement human resource management practices and emphasis the organizational factors affecting employees in their companies by selecting from specific methods inferred from HR employees' interviews and previous studies, The third part includes questions about monitoring the turnover, the average turnover rate in the last five years in their companies, the related department with highest turnover rate in the last five years, turnover reasons, level of risk of turnover on the company's losses, the impact of turnover on the company. The questions in section B are a mix of open and closed questions. To determine the suitability of the questionnaire, a pilot study was conducted by a semi-structured interviews to twenty construction firms to see if the questions were clear. Then, the second main stage of data collection was a questionnaire survey for gathering the data from the required sample of engineers and HRM employees in the Egyptian construction firms and the questionnaires were given out in person and online. The questionnaire was distributed to 154 firms to reinforce the efficiency of the data analysis and 132 were received, representing an 86 percent response rate. The questionnaires were collected through four months from August 2021 to December 2021.

6. RESULTS AND DISCUSSION

Data analysis is done using SPSS. Reliability statistics is employed to verify the relevance of data. The study engaged 132 engineers and project managers at the construction firms for the first section of the questionnaire. The respondents work in different disciplines in construction industry with different levels in close proportions.

Majority of the respondents were male (75%) and are between 25 and 35 years old (53.8%), followed by those between the ages of 36 and 45 representing 40.9% and only

5.3% of them are over 46 years old. This indicates that the results of the research represent more young engineers, and they are the most category of employees who face challenges in the construction industry. The grade of the construction firms that work in the construction sector and was targeted in this study were the 1st and 2nd grades according to the classification of the Egyptian Federation of Construction and Building Contractors. 56.8% of the respondents work for 1st grade companies. Nearly all respondents worked in one to five companies from graduation till now and this clearly shows the emergence of the problem of employee turnover in the Egyptian construction industry, which poses a threat to it. The majority of respondents have from 1 to 10 years of experience.

TABLE 2. Summary of level of implementation

	Practices & Factors	Level of
HRM Practices	Work force Planning	High
	Compensation and	
	Employee Training	
	Performance Appraisal	
	Recruitment and	
	Promotion and Career	
Organizational Factors	Communication	High
	Collaboration	
	Leadership Style	
	Employee	Moderate
	Work-Life Balance	

After Analyzing the second part of the questionnaire which contain questions about each practice and factor, the weighted average for each practice and factor was derived. The intervals of levels of weighted average can be divided to three categories where the low level includes strongly disagree and disagree intervals together, moderate level include neutral interval and high level includes agree and strongly agree intervals. The results showed that all HRM practices and organizational factors are implemented at high level except employee empowerment and work-life balance that are implemented at a moderate level as shown in table 2.

For the second section of the questionnaire, the study asked employees working in the HRM departments. The majority of them were male and 71% of them working as HR specialist. The analysis of this section revealed that the average turnover rate in the last five years is from 10% to 20% and the related department with highest turnover rate is the technical office department.

Also the findings revealed that the reasons for turnover in the majority of the sample are factors related to organizational work and this highlights the importance of

the organizational factors to employee satisfaction. The impact of turnover analysis revealed that time overrun of projects is affected by the highest degree.

The analysis of this section emphasizes the research objectives to predict employee retention. For this research, First, Cronbach's Alpha was utilized to assess the acquired data's internal consistency and reliability. The internal consistency of the questionnaire is verified if the Cronbach's alpha value is greater than 0.70 [45]. Cronbach's alpha for the sample in this study is 0.851, which is acceptable. Based on Table 3, the variables' Cronbach's Alpha demonstrated high reliability.

TABLE 3. The variables' reliability statistics

Variables	Cronbach's Alpha (N=132)
Workforce Planning	0.886
Recruitment and Selection	0.857
Employee Training	0.801
Performance Appraisal	0.761
Compensation and Recognition	0.754
Promotion and career Development	0.931
Employee empowerment	0.883
Communication	0.762
Leadership style	0.789
Work-life balance	0.908
Collaboration	0.893

Then, as shown in Appendix A and B, the correlation analysis was generated between human resource management practices, organizational factors and employee retention. Pearson's coefficients of correlation using a two-tailed significance test to explore the relation between the variables is used. In Appendix A, HRM practices such as Workforce Planning (WP), Recruitment and Selection (RS), Training and Development (TD), Performance Appraisal (PA), Compensation and Recognition (CR) and Promotion and Career development (PC) are regarded as independent variables and Employee Retention (ER) is regarded as the dependent variable while in Appendix B, organizational factors such as Employee Empowerment (Emp), communication (Com), Leadership Style (LS), Work- life Balance (WLB) and Collaboration (Collab) were the independent variables. The perfect negative and positive

correlations are represented by the correlation coefficients, which range from -1 to +1 [46].

From the results, it was derived that employee compensation and recognition, promotion and career development and employee training reported positive and significant relation with staff retention with a Pearson correlation coefficient of $R= 0.934, 0.217$ and 0.65 respectively while workforce planning, performance appraisal, recruitment and selection were not statistically correlated to retention and this is a remarkable conclusion especially for performance appraisal. This can be due to that managers often don't evaluate staff based on performance standards but based on evaluation bias. Also, the results in Appendix B showed that employee empowerment, communication and collaboration reported a Pearson correlation coefficient of $R= 0.20, 0.174,$ and $0.174,$ respectively, which indicated a statistically significant positive relation with staff retention but leadership style and work-life balance were not statistically correlated to retention and this is not compatible with the study in the United Arab Emirates that found a strong relationship between leadership style and employee satisfaction of workers as well as a strong impact on organizational commitment in the construction industry [27]. This may be explained that leadership style may not be important as long as there is empowerment, collaboration, and good communication. Also, in the construction industry in Egypt, employees are aware that work-life balance isn't easy so it will not affect their retention.

6. MULTIPLE REGRESSION MODEL

The data collected was used to carry out correlation and multiple regression analysis to build a regression model that can predict staff turnover. The impact of HRM practices and organizational factors included in this study on employee retention is tested. Multiple-regression analysis is a statistical technique used to investigate and model the relation between variables. All the data collected for performing the regression analysis was qualitative data which was measured in ordinal scale by using Likert scale from 1 to 5. Using regression analysis, a model of employee retention is developed. It is assumed that linear models can adequately approximate the relationship between the dependent variable, employee retention (E.R.), and the independent variables. The relationship takes the following form in Eq. (1):

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n \quad (1)$$

where, Y is dependent variable of employee retention in the Egyptian construction firms. $X_1; X_2; \dots; X_n$ are the independent variables which include the six independent

variables that approved to be significantly correlated with staff retention namely "Compensation and Recognition" (CR), "Promotion and Career development" (PC), "Training and Development" (TD), "Employee Empowerment" (Emp), "Communication" (Com), and "Collaboration" (Collab). $\beta_0; \beta_1; \beta_n$ are the unstandardized regression coefficients. To examine the relation between the independent variables and the dependent variable, regression analysis is utilized and the coefficients of regression equations are derived.

The multicollinearity of the predictors of the regression model was checked by the correlation coefficients and VIF score and tolerance value. As shown in table 4, All tolerance values of the variables are more than 0.2 and none of the variables showed a Variance Inflation Factor (VIF-value) above 4 [47]. All pearson correlation coefficients between the independent variables are less than 0.7 except the correlation coefficient between empowerment and collaboration exceeds 0.7 as shown in appendix B which indicates a problem in the multicollinearity. Therefore, collaboration was excluded from the model because its VIF value is greater than empowerment.

TABLE 4. Collinearity statistics

Model Variables	Tolerance	VIF
CR	.879	1.138
PC	.838	1.194
TD	.899	1.112
Emp.	.338	2.955
Com.	.636	1.573
Collab.	.275	3.632

Hypothesis testing was established using $\alpha = 1\%$ to assess the model's adequacy for evaluating the dependent variables. Then, to determine the wellness of the regression model, the values of R, R^2 , adjusted R^2 and the standard error of estimate was used. R represents the multiple correlation coefficient, which was an indicator of the prediction of the dependent variable, and R^2 denotes to the coefficient of determination which is the percentage of variation in the dependent variable caused by the predictor variables. In order to make the developed model statistically meaningful, 80% of the cases will be used to build the model. The remaining 20% of the collected sample were selected randomly and were set aside to test model validation. The standard value of α of 0.05 with a 95% confidence level were used. The predictor variable with (α value $< .05$) is statistically significant to predict turnover.

Tables 5 and 6 show model summary and the findings of the regression analysis for employee retention.

TABLE 5. Model summary

Model parameter	Value
R	0.945
R ²	0.886
Adjusted R ²	0.893
F-statistic	156.482
Significance	0.000
Standard Error	0.321
Durbin-Watson	2.032

As shown in table 5, The null hypothesis is rejected since the final model is significant at $p = 0.000 < 0.01$ (F value =

156.482). This indicates that a statistically acceptable model could be employed. The R² value had achieved 0.886 indicating that 88.6% of the variation in the dependent variable is associated with variation in the independent variables while other potential factors account for 11.4% of variation in the dependent variable. The adjusted R² with value of 0.893% indicates that according to goodness of fit, the regression model developed from empirical data performed very well. The findings in Table 6 shows that three HRM practices and one organizational factor have positive significant influence on employee retention where CR (.998, $p= 0.00$), PC (.705, $p= 0.031$), TD (.801, $p= 0.023$) and Emp. (.523, $p= .045$). As a result, the empirical model can be expressed as follows in equation 2.

$$Y = .998 (CR) + .705 (PC) + .801 (TD) + .523 (Emp) \tag{2}$$

TABLE 6. Model variables summary

Model Variables	Unstandardized Coefficients		Stand. Coeff.	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
Constant	-.026	.333		-.077	.938	-.685	.634		
CR	.998	.036	.931	28.839	.000	.962	1.104	.921	1.085
PC	.705	.058	.623	.093	.031	-.109	.120	.872	1.146
TD	.801	.055	.556	-1.809	.023	-.209	.009	.908	1.101
Com.	.223	.011	.342	.846	.123	-.070	.179	.740	1.352
Emp.	.523	.049	.235	1.863	.045	-.006	.189	.977	1.023

Communication variable and the constant are excluded from the model as their sig. values are greater than (0.05) so they are not significant. The independent variable with the highest beta has the most influence on the dependent variable. The compensation and recognition has the highest positive beta of .931, this mean that compensation and recognition has the stronger effect on retention in comparison to the other independent variables. Regression analysis's residuals don't seem to be auto-correlated, according to the Durbin-Watson score of 2.032. The cumulative probability plots of residuals of the standardized data versus the standard normal distribution is a method for exploring normal distribution.

If the scatters lie on or very nearly to the straight line, the residuals are normally distributed [48]. As shown in Fig. 2, The scatters of the residuals almost fall straight on the line of the normal distribution with a little bit of deviation of the points from the diagonal showing a normal distribution of residuals.

The assumption of homoscedasticity is that the variance of the residuals should be constant across the values of the independent variable via scatterplot plot between the standardized residuals and the predicted values and that the residual plot is at the same width for all values of the predicted values. As shown in Fig. 3. the scatter plot shows that The points are almost equally distributed above and below zero on the x axis and in the y axis and the errors have the same variance and its magnitude almost stays constant with the increase of the predicted value. Thus, the assumption has been met. Therefore, the model is significant and meets its assumptions.

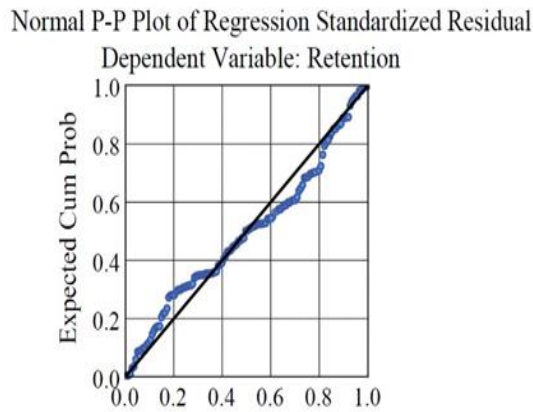


Fig 2. Normal P-P Plot

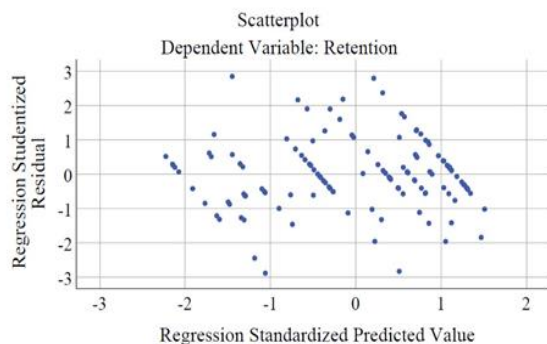


Fig 3. Residuals versus Predicted Values Scatter Plot

The regression model consequently shows that there are four variables that significantly affect employee retention in Egyptian construction firms and compensation and recognition are the practices with the greatest influence on employee retention.

Country	Factors affecting employee retention
United Arab Emirates	leadership style the type of the construction sector adequate pay job security working environment
Sri Lanka	job stress satisfaction with pay co-workers
Vietnam	working environment training and development rewards and recognition good co-worker relationship supervisor support
India	co-worker relationship good salary pleasant working environment positive work culture
Thailand	agile working among employees
Malaysia	proper selection of staff training employee engagement empowerment compensation
Nigeria	leadership style

South Korea	Communication immediate leaders organizational commitment organizational pride
USA	internal and external job satisfaction
Egypt	Compensation and recognition Promotion and career development Training Empowerment

As shown in table 7, The most frequent factors among countries in terms of their impact on employee retention in the construction industry are level of pay, working environment, training, and good co-worker relationships. Certainly, proper compensation for employee, increasing his skills and knowledge during work, a pleasant and risk-free work environment along with the presence of cooperative co-workers affect employees' satisfaction and increase their commitment to work. The remaining factors may vary due to that the construction industry faces many challenges differ from one country to another and that affect company's policies, thus affect employee satisfaction factors.

In the last few years, the construction industry in Egypt is in evolutionary state, yet it faces many challenges due to economic problems and rise of prices of all building materials. There is no doubt that the construction industry in Egypt has stressful working conditions, and potential risks. Also, accidents may occur especially during working on sites, and this calls for the application of fair compensation and recognition practices that take into account the nature of work, years of experience and the workplace supportive. This has an important role in attracting talented employees and maintaining the competitive advantage of any company in line with the continuous change and challenges in the construction industry. The model results are consistent to the findings that employee commitment is mostly affected by compensation, which also guarantees their long-term employment [22]. Also, Employee recognition has a strong relationship with employee retention as it increases their motivation to work [49]. Regarding the studied organizational factors, the model showed that empowerment factor is the most essential one for employee retention. Certainly, Enabling the employee to make decisions on his own during work and to participate with his opinion in the company decisions has a good impact on the employees' satisfaction and feel valued, thus increasing retention in the company and this increases productivity for construction projects. The model also showed that promotion and career development and employee training are important practices for employee retention. This is due to the fact that the construction industry in Egypt has a lot of development, new construction methods and tools for sustainability and this makes employees need to develop their skills. If the company provides opportunities to develop employees' skills and increases their efficiency, this will reflect on their satisfaction and increase their belonging to the company. Career development enables staff to take part in a variety of activities which enhances their abilities, skills and motivation to work. Employees with good training perform well regarding quantity and quality and this leads to less time, money, and resources. These findings conform to the findings that training is the most significant factor for retaining employees [26].

7. MODEL VALIDATION

In order to evaluate the prediction accuracy of the developed regression model by using the four factors resulting from analysis, 20% of the collected sample were selected randomly and used to test model validation. The model is assessed by using a number of parameters to determine how far off the predicted and actual values are from one another. After that, to verify validation of the prediction model, Percentage Errors (PE), Mean Absolute Percentage Error (MAPE), and Root Mean Square Error (RMSE) are used to evaluate the model's performance. The high percentage error values indicate more deviation between the predicted and actual retention. As shown in fig. 4, almost all the predicted values are consistent and nearly similar to the actual ones within the allowable limit of 10%, about 50% of the cases showed a percentage error smaller than 5% and the minimum and maximum are 7.795 and -8.861, respectively. Another metric of the model accuracy is the mean absolute percentage error (MAPE) whose percentage is 19.11% indicating a good forecast performance of the model as the model's performance improves with decreasing (MAPE) value. The root mean square error (RMSE) is 0.5365 which indicate that the regression model expected values and the actual values do not differ noticeably. The findings from t-test in table 8 shows that the observed and forecasted retention mean values aren't significantly different from one another. Moreover, The regression findings in table 9 showed that R² value is high (0.945), the slope is 1, and the intercept is remarkably close to 0. These validation tests indicated that the empirically obtained regression model is likely to predict employee retention.

TABLE 8. Model validation

Mean retention with 95% confidence	Observed	4.0231
	Predicted	4.0252
T-test	P value	0.88
	Significant?	Not significant
RMSE	0.5365	
MAPE (%)	19.11	

TABLE 9. Regression analysis of observed and expected retention

R	R ²	Intercept	Slope	F value	Sig.
.986	.945	6.32E-15	1	623.318	0.000

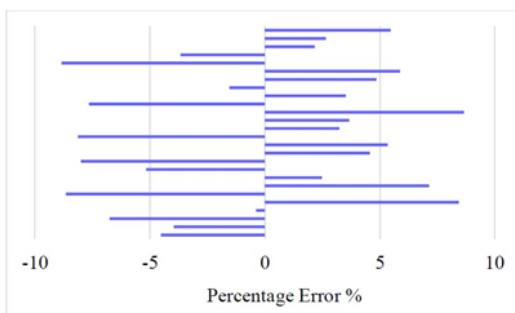


Fig 4. Percentage Error

8. Case Study for Model Validation

A dataset from another research was also used to validate the developed model. This dataset examined the effect of 26 factors on labor turnover in the New Zealand construction industry [23]. The dataset contains the responses of 157 construction workers regarding turnover. The main four variables resulted from the regression analysis in this study were used from the dataset to test the accuracy of the developed regression model and the remaining 22 factors in the dataset were excluded because they are not in the regression equation. The four variables used from the dataset are level of pay, sense of belonging, opportunities for career development, and training investment which refer to the four variables (compensation and recognition, empowerment, promotion and career development, and training and development) respectively in this study. The accuracy of the developed model achieved percentage error value smaller than 10% and a mean absolute percentage error percentage of 20 % which indicate a good performance of the model and the root mean square error is 0.56 which indicated a little difference between the observed and predicted values. The results from t-test for the dataset show that the difference between the observed and predicted retention mean values is insignificant with p-value greater than 5%. Table 10 shows the regression results between the observed and predicted valued for the dataset. The value of R² (.987) is high, the intercept is very close to 0, the slope is very close to 1 and the regression is significant (Sig.< 0.05) . These validation tests on the case study show that the regression model is reasonably accurate to predict employee retention.

TABLE 10. Regression analysis of observed and expected values

R	R ²	Intercept	Slope	F-value	Sig.
.983	.987	6.42E-15	.94	745.36	0

7. CONCLUSIONS

Estimating employee retention in the construction firms with reasonable accuracy is essential to improve employee performance, and therefore increase profits and meet corporate goals and objectives.

In this research, the multiple regression model was employed to identify significant HRM practices and organizational factors in the Egyptian construction firms that may affect employee retention. The results revealed that the four variables that are significant to employee retention are compensation and recognition, promotion and career development, training and development and empowerment. These four factors have become very important in the last decade with the dynamic change in the construction industry and the increase in difficulties and pressure in this industry to develop the skills and abilities of

employees and compensate them in a satisfactory manner which is reflected in the success of the industry as a whole. In comparison between the factors that most influence employee retention in Egypt and other countries, it can be concluded that employee compensation, training, an appropriate work environment, and good coworkers are the key factors influencing turnover. The most influential factors may differ from one country to another due to differences in cultures, standard of life, and construction companies' policies. The significant variables that have been identified provide an insight into the important factors that influence employee turnover. The problems of employee turnover and their effects on the construction industry must be avoided to reduce the losses resulting from it on the firms and on the construction industry as a whole. The applied model showed a good accuracy level in retention prediction by using the collected dataset and also by using another dataset from the New Zealand construction industry and the calculated percentage errors in both datasets are within 10%. The RMSE values are 0.5365, 0.56 respectively indicating that the developed model achieved a good level of accuracy in predicting employee turnover. The application of this model could enable practitioners to forecast employee turnover based on the effectiveness of the important practices and factors in their firms. Also, the model can be adopted to any dataset of employees.

8. LIMITATIONS AND FUTURE RESEARCH RECOMMENDATIONS

Although the objectives of this study has been reached, there are some limitations in this study. First, the study is specific to the construction sector in Egypt and targeted the first and second grades of the construction firms only, but the results can be studied across more grades of companies or with specific sectors in the civil engineering to explore the effect of sector type on the research results. Second, the influence of a portion of HRM practices and organizational factors was explored. Future studies could examine the effectiveness of a larger number of practices and factors on employee turnover from the perspective of employees as well as the employers' perspectives.

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Appendix A

TABLE 11. Pearson's correlation coefficient of HRM practices and employee retention

HRM practices		(1)	(2)	(3)	(4)	(5)	(6)	(7)
Workforce-planning	Pearson Correlation	1	-.012	.244**	.192*	.351**	.061	.031
	Sig. (2-tailed)		.894	.005	.028	.000	.488	.722
	N		132	132	132	132	132	132
Compensation and recognition	Pearson Correlation		1	-.220*	.064	-.137	-.125	.934**
	Sig. (2-tailed)			.011	.469	.117	.153	.000
	N			132	132	132	132	132
Promotion-Career development	Pearson Correlation			1	.267**	.287**	.205*	.217*
	Sig. (2-tailed)				.002	.001	.018	.012
	N				132	132	132	132
Training and development	Pearson Correlation				1	.252**	-.028	.65*
	Sig. (2-tailed)					.004	.753	.016
	N					132	132	132
Performance appraisal	Pearson Correlation					1	.153	-.077
	Sig. (2-tailed)						.079	.381
	N						132	132
Recruitment and selection	Pearson Correlation						1	-.133
	Sig. (2-tailed)							.128
	N							132
Retention	Pearson Correlation							1
	Sig. (2-tailed)							
	N							

** : Correlation is significant at the 0.01 level (2-tailed).

* : Correlation is significant at the 0.05 level (2-tailed)

Appendix B

TABLE 12. Pearson's correlation coefficient of organizational factors and employee retention

Organizational factors		(1)	(2)	(3)	(4)	(5)	(6)
Employee empowerment	Pearson Correlation	1	.183*	-.003	-.098	.770**	.200*
	Sig. (2-tailed)		.035	.971	.266	.000	.021
	N		132	132	132	132	132
communication	Pearson Correlation		1	.181*	-.005	.485**	.174*
	Sig. (2-tailed)			.038	.957	.000	.046
	N			132	132	132	132
Leadership style	Pearson Correlation			1	.248**	.053	-.066
	Sig. (2-tailed)				.004	.547	.452
	N				132	132	132
Work-Life balance	Pearson Correlation				1	-.020	-.114
	Sig. (2-tailed)					.821	.194
	N					132	132
Collaboration	Pearson Correlation					1	.174*
	Sig. (2-tailed)						.046
	N						132
Retention	Pearson Correlation						1
	Sig. (2-tailed)						
	N						

** : Correlation is significant at the 0.01 level (2-tailed).

* : Correlation is significant at the 0.05 level (2-tailed).