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Article

Research on Strategies for Improving Retention Rates of Research Laboratory Support Staff

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Abstract: Support staff in research laboratories are essential to scientific work; however, turnover rates (median 16.2%) are seen as significant challenges to research continuity and retention of organizational knowledge. The study explores organizational factors that impact retention intention among research laboratory support staff with theoretical perspectives from job embeddedness. A survey study was carried out among 286 research laboratory support staff recruited from 15 research institutions. Multiple regression analysis was employed to assess the predictive values of career development opportunities, leadership support, work recognition, compensation satisfaction, and work environment on retention intention. The results showed that the regression equation accounted for 58.3% of retention intention variability ($F = 42.35$, $p < 0.001$). Career development opportunities had the strongest predictive value ($\beta = 0.35$, $p < 0.001$), followed by leadership support ($\beta = 0.28$, $p < 0.001$), work recognition ($\beta = 0.22$, $p < 0.001$), work environment ($\beta = 0.18$, $p < 0.001$), and compensation satisfaction ($\beta = 0.15$, $p < 0.01$). Correlation analysis suggested that there are significant positive relationships ($r = 0.38$-0.52, $p < 0.001$) between all organizational factors and retention intention. The empirical evidence highlights that 'career development opportunities' are the most significant factors that need to be addressed to retain research laboratory support staff. Laboratory administrators should focus on making concerted efforts to improve defined research career

development opportunities, improve organizational leadership support structures, and implement recognition processes to improve research workforce retention.

Keywords: laboratory support staff; retention intention; career development; job embeddedness; organizational factors

1. Introduction

The research laboratory technical staff must be viewed as essential to the efficient conduct and continued quality of research endeavors within academic and medical centers. Yet there exists within the modem research environment an important problem in maintaining key research personnel. Recent data has made clear that the rates of personnel turnover in the research laboratory are alarming; 16.2% was found to be the median personnel turnover in the medical laboratories surveyed, with phlebotomist personnel turnover rates substantially higher—reaching 24.9% in some medical centers (Ahmad et al., 2022).

The healthcare industry has also had cases of retention challenges in various sectors with medical laboratory technologists registering a turnover rate of 15.9% (Giao et al., 2020). The financial impact can be significant with costs associated with employee turnover that include recruitment expenses and investment in training. Apart from that, there are other concerns that include research continuity.

Although there has been extensive research about retention approaches to retain principal investigators and senior research personnel, relatively less research has been conducted about retaining support personnel (Novis et al., 2020). The job embeddedness model that addresses employees' connections with the firm, organizational culture fit, and perception of sacrifice made to leave the firm has been found to be an area with promising development with respect to retention choices (Peltokorpi & Allen, 2024; Samad, 2021). Recently, job embeddedness was found to be more predictive of turnover intention compared with past models (Setthakorn et al., 2024). Significantly less research has been conducted about firm factors that boost retaining research laboratory support personnel. The current study fills these research gaps to identify significant predictors of retention intention among research laboratory support personnel.

2. Research Design

2.1. Theoretical Framework

The current research is based on job embeddedness theory; this suggests that employees are more likely to stay with an organization depending on the three factors—the dimensions of links (networks within the workplace), fit (employee values and organizational culture), and sacrifice (employee change costs) (Peltokorpi & Allen, 2024). A research model has been proposed to investigate the effect of various organizational factors such as career development activities, management commitment to employees, work recognition, compensation satisfaction, and work environment on the retention intention among laboratory support employees. The introduction of these factors in the workplace increases job embeddedness among employees; therefore, retention intention is strengthened. The research model includes controls such as age, organizational tenure, education level, and laboratory types.

2.2. Research Methodology

A quantitative cross-sectional survey design was employed to investigate the relations between organizational variables and retention intention among laboratory support staff. Data collection was conducted using structured questionnaires consisting of proven organizational research measures adapted from various organizational behavior studies. Each question was designed with measures on seven-point Likert scales anchored by “strongly disagree” to “strongly agree." The survey was administered online to ensure complete anonymity to reduce biases linked to social desirability. The survey was pilot-tested among 30 respondents before roll-out.

2.3. Research subjects

The study subjects are laboratory technical support personnel found in higher learning institutions and research organizations such as technicians, research assistants, and technical experts. The sample size was set at 300 to facilitate analysis

on multiple variables. The sampling technique adopted was convenience sampling to allow recruitment from various institutions. The criteria adopted to participate in the study entailed having served in the current capacity for a period of no less than six months. The study involved provision of consent by all respondents besides obtaining clearance from the review board.

2.4. Measurement Instruments

The survey questionnaire consisted of five sections focusing on important constructs. The retention intention, the dependent variable, was measured employing a four-point scale. The independent variables took account of the dimensions such as opportunities for development (four items), leadership support (four items), recognition at work (three items), compensation satisfaction (three items), and work environment characteristics (four items), using items that had been previously identified on reliable organizational behavior scales. The demographic data covered control variables such as age, gender, tenure with the firm, and level of education. The entire survey scale had undergone translation and translation-backward processes.

2.5. Data analysis methods

Data analysis was carried out with the use of the SPSS 26.0 computer package. The organizational factors affecting retention intention were tested with the aid of multiple regression analysis after establishing the correlation between the organizational factors and retention intention with the use of Pearson correlation analysis. The validity and reliability of the research constructs were carried out with the use of Cronbach alpha analysis before testing the hypotheses.

2.6. Data collection

Data collection was carried out over a period of three months between March and May 2024 to allow enough time for recruitment and accumulation of responses. The survey website was shared through laboratory managers' networks and professional bodies to ensure that the study was taken to as many institutions as possible. Follow-up reminders were sent every two weeks to boost the rate of

responses. Incomplete data was omitted from analysis to ensure data quality was maintained by eliminating outliers through data screening processes.

3. Results

3.1. Sample features

In all, 286 valid questionnaires were gathered among the laboratory support staff from 15 research institutions with a 95.3% response rate. As illustrated in **Table 1**, the sample population was predominantly made up of 129 (45.1%) male and 157 (54.9%) female respondents, with somewhat balanced representation among the sexes. A substantially greater proportion (59.4%) was aged 25-35 years, who dominated among the study subjects as the key demographic group. In terms of education attained, 65.0% had a baccalaureate degree, 30.4% had post-graduate degrees, and 4.6% had an associate degree and lower. The average organizational tenure was 3.8 years (SD = 2.4), with 42.3% among the subjects who had tenure with their current employers 1-3 years. These sample demographic parameters are within expectations and are reflective of the workforce composition in earlier studies among laboratory personnel.

Table 1

Demographic Characteristics of Participants (N = 286)

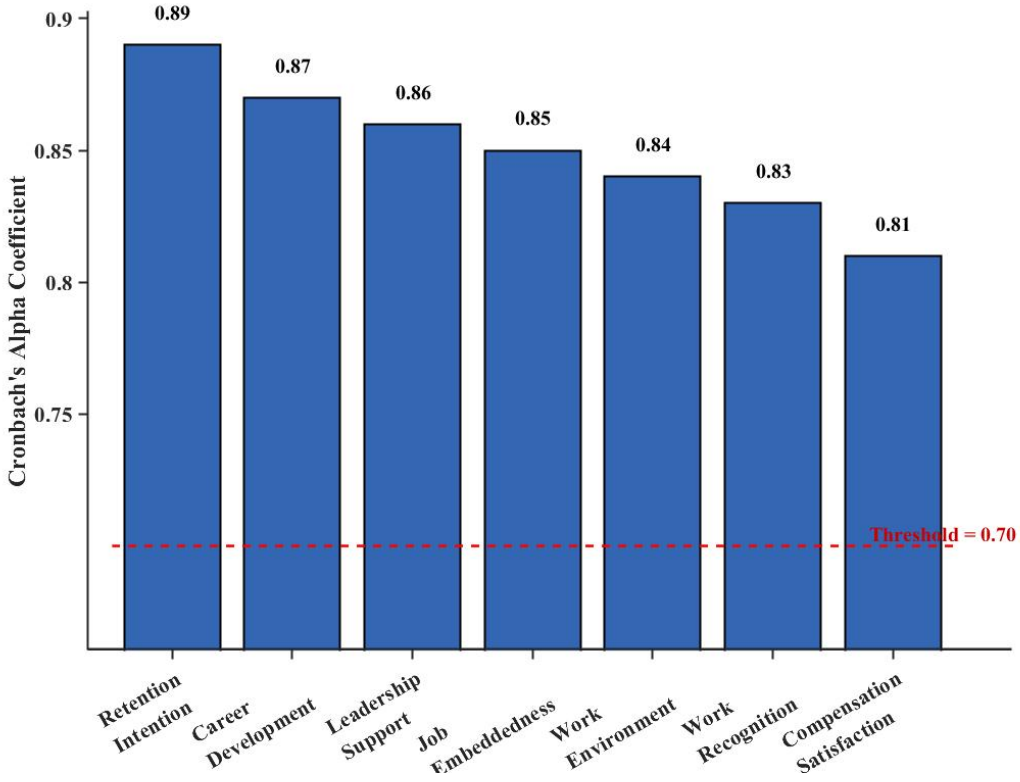
Characteristic	Category	Frequency	Percentage (%)
Gender	Male	129	45.1
	Female	157	54.9
Age	Under 25	38	13.3
	25-35	170	59.4
	36-45	58	20.3
	Above 45	20	7.0
Education	Associate degree or below	13	4.6
	Bachelor's degree	186	65.0
	Master's degree	87	30.4
Tenure	Less than 1 year	52	18.2
	1-3 years	121	42.3
	4-6 years	74	25.9
	More than 6 years	39	13.6

3.2. Reliability and validity testing

In the event that hypothesis testing was to be carried out, there was a need to establish the validity and reliability of the measures. The alpha values exceeded the recommended 0.70 values for all constructs. Retention intention had the highest alpha with 0.89. career development opportunities had an alpha of 0.87. leadership support had an alpha value of 0.86. job embeddedness had an alpha of 0.85. work environment had alpha values that stood at 0.84. work recognition had an alpha of 0.83. compensation satisfaction had an alpha that stood at 0.81. **Table 1** above shows that the Kaiser-Meyer-Olkin (KMO) sampling adequacy had values that stood above 0.60. The result also showed that the application was perfect since the p-value was below .001. The result had an approximate Chi-Square distribution of 3824.56 with freedom of 45. The results indicate that there is validity within the constructs since all the values stand above 0.70. As illustrated in **Figure 1**, all constructs demonstrated high internal consistency, with Cronbach's alpha coefficients ranging from 0.81 to 0.89, exceeding the recommended threshold of 0.70.

Figure 1

Cronbach's Alpha Coefficients for Study Variables



3.3. Descriptive statistics

Table 2 shows the descriptive statistics for all variables in this research. The average retention intention score was 4.21 (S.D. 1.35), with higher values signifying stronger retention intentions among laboratory technical personnel. Among the independent variables, the lowest average score was received on opportunities for career development (M= 3.78, S.D. 1.42), indicating that there is significant need for improvement in this area. Support from leaders (M= 4.35, S.D. 1.28), while rather modest, was slightly higher. Work recognition (M= 4.48, S.D. 1.31) was also modest to moderate. Results also indicate that there is moderate satisfaction with compensation (M= 4.12, S.D. 1.38) and work environment (M= 4.29, S.D. 1.26), again indicating areas that need to be improved. The job embeddedness had an average score of 4.52 (S.D. 1.19), again with higher values indicating higher job embedding among organizational personnel.

Table 2

Descriptive Statistics for Study Variables (N = 286)

Variable	Mean	SD	Min	Max
Retention Intention	4.21	1.35	1.00	7.00
Career Development	3.78	1.42	1.00	7.00
Leadership Support	4.35	1.28	1.00	7.00
Work Recognition	4.48	1.31	1.00	7.00
Compensation Satisfaction	4.12	1.38	1.00	7.00
Work Environment	4.29	1.26	1.00	7.00
Job Embeddedness	4.52	1.19	1.00	7.00

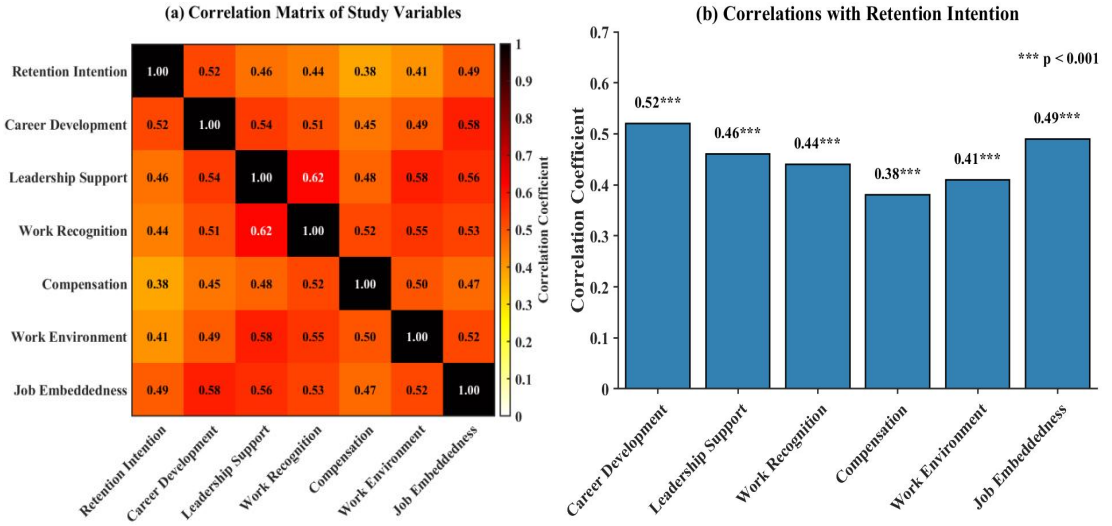
3.4. Correlation analysis

Pearson correlation analysis was employed to study bivariate correlation among various study variables. The findings are presented in **Figure 2**. As shown in **Figure 2(a)**, it was clear that all the independent variables had significant positive correlation with retention intention ($p < 0.001$). The correlation found was higher with career development opportunities, with correlation coefficient 0.52 ($p < 0.001$), followed by leadership support with correlation coefficient 0.46 ($p < 0.001$), and then work recognition with correlation coefficient 0.44 ($p < 0.001$) with retention intention. Job embeddedness had significant positive correlation with various organizational factors.

The correlation was higher with career development with correlation coefficient 0.58 ($p < 0.001$), and another notable correlation was found with retention intention with correlation coefficient 0.49 ($p < 0.001$), indicating that job embeddedness was pertinent to the study as an organizational indicator to establish organizational attachment. As was shown in **Figure 2(b)**, it was found that compensation satisfaction had correlation coefficient 0.38 ($p < 0.001$), and work environment had correlation coefficient 0.41 ($p < 0.001$) with retention intention.

Figure 2

Correlation Analysis Results: (a) Correlation Matrix of Study Variables; (b) Correlations with Retention Intention



3.5. Correlation analysis

Multiple regression analysis was employed to investigate the predictive relationships between organizational variables and retention intention. The full model was statistically significant ($F=42.35$, $p<0.001$), with 58.3% explanatory power (R Square=0.583; Adjusted R Square=0.571). **Table 3** presents the detailed regression coefficients and significance levels for all predictor variables. The result disclosed that the most influential organizational variable was career development opportunities (Beta=0.35; $p<0.001$), followed by leadership support (Beta=0.28; $p<0.001$), work recognition (Beta=0.22; $p<0.001$), work environment (Beta=0.18; $p<0.001$), and compensation satisfaction (Beta=0.15; $p<0.01$). Each VIF was less than 2.5; therefore, there was no problem with multicollinearity.

Table 3

Multiple Regression Analysis Results: Predictors of Retention Intention (N = 286)

Variable	B	SE	β	t	p	VIF
(Constant)	0.87	0.24	-	3.63	< 0.001	-
Independent Variables						
Career Development Opportunities	0.33	0.048	0.35	6.82	< 0.001	2.18
Leadership Support	0.30	0.055	0.28	5.47	< 0.001	2.34
Work Recognition	0.23	0.052	0.22	4.38	< 0.001	2.12
Work Environment	0.19	0.054	0.18	3.56	< 0.001	1.98
Compensation Satisfaction	0.15	0.048	0.15	3.02	0.003	1.76
Control Variables						
Age	0.02	0.038	0.03	0.58	0.564	1.24
Gender (Male = 1)	-0.08	0.135	-0.03	-0.62	0.537	1.12
Tenure	0.04	0.028	0.07	1.45	0.148	1.35
Education Level	0.06	0.065	0.04	0.89	0.372	1.18
Model Statistics						
R^2			0.583			
Adjusted R^2			0.571			
F-statistic			42.35		< 0.001	
Durbin-Watson			1.95			

4. Discussion

The current research aimed to explore the important factors related to intention to retain research laboratory support personnel. The findings reveal that career development opportunities, management support, recognition at work, work environment, and compensation satisfaction are important factors that account for 58.3% variance in intention to retain research laboratory support personnel (van den Toren et al., 2023).

Interestingly, control variables such as age, organizational tenure, types of laboratories, and education levels are found to be insignificant in influencing retention intention ($p > 0.05$), indicating that the impact of organizational factors is more uniform across various demographic groups.

Career development opportunities rated the lowest with the lowest mean ($M = 3.78$), but had the strongest predictive role ($\beta = 0.35$, $p < 0.001$), indicating that there is a crucial area that has been overlooked by current human resource management practices (van Zyl et al., 2025). This result is consistent with job embeddedness

principles that propose improvements in development opportunities increase job embeddedness through the fit aspect (Shah et al., 2020). Support from management ($\beta = 0.28$, $p < 0.001$) and work recognition ($\beta = 0.22$, $p < 0.001$) similarly represented significant predictors. Although compensation satisfaction was shown to be significant ($\beta = 0.15$, $p < 0.01$), with its less-than-small effect size, it seems that financial considerations are no longer the sole considerations in retention approaches supported by current research in the area (Waqar et al., 2021).

The above results present evidence-based best practices to those laboratory administrators who want to improve staff retention within the current challenging market environment.

5. Conclusion

The current research offers empirical evidence about the factors that are linked to retention intention within the research laboratory support workforce. Based on an analysis of 286 employees, factors such as development opportunities, management support, and recognition are found to be the key predictors that account for 58.3% variability in retention outcome. The study applies the job embeddedness theory to laboratory support employees.

As to the practical application perspective, the administrators in laboratories should consider making job development pathways, implementing mentorship initiatives, and establishing recognition platforms as priority considerations. The fact that development considerations are paramount predictors means that institutions need to look beyond offerings that are directed to compensation concerns to meet development needs.

The study was limited by the fact that it was carried out in such a way that it was impossible to establish causes. The study was also self-reporting. In the future, research should be carried out longitudinally to see retention outcomes. Additionally, research should attempt to establish the role that job embeddedness has in the retention process.

Conflict of interest: The authors declare no conflict of interest.

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