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Neuroscience in HR : Employee Behavior Analysis to Optimize Performance

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Abstract: *This study aims to analyze the effect of work motivation, neuroscience factors, emotional intelligence, and job type on employee performance. This research uses quantitative methods with multiple linear regression approaches. Data was collected from 100 respondents who work in various industrial sectors. The results showed that emotional intelligence and work motivation have a significant influence on employee performance, while neuroscience factors and job type did not show a significant influence. The F-test yields a value of 21,795 with a significance of 0.000, which indicates that simultaneously, the independent variables in this model have a significant effect on employee performance. The R-Square value of 0.479 indicates that 47.9% of the variation in employee performance can be explained by the variables used in the model, while 52.1% is explained by other factors outside this model. The results of this study indicate that companies need to improve employees' work motivation and emotional intelligence to optimize their performance. In addition, this study recommends exploring additional variables that may affect employee performance to improve the accuracy of the prediction model.*

Keywords: *Emotional intelligence, Employee performance, Neuroscience factors, Work motivation*

1. INTRODUCTION

In the context of digital transformation and increasing competition, leveraging neuroscience in human resource management (HRM) can significantly improve organizational performance. By understanding the brain mechanisms behind decision-making, organizations can refine their strategies to increase employee engagement and reduce bias in choices (Saputrabey et al., 2025). Additionally, insights into the neuroscience of employee engagement reveal how motivation and satisfaction are driven by neural processes, enabling the development of targeted engagement strategies (Bokhari & Ghaffar, 2024). Furthermore, recognizing the role of self-motivation and reward systems can help organizations cultivate a more productive workforce by aligning incentives with intrinsic motivators (Lakshmi Priya & Jayalakshmi, 2024). Finally, understanding the stress response and promoting resilience is critical to maintaining employee well-being, ultimately reducing burnout and improving overall performance (Lee, 2024). By integrating these neuroscience principles, HRM can create a more adaptive and effective work environment that meets the challenges of the modern business landscape. Understanding the neuroscience behind emotions, stress, and motivation is critical to improving employee productivity and job satisfaction. Neuroscience reveals how individuals respond to incentives and manage work stress, which can inform the development of effective HR strategies. For example, an empathy-based leadership

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approach can foster a supportive work environment by prioritizing employees' emotional needs, thereby increasing motivation and productivity (Rachmawati et al., 2024). Additionally, neurolearning-based training programs can optimize learning and retention, improving cognitive function and emotional regulation, which are critical for performance (Bose & Mohanty, 2024). Furthermore, addressing chronic stress through targeted management strategies can reduce its negative impact on motivation and job satisfaction, ultimately improving employee well-being (Sharma & R, 2024). By leveraging these insights, organizations can create work environments that not only support focus and creativity but also align with the neural mechanisms that drive employee behavior.

The application of neuroscience in Human Resources (HR) offers significant potential to improve employee performance, but also raises critical ethical and privacy issues. Technologies such as neurofeedback and biometric analysis can provide valuable insights into employee behavior and well-being, helping organizations tailor interventions to improve performance (McCreedy, 2024). However, the use of biometric data to monitor workload responses can lead to ethical dilemmas, especially regarding employee privacy and autonomy (Khushk et al., 2025). Therefore, it is important for organizations to implement clear regulations and ethical guidelines to ensure the responsible use of neuroscience technologies in HR (Khushk et al., 2025). Balancing the benefits of neuroscience with ethical considerations is critical to fostering a workplace environment that respects employee rights while leveraging innovative strategies for performance management (Mathur et al., 2024). This study aims to explore these dynamics, emphasizing the need for a thoughtful approach to integrating neuroscience into HR practices..

2. LITERATURE REVIEW

Neuroscience in the Context of Human Resource Management (HRM)

Neuroscience provides valuable insights into how the brain influences various aspects of human behavior, especially in the context of human resources (HRM). Understanding the neuroscience of decision-making can help organizations design frameworks that improve decision-making processes and reduce bias, thereby increasing overall effectiveness (Frisina, 2024). Additionally, the brain's motivation and reward systems are critical to driving employee engagement and performance; recognizing these mechanisms allows HR to create more effective incentive programs (Dalalana et al., 2024). Emotional intelligence, which involves recognizing and managing emotions, is critical to effective leadership and communication in organizations (Kulshrestha & Kulshrestha, 2024). Additionally, awareness of cognitive biases can help reduce unfair practices in hiring and evaluation, promoting a more objective workplace (McCreedy, 2024). Finally, neuroplasticity highlights the brain's ability to adapt and learn, informing strategies for employee development and training that foster continued growth (Knights, 2024). Together, these insights underscore the importance of integrating neuroscience into HR practices to improve organizational performance. Research by Lieberman (2013) suggests that social interactions in the workplace are influenced by brain responses to social rewards and threats. Factors such as empathy, trust, and emotion can be optimized by understanding the underlying neurological mechanisms. This is relevant in team management, leadership development, and employee productivity improvement strategies.

Neuroscience and Employee Decision Making

Decision making is a critical component of employee performance, significantly influenced by the brain's limbic system and prefrontal cortex. The limbic system regulates emotional responses, which are essential for emotional intelligence, allowing employees to effectively navigate interpersonal dynamics and make informed decisions ("Neural Mechanisms of Decision Making," 2023). In contrast, the prefrontal cortex is responsible for executive functions such as planning and problem solving, which are critical for rational decision making (Ghosh & Kumar, 2024). Understanding the interactions between these brain regions can improve decision-making models, helping organizations identify factors that influence employee choices (Frisina, 2024). In addition, motivation and reward systems, linked to the limbic system, can further shape decision-making by incentivizing optimal performance (Jeni & Reddy, 2024). By integrating insights from neuroeconomics, organizations can develop strategies that leverage both the emotional and rational aspects of decision-making, ultimately improving employee outcomes (Wei, 2024). Research by Kahneman (2011) distinguishes two systems in the human brain: System 1 (fast, intuitive decision-making) and System 2 (more rational, analytical decision-making). This understanding is important in designing employee training, performance evaluation strategies, and developing incentive policies that can improve work effectiveness.

Neuroscience and Employee Motivation

Employee motivation is significantly influenced by psychological theories and biological factors. Self-Determination Theory (SDT) emphasizes the importance of intrinsic motivation, driven by innate psychological needs for autonomy, competence, and relatedness, which are essential for fostering employee engagement and well-being (Deci et al., 2017). In parallel, recent research highlights the role of neurotransmitters, especially dopamine, in motivating behavior. Dopamine is essential for both intrinsic and extrinsic motivation, as it is involved in the brain's reward processing system, suggesting that understanding its biological underpinnings may improve motivational strategies (A Critical Review of Motivational Theories in Management and Their Role in Modern Era, 2021). While intrinsic motivation leads to sustained effort and creativity, extrinsic motivation may provide short-term incentives but may reduce long-term engagement if not properly balanced (Restrepo & Valencia, 2014). Therefore, integrating insights from SDT with knowledge of neurotransmitter function may help organizations create more effective motivational frameworks. A study by Ariely et al. (2009) found that dopamine-based rewards, such as recognition and financial incentives, can increase employee engagement and productivity. Therefore, companies can optimize compensation and reward strategies by considering how the brain's systems respond to incentives and feedback**.**

Neuroscience and Workplace Stress Management

Workplace stress significantly impacts employee health and performance, primarily through the release of cortisol, which impairs cognitive function and productivity (Bigliassi et al., 2025). To address this, neuroscience-based stress management techniques, such as mindfulness and neurofeedback, have emerged as effective solutions. Mindfulness practices, including meditation and deep breathing, can improve self-regulation and resilience, ultimately improving employee well-being and task performance (Bajwa et al., 2024). Additionally, neurofeedback offers real-time feedback on brain activity, allowing individuals to self-regulate and reduce stress (Putri et al., 2024). Organizations that adopt neurocoaching programs, which leverage neuroscience insights to improve performance, have reported improvements in employee retention and overall health (Ferreira et al., 2025). By integrating these approaches, companies can create supportive environments that reduce stress and foster productivity, leading to a healthier workforce**.**

3. METHOD

This study used a quantitative approach. Quantitative approach is used to measure the relationship between neuroscience variables (such as stress response, motivation, and decision making) with employee performance. This study uses a descriptive design. Descriptive design is used to analyze the relationship between neuroscience factors with employee behavior and performance. Population Employees from various industries (eg technology, manufacturing, and services) who work in companies that implement neuroscience-based policies in HR management. Sample Taken using purposive sampling technique, with a total of 150 respondents. The variables in this study use the Dependent Variable (Y): Employee performance, while the Independent Variable (X): Neuroscience factors in HR (X1), emotional intelligence (X2), type of work (X3), Mediating Variable: Work motivation

4. RESULTS AND DISCUSSION

Validity & Reliability Test

Table 1 Validity Test

Correlations		
Sig (2-tailed)		Information
Neur Factor	0,000	Valid
Emotional Intelligence	0,000	Valid
Type of Work	0,000	Valid
Work Motivation	0,000	Valid
Employee performance	0,000	Valid
**. Correlation is significant at the 0.01 level (2-tailed)		

Interpretation

All items in this study have a significance value of 0.000 (<0.005), thus it can be stated that the question items in this study are declared valid.

Table 2 Realiability

Reliability Statistics	
Cronbach's Alpha	N of Items
0,910	5

Interpretation

All question items in this study have a Cronbach`s Alpha value of 0.910 (> 0.70), thus it can be stated that all items in this study are stated as Reliable, and can be continued to the next stage.6

Multiple Linear Regression Test

Model 1.

Table 3 T Test

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
1	(Constant)	2,952	0,923		3,197	0,002
	Neuroscience Factors	0,109	0,110	0,111	0,989	0,325
	Emotional Intelligence	0,176	0,096	0,213	1,829	0,071
	Type of work	0,394	0,130	0,385	3,042	0,003
a. Dependent Variabel : Work Motivation						

Interpretation of t-test

a. Neuroscience Factor

The calculated t-value: 0.989 and Sig.: 0.325 (> 0.05), with a t-table value of 1.985. So it can be seen that the neuroscience factor does not have a significant effect on work motivation.

b. Emotional Intelligence

The calculated t-value: 1.829 and Sig.: 0.071 (> 0.05), with a t-table value of 1.985, meaning: the emotional intelligence variable has an effect on work motivation.

c. Type of Job

The calculated t-value: 3.042 and Sig.: 0.003 (< 0.05), with a t-table value of 1.985, meaning significant. Thus, the type of job variable has a significant effect on work motivation..

Tabel 4 F Test

ANOVA[a]						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	146,599	3	48,866	22,510	,000[b]
	Residual	208,401	96	2,171		
	Total	355,000	99			
a. Dependent Variable : Work Motivation						
b. Predictors : (Constant) , Type of Work, Neuroscience Factors, Emotional Intelligence						

Interpretation of F Test

The F-count value = 22.510 and the Sig. Value (p-value) = 0.000 (<0.05)., then the overall regression model is significant, which means that the independent variables (type of work, neuroscience factors, and emotional intelligence) together have a significant effect on work motivation. Because the F-count (22.510) > F-table (2.70), then this regression model is significant

Table 5 Ceofficien Determinan

Model Summary				
Model	R	R Square	Adjusted R Square	Std.Error if the Estimate
1	,643[a]	0,413	0,395	1,473
a. Predictors : (Constant) , type of Work, Neuroscuence Factors				

Interpretation

The R Square value is 0.413, thus the influence of the independent variable on the work motivation variable is 41.3%, thus the remaining 58.7% is influenced by variables outside this study.

Model 2.

Table 6 F Test Model 2

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
1	(Constant)	1,947	0,917		2,123	0,036
	Neuroscience Factors	0,203	0,105	0,207	1,935	0,056
	Emotional Intelligence	0,337	0,092	0,409	3,647	0,000
	Type of work	-0,019	0,128	-0,019	-0,152	0,879
	Work Motivation	0,208	0,096	0,209	2,162	0,033
a. Dependent Variabel : Employee Performance						

Interpretation of t-Test Model 2

a. Neuroscience Factor

The t-value = 1.935, and the Sig. value = 0.056 (> 0.05), it can be seen that the Neuroscience Factor does not have a significant effect on Employee Performance. Because the t-value is below the t-table value (1.985)

b. Emotional Intelligence

The t-value = 3.647 and the Sig. value = 0.000 (< 0.05), it can be seen that the Emotional Intelligence variable has a significant effect on Employee Performance. because the T-value is greater than the T-table value (1.985)

c. Type of Work

The t-value = -0.152 and the Sig. value = 0.879 (> 0.05), Because the significance value is greater than 0.05, the Type of Work does not have a significant effect on Employee Performance. Because the t-value is below the t-table value (1.985)

Work Motivation

The t-value is 2.162 and the Sig. value is 0.033 (<0.05), because the significance value is less than 0.05, then Work Motivation has a significant effect on Employee Performance. Because the T-value is greater than the T-table value (1.985)

Tabel 7 Uji F Model 2

ANOVA[a]						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	168,729	4	42,182	21,795	,000[b]
	Residual	183,861	95	1,935		
	Total	352,590	99			

a. Dependent Variable : Employee Pereformance
b. Predictors : (Constant) ,Wok Motivation, Type of Work, Neuroscience Factors, Emotional Intelligence

Interpretation of F Test Model 2

F-calculated value = 21.795 and Sig. value = 0.000 (<0.05), Because the Sig. value = 0.000 is smaller than 0.05, it can be concluded that the overall regression model is significant, the regression model is declared significant because the F-calculated value (21.795) > F-table (2.47)

Table 8 Coefficien Determinan

Model Summary				
Model	R	R Square	Adjusted R Square	Std.Error if the Estimate
1	,692[a]	0,479	0,457	1,391
a. Predictors : (Constant) , Work Motivation , Neuroscuence Factors				

Interpretasi

The R Square value is 0.479, thus the contribution of the influence of the Independent variable is 47.9% on the employee performance variable, and the remaining 63.1% is influenced by other variables outside the research.

5. DISCUSSION

t-test (Partial Test)

a. The neuroscience factor has a t-value of 1.935 with a p-value of 0.056. Because the p-value is greater than 0.05, the neuroscience factor does not have a significant effect on employee performance in this model.
b. Emotional intelligence has a t-value of 3.647 with a p-value of 0.000, indicating that this variable has a significant effect on employee performance. This means that the higher a person's emotional intelligence, the higher their performance.
c. Type of work has a t-value of -0.152 with a p-value of 0.879, which means that the type of work does not have a significant effect on employee performance.
d. Work motivation has a t-value of 2.162 with a p-value of 0.033, indicating that this variable has a significant effect on employee performance. This means that the higher a person's work motivation, the better their performance.
e. From the results of this t-test, it can be concluded that emotional intelligence and work motivation have a significant influence on employee performance, while neuroscience factors and type of work do not have a significant influence.

F Test (Simultaneous Test)

The F test is conducted to see whether the independent variables simultaneously affect the dependent variable. In Model 2, the F value obtained is 21.795 with a p-value of 0.000. Because the p-value is less than 0.05, it can be concluded that this model is significant overall, which means that neuroscience factors, emotional intelligence, type of work, and work motivation together affect employee performance.

These results indicate that although some variables are not significant individually (such as neuroscience factors and type of work), overall this model still has good predictive ability on employee performance.

R-Square Test (Coefficient of Determination)

The R-Square test is used to determine how much the independent variables contribute to explaining the dependent variable. In Model 2, the R-Square value is 0.479, which means that 47.9% of employee performance variability can be explained by neuroscience factors, emotional intelligence, type of work, and work motivation. The rest, which is 52.1%, is explained by other variables outside this model. When compared to Model 1 which has an R-Square of 0.413, it can be seen that Model 2 has an increase in predictive ability after adding the work motivation variable. This shows that work motivation provides a significant additional contribution in explaining employee performance variations.

6. CONCLUSION

Based on the results of the regression analysis that has been carried out, it can be concluded that there is an increase in the quality of the model after adjustments from Model 1 to Model 2. In Model 1, the R-Square value is 0.413, which means that 41.3% of employee performance variability can be explained by the neuroscience factor variables, emotional intelligence, and type of work, while the rest is influenced by other factors not included in the model.After developing the model by adding work motivation variables in Model 2, the R-Square value increased to 0.479, which indicates that 47.9% of employee performance variability can be explained by the independent variables in this model. This increase in the R-Square value indicates that Model 2 has a better ability to explain the factors that influence employee performance compared to Model 1.Based on the t-test (partial), the emotional intelligence variable has a significant influence on employee performance with a t-value of 3.647 and a p-value of 0.000. In addition, the work motivation variable added in Model 2 also showed a significant effect on employee performance with a t-value of 2.162 and a p-value of 0.033. However, the neuroscience factor variable did not show a significant effect on employee performance with a t-value of 1.935 and a p-value of 0.056, and the type of work variable also did not have a significant effect with a t-value of -0.152 and a p-value of 0.879.Meanwhile, the results of the F test (simultaneous) showed that both models as a whole were significant in explaining employee performance variables. In Model 2, the F value was 21.795 with a p-value of 0.000, which means that this model is statistically significant and can be used to analyze the factors that affect employee performance as a whole.From the results of this analysis, it can be concluded that Model 2 is better than Model 1 in explaining employee performance variability, especially with the presence of work motivation variables which have been shown to contribute significantly to improving employee performance. However, the neuroscience factor variables and type of work do not have a significant influence in this model, so they can be considered for further study in subsequent research.

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