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TALENT MANAGEMENT IMPACT ON EMPLOYEE RETENTION ON TALENT ACQUISITION FOR EMPLOYEES BY USING THE NEURAL NETWORK (NN) METHOD

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ABSTRACT:
The Neural Network (NN) Method is used to model complex. This advanced machine learning technique predicts retention outcomes based on the interplay of various factors, offering highly accurate insights into which practices drive long-term employee commitment. This advanced analytical approach helps to model complex relationships between training relevance, skill development, and mentoring, and their influence on employee retention. The neural network model further highlights this factor as a key predictor of the overall success of talent management practices in driving retention

Key words:
Talent management practices, Neural Network Model, Employee commitment, Employee retention.

I. Introduction

The Neural Network (NN) method to analyze the impact of talent management practices on employee retention, focusing specifically on talent acquisition. The Neural Network architecture used in this study is a multilayer feedforward network, implemented using SPSS 20. The architecture that provides the best fit for the data consists of three hidden layers and an output layer. The learning and momentum parameters are set to 0.6 and 0.9, respectively, with error convergence falling below 0.01 percent. For the hidden layers, the Tan sigmoid activation function is used, while the pure linear function is employed for the output layer to produce real-time values.

The network has seven input layers, ten covariate variables, one hidden layer, and one output layer, as illustrated in Figure 4.2. By utilizing this neural network model, the analysis aims to uncover the complex relationships between various aspects of talent acquisition, such as recruitment channels, process transparency, and cultural fit, and their influence on employee retention. The results will provide valuable insights into how organizations can optimize their talent management strategies to improve employee retention and engagement.

1.1. Key elements of talent management practices

Talent management practices refer to the systematic approach and strategies organizations use to attract, develop, engage, retain, and optimize their workforce. These practices are essential for fostering a high-performing and sustainable workforce that drives organizational success. Key elements of talent management practices include:

- Talent Acquisition
- Learning and Development
- Performance Management
- Career Development and Succession Planning
- Employee Engagement
- Compensation and Benefits
- Workplace Culture
- Technology in Talent Management

1.2. The impact of talent management practices on employee retention

Talent management practices significantly influence employee retention by addressing the core factors that contribute to an employee's decision to remain with an organization. These practices encompass strategies for attracting, developing, rewarding, and engaging employees in a way that fosters loyalty and reduces turnover. Retention is a critical component of organizational success, as high employee turnover leads to increased costs, loss of institutional knowledge, and disruption in operations (Amushila et al., 2021). Effective recruitment and onboarding processes are foundational to employee retention. Attracting the right candidates who align with the organization's culture and values ensures a good person-organization fit, which increases the likelihood of long-term employment.

Compensation and rewards also play a significant role in employee retention. Offering competitive salaries, benefits, and rewards for performance ensures that employees feel valued and fairly compensated (James, Beekun, Daly & Vanka, 2009). Beyond monetary benefits, non-monetary recognition, such as awards, appreciation, and opportunities for personal development, enhances an employee's emotional connection to the organization. When employees feel that their contributions are acknowledged and appreciated, they are more likely to remain loyal.

1.3. Significance of the study

This study holds significant importance in both academic and practical contexts, particularly in understanding the impact of talent management practices on employee retention within the pharmaceutical industry in Visakhapatnam. In a sector driven by innovation, specialized skills, and intense competition, retaining a skilled and motivated workforce is essential for organizational sustainability and growth. By examining various dimensions of talent management, this study provides valuable insights into strategies that can enhance employee satisfaction, engagement, and loyalty. From an academic perspective, this study contributes to the existing literature on talent management by exploring its application in a specific context—Visakhapatnam's pharmaceutical industry.

1.4. Scope of the study

The scope of this study encompasses the examination of talent management practices and their impact on employee retention within the pharmaceutical industry in Visakhapatnam. It aims to provide an in-depth analysis of the key dimensions of talent management, including talent acquisition, learning and development, performance management, career development and succession planning, employee engagement, compensation and benefits, workplace culture, technology in talent management, employee satisfaction, and employee retention. The study is designed to explore the interconnectedness of these dimensions and their influence on the ability of pharmaceutical organizations to retain their workforce effectively. The study also explores the integration of technology in talent management practices, examining how digital tools and platforms enhance recruitment, training, performance evaluation, and engagement processes.

1.5. Objectives of the study

The research objectives are designed to explore the impact of talent management practices on employee retention in the pharmaceutical industry in Visakhapatnam.

- To analyze the socio-demographic profile of employees in the pharmaceutical industry in Visakhapatnam and its influence on employee retention.
- To assess the combined influence of talent management practices on employee retention and satisfaction in the pharmaceutical industry in Visakhapatnam.

II. Literature

The review of literature chapter provides a comprehensive analysis of existing studies and theoretical frameworks related to talent management practices and employee retention.

2.1 Empirical studies on talent acquisition

Training plays a vital role in this process, as it involves equipping employees with the necessary skills, knowledge, and attitudes to enhance organizational performance *(Blass, 2017).* By integrating these practices into the talent acquisition process, organizations ensure not only the hiring of suitable

candidates but also the effective development and placement of employees to maximize overall productivity.

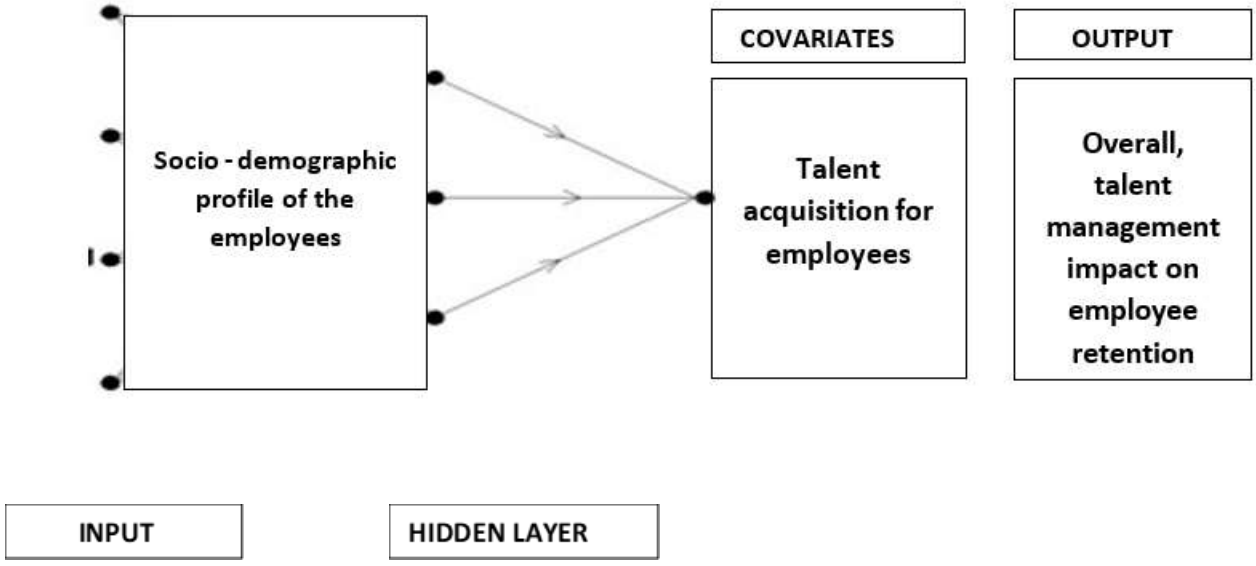
In the context of talent acquisition, it is essential to address the challenges of identifying poor performers and taking appropriate actions to optimize their contributions to the organization. According to *McDonnel et al. (2017),* talent management processes should determine whether an employee's underperformance is due to a lack of skills, prompting the need for targeted training. *Blass (2007)* suggests that instead of dismissing poor performers, organizations can reposition them to roles that better align with their inherent skills, unlocking their potential and improving outcomes.

2.2. Empirical studies on employee engagement

Addressing factors such as work-life balance, effective leadership, and organizational culture is essential for fostering employee engagement in the pharmaceutical industry. Employee engagement is increasingly recognized as a key determinant of talent retention, particularly in a sector where innovation, compliance, and operational efficiency are critical. *Dirani et al. (2016)* and *Kerdpitak & Jermsittiparsert (2020)* highlight engagement, flexibility, and autonomy as pivotal drivers in retaining top talent. Work-life balance plays a vital role in ensuring employees remain satisfied and committed to their roles. By offering flexible work arrangements and support systems, organizations can reduce burnout and create a more sustainable work environment. Effective leadership is equally important, as it involves guiding employees with clear communication, providing constructive feedback, and recognizing contributions, all of which enhance their sense of purpose and alignment with organizational goals

III. Analysis

Figure – 1: Basic Neuron Model for overall, talent management impact on employee retention on talent acquisition for employees



The model used in this study is a Feed Forward Multilayer Perceptron, implemented with the Back Propagation Algorithm. The network architecture consists of 7 input layers, 10 covariate layers, 1 hidden layer, and 1 output layer. All input variables are carefully analyzed in the experimental validation section, with the results illustrated through graphs to highlight the influence of various parameters. The details of the network configuration are summarized in the table. Additionally, the validation of the estimated Neural Network (NN) and the experimental values are displayed in Figure, providing a clear comparison between the predicted and actual results.

Table – 1: Model Summary for Neural Network Model for talent acquisition for employees

Training	SSE	160.333
	RE	.798

	SRU	1 consecutive step(s) with no decrease in error[a]
	TT	0:00:00.57
Testing	SSE	105.502
	RE	.931
Dependent Variable: Overall, Talent Management Impact on Employee Retention		
a. Error computations are based on the testing sample.		

Source: Output generated from SPSS 21.

The Neural Network model for talent acquisition shows a training Sum of Squared Errors of 160.333 and testing Sum of Squared Errors of 105.502, indicating the model fits the training data well but has slightly higher error on the test data. The relative error is 0.798 for training and 0.931 for testing, suggesting a slight reduction in performance on unseen data. The model completed training in 0:00:00.57, indicating quick computation. These results show that the model performs reasonably well but may require further refinement for improved generalization.

Table – 2: Neural Network Model for overall, talent management impact on employee retention on talent acquisition for employees

Input Layer	Factors	1	Age
		2	Gender
		3	Marital Status
		4	Educational Qualification
		5	Income Level (Monthly)
		6	Employment Type
		7	Experience in Pharma Industry
	Covariates	1	Recruitment Channels
		2	Process Transparency
		3	Job Description Clarity
		4	Candidate Fit
		5	Onboarding Effectiveness
		6	Cultural Fit
		7	Diversity & Inclusion
		8	Competitor Talent
		9	Technology Utilization
		10	Process Efficiency
	Number of Units[a]		39
	Rescaling Method for Covariates		Standardized
Hidden Layer(s)	Number of Hidden Layers		1
	Number of Units in Hidden Layer 1[a]		7
	Activation Function		Hyperbolic tangent
Output Layer	Dependent Variables	1	Overall, Talent Management Impact on Employee Retention
	Number of Units		1
	Rescaling Method for Scale Dependents		Standardized
	Activation Function		Identity
	Error Function		Sum of Squares
a. Excluding the bias unit			

Source: Output generated form SPSS 21.

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The Neural Network Model for analyzing the overall talent management impact on employee retention in talent acquisition uses seven input factors including age, gender, marital status, educational qualification, income level, employment type, and experience in the pharma industry. It incorporates ten covariates like recruitment channels, process transparency, job description clarity, candidate fit, onboarding effectiveness, cultural fit, diversity and inclusion, competitor talent, technology utilization, and process efficiency. The model has one hidden layer with seven units, and uses the hyperbolic tangent activation function for the hidden layer. The output layer predicts overall talent management impact on employee retention, using the identity activation function, with error minimized using the sum of squares function.

Figure – 2: Normalized importance for the overall, talent management for employees impact on employee retention on talent acquisition

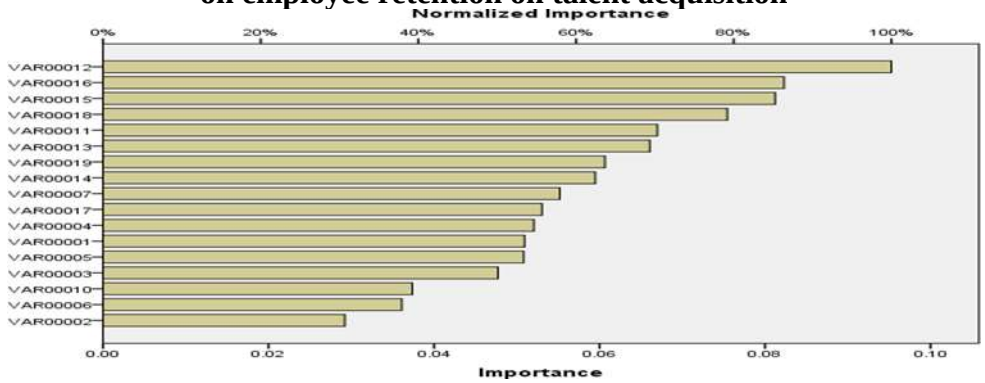


Table – 3: Independent Variable importance for Neural Network Model for the overall, talent management impact on employee retention on talent acquisition for employees

Independent Variable Importance	Importance	Normalized Importance
Age	.051	53.5%
Gender	.029	30.7%
Marital Status	.048	50.1%
Educational Qualification	.052	54.6%
Income Level (Monthly)	.051	53.4%
Employment Type	.036	37.9%
Experience in Pharma Industry	.055	57.9%
Recruitment Channels	.037	39.2%
Process Transparency	.067	70.3%
Job Description Clarity	.095	100.0%
Candidate Fit	.066	69.4%
Onboarding Effectiveness	.059	62.4%
Cultural Fit	.081	85.2%
Diversity & Inclusion	.082	86.4%
Competitor Talent	.053	55.7%
Technology Utilization	.075	79.2%
Process Efficiency	.061	63.7%

Source: Output generated from SPSS 21.

The Independent Variable Importance analysis for the Neural Network model reveals that Job Description Clarity has the highest normalized importance at 100.0%, indicating it is the most significant factor influencing employee retention. This highlights the critical role that clear and well-defined job descriptions play in retaining talent. Other important factors include Process Transparency (70.3%), Cultural Fit (85.2%), and Diversity & Inclusion (86.4%), which emphasize the importance of transparent recruitment processes, a strong cultural alignment, and inclusive practices in enhancing retention. Technology Utilization (79.2%) also plays a key role, reflecting the growing importance of

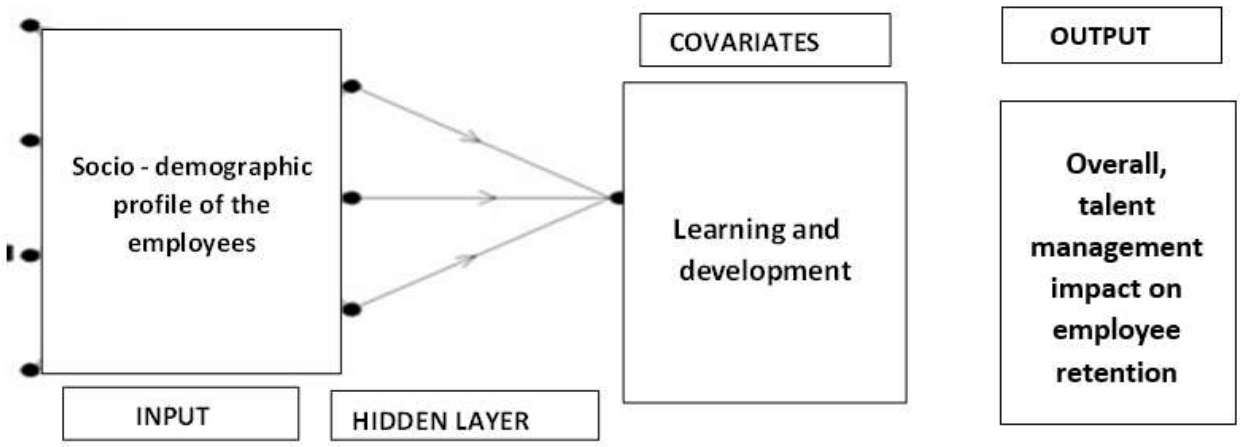
digital tools in the recruitment process. Socio-demographic factors such as Experience in Pharma Industry (57.9%) and Educational Qualification (54.6%) are also significant, though their influence is less compared to the structural and process-related factors. On the other hand, Gender (30.7%) and Employment Type (37.9%) have relatively lower importance, suggesting that while they impact retention, they are not as crucial as other factors like job clarity and transparency. Overall, the analysis suggests that improving job descriptions, fostering a transparent hiring process, and aligning employees with the organizational culture are key strategies for enhancing employee retention. The results of the Independent Variable Importance analysis indicate that Job Description Clarity is the most critical factor affecting employee retention in talent acquisition, followed by Process Transparency and Cultural Fit. This suggests that organizations should prioritize creating clear job descriptions, fostering a transparent hiring process, and ensuring a strong cultural alignment to improve employee retention. While socio-demographic factors such as Experience and Income Level also play a role, the emphasis should be on improving the structure and quality of the recruitment and onboarding processes to effectively retain employees.

employees. In the pharmaceutical sector, talent management practices are crucial for fostering satisfaction by ensuring employees feel valued and supported. Key HR practices such as training, performance appraisal, teamwork, compensation, and employee participation play a significant role in creating a positive work environment. When employees in the pharmaceutical industry are satisfied with these practices, they are more likely to be engaged, motivated, and committed to their roles, leading to enhanced productivity, innovation, and long-term organizational success.

Analysis of overall, Talent Management impact on Employee Retention by using the Neural Network (NN) Method

It focuses on analyzing the overall impact of talent management on employee retention, specifically examining the role of learning and development through the use of the Neural Network (NN) method. This advanced analytical approach helps to model complex relationships between learning and development factors, such as training relevance, skill development, and mentoring, and their influence on employee retention. By leveraging the NN method, this analysis offers deeper insights into how various elements of talent management can contribute to improving retention rates, providing a robust framework for understanding the intricate dynamics of employee engagement and organizational growth.

Figure – 3: Basic Neuron Model for overall, talent management impact on employee retention on learning and development



The model employed in this study is a Feed Forward Multilayer Perceptron utilizing the Back Propagation Algorithm, configured as a (4-3-1) structure. This structure consists of 7 input layers, 10 covariate layers, 1 hidden layer, and 1 output layer.

All input variables are analyzed in the experimental validation phase, with results illustrated graphically to capture the impact of various parameters. The network configuration and corresponding details are provided in the table, while the validation of the estimated neural network and experimental values are demonstrated through visual representations in the figure.

Table – 4: Model Summary for Neural Network Model for learning and development

Training	SSE	218.164
	RE	1.019
	SRU	1 consecutive step(s) with no decrease in error[a]
	TT	0:00:00.77
Testing	SSE	74.948
	RE	.974
Dependent Variable: Overall, Talent Management Impact on Employee Retention		
a. Error computations are based on the testing sample.		

Source: Output generated from SPSS 21.

Table – 5: Neural Network Model for overall, talent management impact on employee retention on learning and development

Input Layer	Factors	1	Age
		2	Gender
		3	Marital Status
		4	Educational Qualification
		5	Income Level (Monthly)
		6	Employment Type
		7	Experience in Pharma Industry
	Covariates	1	Training Relevance
		2	Skill Development
		3	External Certifications
		4	Career Development Support
		5	Leadership Development
		6	Strategic Alignment
		7	Mentoring/Coaching
		8	Training Effectiveness
		9	Innovative Learning Tools
		10	Career Development Satisfaction
	Number of Units[a]		39
	Rescaling Method for Covariates		Standardized
Hidden Layer(s)	Number of Hidden Layers		1
	Number of Units in Hidden Layer 1[a]		6
	Activation Function		Hyperbolic tangent
Output Layer	Dependent Variables	1	Overall, Talent Management Impact on Employee Retention
	Number of Units		1
	Rescaling Method for		Standardized

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	Scale Dependents	
	Activation Function	Identity
	Error Function	Sum of Squares
a. Excluding the bias unit		

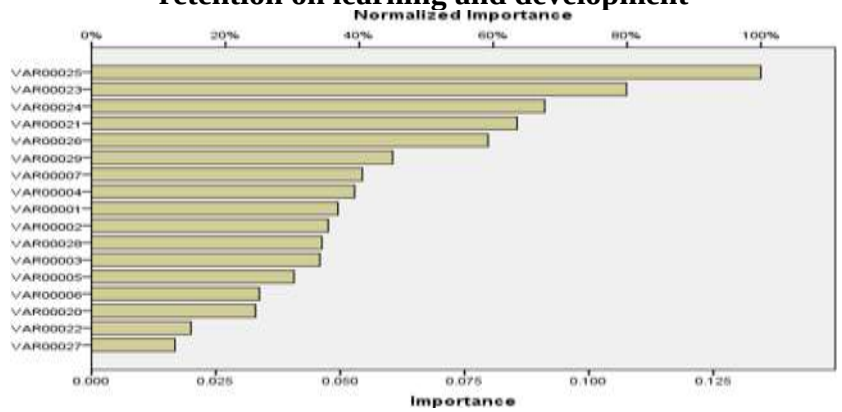
Source: Output generated form SPSS 21.

Table – 6: Independent Variable importance for Neural Network Model for the overall, talent management impact on employee retention on learning and development

Independent Variable Importance	Importance	Normalized Importance
Age	.050	36.8%
Gender	.048	35.4%
Marital Status	.046	34.1%
Educational Qualification	.053	39.3%
Income Level (Monthly)	.041	30.3%
Employment Type	.034	25.1%
Experience in Pharma Industry	.054	40.5%
Training Relevance	.033	24.5%
Skill Development	.086	63.6%
External Certifications	.020	14.9%
Career Development Support	.108	79.9%
Leadership Development	.091	67.7%
Strategic Alignment	.135	100.0%
Mentoring/Coaching	.080	59.2%
Training Effectiveness	.017	12.5%
Innovative Learning Tools	.046	34.4%
Career Development Satisfaction	.061	45.0%

Source: Output generated from SPSS 21.

Figure – 4: Normalized importance for the overall, talent management impact on employee retention on learning and development



The table and diagram indicate that "Strategic Alignment" plays a significant role in determining the overall talent management impact on employee retention, especially when considering learning and development factors. In the context of the neural network model, the contribution of "Strategic Alignment" is reflected through its strong influence on the output. This means that aligning training, development, and career opportunities with organizational goals and strategies significantly enhances employee retention, as it directly connects the personal growth of employees with the broader business objectives. By ensuring that employees' learning and development opportunities align with the company's strategic direction, organizations can foster a sense of purpose and engagement. Employees are more likely to stay with an organization if they see a clear connection between their personal career growth and the company's long-term goals. Thus, the high contribution of "Strategic Alignment"

suggests that it is a crucial variable for improving employee satisfaction and retention, as it provides clarity and direction for their career development. The neural network model further highlights this factor as a key predictor of the overall success of talent management practices in driving retention.

IV. Findings

- Talent acquisition dimensions such as process transparency, job description clarity, cultural fit, and technology utilization are perceived differently by employees with varying experience levels, reflecting differing expectations.
- More experienced employees may prioritize transparency and cultural alignment in recruitment processes. However, recruitment channels, onboarding effectiveness, and process efficiency show consistent perceptions across experience groups. This indicates that many aspects of the organization's recruitment efforts are broadly appreciated, with room for refinement in targeted areas.
- The neural network model highlights "Strategic Alignment" as a key factor in driving employee retention through Learning and Development. Aligning L&D programs with organizational goals enhances employees' sense of purpose and connection to the company's vision. Employees are more likely to remain committed when their personal growth aligns with broader strategic objectives. This alignment fosters engagement and clarity in career development, making it a strong predictor of talent management success. The findings emphasize that strategic alignment is integral to retaining and developing employees effectively.

V. Conclusion

This study has provided valuable insights into the intricate relationship between talent management practices and employee retention of using Neural Network (NN) method within the pharmaceutical industry in Visakhapatnam. The neural network model highlights "Strategic Alignment" as a key factor in driving employee retention through Learning and Development. Using Neural Network (NN) method for fostering a high-performing and sustainable workforce that drives organizational success. Additionally, the integration of technology in talent management and the provision of competitive compensation and benefits emerged as critical components in retaining a committed workforce.