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Unlocking Supply Chain Excellence: An Empirical Study on the Relationship Between HR Capabilities and SCM Performance

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Abstract: The article is carried out to examines the significant impact that human resource (HR) capabilities have on supply chain management (SCM) performance. This article outlines essential independent aspects that considerably boost the results of supply chain management. These factors include employee engagement, talent management, learning and development, and training. The study demonstrates how a competent and involved staff, supported by a positive culture, can enhance supply chain performance. This is accomplished through the mediating influence of employee skills and competencies, as well as the moderating impact of organizational culture. Empirical evidence underscores the importance of organizations making substantial investments in human resource management systems to cultivate a staff that is both competent and engaged. In the final section of the essay, which emphasizes the importance of establishing a culture of continuous improvement and teamwork, the author provides helpful recommendations for businesses to implement to attain supply chain excellence.

Keywords: Training and Development; Supply Chain Performance; Structural Equation Model; Human Resource Capabilities; Empirical Evidence; Employee Engagement; Organizational Culture.

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1. Introduction

The automobile industry, particularly Original Equipment Manufacturers (OEMs), is at the forefront of global manufacturing, fostering economic development and innovation. The complexity of the industry's supply chain management (SCM) practices increases as it develops. Once considered a commonplace operational function, supply chain management (SCM) has now become a critical strategic lever that can have a substantial impact on a company's competitiveness, profitability, and market position. The efficacy of the supply chain is of utmost importance to OEMs, as the production process requires the integration of thousands of components from various suppliers. In addition to a highly competent workforce, achieving excellence in this field necessitates not only advanced technological systems and processes [4]. This is the point at which Human Resources (HR) becomes indispensable. In the automotive industry, there has been a growing interest in the correlation between human resource

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(HR) capabilities and supply chain management (SCM) performance. The efficacy of supply chain operations is directly influenced by human resource (HR) capabilities, which encompass recruitment, training, talent management, and employee engagement.

The objective of this investigation is to investigate this relationship by concentrating on the personnel of original equipment manufacturers (OEMs) in the automotive sector. The research aims to investigate the impact of HR practices on SCM performance from the perspective of those directly involved in the supply chain process, with a specific focus on this particular group [26]. This study examines the crucial role that human resource (HR) capabilities play in enhancing the performance of supply chain management (SCM), with a specific focus on key HR activities, including training and development, talent management, learning and development, and employee engagement. In today's rapidly evolving business landscape, supply chain excellence is increasingly recognized as a strategic advantage. The ability of the workforce to adapt, innovate, and execute is crucial in achieving this. Effective training and development equip staff members with the necessary skills to handle the intricacies of modern supply chains, therefore enhancing operational efficiency and flexibility [9]. Talent management enables organizations to effectively identify, retain, and cultivate highly skilled employees who can maintain the flexibility of their supply chain and facilitate innovation. Learning and development processes foster a culture of continuous improvement, encouraging staff workers to refine their skills and embrace new technologies and methodologies. Ultimately, employee engagement ensures that personnel are motivated and aligned with business goals, thereby enhancing productivity and collaboration across multiple supply chain processes [20]. This paper aims to provide insights into how firms can achieve supply chain excellence by strategically investing in their human capital and examining primary human resource competencies.

2. Theoretical Basis and Literature Review

2.1. Human Capital Theory

The concept of human capital theory is crucial for understanding the value of an individual's skills, expertise, and experience within an organization. First formulated in the field of economics, this concept posits that investments in individuals, such as healthcare, education, and training, enhance their ability to be productive, therefore benefiting both the individual and the organization [7]. Employees are regarded as valuable assets or resources that, when developed, have the potential to generate significant benefits in terms of organizational performance and competitiveness, not just as workers. A fundamental principle of Human Capital Theory is that, similar to physical capital, such as machinery and technology, human capital also requires maintenance and enhancement, which necessitates investment. Through training programs, leadership development, and education, organizations provide resources to their workforce, therefore equipping employees with improved skills and knowledge that increase their productivity. Consequently, this enhanced productivity contributes to the overall success and optimal performance of the organization.

Particularly in rapidly changing industries where expertise and experience are key distinguishing factors, human capital is seen as a critical driver of innovation, productivity, and adaptability [27]. A comprehensive understanding of the various aspects of the return on investment in human resources is facilitated by Human Capital Theory. Highly competent and extensively trained personnel are, above all, more efficient in carrying out tasks, reducing operational errors, and improving the operation of processes [23]. Within industries such as manufacturing and supply chain management, the ability to optimize processes, reduce waste, and streamline production largely relies on the expertise and skills of the personnel.

Proficiency in supply chain dynamics enables personnel to anticipate interruptions, identify opportunities for cost reduction, and contribute to the development of more adaptable and responsive supply chain systems. In addition, Human Capital Theory emphasizes the role of tacit knowledge, which encompasses the expertise, intuition, and problem-solving skills that workers acquire through experience and informal learning. Inherently challenging to articulate or convey, this type of information becomes deeply embedded throughout the organization, enhancing its competitive edge [13]. For instance, experienced supply chain professionals may possess a profound understanding of supplier relationships, intricacies of logistics, or customer behavior—all of which are crucial for maintaining a smooth and efficient operational system. Hence, the retention of such employees and the continuous enhancement of their abilities have a direct impact on the efficiency of the supply chains.

2.2. Resource-Based View (RBV)

The Resource-Based View (RBV) philosophy in strategic management posits that a firm's competitive advantage is mainly determined by its unique resources and competencies. This argument posits that organizations can achieve outstanding performance by cultivating and utilizing their resources rather than solely responding to external market forces. Formulated in the latter part of the 20th century by scholars such as Jay Barney, the Resource-Based View (RBV) emphasizes the intrinsic value of a firm's resources, proposing that certain resources hold greater worth than others and may serve as the foundation for sustained competitive advantage [15]. The Resource-Based View (RBV) categorizes resources into two primary groups:

physical and immaterial. Intangible resources encompass dimensions such as brand reputation, intellectual property, corporate culture, and human capital, whereas tangible resources consist of physical assets, including machinery, technology, and financial capital [12]. Resource-Based View (RBV) asserts that the extent to which firms can cultivate and utilize these resources to generate value determines their distinctions. While physical resources are indeed valuable, the Resource-Based View (RBV) typically emphasizes the importance of intangible assets, particularly because competitors often struggle to imitate and replicate them [10].

Perceived Hypothesis (H1): Employee skills and competencies mediate the relation between training and development and SCM performance.

Hypothesis (H2): Employee skills and competencies mediate the relationship between talent management and SCM performance.

Hypothesis (H3): Employee skills and competencies mediate the relation between leadership development and SCM performance.

Hypothesis (H4): Employee skills and competencies mediate the relation between employee engagement and SCM performance.

2.3. Mediating variable – Employee skills and competencies

This mediation approach focuses on the pathway by which HR competencies, including training, development, leadership, and talent management, are transformed into tangible advantages for the supply chain process. The workforce competencies and abilities serve as the connection between human resources activities and the overall efficiency, adaptability, and success of the supply chain. The recognition that achieving supply chain excellence requires a workforce with specific skills and abilities tailored to the intricacies of modern supply chain operations underpins the mediation from its basic essence [19]. These encompass both soft skills, such as problem-solving, teamwork, and leadership, as well as technical requirements, including expertise in supply chain analytics, procurement, and logistics.

Human resources capabilities focused on developing these areas result in a more competent and adaptable staff, which in turn leads to improvements in supply chain management performance downstream [18]. For instance, implementing HR policies that include targeted training courses can significantly enhance employees' skills in areas such as supply chain management, demand forecasting, and inventory control. As they enable personnel to optimize critical processes, reduce inefficiencies, and enhance overall operational flexibility, these technical skills have a direct correlation with supply chain effectiveness. Given the increasing digitization and data-driven nature of supply networks, specialized expertise in supply chain technologies, artificial intelligence, and big data analytics becomes increasingly crucial. These highly developed skills enable personnel to effectively utilize contemporary technologies that can accurately forecast demand, monitor shipments in real-time, and promptly respond to disruptions, thus enhancing supply chain performance [8].

2.4. Moderating variable – Organisational culture

Organizational culture refers to the collective values, concepts, norms, and behaviors that guide conduct within a workforce. It encompasses the implicit norms and criteria that shape communication, collaboration, innovation, and decision-making. The manifestation and implementation of HR competencies, including talent development, leadership, and employee engagement, within an organization are heavily influenced by the prevailing culture of that company. Within the realm of supply chain management, where efficiency, adaptability, and synchronization are paramount, a supportive and synchronized corporate culture can optimize the advantages of HR competencies on performance [1]. Corporate culture plays a significant role in shaping employee behavior and attitudes, which in turn helps reduce the correlation between HR skills and supply chain management performance. In a culture that emphasizes innovation, continuous growth, and collaboration, employees are more inclined to appreciate the skills and competencies they acquire through human resources activities. Suppose a company's culture prioritizes knowledge sharing and collaboration. In that case, individuals who receive training in supply chain optimization are more likely to actively contribute their ideas to colleagues, thereby enhancing the overall performance of the supply chain [24].

Conversely, while possessing the necessary professional knowledge, workers in a siloized or hierarchical organization may be less inclined to collaborate. Insufficient realization of the potential benefits of cross-functional collaboration and shared knowledge would diminish the positive impact of HR capabilities on SCM performance. Moreover, corporate culture has a significant influence on the management of change within the supply chain. Effective supply chain performance in a dynamic and rapidly evolving corporate environment relies on your ability to respond promptly to emerging technologies, market conditions, and customer demands [2]. Human resource capabilities, such as training and development, which facilitate

adaptability, transparent communication, and a willingness to embrace change, are more effective when a culture upholds these principles. Specifically, HR-led initiatives that aim to implement innovative supply chain technologies or methodologies are more likely to succeed when a business fosters a culture that encourages employees to explore and implement new ideas and processes [21]. In such a culture, workers are more likely to acquire new skills, adopt new technologies, and adjust their operational approaches to enhance supply chain performance. Conversely, in a conservative or risk-averse culture, even well-designed HR initiatives may struggle to gain traction, as staff members may resist change and adhere to traditional methods, thereby limiting potential performance enhancements in supply chain management.

2.5. Objectives

The following are the objectives of the study:

- To analyze the impact of training and development on enhancing supply chain management performance.
- To understand the role of talent management in supporting SCM performance in the current context.
- To analyze the influence of leadership development on the impact of sustainable SCM performance.
- To apprehend the impact of Employee engagement in enhancing SCM performance in the organization.

3. Methodology

The primary objective of this paper is to analyze and understand the nature of the relationships between Training and Development, Talent management, Leadership Development, and employee engagement in relation to supply chain performance within the organization. The research also investigates the role of Employee skills and competencies as mediation variables and organizational culture as the moderating variable. The researcher employs a descriptive research design to conduct the study, collecting data from both primary and secondary sources. For the primary source of data, a detailed questionnaire was constructed, and responses were received from sample respondents, who are employees working in the supply chain domain across various industries. The researcher intends to collate the data from both primary and secondary sources. For the primary source of data, the researcher will prepare a detailed closed-ended questionnaire, which will be shared with the respondents, who are the employees of supply chain companies.

This study used stratified random sampling to guarantee a representative choice of respondents from the target population—that of workers in the automotive sector, more especially those employed by Original Equipment Manufacturers (OEMs). This approach was intended to provide a varied and thorough perspective on several supply chain management (SCM) related sectors of the workforce. First, the population of employees was divided into several strata based on pertinent criteria, such as job function, experience level, and departmental roles within the SCM function, using stratified random sampling. This stratification ensured sufficient representation of all key population groupings in the sample. Respondents were randomly selected from every stratum to ensure the sample represented the diversity of the entire population. This approach selected 650 responders overall, providing a robust sample size that enables significant statistical analysis. This strategy ensures that the insights gained accurately reflect the broader workforce base in the OEM sector of the automotive industry while also enhancing the validity of the conclusions. Thus, the stratified random sampling technique was quite important in obtaining a representative and balanced sample for this empirical research and also Conceptual Framework has figured in 1.

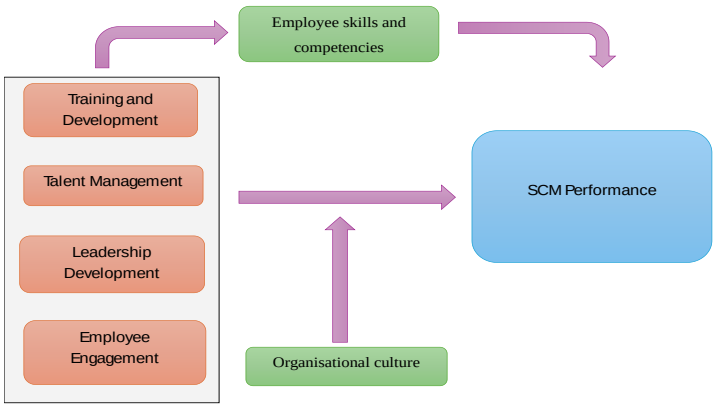

Figure 1: Conceptual framework of the impact of human resource practices on SCM performance

4. Data Analysis

4.1. Construct Reliability, Validity, and Convergence analysis

The correlation Table 1 presents a detailed analysis of the relationships between various HR capabilities (Employee Skills and Competence, Organizational Culture, Training and Development, Talent Management, Learning and Development, and Employee Engagement) and Supply Chain Management (SCM) performance. The reliability indicators, including Composite Reliability (CR), Average Variance Extracted (AVE), and Cronbach's Alpha, show strong internal consistency and construct validity for each variable. Employee Skills and Competence show a strong positive correlation with all other variables. The highest correlation is with Organizational Culture (0.930), indicating that a supportive and collaborative culture significantly enhances the impact of employee skills on SCM performance. The correlation with SCM Performance (0.795) also shows that higher employee skills directly improve supply chain outcomes.

Table 1: Relationship between various organizational components

Correlations	CR	AVE	Alpha	Employee Skills and Competence	Organisational Culture	Training and Development	Talent Management	Learning and Development	Employee Engagement	SCM Performance
Employee Skills and Competence	1.213	0.701	0.913	1	.930**	.822**	.816**	.752**	.845**	.795**
Organisational Culture	1.227	0.749	0.905	.930**	1	.812**	.827**	.760**	.851**	.791**
Training and Development	1.233	0.769	0.959	.822**	.812**	1	.891**	.834**	.912**	.868**
Talent Management	1.218	0.719	0.941	.816**	.827**	.891**	1	.854**	.912**	.866**
Learning and Development	1.186	0.624	0.919	.752**	.760**	.834**	.854**	1	.844**	.840**
Employee Engagement	1.208	0.685	0.912	.845**	.851**	.912**	.912**	.844**	1	.901**
SCM Performance	1.191	0.641	0.926	.795**	.791**	.868**	.866**	.840**	.901**	1

Organizational culture correlates highly with other variables, particularly Employee Engagement (r = 0.851) and Employee Skills and Competence (r = 0.930). This suggests that a positive organizational culture is pivotal in fostering engagement and the development of employee competencies, both of which are critical to SCM performance. The strong relationship between culture and SCM performance (r = 0.791) further highlights the role of culture as a moderating factor in improving SCM outcomes. Training and development exhibit strong correlations across all variables, particularly with Employee Engagement (r = 0.912) and Talent Management (r = 0.891). This implies that training initiatives not only boost employee engagement but also work synergistically with talent management to improve SCM performance. The significant correlation with SCM performance (r = 0.868) indicates that well-executed training programs have a direct, positive impact on supply chain effectiveness.

Talent Management also shows high correlations with other variables, notably with Employee Engagement (0.912) and Training and Development (0.891). The relationship with SCM Performance (r = 0.866) underscores the significant contribution of effective talent management to supply chain success, emphasizing the importance of retaining and developing top talent within the supply chain framework. Learning and development correlate well with other HR capabilities, especially with Talent Management (0.854) and Employee Engagement (0.844). This shows that continuous learning initiatives are integral to both employee satisfaction and talent retention. The correlation with SCM performance (r = 0.840) suggests that ongoing development is crucial for maintaining a flexible and high-performing supply chain management system.

Employee Engagement has one of the strongest relationships with SCM performance (r = 0.901), indicating that engaged employees are more likely to contribute positively to supply chain efficiency and resilience. It also correlates highly with Training and Development (0.912) and Talent Management (0.912), showing that HR initiatives aimed at fostering engagement have a cascading effect on supply chain performance. SCM Performance correlates positively with all HR variables, with the highest correlations observed with Employee Engagement (r = 0.901) and Training and Development (r = 0.868). This

emphasizes that engaged, well-trained employees are crucial for optimizing supply chain operations and achieving performance excellence. The strong correlations suggest that HR capabilities have a significant influence on SCM success.

4.2. Regression Analysis

The regression analysis presented provides insights into the connections between various independent variables (Training and Development, Talent Management, Learning and Development, and Employee Engagement) and a dependent variable, which could be an organizational outcome, such as performance or employee satisfaction. The study consists of two sections: one focusing on the overall significance of the model and the other examining the individual contributions of each predictor. The regression sum of squares is divided by the degrees of freedom (df = 4) to obtain the Mean Square for the regression (40.442). Similarly, the residual mean square (0.213) is calculated by dividing the residual sum of squares by its degrees of freedom (df = 145) (Table 2).

Table 2: Relationship between various organizational components and employee satisfaction

Model	Sum of Squares	df	Mean Square	F	p-value
Regression	161.768	4	40.442	191.059	.000b
Residual	30.692	145	0.212		
Total	192.46	149			
Model	B	Std. Error	Beta	t	p-value
(Constant)	0.241	0.146		1.655	0.10
Training and Development	0.159	0.088	0.158	1.803	0.07
Talent Management	0.098	0.085	0.105	1.151	0.25
Learning and Development	0.206	0.067	0.21	3.076	0.00
Employee Engagement	0.463	0.093	0.484	4.998	0.00

The F-statistic (191.059) measures the overall fit of the model by calculating the ratio of the residual mean square to the regression mean square. The F-statistic, with a p-value of .000, is highly significant ($p < .05$). This indicates that the model fits the data very well and that the independent variables together explain a substantial portion of the variation in the dependent variable. The second phase of the study examines the influence of each independent variable on the model. The B coefficients represent the extent of change in the dependent variable for each unit change in the predictor variable. These coefficients are unstandardized regression coefficients, meaning that they remain constant while holding all other variables constant (Table 3).

Table 3: HTMT criterion

HTMT	TAD	TMA	LDA	EEG	SCM
TAD	1				
TMA	0.918	1			
LDA	0.952	0.936	1		
EEG	0.821	0.906	0.911	1	
SCM	0.896	0.833	0.906	0.867	1

Training and Development (TAD) exhibits strong relationships with other variables, particularly Learning and Development (r = 0.952) and Talent Management (r = 0.918). This indicates that while TAD is distinct from these constructs, it is closely related, as training efforts often overlap with learning programs and talent management strategies. The HTMT value with SCM (0.896) is also high, indicating that TAD has a significant influence on SCM performance while still maintaining some degree of distinction. Talent Management (TMA) has a strong association with Learning and Development (r = 0.936) and Employee Engagement (r = 0.906). These high values indicate that talent management strategies are closely aligned with continuous learning efforts and employee motivation. However, the values also demonstrate that TMA remains a distinct construct despite its strong ties to other HR capabilities. The value of 0.833 with SCM indicates that TMA also impacts SCM performance but retains its unique influence. Learning and Development (LDA) exhibits high HTMT values with both TAD (0.952) and TMA (0.936), which reflects the close link between learning programs, talent management, and training initiatives. These high values imply that while learning and development are pivotal in HR strategies, they are closely integrated with other HR processes, such as training and talent management. The HTMT value of 0.906 with SCM indicates a significant relationship between SCM and SCM performance, further underscoring the critical role of continuous learning in enhancing supply chain outcomes.

Employee Engagement (EEG) exhibits a strong HTMT value with Talent Management (0.906) and Learning and Development (0.911), indicating that engaged employees are often the result of effective talent management and development programs. The HTMT value of 0.867 with SCM indicates a strong but distinct influence on supply chain performance, highlighting the important role that engaged employees play in driving supply chain efficiency and success. SCM exhibits moderate to high HTMT values in relation to other constructs, with the strongest associations observed with Learning and Development (0.906) and Training and Development (0.896). This implies that SCM performance is significantly influenced by these HR capabilities, particularly in areas such as continuous learning and structured training programs. However, the SCM construct remains distinct, as evidenced by its HTMT values being below critical thresholds (Figure 2).

5. Structural Equation Model

5.1. Analysis of Overall Factors

Table 4 labelled as "Overall Factors," appears to be an aggregate measure influenced by multiple variables, including Training and Development, Talent Management, Learning and Development, Employee Engagement, and Employee Skills and Competence. Among these, Talent Management exhibits the highest estimate (0.344) with a critical ratio (CR) of 50.681 and a p-value of 0.00, indicating a very strong and significant relationship. This suggests that Talent Management is a key determinant of overall factors, underscoring its importance in the broader context of organizational capabilities.

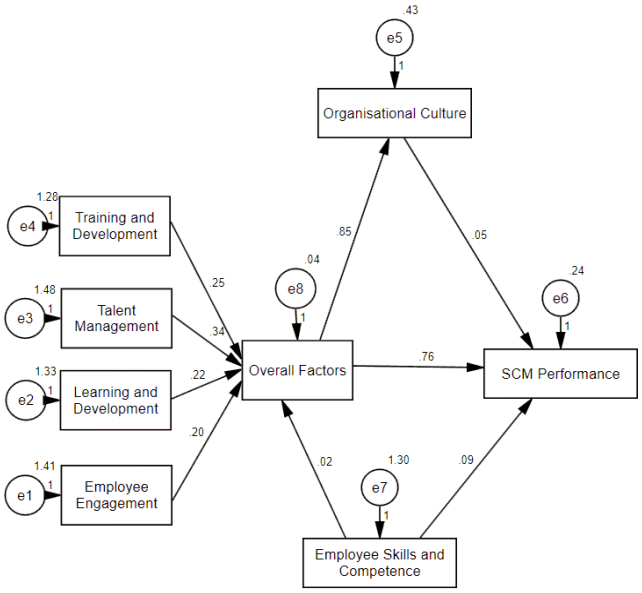

Figure 2: Structural equation model illustrating the influence of hr practices on SCM performance via mediating factors

Table 4: Results of hypothesis testing for the structural equation model

Constructs	Variables	Estimate	S.E.	CR.	P
Overall Factors	Training and Development	0.247	0.007	33.796	0.00
Overall Factors	Talent Management	0.344	0.007	50.681	0.00
Overall Factors	Learning and Development	0.216	0.007	30.127	0.00
Overall Factors	Employee Engagement	0.198	0.007	28.366	0.00
Overall Factors	Employee Skills and Competence	0.018	0.007	2.441	0.02
Organisational Culture	Overall Factors	0.852	0.04	21.423	0.00
SCM Performance	Overall Factors	0.76	0.039	19.624	0.00
SCM Performance	Organisational Culture	0.049	0.029	1.665	0.10
SCM Performance	Employee Skills and Competence	0.094	0.017	5.606	0.00

Following Talent Management, Training, and Development, these factors also exhibit a significant positive relationship with Overall Factors, with an estimated coefficient of 0.247 and a high critical ratio of 33.796. Similarly, Learning and Development (estimate = 0.216, CR = 30.127) and Employee Engagement (estimate = 0.198, CR = 28.366) are significant contributors to

Overall Factors, though to a slightly lesser extent than Talent Management. Conversely, Employee Skills and Competence has a very low estimate (0.018), and while its critical ratio of 2.441 and p-value of 0.02 indicate significance, the strength of this relationship is markedly weaker compared to other variables. This may imply that within the scope of this study, Employee Skills and Competence, while statistically significant, do not contribute as strongly to the composite measure of Overall Factors as the other variables.

5.2. Relationship Between Organisational Culture and Other Constructs

Organisational Culture has a substantial positive relationship with Overall Factors, as indicated by an estimate of 0.852, a critical ratio of 21.423, and a p-value of 0.00. This strong relationship suggests that Organizational Culture is a significant underlying determinant of the aggregated measures captured by the Overall Factors construct. It suggests that a robust organizational culture may be foundational in enhancing training, talent management, learning, employee engagement, and overall skill development. When examining the influence of Organisational Culture on SCM Performance, however, the relationship appears to be notably weaker. The estimate is only 0.049, with a critical ratio of 1.665 and a p-value of 0.10, indicating that this relationship is not statistically significant at the conventional 0.05 threshold. This suggests that while Organisational Culture is vital in shaping the Overall Factors, its direct impact on SCM Performance might not be as profound, possibly because SCM Performance is more directly affected by other elements or a combination of different organizational factors.

5.3. Influence on SCM Performance

SCM Performance, which represents the performance of Supply Chain Management, is influenced by several key factors. The strongest relationship is with Overall Factors, with an estimate of 0.76, a critical ratio of 19.624, and a p-value of 0.00, showing a highly significant positive association. This suggests that enhancements in the Overall Factors—such as through improved training, talent management, and learning—are likely to result in substantial improvements in SCM Performance. Moreover, Employee Skills and Competence also positively impact SCM Performance, as evidenced by an estimate of 0.094, a critical ratio of 5.606, and a p-value of 0.00, pointing to a statistically significant relationship. This finding suggests that specific competencies and skills among employees are crucial in enhancing supply chain performance, likely due to the technical and operational expertise required in this domain. In summary, the analysis reveals that Talent Management, Training and Development, Learning and Development, and Employee Engagement are significant contributors to Overall Factors, which in turn have a strong influence on SCM Performance. Organisational Culture is a major driver of Overall Factors, but its direct impact on SCM Performance is limited. Employee Skills and Competence, while less influential on Overall Factors, still play a crucial role in shaping SCM Performance. These insights highlight the multifaceted nature of organizational effectiveness and performance, emphasizing the need for a holistic approach to enhancing both internal and external outcomes.

5.4. Mediating effects

The mediating effect of employee skills on the relationship between Training and Development and Supply Chain performance is supported, with an estimate of 0.6729. The confidence interval ranges from 0.61 to 0.73, showing a high level of confidence in the positive mediation effect. A p-value of 0.00 further confirms the statistical significance, meaning that employee skills play a crucial role in amplifying the impact of training and development on supply chain performance. The mediating effect of employee skills on the link between Learning and Development and Supply Chain performance is similarly supported, with an estimate of 0.5584. The confidence interval ranges from 0.50 to 0.61, showing a slightly lower but still strong mediating effect. The p-value of 0.00 reinforces the significance of this relationship, indicating that learning and development initiatives have a more substantial impact on supply chain performance when employee skills support continuous learning (Table 5).

Table 5: Hypothesis testing results for direct effects

	Estimate	Lower	Upper	S.E.	p-value	Conclusion
TAD - SC – ESC	0.6729	0.61	0.73	0.08	0.00	supported
TMA - SC – ESC	0.6311	0.57	0.69	0.03	0.00	supported
LDA - SC - ESC	0.5584	0.50	0.61	0.02	0.00	supported
EEG - SC - ESC	0.7923	0.73	0.85	0.03	0.00	supported

The strongest mediating effect is observed between Employee Engagement and Supply Chain performance, with an estimate of 0.7923. The confidence interval from 0.73 to 0.85 reflects a very high and significant mediation by employee skills. The p-value of 0.00 confirms that organizational culture plays a crucial role in enhancing the impact of employee engagement on supply chain performance. This indicates that engaged employees with positive employee skills are highly instrumental in driving supply chain excellence (Figure 3).

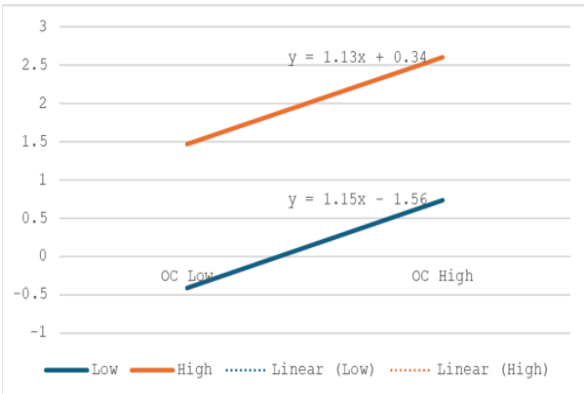

Figure 3: Moderating effect of organisational culture

Training and Development (T&D): This latent variable is measured by three indicators: TAD1, TAD2, and TAD3. Each indicator has a corresponding error term (e1, e2, e3). The factor loadings represented by the arrows are high, with values of 0.95, 0.90, and 0.82, indicating that these indicators contribute strongly to the latent variable "Training and Development."

Talent Management (TM): The "Talent Management" latent variable is also measured by three indicators: TMA1, TMA2, and TMA3, with error terms e4, e5, and e6. The factor loadings are particularly high, around 0.99 and 1.02, suggesting that these indicators are highly reflective of the Talent Management construct.

Learning and Development (L&D): This latent variable comprises indicators LDA1, LDA2, and LDA3, along with corresponding error terms e7, e8, and e9. The factor loadings are 0.96, 0.82, and 0.96, signifying a strong relationship between the indicators and the latent variable Learning and Development (Figure 4).

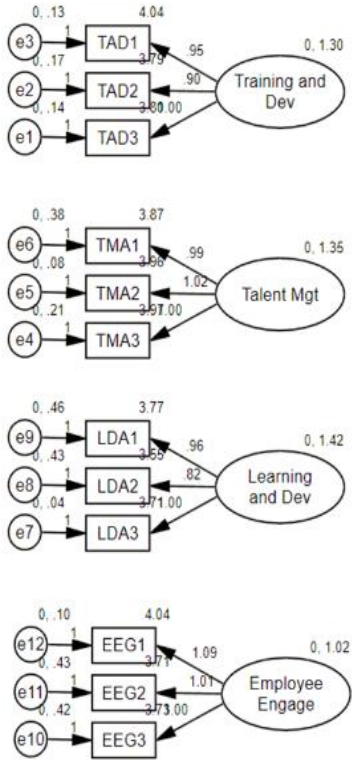

Figure 4: Measurement model for human resource practices constructs

Employee Engagement (EE): "Employee Engagement" is measured by indicators EEG1, EEG2, and EEG3, with error terms e10, e11, and e12. The factor loadings for these indicators are also high, ranging from 1.01 to 1.09, which indicates a strong connection between the observed variables and the latent construct of Employee Engagement. The numbers on the paths leading to the latent variables indicate the strength of the relationships between the latent variables and their indicators, with values close to 1 denoting a very strong relationship. The error terms indicate some degree of variance in the observed variables that is not accounted for by the latent constructs.

6. Discussion

In the field of current supply chain management (SCM), the relationship between human resource (HR) capabilities and supply chain management (SCM) performance is becoming an increasingly acknowledged and important subject of research [5]. These variables include Training and Development, Talent Management, Learning and Development, and Employee Engagement. Training and development are the primary means by which individuals can be equipped with the knowledge and abilities necessary to traverse the complexities of supply chain operations. Employees are kept up to date on the latest industry standards, technology, and compliance regulations through effective training programs. Increasing individual competencies and cultivating a culture of continuous improvement within businesses are both outcomes that can be achieved through investment in systematic training programs [11]. Aligning individual talents with corporate objectives is crucial for effective supply chain management (SCM) performance. This alignment enables the creation of a more flexible and responsive supply chain [16].

Management of talent is an essential independent variable that plays a role in the success of supply chain management [6]. Through the process of discovering and cultivating individuals with high potential, organizations can build a healthy talent pool that enhances the efficiency of supply chain operations and drives innovation. To cultivate a workforce that is both skilled and motivated to support the business in achieving its goals, it is essential to implement strategic talent management practices, including recruitment, succession planning, and career development. Emphasizing talent helps ensure that the right people are in the right positions, ultimately leading to an increase in the overall efficiency of the supply chain [22]. These activities are supported by learning and development, which helps cultivate an atmosphere where employees are encouraged to participate in ongoing education and skill enhancement. Organizations that place a high priority on learning and development are more likely to demonstrate greater adaptability among their workforce in response to the rapid advancement of technology and the continuously shifting economic conditions. Individual performance is improved as a result of this dedication to lifelong learning, which in turn leads to an improvement in supply chain management performance [14]. This is because personnel are more equipped to adopt best practices and address issues.

One of the most important factors that determines the efficacy of SCM and HR capabilities is employee engagement. Employees who are engaged in their work often take responsibility for their duties, which enhances the level of collaboration, morale, and productivity within the department [17]. Employees who have the sense that they are respected and who participate in the decision-making process are more likely to make significant contributions to supply chains. This level of engagement is further amplified when firms cultivate a culture that recognizes and respects the contributions of their employees, ultimately leading to improved supply chain management outcomes. The mediating variable, which is referred to as Employee Skills and Competencies, has a significant impact on this dynamic. Enhanced training, talent management, educational programs, and engagement methods all contribute to the development of a competent workforce, which in turn has an impact on the quality of the interaction between human resource skills and supply chain management operations [25]. The abilities that employees acquire through these HR activities have a direct impact on their ability to execute supply chain operations with precision and efficiency.

Furthermore, the culture of the organization serves as a moderating influence, a factor that cannot be ignored. It is possible to enhance the impact of human resource capabilities on supply chain management performance by emphasizing cooperation, innovation, and a shared vision within a constructive corporate culture. A culture that encourages open communication and ongoing development fosters an environment where employees can thrive, ultimately enhancing the alignment between HR policies and supply chain objectives. The effectiveness of human resources (HR) activities may be hindered by a culture that is poisonous or inflexible, which also limits the impact that HR efforts have on supply chain excellence.

7. Conclusion

The investigation into the relationship between human resource capabilities and supply chain performance yields significant insights, highlighting the importance of strategic human resource interventions in enhancing operational performance. Training and Development, Talent Management, Learning and Development, and Employee Engagement are the key independent variables that directly affect the outcomes of SCM. This article highlights the significance of these variables by highlighting their significance among the primary independent variables [3]. There is evidence to suggest that businesses that place a higher priority on certain human resource talents are more likely to achieve supply chain excellence. Additionally, the fact that

employee skills and competencies play a mediating role suggests that investments in human capital contribute to improvements in supply chain performance and enhance individual capabilities. The requirement of developing circumstances that are conducive to employee empowerment, innovation, and collaboration is another point emphasized by the moderating influence of corporate culture. The effectiveness of human resource policies is enhanced by a culture that is encouraging, and it also helps cultivate an environment in which employees are motivated to take an active role in their work and contribute to the organization's achievement of its objectives. Based on this interaction, it appears that for businesses to achieve supply chain excellence, they must create a solid organizational culture aligned with their strategic objectives, in addition to enhancing their human resource competencies.

According to the findings of this study, several recommendations can be made to businesses seeking to enhance their supply chain management performance by leveraging human resource competencies. Initially, companies should prioritize funding comprehensive training programs that are tailored to meet the specific needs of supply chain roles. Therefore, this investment should encompass not only the training of technical skills but also the development of interpersonal skills. This is because efficient supply chain ecosystems are dependent on effective communication and collaboration. Secondly, it is essential to adopt a proactive approach to talent management. To identify individuals with high potential and offer them targeted development opportunities that prepare them for future leadership roles in the supply chain, organizations must establish criteria to identify high-potential employees. Programs that focus on mentoring and succession planning are effective in retaining and developing talent.

In the third place, it is of the utmost importance to encourage advancement and learning within our community. The ability to facilitate continual professional development is made possible for businesses through the use of cross-functional training programs, e-learning platforms, and workshops. Fostering a culture of lifelong learning enables businesses to maintain a staff that is both skilled and adaptable, thereby meeting the ever-evolving demands of their respective industries. Increasing the level of participation among workers should also be a top objective. Employees can be actively involved in decision-making processes, their efforts should be valued, and feedback channels should be made available to employees. This is something that businesses can do. Improvements in supply chain performance can be attributed to the initiative, creativity, and productive teamwork of individuals who are actively engaged in their work. Ultimately, it is the responsibility of leaders to foster a solid business culture that supports these HR activities. This involves promoting ideals such as respect, transparency, and teamwork, which will considerably boost employee performance and morale. Company culture should be regularly evaluated through staff surveys to ensure it aligns with the strategy's objectives and to identify areas for development.

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