

Effective Human Resource Management (HRM) Practices Moderates Supply Chain Management (SCM) and Supply Chain (SC) Performance

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Abstract

This study was conducted to investigate the moderating effect of competitive intensity on the effectiveness of elements of Human Resource Management (HRM) in Supply Chain Management (SCM). The study was designed quantitatively in the form of correlational research, which aims to examine the relationship between HRM practices, SCM, competitive intensity and supply chain performance. 246 employees were selected randomly from Future Retail Ltd., Chennai for the study. Structured questionnaires, open-ended questionnaires, and personal interviews were used to gather the quantitative and qualitative data for realizing the research objectives of HRM and SCM practices. The answers given were measured on a 5-point Likert scale, while the reliability of the measurement instruments was tested by Cronbach's alpha coefficient which showed good internal consistency of the research instruments. The statistical results, in turn, showed that level of competitiveness significantly influenced the link between HRM practices and supply chain performance. The results of Confirmatory Factor Analysis (CFA) showed that the proposed research framework had a good model fit, with a CFI value of 0.814 and GFI of 0.908. The study also found that SCM practices have positive impacts on the efficiency and effectiveness in the supply chain. Moderated mediation revealed that a high level of competitive intensity was found to be necessary to obtain efficient supply chain performance (Indirect effect = 0.070, SE = 0.031). The results highlighted the significant role of human friendly HRM practices like talent retention, leadership development, employee participation and organizational coordination as strategic enablers for SCM sustainable performance. Overall, the study makes a contribution to the application of statistical instruments in the analysis of HRM and SCM synergy and the significance of the enhancement of human resource capacities for a sustainable performance of a retail supply chain.

Keywords: Human Resource Management, Supply chain management, Supply chain performance, competitive intensity.

1. Introduction

Supply Chain Management (SCM) is now a key competitive advantage in the highly complex world of global trade especially with the focus on lean logistics, cost reduction and operational efficiency (Chopra and Meindl, 2021). Good coordination between suppliers, manufacturers, distributors and customers is vital for

organizations in all sectors to implement good SCM practices. The activities in a supply chain can be significant to an organization's productivity, customer satisfaction and sustainability if they are done efficiently. The increasingly dynamic and changing markets and expectations are forcing companies to implement integrated strategies for SCM that will improve responsiveness, flexibility and operational efficiency.

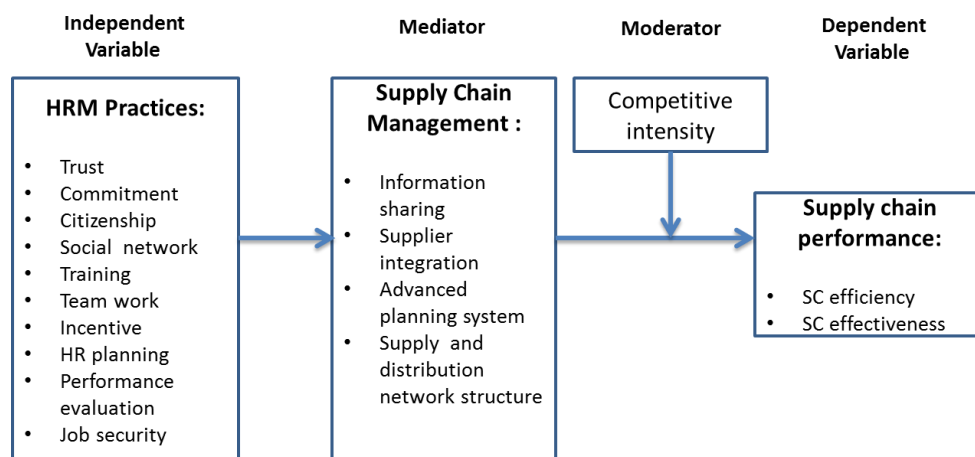
Human Resource Management (HRM) is equally vital to aid the organization to perform effectively in managing its human resources. HRM includes recruitment, training and development, performance measurement, motivational practices and even development of a positive organizational culture. Chowdury et al. (2023) have highlighted that HRM practices such as knowledge sharing, employee empowerment and team-based problem solving are crucial to create resilient and adaptive supply chains. Employees are the operational backbone of activities of the supply chain, their skills, commitment and collaboration directly affect the success of the implementation of the supply chain strategies. It is therefore becoming clear that supply chain effectiveness requires the capabilities of humans as well as technology and processes, and that this depends on the organizations' culture.

Traditional approaches to the SCM have been found to be inadequate because the expectations of the different stakeholders with regard to CSR and sustainable business practices have grown in recent years (Hoffmann et al., 2019). While much of the research on conventional approaches is on the operational aspects, human factors, like trust, psychological safety, equity and employee well-being, are not to be forgotten. The lack of frameworks which combine these human factors reduces the strength of SCM outcomes as well as HRM performance. Craighead et al. (2020) argued the gap between SCM and HRM and discussed the role of human-centered practices in improving the effectiveness of the supply chain. If not integrated, an organization can find itself unable to gain resilience, innovation and long-term competitiveness in the fast-changing business landscape.

Recent studies also emphasize the need to integrate HRM and SCM strategies to achieve the desired SC resiliency, agility and competitiveness. Sanders and Swink (2022) contended that there is a relationship between the effectiveness of HRM practices and SCM initiatives that improve the adaptability and overall supply chain effectiveness of the organization. HRM practices can be regarded in this context as a moderating variable in strengthening the relationship between HRM practices and supply chain performance. HRM systems foster employee engagement, teamwork, and ongoing enhancement, and help companies adapt more effectively to market pressures and competition. Thus this study proposes human resource involvement as the moderating variable between effective HRM practices and human resource involvement is examined on the effectiveness of SCM practices in improving supply chain performance.

2.1 Conceptual framework:

To showcase the impact of HRM practices and effective SCM on SC performances measuring the two resultant variables in terms of SC efficiency and SC effectiveness. Between the independent and output variables, the competitive intensity function is moderated. The conceptual model is shown as figure below:



2.2 Hypothesis testing:

1. The relationship between supply chain management, human resource management techniques, and supply chain performance is moderated by competitive intensity.
2. Human resource management techniques, supply chain management, competitive intensity, and supply chain performance all significantly fit the model.

2.3 Objectives

This study aims to examine:

1. Supply Chain Management and the outcome variable are significantly impacted by human resource practice.
2. The relationship between HRM practices, SCM, and SC performances is mediated by competitive intensity.
3. Model fit analysis between SCM, competitive intensity, HRM practices, and SC performance.

3. Review of Literature

In today's global market, supply chain management (SCM) is a crucial source of a company's competitive edge. In today's highly competitive markets, efficient supply chain systems are critical for organizations to enhance operational efficiency, lower costs and sustain lean logistics practices (Chopra and Meindl, 2021). SCM allows companies to join the activities of suppliers, manufacturers, distributors and customers as a single unit, making it easier to be productive and satisfy customers. In the last few years, companies have realised that supply chains are no longer just a transportation of goods and services but also a web of relationships, flows of information, and people. As a result, organisations are working towards building resilient and agile supply chains that are quick to react to disruptions, shifting consumer needs and competition.

The traditional SCM frameworks (the Supply Chain Operations Reference (SCOR) model and the Global Supply Chain Forum (GSCF) framework) concentrated primarily on ways to increase operational efficiency, integrate processes, and measure performance. Often these models, however, overlooked the relational and human aspects that can have a significant influence on long-term supply chain resilience and sustainability (Wieland et al., 2016). These global disruptions, labour problems, ethics and unpredictable market conditions are all challenges that a modern supply chain needs to overcome, but with more than just operational solutions. Human factors like trusting relationships, psychological safety, teamwork, fairness and employee flourishing are being linked to supply chain effectiveness more and more. Craighead et al. (2020) pointed out that there is a lack of holistic models that take a more active role of these human factors as an active mediator between SCM practices and organizational performance. The increasing focus on human-centric aspects highlights that sustainable supply chain performance relies on more than just technology and logistics capacities; it also relies on the quality of workforce engagement and organization relationships.

Multiple incidents in the real world have again reinforced the importance of integrating the sustainability of humans in the supply chain. When the Rana Plaza factory collapsed in 2013, it brought to light the poor working conditions and unethical labour practices in the global supply chain, making it a significant wake-up call for the industries around the globe (Reinecke and Donaghey, 2021). The incident highlighted the importance of employee health and safety in the workplace and its impact on the company's reputation and operations. As a consequence, organizations started to turn their focus to social sustainability and responsible HR practices in their supply chains. Gualandris et al. (2018) reported that investments in worker compensation, training, and facility improvements resulted in significant improvements in product quality and operational performance. Likewise, Dzreke and Dzreke (2025) established that human factors made a more significant impact on the performance of the organization in the long run than traditional efficiency measures. The results indicate that human capital development and employee-centred practices are strategic multipliers which have a positive impact on the effectiveness of SCM and the performance of the supply chain.

Thus, Human Resource Management (HRM) becomes a key element in enhancing the supply chain capabilities of the organization and its competitiveness. HRM is the effective management of employees through recruitment, training, performance management, remuneration, motivation and development of a positive organisation culture (Holloway, 2024). In the realm of SCM, HRM practices are relevant to building an educated and motivated workforce that can deliver the necessary capabilities for the increasingly complex supply chain processes. Sparrow et al. (2021) highlighted the importance of HRM strategies supporting the supply chain objectives, to obtain the goal of optimal operational and strategic results. Logistics management, procurement, digital technologies and data analytics are becoming increasingly important knowledge areas for employees in the supply chain field, in terms of supply chain coordination and decision-making. Collings et al. (2021) found that having qualified employees with supply chain specific skills within the organization improves their adaptability and innovation.

In addition, companies are undergoing dramatic transformation, and need to cultivate resilient workforces to deal with uncertainty and disruption. Ivanov and Dolgui (2020) emphasized the need for employee skills and competencies to effectively deal with disruptions in the supply chains and unexpected crises. HRM systems that are effective are more likely to support employees to collaborate, work in teams, share knowledge, and improve continuously. Good HRM also facilitates employee engagement and commitment which has a positive impact on operational performance and organizational performance. Schaufeli (2021) stated that an energised workforce can also look at inefficiencies, find solutions to problems, and work to improve the overall supply chain, beyond just their formal duties. The proactive course of action of staff members contributes to the organization's flexibility and competitiveness in dynamic markets.

The global market is becoming more competitive, further emphasising the importance of integrated SCM and HRM. Competitive intensity is the level of competition that an organization experiences in its industry, involving the competition from other firms, evolving customer demands and technological innovations. In a highly competitive world, the organizations have to continually boost the efficiency, innovation and responsiveness of the supply chains in order to keep their position in the market. Through HRM practices, the relationship between the SCM and supply chain performance can be moderated by improving employee capabilities, collaboration and adaptability. By engaging human resources, organisations can be more responsive to shifts in the global market and operating pressures, which can enhance the supply chain's resilience and performance. This review, thus, reveals that good HRM practices act as a strategic moderating variable that enhances the effectiveness of SCM and improves the performance of the SC under competitive business environment.

4. Methodology:

4.1. Data Collection procedure:

In view of the shortcomings of relying solely on a methodological tradition, the present study utilized a mixed-method approach, a combination of quantitative and qualitative methods. Overall, these methods helped to derive a deeper understanding of how Human Resource Management (HRM) practices relate to Supply Chain Management (SCM), competitive intensity, and supply chain performance. The quantitative component applied stratified random sampling method for adequate representation at various organizational levels and functional divisions in Future Retail Ltd, Chennai. The study involved 246 professionals over a collection period of 14 months to allow for an appreciation of operational and management variations over time.

The purposive sampling method was also adopted to ensure that the respondents have the appropriate knowledge and experience in HRM and SCM activities. The participants ranged from HR managers to supply chain directors to logistics executives to technical staff, ensuring a diverse perspective on issues of organizational coordination and supply chain effectiveness. A structured questionnaire and open-ended questions were used to gather the primary data with their emphasis on practices of HRM, integration of SCM, challenges faced, employee involvement and how such involvement is affecting the performance of the supply chain. In addition, the fact that the study incorporated open-ended answers also enriched the study with qualitative information regarding practical problems faced by organizations during competitive operating conditions on their supply chain.

4.2. Data analysis:

The collected data were analyzed by appropriate statistical technique for the reliability and validity of the measurement scale. Opinions and perceptions of the respondents with respect to HRM practices, SCM activities, competitive intensity and supply chain performance were measured using five-point Likert scale. The scale was from strongly disagree to strongly agree allowing the respondents to indicate their level of agreement with the statements included on the questionnaire.

For dimensionality analysis of the measurement items and to ensure that each item loaded sufficiently on the factor, factor analysis using Principal Component Analysis (PCA) was performed. Factors with Eigen values less than one were not used for analysis. To ensure the validity and accuracy of the constructs, the items in the measurement of each construct were selected with a factor loading less than 0.40. In addition, Cronbach's alpha coefficient was used to determine the reliability of the measurement scales. According to Nunnally (1978), all constructs in the study had reliability values over 0.70, which is the recommended minimum level of internal consistency and reliability of research instrument.

5. Results and Discussion :

5.1. Data Analysis : Construct validity was assessed using confirmatory factor analysis (CFA). The independent, mediating, and outcome variables were analyzed using the statistical software package AMOS.

Table 1

Summary of model fit for the independent variables and mediator

| Model | CMIN | DF | CMIN/DF | GFI | AGFI | CFI | RMR | RMSEA | NFI |
|-------|--------|----|---------|-------|-------|-------|-------|-------|-------|
| Index | 81.126 | 18 | 4.507 | 0.876 | 0.902 | 0.911 | 0.029 | 0.009 | 0.795 |

Source: Primary Data

The Confirmatory Factor Analysis (CFA) that was carried out included 14 measurement items covering important dimensions of trust, commitment, citizenship behaviour, job security, HR planning, social networking, information sharing, supply integrity, advanced planning systems, supply and distribution networks. These variables were used to examine the overall measurement structure, as well as to evaluate the goodness of fit of the research model proposed. The CFA aimed to explore the correlations among the observed variables and the latent constructs of Supply Chain Management (SCM) and Human Resource Management (HRM) practices.

The goodness of fit indices show that the proposed model was an acceptable fit. The ratio of the chi-square statistic to degrees of freedom (CMIN/DF) was 4.507; the Goodness of Fit Index (GFI) was 0.876 and Adjusted Goodness of Fit Index (AGFI) was 0.902. The Normal Fit Index (NFI) and Comparative Fit Index (CFI) were also calculated and were 0.795 and 0.911 respectively while the Root Mean Square Error of Approximation (RMSEA) was 0.009. These values combined suggest a satisfactory model fit of the CFA model. Based on this, the measurement model was found to be statistically reliable and appropriate for analyzing the relationship between SCM practices, HRM practices, competitive intensity and performance of the supply chain.

Table 2

Outline of model fit for the competitive intensity and supply chain performance

| Model | CMIN | DF | CMIN/DF | GFI | AGFI | CFI | RMR | RMSEA | NFI |
|-------|--------|----|---------|-------|-------|-------|-------|-------|-------|
| Index | 19.062 | 9 | 2.118 | 0.908 | 0.833 | 0.814 | 0.011 | 0.021 | 0.839 |

Source: Primary Data

The Confirmatory Factor Analysis (CFA) was performed for three measurement items related to supply chain performance and competitiveness that were utilized. The Goodness of Fit (GOF) indices used to evaluate the model fitness were chi-square statistics degrees of freedom (CMIN/DF = 2.118), Goodness of Fit Index (GFI = 0.908), Adjusted Goodness of Fit Index (AGFI = 0.833), Normal Fit Index (NFI = 0.839), Comparative Fit Index (CFI = 0.814), and Root Mean Square Error of Approximation (RMSEA = 0.021). The values suggest an acceptable fit of the measurement model and appropriate representation of the relationship between the observed and latent variables.

The results of the CFA also show that the competitive intensity variable plays a significant role in the relationship between the independent variables and supply chain performance. The RMSEA is low and the goodness-of-fit indices are satisfactory, indicating the proposed structural model is statistically reliable and consistent with the data collected. Thus, the results indicate that the conceptual model developed for this study is valid because it is in line with the theoretical assumptions and empirical observation.

5.2. T-test

Independent t-test was used to evaluate mean and S.D. values of items in the independent variable and the mediator.

Table 3

Results of t-test - between independent variables and mediator on outcome variables

| Variable | Outcome variable | | | | | | Bootstrapped 95% Confidence Interval | |
|-------------------------|---------------------------|------|----------------------------|------|---------|---------|--------------------------------------|-------|
| | Supply chain efficiencies | | Supply chain effectiveness | | | | Lower | Upper |
| | Mean | SD | Mean | SD | t value | P value | | |
| HRM Practices | 18.23 | 4.21 | 17.35 | 2.56 | 5.695 | 0.019** | -1.984 | 0.483 |
| Supply chain management | 21.85 | 2.42 | 16.90 | 3.04 | 7.394 | 0.048** | 0.823 | 1.495 |
| Competitive intensity | 29.47 | 2.14 | 25.55 | 2.48 | 6.294 | 0.011** | 1.046 | 2.001 |

Source: Primary Data

The analysis of the mean value and standard deviation values for the results found that variables and mediators had a significant and positive effect on the outcome variables in Table 3. The results suggest that there is a significant contribution to the improvement of Supply Chain performance from Supply Chain Management (SCM) practices and Human Resource Management (HRM) practices. The differences found for the mean values of the SCM, HRM practices and the outcome variables shows the strong relationship between the constructs. Moreover, the findings reveal that there is a positive relationship between SCM practices and SCM performance, indicating that good supply chain strategies can boost operational efficiency and organizational effectiveness.

Analysis also indicated that competitive intensity does not directly affect the outcome variable, but has a strong effect on supply chain efficiency and supply chain effectiveness. Means of supply chain efficiency and supply chain effectiveness were 29.47 and 25.55 respectively and the standard deviation values were 2.14 and 2.48, respectively, which shows some consistency across the participant responses. Additionally, the calculated t-values for HRM practices, SCM and competitive intensity were 5.695, 7.394 and 6.294 respectively, that were found to be significant when compared to the corresponding p-values. The results suggest that a good SCM with good HRM practices has a significant influence on the performance of the supply chain and competitiveness of the organization.

5.3. Moderated Mediation Analysis :

A moderator effect is when a second predictor modifies the effect of the first. To fully disentangle the nature of relationship between variables, it may be necessary to combine these two approaches.

Table 4

Moderated Mediation Analysis

| Moderator | Level | Process of Indirect Effect | SE | 95% IC LL | 95% IC UL |
|-----------------------|-----------|----------------------------|-------|-----------|-----------|
| Competitive intensity | High | 0.070** | 0.031 | 0.044 | 0.059 |
| | Low | 0.055 | 0.065 | 0.051 | 0.068 |
| | High- Low | 0.050 | 0.027 | 0.025 | 0.035 |

Note: p < 0.05, *** p < 0.01, n = 632, IC = confidence interval, Bootstrap samples = 5000.

The moderated mediation analysis showed that the indirect effect of HRM practices on supply chain performance was significant at high competitive intensity but not significant at low competitive intensity. The results showed that HRM practices had more impact on supply chain performance indirectly (indirect effect = 0.070, SE = 0.031, P < 0.01) at high competitive intensities than at low competitive intensities (indirect effect = 0.055, SE = 0.06, P < 0.01). The results support the research hypotheses and reveal that competitive intensity is a positive moderator of the relationship between HRM practices and supply chain performance. The statistical evidence indicates that organizations in highly competitive environments have a better performance when they emphasis the effectiveness of HRM systems, which help to coordinate, respond and be efficient in their activities in the supply chain.

The results of the current study also show that HRM practices and SCP are synergic in the improvement of the overall supply chain effectiveness. The application of advanced HRM practices like trust building, reward system, incentive, performance assessment, promotions, and effective human resource management play a significant role in the productivity of an organization and sustainability of the supply chain, as cited by Stank et al. (2021). The same analysis was reported in the work of Dzreke and Dzreke (2025) highlighting that human friendly organizational practices are strategic factors that can be used to improve the resilience and robustness of the supply chain. Collins et al. (2021) further noted that if a company is going to stay competitive in its supply chain operations attracting and retaining skilled labour is crucial. Moreover, Cousins et al. (2020) emphasized the need to enhance the HR skills by targeted training, coordination and performance-based systems that should be integrated with the supply chain objectives. Hence it is concluded in the present study that it is very important to continuously improve the human resources to achieve sustainable Supply Chain Management (SCM) and better supply chain performance.

6. Limitation and future research

This research has some drawbacks which must be taken into account in the interpretation of the results. The study investigated the moderating effect of HRM practices on the relationship between Supply Chain Management (SCM) and supply chain performance but an absolute and comprehensive determination of the moderating effect could not be completely achieved. The results mainly showed that the more competitive HRM practices increase the effectiveness of SCM and improve the performance of supply chains. The relatively small sample size may be a limitation because of the statistical power and accuracy of the results obtained. The study, although limited, offers an insight into the HRM practices in the retail organizations, especially with regards to efficiency of SCM and improvement of performance. Further research should utilize larger and more heterogeneous samples of retailers in various retailing categories and in various geographic areas for more generalizable and statistically valid results. Other variables like organizational culture, digital transformation,

employee engagement, and technological innovation could also be incorporated in further studies to gain deeper insights on their impact on sustainable supply chain performance.

7. Conclusion

The present study emphasized the important linkage between Human Resource Management (HRM) practices and Supply Chain Management (SCM) to create better supply chain performance. The results showed that good HRM positively supports activities of SCM, which helps to achieve the efficiency and sustainability of the organization. It also found that competitive intensity is an important moderating variable to improve the effectiveness of HRM and SCM integration. A good human resource system is essential to a business that wants to be effective in the supply chain, flexible in its operations, and competitive in the long run in highly competitive environments.

The study highlighted that HRM practices that focus on the employees, like appropriate recruitment and selection, ongoing training and development, fair compensation, performance evaluation, employee participation in decision making and creation of a positive work environment, are crucial for the effective functioning of a supply chain. These practices help organizations develop skilled and motivated employees who can efficiently manage complex supply chain activities and respond effectively to market uncertainties. The findings also indicate the need for organisations to develop a culture of collaboration and knowledge sharing within their supply chain networks to create an environment that promotes innovation, teamwork and operational excellence.

In addition, the use of modern technologies, like Artificial Intelligence (AI) in HRM and SCM processes has the potential of enhancing the productivity and decision-making abilities of organizations. By leveraging AI, these systems can improve forecasting accuracy, inventory management, staff planning, and operational coordination, contributing to sustainable supply chain performance. The study findings overall suggest that the strategic integration of the HRM practices and SCM activities plays important role in enhancing retail company efficiency, building competitive advantage and making the organization sustainable in the dynamic business settings.

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