Name of Publisher: BRIGHT EDUCATION RESEARCH SOLUTIONS

Area of Publication: Business, Management and Accounting (miscellaneous)

Let's Start!

Journal of Management & Social Science

ISSN Online: 3006-4848
ISSN Print: 3006-483X

https://rjmss.com/index.php/7/about

RECOGNIZED IN "Y" CATEGORY BY HEC

[Role of Green Human Resource Management Strategies in Enhancing Green Supply Chain Performance: Moderating Role of Internal Integration]

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Review Type: Double Blind Peer Review

Journal of Management & Social Science
VOL-2, ISSUE-2, 2025

ABSTRACT

This research aims to investigate the role of different green human resource strategies (GSCM) like green training (GT), green reward and incentive (GRI), and managerial support (MS); in enhancing green supply chain performance (GSCP), while examining the moderating role of internal integration (II) within textile sector of Karachi, Pakistan. A quantitative research approach was employed using partial least structural equation modeling (PLS-SEM), Smart PLS 4 software was used for analysis. Data gathered from 310 respondents who are working at managerial positions in HRM or SCM domains. Top performing companies in Karachi listed on Pakistan Stock Exchange (PSX) were selected. A structured questionnaire adapted; 5-point Likert scale used to range from strongly disagree to strongly agree (1-5). The results indicate that GT and MS have a positive direct impact on GSCP, while surprisingly GRI and GSCP have a negative direct impact. II shows positive moderation between GT and GSCP. In contrast, insignificant moderation is found in between II with GRI and MS. These findings highlight that some GHRM practices contribute positively to GSCP and ultimately to sustainable outcomes. In contrast, other practices may require better alignment with organizational culture and environmental needs. This study is limited to the textile sector in Karachi and may not be generalized to any other industry and region. GHRM dealt with only three perspectives i.e. GT, GRI and MS. Also, this study is limited to internal integration. Companies should prioritize GT and MS to enhance GSCP. GRI needs reevaluation and restructured to better align with culture and environmental goals. II implementation further enhances GT. Future studies can explore other moderation variables e.g. integration with supplier and integration with customer.

Keywords: Green Supply Chain Management (GSCM), Green Human Resource Management (GHRM), Green Supply Chain (GSC) Performance, Internal Integration (II), Managerial Support (MS), Green Training (GT), Green Reward and incentives (GRI), Social Exchange Theory (SET).

Introduction

From the near past, the world has been experiencing a disastrous global warming impact. Businesses are the main cause of it and are now under pressure to adopt Green Supply Chain (GSC) practices (Gim et al., 2022). Environmental concerns (Sahu et al., 2024), global pressure concern to climate change (Le & Tham, 2024) and regulatory requirements (Gelagay & Werke, 2024) combinedly put pressure on firms to adopt green practices to their operations for mitigate adverse effects on the environment. The shift toward environmental practices is critical for resource intensive industries like textile industry to get competitive advantage as demanded by stakeholders (Gelagay & Werke, 2024; Murad & Zou, 2023).

Pakistan's textile sector is a major contributor in the country's economy (Junaid et al., 2022), is facing critics internationally due to its ecological footprint (Fayyaz et al., 2024). International stakeholders demand eco-friendly products and operations making it crucial for the industry to do practices as per global ecological standards (Amoako et al., 2022; Sahu et al., 2024). Weak regulatory policies and limited investment hinder in

adopting ecological technologies (Fayyaz et al., 2024; Shaikh & Ali, 2023).
Green Human Resource Management (GHRM) plays an important role in building sustainable culture in the organization (Faeni, 2024). Green Human Resource Management (GHRM) defined as HRM practices align with environmentally sustainable practices by creating green talent (Sahu et al., 2024). According to (Chen et al., 2022; Gim et al., 2022) GHRM activities comprise of HRM activities coincide with environmentally sustainable activities. There is a need for firms to get environmentally aware employees who put their information creatively in GSCM practices (Agyabeng-Mensah et al., 2024). This will be acquired by aligning human resource practices with environmental objectives and helping organizations get a workforce which are environmentally aware and competent of doing GSC practices (Gelagay & Werke, 2024). (Faeni, 2024) highlights the importance of environmental responsibility and insists the HRM department ensures it is a part of the firm's mission statement.

Core GHRM practices include green training (GT), green reward and incentive (GRI) and managerial support (MS). GT equips employees with the necessary knowledge to adopt the skills and implement practices like energy conservation and waste management (Muisyo & Qin, 2021). Some studies revealed that trained employees are more likely to detect inefficiencies in processes and take corrective measures and contribute to GSCM (Le & Tham, 2024). The GRI system motivates employees to equip them with pro-environmental behavior through appraisals, bonuses, career growth and recognition (X. Xie et al., 2020). MS in terms of allocation of resources in GSCM projects are more likely to motivate employees to embrace green practices (Graham et al., 2023) and ultimately their commitment plays a key role in fostering organizational culture according to environment and social perspective (Ilyas et al., 2020).

There is a direct proportion of employees' environmental knowledge with the organization's contribution towards environmental practices (Aboramadan, 2022). Some studies highlight that GHRM practices enhance employee commitment towards environmental practices and support them to adopt green practices (Agyabeng-Mensah et al., 2024; Chen et al., 2022). For instance, green training equips employees with adequate knowledge and skill set that enables them to identify and eliminate wastages and ultimately contribute to Green Supply Chain Management (GSCM) (Le & Tham, 2024; Muisyo & Qin, 2021). Thus (Al-Alawneh et al., 2024) considered GHRM a competitive strategy.

For the Pakistani textile sector, GHRM is not just an ethical thing but a competitive strategy. Firms who adopt GHRM practices can enhance global standards meeting criteria (Shaikh & Ali, 2023), attract eco conscious buyers (Amoako et al., 2022) and innovation through green solutions (Agyabeng-Mensah et al., 2024).

Green Supply Chain Management (GSCM) involves strategic green practices in every stage of GSCM like raw material sourcing, product design and manufacturing, operations and logistics which tends to improve the environment (Gelagay & Werke, 2024). As per (Aboramadan, 2022) GSCM focuses on waste elimination, optimizing the resource allocation and ensuring environmental standards throughout the supply chain. Studies showed that adopting GSC practices is a win-win situation for organizations which not only enhances their operational efficiency but also creates economic benefits

(Mukem et al., 2019). GSCM success can't be achieved without effective cross departmental collaboration and collaboration with external partners (Tarigan et al., 2021; Zhang et al., 2019). In the context of the Pakistani textile industry, GSCM is vital to meet international standards and to avoid sanctions (Fayyaz et al., 2024).

GSCM involves elimination of waste through lean practices, recycling and reuse of material which not only enhances operational efficiency but also reduces operational cost (Aboramadan, 2022; Mukem et al., 2019). One possible solution a textile firm could adopt is the use of the closed-loop system which reduces the water and chemical usage (Junaid et al., 2022). Unfortunately, many companies are prioritizing short term gains over long term GSCM and sustainability (Murad & Zou, 2023). International stakeholders are demanding ISO 14001 certifications (Amoako et al., 2022), if companies fail to adhere to compliance on a verge to losing market share (Shaikh & Ali, 2023).

Internal Integration (II) defines cross departmental collaboration (Tarigan et al., 2021; Zhang et al., 2019) to remove barriers in green innovation and information sharing (Junaid et al., 2022) it's about alignment of resources to accelerate environmental objectives and serves as moderating mechanism between GHRM strategies and GSC performance (Amoako et al., 2022; Junaid et al., 2022) Firm's internal structure, integration and collaborative processes collectively enables organization to fulfill stakeholder's need for GSC (Junaid et al., 2022). Employees being key stakeholders acquired knowledge to detect waste and eliminate it from process (Chen et al., 2022). In the Pakistani textile sector context where departments work fragmentally and often hinder in attaining GSCM, II serves as moderator that amplifies the GHRM and GSCM mechanism (Amoako et al., 2022).

Effective II requires departments like procurement, production, distribution and HR to work collectively on GSCM goals (Zhang et al., 2019). Firms who put tracking metrics to check carbon footprints, and water usage etc. are more likely to achieve higher II (Junaid et al., 2022). Textile companies who are using software for real-time data sharing between cross departments are faster in adopting eco-friendly practices (Tarigan et al., 2021). II not only a logistic necessity but also a strategic tool to alter GHRM impact on GSCP (Junaid et al., 2022).

Global pressure redefined businesses' priorities and now they are balancing economic and environmental gain, by adopting GSCM and GHRM concepts to their operations (Gelagay & Werke, 2024). International regulations escalate the demand for green operations particularly in the highly environmentally impacted sector (Aboramadan, 2022; Shaikh & Ali, 2023). This transition is an opportunity and challenge for developing countries like Pakistan (Murad & Zou, 2023) where the textile sector significantly contributes to the nation's economy and generating employment, facing critics for its environmental footprint worldwide (Fayyaz et al., 2024; Junaid et al., 2022).

Pakistan ranked 176th out of 180 on the International Environmental Performance Index and has a drastic need to acquire GSCM practices (Fayyaz et al., 2024). Another study (Junaid et al., 2022) highlights Pakistan ranked 8th among pollution affected countries. As international markets are prioritizing sustainable supply chain practices, the Pakistani textile sector is on verge to lose its market share. So, there is a need to implement GSC strategies to gain global competitiveness (Shaikh & Ali, 2023).

Exploring the direct relationship between GHRM and GSCM by altering it with II in the textile sector of Karachi, by examining how GHRM strategies enable companies to enhance their GSC performance and how II accelerates their relationship. This research provides grounding for policymakers, contributes to broader aspects and provides actionable insights and offers solutions for fostering environmental concerns (Gim et al., 2022; Mukem et al., 2019; Pham et al., 2020).

GHRM has an important role in catering to these issues and provides substantial solutions by creating green talent within the organization (Faeni, 2024; Sahu et al., 2024). GHRM bridges the gap between environmental goals and workforce competency by putting green practices to general HR practices (Sahu et al., 2024). Studies highlight that the organization implements GHRM strategies, experience enhancement in employee engagement and operational efficiencies which are critical in attaining greener objectives (Chen et al., 2022; Le & Tham, 2024). Key GHRM activities comprise of GT; equipping employees with knowledge to identify and reduce waste (Pham et al., 2020), GRI; motivating employees toward pro-environmental behavior through appraisals and recognition (H. Xie et al., 2024) and MS; ensuring leadership support and commitment to green environmental objectives (Ilyas et al., 2020). The effectiveness of GHRM depends on II that is collaborative attitude between departments to welcome green initiatives (Junaid et al., 2022).

GSCM has gained popularity worldwide as a strategic approach to align economic gain with ecological and social preservation (Aboramadan, 2022). GSCM includes practices like green procurement, energy-efficient green production and waste management throughout the supply chain (Gelagay & Werke, 2024). It eliminates waste through processing, adopts sustainable practices in procurement, operations and logistics which ultimately reduce global environmental footprints (Aboramadan, 2022; Gelagay & Werke, 2024). Firms who achieve GSCM not only lessen the adverse effect on the environment but also achieve cost saving and better market positioning (Mukem et al., 2019). Effective implementation of GSCM is tied with cross-department collaboration and employee management practices, which highlights the important role of GHRM. II includes intra departments communication and collaboration for executing GSCM practices smoothly (Tarigan et al., 2021; Zhang et al., 2019).

Pakistan's textile industry is the backbone of the country's economy, over 60% exports and contribute to millions of employment generation (Junaid et al., 2022). Compared to its economic significance, the textile sector indulges in unsustainable practices including excessive water consumption, use of chemicals and high carbon emissions (Fayyaz et al., 2024; Shaikh & Ali, 2023). International buyers and regulatory bodies are increasingly demanding certifications like ISO 14001 as a prerequisite for trade (Amoako et al., 2022).

Most of the studies regarding GHRM role on sustainable practices done on developed nations and are ignoring underdeveloped nations (Gelagay & Werke, 2024) like Pakistan (Fayyaz et al., 2024), leaving a significant gap in resource constrained countries that how they can adopt these strategies (Al-Swidi et al., 2021; Fayyaz et al., 2024). By addressing this gap and equipping companies with environmental procedures and policies, the textile sector is able to compete in the global market (Shaikh & Ali, 2023).

This gap creates a need to explore the comprehensive interplay role of GHRM and GSCM while considering II as moderator.

Pakistan's textile sector a major contributor to economy, facing challenges globally to adopt global green supply chain standards. Due to intensive resource processes like water and energy consumption, chemical usage causes degradation of the environment (Junaid et al., 2022; Shaikh & Ali, 2023). These inefficiencies make the textile sector on the verge of losing its global market share which is already prioritizing pro-environmental products (Gelagay & Werke, 2024).

Although GHRM and GSCM frameworks provide promising solutions (Amoako et al., 2022), its adoption is lacking in the Pakistan textile sector (Aboramadan, 2022). As most of the studies regarding the interplaying role of GHRM, GSCM and II are on developed nations and scarce in underdeveloped nations like Pakistan (Shaikh & Ali, 2023). So, there is a gap in underdeveloped nations to address these issues and tailored a framework to address the challenges (Mukem et al., 2019).

There are some barriers like weak regulatory structure, lack of investment in green technologies and no alignment between stakeholder and environmental goals which are challenging in adoption of the framework (Fayyaz et al., 2024; Murad & Zou, 2023). Moreover, absence of effective II lacking organizations to benefit from GHRM and GSCM practices (Chen et al., 2022). This gap creates an urgency to build a comprehensive approach to tackling ecological challenges.

The research intends to address the above challenges and issues by investigating the interplay role of GHRM, GSCM and II in Pakistani context. It will provide insight to policy makers by identifying the barriers and enablers, which leads to sustainable industrial development, enhancement of GSC performance and ultimately improves the environment (Agyabeng-Mensah et al., 2024; Gelagay & Werke, 2024).

Literature Review

Theoretical Framework

The foundation of this theory draws on Social Exchange Theory (SET) which is about a mutually beneficial relationship between employer and employee (Amrutha & Geetha, 2021; H. Xie et al., 2024), where an employee gets benefits and will put extra effort into environmental causes (Pham et al., 2020). SET describes how one should behave, and the others who follow these norms are obliged to respond to reciprocity (Pham et al., 2020). Organizations started such practices to contribute to the well-being of their employees in return for their green behavior (Meira & Hancer, 2021). The employer's green attitude convinces employees to exhibit pro-environmental behavior at the workplace (Al-Swidi et al., 2021). (Aboramadan, 2022; Pham et al., 2020) further argues that it's a GHRM and employees' green behavior relation, when the organization commits to GSC practices and provides green training, green rewards and incentives, appraisals, and support to employees, which in turn yield attachment in employees to the organization, and they show green attitude towards a clearly defined goal.

Organizations that invest in environmental training and employee development create a sense of obligation among employees who then reciprocate through enhanced green performance, aligning with organizational goals (Pham et al., 2020) . (Xie et al., 2024) also highlights that when GRI is properly placed in the structure, it motivates

employees to adopt green behavior. The integration of SET is a psychological factor that underlies employee response to green initiatives, which aligns with the work of (Aboramadan, 2022) that GSCP is achieved through a combination of motivational and structural factors, i.e. SET and II-based.

GHRM Strategies

Management must consider the importance of human factors; employees' participation increases their commitment and empowers them to work in a team and hence enhancing their productivity (Akhtar et al., 2023). Firms must have an environmentally aware workforce so they can use their creative approach in enhancing GSC performance (Agyabeng-Mensah et al., 2024). GHRM is an effective strategy in enhancing GSC performance (Al-Alawneh et al., 2024). Good HR practice is to consider employees as long-term investment and devil high level performance through mentoring (Akhtar et al., 2023). GT and GRI are of great importance in creating an environmentally friendly workplace (H. Xie et al., 2024). To enhance GSC performance firms needed GHRM practices to cultivate green attitude in employees by green training, reward (Chen et al., 2022) and by top management support (Graham et al., 2023).

Green Training (GT)

GT raises awareness among employees on ecological issues and promotes proactive approaches to adopt green practices (Agyabeng-Mensah et al., 2024; Muisyo & Qin, 2021). GT considers a core GHRM function that trains staff and develops their skills on environmental matters (Muisyo & Qin, 2021). (H. Xie et al., 2024) define GT as an HR strategy to motivate employees to get environmental protection skills and awareness to deal with them. GT interpreted by (Le & Tham, 2024) as training programs designed to equip employees with the knowledge of mitigating pollution and enable them to create an eco-friendly environment. (Pham et al., 2020) describe GT as, it boosts employees to get skills that improve its green performance at workplace. According to (H. Xie et al., 2024) GT initially teaches employees about regulatory requirements which then lead to learning new skills to comply with advance needs to meet environmental goals.

The effectiveness of GT frequently examines under the SET (Amrutha & Geetha, 2021) , that when organization invests in environmental education employees will respond through enhanced green behaviors and performance (Pham et al., 2020) . This reciprocal relation was also found in (Chen et al., 2022) study, that those firms implement GT to their structure reported improvement in waste reduction and resource efficiency. (Chen et al., 2022; Le & Tham, 2024) found positive correlation between GT and GSCP. GT helps underdeveloped nations like Pakistan to navigate employee green training to compliance with environmental regulations (Shaikh & Ali, 2023). Training programs that cover international standards enable firms to maintain their competitiveness globally (Gelagay & Werke, 2024).

Several Pakistani firms are lack in dedicated budget for green training (Fayyaz et al., 2024; Murad & Zou, 2023) , one of the challenges in effective development of GT mechanism. Another challenge is the traditional mindset which often view GT as cost centers rather than value added center (Al-Swidi et al., 2021). (Graham et al., 2023) input the need for change in management to overcome such resistance.

So, this literature gives GT significant importance in green transformation in textile

industry. When proper and efficient green training programs are developed, it will lead to sustainable green transformation, enhanced GSCM performance, compliance with regulatory factors and increase operational efficiencies (Le & Tham, 2024). However, to get full benefits from GT results addressing potential barriers like traditional mind set which resist change (Junaid et al., 2022).

GT creates a sense of responsibility in the adoption of green practices by employees and encourages them to adopt environment conscious behavior (Muisyo & Qin, 2021). As per (Pham et al., 2020) GT bridges between traditional work practices and sustainable green operations. Employees should have information through training, thereby can be utilized to eliminate waste and ultimately impacts on GSC performance (Graham et al., 2023). GT and combination of II eventually enhances GSCP (Murad & Zou, 2023). So, we hypothesized it as

H_{A0}: Green Training has no significant impact on GSC performance

H_{A1}: Green Training has a significant impact on GSC performance

Training programs are essential to create a green environment within organizations (Pham et al., 2020). GT outcome increases in cross-departmental collaboration through consistent applications of learned skills and principles (Junaid et al., 2022).

H_{B0}: Internal Integration negatively moderates the relationship between Green Training and GSC performance

H_{B1}: Internal Integration positively moderates the relationship between Green Training and GSC performance

Green Reward and Incentive (GRI)

Incentive schemes can be strategically utilized by organizations to compensate employees by rewarding and in return achieve its green goal (Al-Alawneh et al., 2024). So, it is a win-win situation for both employer and employee (Faeni, 2024). GRI serves to align employee behavior to organizational objectives to adopt GSC practices (Aboramadan, 2022). Both Monetary and non-monetary rewards are given to employees to attract them to gain sustainable knowledge and attitude towards GSC practices (Chen et al., 2022; H. Xie et al., 2024). Non-monetary rewards are termed as public recognition given to employees on their outstanding performance towards GSC (Le & Tham, 2024). Employees can create environmental practices if rewards are seriously considered, GRI can attract, retain and motivate employees to get environmental training and attitude toward green objectives (Fayyaz et al., 2024).

SET theory builds argument that when organizations offer incentives to employees, it reciprocates their behavior in environmental cause (Pham et al., 2020). Performance based rewards directs in waste reduction techniques (Chen et al., 2022). The main cause of rewarding employees is to motivate them to achieve organizational goals and make them efficient and effective (Farmania et al., 2021). Performance based incentive link to GSC practices encourages employees to innovate themselves and brainstorm efficient solutions (Le & Tham, 2024). Organizations can get positive GSC performance by rewarding employees with promotion, career gains and bonuses (Muisyo & Qin, 2021), as employees believe that their green performance will be appreciated and reciprocated by the organization (H. Xie et al., 2024).

H_{C0}: There is no significant relation between Green Reward & Incentive and GSC performance
H_{C1}: There is a significant relation between Green Reward & Incentive and GSC performance

Employees get motivated because of their increase in knowledge that can be developed only in internal GSCI (Mukem et al., 2019). When II is high employees employ skills more effectively across departments, and led to GSC performance (Junaid et al., 2022). Hence, we propose hypothesis as follows
H_{D0}: Internal Integration negatively moderates the relationship between GRI and GSC performance
H_{D1}: Internal Integration positively moderates the relationship between GRI and GSC performance

Managerial Support (MS)

MS has a critical role in adopting GSC practices in organization, which involve active participation from the leaders creating environmentally aware culture, allocating the resources as per need and facilitating the implementation of green practices (Murad & Zou, 2023; Shaikh & Ali, 2023). Effective MS ensures GSC practices should be included in decision making processes creating organizational frameworks to enhance GSCP (Pham et al., 2020). Studies highlight that MS plays a significant role in employee engagement by creating incentives programs and offering GT to them (Agyabeng-Mensah et al., 2024; Chen et al., 2022). MS also plays a crucial role in creating a collaborative environment between different functions of the organization body (Gelagay & Werke, 2024; Zhang et al., 2019).

As per SET grounding the conclusion that when top management supports employees and committed to organizational green goals in return for employee's sincerity to enhanced green behavior which led to enhancement in GSCP (Pham et al., 2020) . Top management input their efforts in terms of budget allocation to green initiatives (Graham et al., 2023), invest in eco-logical technologies (Murad & Zou, 2023), regular GSCP review (Al-Alawneh et al., 2024) and transparent green performance evaluation of all employees (Pham et al., 2020).

Top management commitment to organization drives green practices and green environmental practices within the organization (Ilyas et al., 2020). Thus, it's a mechanism to implement change (Graham et al., 2023). Adjust manufacturing processes as per waste management, adoption of ecological processes, recycle and reuse products; top management cooperation is needed (Junaid et al., 2022).

Managers who show a green attitude consistently will motivate subordinates participating in GSC practices (Al-Swidi et al., 2021). Managers should have a personality that makes people who aim to have green training (Amrutha & Geetha, 2021). MS is needed in adopting new processes, changes in company's culture and acquiring new technologies which impact sustainability and ultimately impact GSC performance (Graham et al., 2023). Employees who perceive green support are more likely to be involved in green behavior (H. Xie et al., 2024).
H_{E0}: Managerial Support has no significant influence on GSC performance
H_{E1}: Managerial Support has a significant influence on GSC performance

MS puts shades on environmental importance and promotes ecological behavior and raises awareness within interdepartmental functions (Al-Alawneh et al., 2024). Thus, hypothesized as

H_{F0}: Internal Integration positively moderates the relationship between MS and GSC performance

H_{F1}: Internal Integration positively moderates the relationship between MS and GSC performance

Internal Integration

II involves information sharing and working collaboratively with different functions of organization (Zhang et al., 2019). It includes internal environment management and work collaboratively on green technologies with different departments (Murad & Zou, 2023). II improves performance within organization, through information sharing, integration of data and collaboration between dissimilar functions of organization, it also speeds up response time and conflict resolution (Amoako et al., 2022). II breakdown operational silos, enable departments to work in teams and ultimately achieve GSCP (Tarigan et al., 2021).

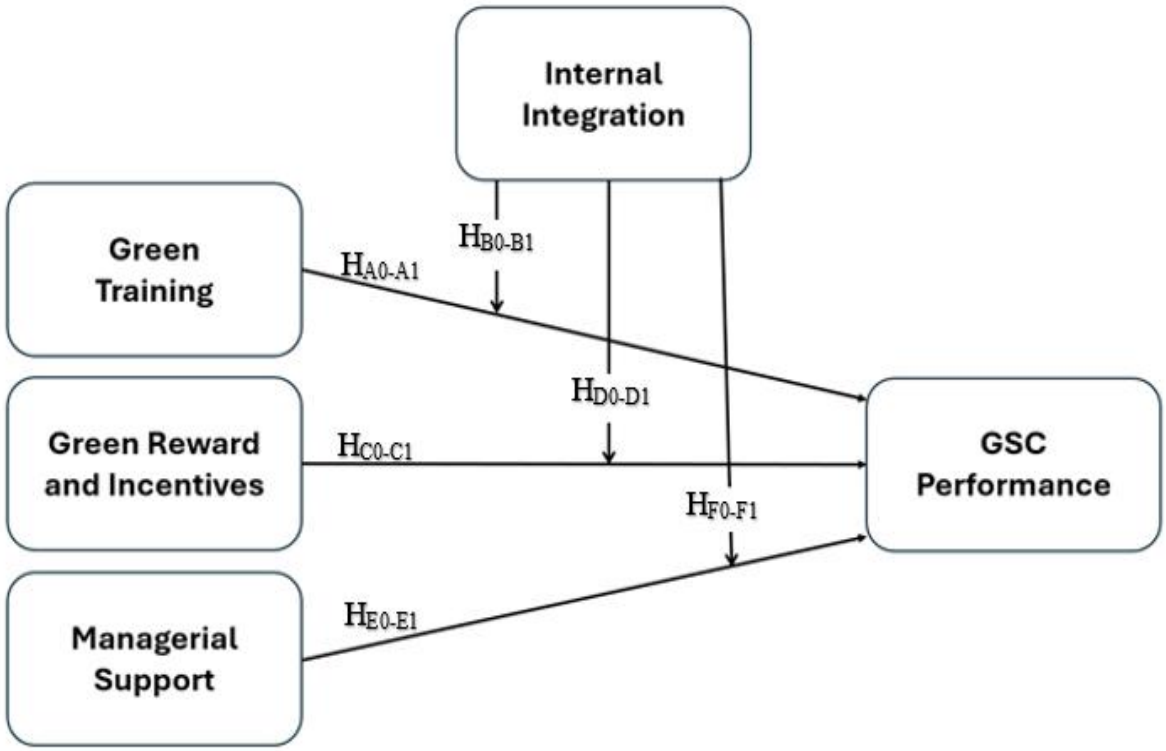
II facilitates reciprocate relationship between departments as conclude by SET (Junaid et al., 2022). II leads to common organizational goals (Tarigan et al., 2021), and joint decision-making (Chen et al., 2022). Traditional organizational structure is hindered in horizontal communication (Al-Swidi et al., 2021), department competitions override collective goals (Aboramadan, 2022) and middle management resistance to share operational control (Ilyas et al., 2020) are challenges in effective implementation of II structure. Joint cross-department training programs (Pham et al., 2020) and recognition programs in collaborative approach (Xie et al., 2024) potentially lead to sustainable development II mechanisms.

Green Supply Chain Performance

Firms that have opted green practices priorly concern not only think about economic gain, but also think of environmental, social and economic aspects (Junaid et al., 2022). Balancing economic gain, environmental and social practices are obligations to organization (Chen et al., 2022). Reducing waste, optimizing resource usage and ensuring compliance with international standards to the environment have come under the umbrella of GSCM and ultimately enhances its performance (Aboramadan, 2022).

With GSCP metrics we can improve efficient resource usage like energy, material and water (Aboramadan, 2022), waste and recycle management (Mukem et al., 2019), compliance to internation environmental standards (Amoako et al., 2022), to meet new evolving principles (Fayyaz et al., 2024), to meet customer green product requirements (Junaid et al., 2022) and investors trust on long term economic and environmental gain (Graham et al., 2023). Certain challenges are hindered in effective implementation of GSCP metrics like there are lack of standardized metrics in small-medium companies (Shaikh & Ali, 2023), gap in technological capabilities (Al-Alawneh et al., 2024), ineffective data collection procedures (Aboramadan, 2022) and limited research work on closed-loop system in Pakistan (Shaikh & Ali, 2023).

Conceptual Framework



Source of the Model: (Chen et al., 2022; Dahinine et al., 2024; Ilyas et al., 2020; Junaid et al., 2022)

Figure 1: Conceptual Framework

Research Methodology

Research Context

The study focuses on quantitative research design to measure the relationship between GHRM practices (green training, reward & incentive and managerial support) and GSC performance while mediating internal integration. To access the relationship between variables data gathered from textile companies in Karachi, Pakistan. Top performing companies in Karachi which are listed on Pakistan Stock Exchange (PSX) have been selected. We proceeded to approach possible participants through e-mail and WhatsApp channel to get their consent to participate in the survey. The convenience sampling technique was used to easily approach respondents who are willing to participate. We used a purposive sampling technique, which ensures that data collected from the participants who are working in Human Resource departments and Supply Chain departments. The respondents of this study are working at different managerial levels at HR and SC departments which includes human resource managers, supply chain managers, operation managers, procurement managers, logistics managers and their respective assistant managers and supervisors.

We sent a questionnaire and guiding principle with them on how to respond to it. Objectives of the study clearly communicate with participants of the study. Four hundred questionnaire forms were sent to 62 companies who showed consent after being communicated. We received 310 responses and moved to further analysis. A two-month

survey period from March 2025 to April 2025 is undertaken to collect data, with a success rate of 77%. As per (Sahu et al., 2024), 300 respondents' data is enough for statistical and hypothesis testing.

Respondents' Profile

There are 310 questionnaires which are considered to be valid for analysis. 20.6% females and 79.4% males participated in the survey. 34.5% respondents are from the Human Resource Department and the rest 65.5% are from the Supply Chain Department. The respondents are in charge as 64.2% at lower management, 28.4% at middle management and 7.4% at top management. 66.1% of the respondents have more than 6 years' working experience, which shows that employees have a better understanding of the working environment. In Table 1 respondents' profiles are demonstrated.

Table 1: Respondent Profile

Attributes	Items	Frequency	Percentage
Age	21 to 30	89	28.7%
	31 to 40	128	41.3%
	41 to 50	85	27.4%
	50 to 60	7	2.3%
	Above 60	1	0.3%
Gender	Female	64	20.6%
	Male	246	79.4%
Education	Below Undergraduate	35	11.3%
	Undergraduate	158	51.0%
	Graduate	98	31.6%
	Post-Graduate	19	6.1%
Department	Human Resource	107	34.5%
	Supply Chain	203	65.5%
Managerial Level	Top Level	23	7.4%
	Middle Level	88	28.4%
	Lower Level	199	64.2%
Year of Experience	Less than a year	28	9.0%
	1-5 years	77	24.9%
	6-10 years	104	33.5%
	Above 10 years	101	32.6%

Instruments

A 5-point Likert scale, ranging from 1 = strongly disagree to 5 = strongly agree was adapted in this study. GT was accessed by using a four-item scale adapted from (Chen et al., 2022), providing environmental training programs to managers and employees. The three-item scale for GRI adapted from (Chen et al., 2022), that employees and managers are motivated with a reward system. The six-item scale for MS is adapted from the study of (Ilyas et al., 2020), that our managers are more proactively working to green practices than competitors.

Furthermore, to measure moderation relation of II seven-item scale adapted from the study presented by (Junaid et al., 2022), our company built a culture where all departments collaboratively worked together for environmental causes. The GSCP was measured by using four-item scale adapted by (Dahinine et al., 2024), that the company established a system that allows avoiding hazardous emissions and manufactures goods with least energy consumption and wastes.

Results and Analysis

This study uses Smart-PLS version 4for data analysis. The Partial Least Square-structural equation modeling (PLS-SEM) was used to assess data and hypothesis testing. According to (Hair, Sarstedt, Pieper, et al., 2012) Smart-PLS software assists in analyzing complex cause and effect relationships. This study is about the direct effects of GHRM practices onto GSC performance while altering the relationship with internal integration.

Measurement Model

Before moving to structural/inner model, it's necessary to meet quality criteria for measurement/outer model. Table 2 shows the factor item loadings for all measurement constructs, as suggested by (Hair et al., 2011) all item factor loadings are above 0.7 criteria and hence meet indicators reliability. To assess construct reliability, Cronbach's alpha (CA) and composite reliability (CR) was used. The suggested threshold value for CA and CR should be greater than 0.70 and 0.80 respectively (Hair et al., 2020), Table 3 shows the value above threshold limit indicating there is good internal consistency reliability. For convergent validity all construct's average variance extracted should be greater than 0.50 (Hair, Sarstedt, Ringle, et al., 2012). Table 3 shows that each construct associates with a high degree of convergent validity.

Discriminant validity refers to the fact that the indicators of each construct should not correlate with the indicators of other constructs. We used "heterotrait-monotrait ratio" (HTMT) to analyze discriminant validity as suggested by (Henseler et al., 2015) that HTMT is more suitable than Fornell–Larcker criteria. The criteria to achieve discriminant validity is HTMT value should be lower than 0.85. From Table 4, it's observed that the highest obtained value for HTMT is 0.877, which is somewhat acceptable. Thus, all the constructs meet the criteria for discriminant validity.

Table 2: Factor's Loading Analysis

Constructs	GRI	GSCP	GT	II	MS
GRI1	0.880				
GRI2	0.892				
GRI3	0.890				
GSCP1		0.872			
GSCP2		0.895			
GSCP3		0.881			
GSCP4		0.863			
GT1			0.879		
GT2			0.847		
GT3			0.882		
GT4			0.871		
II1				0.908	

II2	0.919	
II3	0.912	
II4	0.915	
II5	0.914	
II6	0.914	
MS1		0.755
MS2		0.770
MS3		0.786
MS4		0.773
MS5		0.730
MS6		0.760

Notes: GRI = Green Reward and Incentive; GT= Green Training; MS = Managerial Support; II = Internal Integration; GSCP = Green Supply Chain Performance
Source: Autor's own creation

Table 3: Reliability and Validity

Constructs	Cronbach's alpha	Composite reliability	Average variance extracted (AVE)
GRI	0.865	0.865	0.787
GSCP	0.901	0.904	0.771
GT	0.893	0.902	0.756
II	0.960	0.961	0.835
MS	0.856	0.859	0.581

Notes: GRI = Green Reward and Incentive; GT= Green Training; MS = Managerial Support; II = Internal Integration; GSCP = Green Supply Chain Performance
Source: Autor's own creation

Table 4 Discriminant validity

Constructs	GRI	GSCP	GT	II	MS	II * GRI	II * MS	II * GT
GRI	-	-	-	-	-	-	-	-
GSCP	0.799	-	-	-	-	-	-	-
GT	0.478	0.335	-	-	-	-	-	-
II	0.775	0.630	0.738	-	-	-	-	-
MS	0.849	0.696	0.766	0.877	-	-	-	-
II * GRI	0.047	0.090	0.475	0.144	0.371	-	-	-
II * MS	0.407	0.351	0.300	0.189	0.408	0.437	-	-
II * GT	0.446	0.328	0.324	0.138	0.256	0.013	0.333	-

Notes: GRI = Green Reward and Incentive; GT= Green Training; MS = Managerial Support; II = Internal Integration; GSCP = Green Supply Chain Performance

Structural Model

The coefficient of determination (R^2) is used to evaluate structural models. (Hair et al., 2019) describe coefficient of determination (R^2) as the sum of independent variables

described by dependent variables. R^2 values are calculated for all constructs; values are 0.10, 0.30 and 0.60 for endogenous variables in structural model normal, moderate and large respectively (Chin, n.d.) Figure 2 shows the value of R^2 for green supply chain performance (R^2 = 0.554) that is considered dependent variable largely explained by independent variable and accepted. Fitness of the model was evaluated with standardized root mean square (SRMR). According to (Hair et al., 2011; Henseler et al., 2015) SRMR value should be less than 0.08 to achieve model fitness, extracted value was 0.043 and hence signifying the satisfactory level of model fitness.

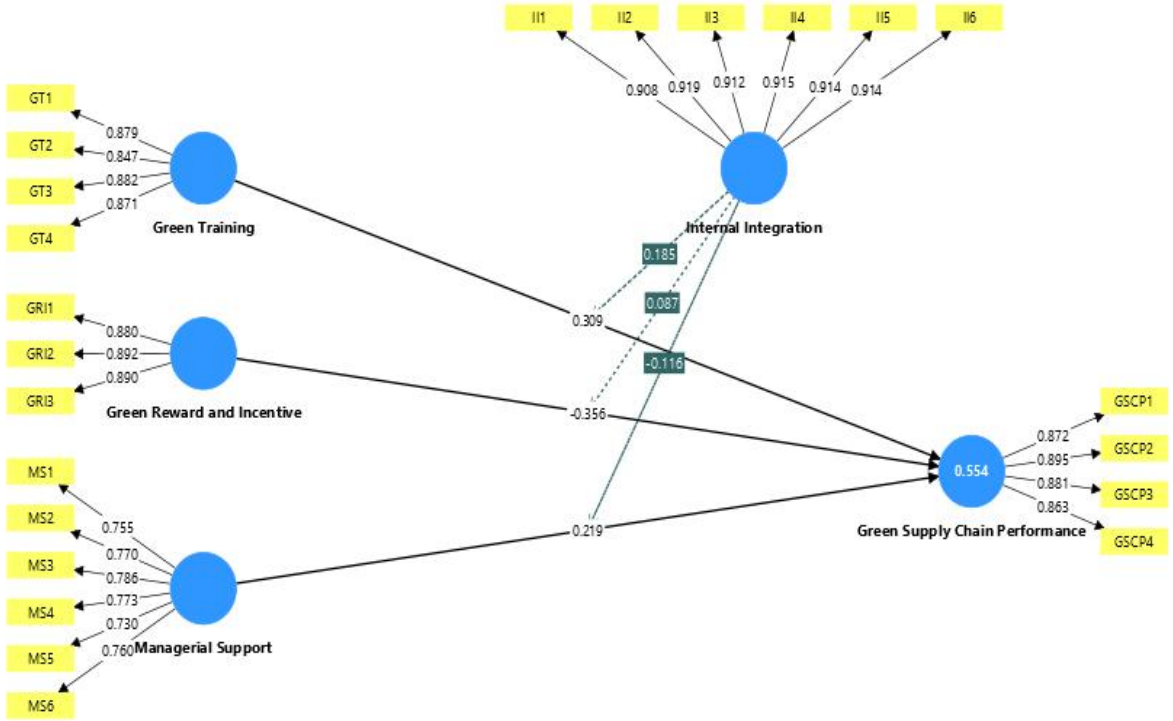


Figure 2.
Measurement Model

Hypotheses Testing

The hypotheses were tested through 5,000 bootstrap methods and at significant level (α) 0.05 using SmartPLS software. At significant level (α) 0.05, p-value should be below 0.05 for hypothesis acceptance criteria. Table 5 and Figure 3 reveal the hypothesis's result.

Table 5: Hypotheses Testing For Hypothesis Acceptance

Hypotheses	Relationships	β	t	p
H_{Ao} - H_{A1}	GT -> GSCP	0.309	4.296	0.000
H_{Bo} - H_{B1}	GT - II -> GSCP	0.185	3.530	0.000
H_{Co} - H_{C1}	GRI -> GSCP	-0.356	3.951	0.000
H_{Do} - H_{D1}	GRI - II -> GSCP	0.087	1.026	0.305
H_{Eo} - H_{E1}	MS -> GSCP	0.219	2.819	0.005
H_{Fo} - H_{F1}	MS - II -> GSCP	-0.116	1.346	0.178

Notes: GRI = Green Reward and Incentive; GT= Green Training; MS = Managerial Support; II = Internal Integration; GSCP = Green Supply Chain Performance

Hypothesis H_{A0} - H_{A1}

There is a significant positive relationship between green training and GSC performance (β = 0.309; t = 4.296; p = 0.000), as GT increases GSCP tends to increase. Thus, an alternate hypothesis (H_{A1}) is accepted.

Hypothesis H_{B0} - H_{B1}

Internal integration positively moderates the relationship between green training and green supply chain performance (β = 0.185; t = 3.530; p = 0.000). Hence, alternate hypothesis (H_{B1}) accepted. The positive effect of β-coefficient suggests that the higher the II, the stronger positive relation in GT and GSCP.

Hypothesis H_{C0} - H_{C1}

There is a significant negative relation between green reward & incentive and green supply chain performance (β = -0.356; t = 3.951; p = 0.000). So, an alternate hypothesis (H_{C1}) is accepted. However, the negative β-coefficient tends to show negative relations that means higher the GRI will negatively impact GSCP.

Hypothesis H_{D0} - H_{D1}

There is no significant result obtained for internal integration moderating GRI and GSCP (β = 0.087; t = 1.026; p = 0.305). Thus, the alternate hypothesis (H_{D1}) is rejected.

Hypothesis H_{E0} - H_{E1}

There is a positive relationship between managerial support and green supply chain performance (β = 0.219; t = 2.819; p = 0.005). Therefore, an alternate hypothesis (H_{E1}) is accepted.

Hypothesis H_{F0} - H_{F1}

The study did not show any significant moderation relation of internal integration with managerial support and green supply chain performance (β = -0.116; t = 1.346; p = 0.178). Ultimately, rejects the alternate hypothesis (H_{F1}).

Summary of Hypotheses Testing

Table 6 Summary of Hypotheses Testing

Hypothesis	Result
H_{A0}: β = 0.309; t = 4.296; p = 0.000	Accepted
H_{B0}: β = 0.185; t = 3.530; p = 0.000	Accepted
H_{C0}: β = -0.356; t = 3.951; p = 0.000	Accepted
H_{D0}: β = 0.087; t = 1.026; p = 0.305	Rejected
H_{E0}: β = 0.219; t = 2.819; p = 0.005	Accepted
H_{F0}: β = -0.116; t = 1.346; p = 0.178	Rejected

Discussion & Conclusion

This present study intends to investigate the influence of GHRM practices like green training, green reward and incentive and managerial support as well moderation of II on green supply chain performance in a textile sector of Karachi, supported by SET. The findings support 4 out of 6 proposed hypotheses. The finding suggests that GT and MS have a direct positive impact on GSCP and hence contribute to enhancing GSCP. While GRI has a negative direct impact on GSCP so up to a certain level GRI impacts GSCP. The moderation effect of II is only significant between GT and GSCP. While in the other two moderation relations, i.e. II with GRI-GSCP and MS-GSCP, no direct significant moderation relation was found.

Discussion of Direct Effects

- In response to RQ1 and SET, the finding shows the significant positive effect of GT with GSCP which is also aligned with prior studies (Chen et al., 2022; Graham et al., 2023; Le & Tham, 2024), which suggests when employees are well equipped with knowledge, they implement those practices and ultimately assist in improving GSCP.
- Addressing RQ2 and SET, unexpected negative relation found in GRI and GSCP. One possible explanation is that the current reward system is not effectively communicated to motivate towards desired green behavior. As (Al-Alawneh et al., 2024) highlights that poorly maintained incentive system may lead without any real impact. This finding challenges the conventional view that GRI always tends to enhance GSCP, one of the studies (H. Xie et al., 2024) findings also highlight the same issue and opens the door for further investigation.
- In response to RQ3 and SET, significant positive direct relationship found in MS and GSCP, which defines when management priorities environmental practices and encourages employees to do so this will lead to enhance in GSCP (Al-Swidi et al., 2021; Amrutha & Geetha, 2021). So, this result reveals the critical role of leadership to attain a GSC environment.

Discussion of Moderation Effects

- The significant positive moderation relation of II with GT * GSCP suggests a positive response to GT enhancement when there is strong II. It means when different functions of the organization work collaborate, skills and knowledge acquired from GT are more effectively implemented to make progress in GSCP (Graham et al., 2023).
- The non-significant moderation effect of II on the relation between GRI and GSCP suggests that II does not significantly alter the relationship. Perhaps the GRI system is strong on its own (Muisyo & Qin, 2021). So, there is a need to further study the design and implementation of GRI separately.
- The direct role of MS with GSCP is significant, however when coupled with altering relationship with II, a non-significant impact found this could be due to non-synchronization of common goals between different department top management.
- Regarding RQ4 and SET, II significantly moderate the relation between GT and GSCP but not with GRI or MS with GSCP and not align with SET and RQ4.

In short, this research majorly aligns with previous research that GHRM practices can lead to betterment of GSCP and builds strong ground for the organizations to adopt GHR practices into account to reduce hazardous effects to meet global criteria and maintain long term profitability.

Recommendations And Conclusion

Recommendations

This study recommends some actionable practical implications to policy makers and textile industry leaders:

Develop green training programs to equip employees with the knowledge that how they can achieve operational efficiencies along with environmental goals. Ensure periodic training and performance evaluation to strengthen employee learnings and green practices adoption. Redesign green reward and incentive systems that synchronize with organizational culture and environmental needs. Balance is needed in between

monetary and non-monetary rewards such as career growth and public recognition to better attain environmental objectives. Top managers should take visible decisions that show commitments to pro-environmental attitudes. While middle and lower management needs to follow a green strategic vision. Promotes intra-departmental collaboration and communication to ensure shared environmental objectives, joint problem solving and green practices across departments. Textile companies should take initiatives to embed core GHRM practices into core business functions that facilitate knowledge sharing and reciprocate to green practices.

Limitations and future research direction

This study is limited to the textile sector in Karachi and may not be generalized to any other industry and region. Current study dealt only with three GHRM perspectives i.e. GT, GRI and MS future research can also take other perspectives into account like teamwork, green empowerment, green hiring and green performance management etc. Also, this study is limited to internal integration. Future studies may take other moderate variables into account like supplier integration and customer integration. Employee environmental commitments, cultural influence, technological readiness and organizational green support may have other moderate variables for future direction.

Conclusion

This study explores the role of green human resource management (GHRM) practices on green supply chain performance (GSCP) while analyzing the moderating role of internal integration (II) in the textile sector of Karachi, Pakistan. Social exchange theory (SET) highlights the reciprocity of the relationship of employees with that company in fostering adoption of green environmental practices.

Analysis confirmed that green training (GT) and managerial support (MS) have significantly impacted green supply chain performance (GSCP), emphasizing policy makers to invest in employee training and development and maximize top management commitment. The current green reward and incentive (GRI) system shows some potential issues in design, shows relation with GSCP in negative magnitude and hence redesigning is mandatory to current system alignment with organizational culture and environmental goals. Additionally, II alters the relationship with GT and GSCP while insignificant with GRI and MS.

In short, not all GHRM practices effectively contribute to enhancing GSCP. Their success is contingent with firms' policies for how they implemented these practices. Thus, this study contributes to both academic understanding and practical implications.

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