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KEYWORDS	ABSTRACT
Green HRM, Employee Green Behavior, Green Supply Chain Management, Sustainability, AMO Theory, Mediation	<p>Although it has become known that successful implementation of GSCM depends on workforce behavior, the mechanism by which the practices of Green Human Resource Management (GHRM) can lead towards successful implementation of GSCM is still not empirically verified. Based on Ability–Motivation–Opportunity (AMO) model and Social Exchange Theory, this study proposes and tests Employee Green Behavior (EGB) as the behavior mediator between the GHRM–GSCM relationship. The six industry sectors of multinational company (MNC) in Pakistan were sampled using stratified random sampling with total of N = 370 employees and data were analyzed in SmartPLS 4.1.1.6 software. The measurement model established excellent fit (CFI = .995; TLI = .995; RMSEA = .015; SRMR = .033; GFI = .944). All four hypotheses were supported as GHRM was a strong predictor of EGB ($\beta = .496, p < .001; f^2 = .327$) and EGB was a significant predictor of the GSCM implementation ($\beta = .401, p < .001$). The results not only highlight that the GHRM can be considered strategically important GSCM enabler but offer some practical implications for managers who want to use green training, green performance appraisal & employee environmental participation to develop workforce dispositions that support maintaining of supply chain sustainability practices.</p>
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INTRODUCTION

Due to mounting environmental pressures, the sustainability movement has been incorporated into organizations' core management systems, resulting in the emergence of two interrelated research streams: Green Human Resource Management (GHRM) & Green Supply Chain Management (GSCM). GHRM is the conscious linkage of HRM practices (recruitment, training, performance assessment and

rewards) and organization's environmental goals, to make employee a part of environment instead of a victim of the environment's policies (Renwick, Redman & Maguire, 2013; Aboramadan, 2022). GSCM also involves the integration of environmental considerations in inter-organizational supply chain processes such as green procurement, eco-design, internal environmental management and reverse logistics (Zhu & Sarkis, 2004; Jabbour & Jabbour, 2016). Although there is evidence that GSCM practices can have positive benefits for environment (Graham, Zammit & McCabe, 2023; Agyabeng, Ahenkorah, Dacosta & Tachie, 2020), behavioral mechanisms at employee level by investments in HR lead to effective execution of GSCM have received little theorization and little empirical examination.

This gap is consequential because it means. Although Jabbour and Jabbour (2016) conceived the relationship between GHRM and GSCM as people intensive, the relationship between two constructs at an individual-level, as far as we can see, has never been tested empirically. Previous research has either conceptualized GHRM and GSCM as parallels antecedents of the environmental performance (Agyabeng, 2020) or as the direct cause-and-effect relationships (Saeed, Afsar, Cheema & Javed, 2021), however neither has the employee green behavior (EGB) as the mediation mechanism been considered. EGB includes both in-role pro-environmental behaviors which are required as part of the job, and extra-role discretionary behaviors which are performed beyond the job requirements (Bissing, Iyer, Fielding & Zacher, 2013; Dumont, Shen & Deng, 2017). Thus, effectiveness in the implementation of GSCM depends on the daily decisions made by employees involved in various procurement, manufacturing, logistics and supplier management processes, and if the employees are unskilled with environmental ability, motivation and opportunity, they will implement GSCM superficially, despite having green assurance (Nureen, Sun, Irfan & Nuta, 2022; Graham, Zammit & McCabe, 2023).

This study fills that gap; it is based on two complementary theoretical frameworks. The individual mechanism is provided by theory of ability, motivation, opportunity (AMO) (Appelbaum, Bailey, Berg & Kalleberg, 2000): green training (ability) creates environmental competence, while green appraisal and reward (motivation) drive pro-environmental behavior, and participative decision-making structures (opportunity) allow for discretionary environmental action. The Social Exchange Theory (SET; Blau, 1964) supports concept by suggesting that employees will return an organization investment (reciprocity) with green behaviors that go beyond norm (Aboramadan, 2022; Dumont et al., 2017). These frameworks help to make sense of why GHRM activates EGB, and why EGB, in turn, sustains GSCM practices. The study is carried out in Pakistan, a fast-industrializing economy where environmental regulatory enforcement is inconsistent but where MNCs are increasingly under pressure from global buyers, corporate and parent company environmental, social, and governance (ESG) standards, and environmental compliance requirements of global value-chain (GVC) partners (Hameed, Khan, Islam, Sheikh & Naeem, 2020; Shah, Cheung, Bhatti, Farrukh & Raza, 2022; Nureen et al., 2022).

Theoretically, this context is important as MNCs in less developed economies can bring in advanced environmental management standards that interact with the local context of the workforce in ways that are not fully understood (Ghani et al., 2023), and their GHRM systems could be institutional

mechanisms that disseminate sustainability norms without the pressure of government regulations. This study has three contributions to make. Firstly, it empirically tests the EGB as the behavioral mediator in the GHRM-GSCM chain for first time, making [Jabbour and Jabbour \(2016\)](#) hypothesis of EGB as the behavioral mediator at GSCM level come to life that ultimately allow for discretionary environmental action. Secondly, it addresses the need of [Amrutha and Gupta \(2020\)](#) for empirical test of theoretical proposition of EGB as behavioral mediator in GHRM-GSCM chain in realizing the desired leading consequences. Second, it extends AMO theory's explanatory domain by taking it beyond the green outcomes, to the adoption of HR systems. Third, it provides the evidence-informed insights for HR directors and supply chain managers in MNCs doing business in emerging markets, and shifts the focus for GHRM investment to a strategically important GSCM enabler from a side product HR role.

LITERATURE REVIEW

This study is based on Ability–Motivation–Opportunity (AMO) model ([Appelbaum et al., 2000](#)), which posits that employee performance is a function of three mutually–dependent factors: ability to perform (knowledge and skills), motivation to perform (incentives and rewards), and opportunity to perform (structural and participatory conditions). What is crucial, is the idea that HR practices do not directly result in organizational outcomes, but act through the individual employee, the sum of whose AMO conditions represents the mechanism that transforms the HR system–level inputs into observable behavioral outputs ([Bos, Riemsdijk & Looise, 2013](#)). The pathway logic of this study is as follows: the individual level of ability, motivation, and opportunity is a function of GHRM practices; and if ability, motivation, and opportunity are translated to employee green behavior (EGB), EGB is behavioral mechanism that leads to green supply chain management implementation ([Hameed, Khan, Islam, Sheikh & Naeem, 2020](#)). In systematic review of 104 studies on AMO, [Bos et al. \(2023\)](#) find that AMO–aligned HR practices have synergistic, not just additive, effects on performance, a conclusion that holds true in the context of GHRM systems, which are composed of multiple practices working together.

The three pillars correspond to the following good practices in the field of GHRM in the green AMO literature. The green training and development (T&D) are the ability dimension as employees are empowered with environmental knowledge and competencies to take action towards green goals ([Jabbour & Jabbour, 2016](#); [Rayner et al., 2017](#)). The green rewards, compensation and performance evaluation are related to motivation, where the individual incentives are tied with environmental considerations of the organization ([Renwick et al., 2013](#); [Anwar et al., 2020](#)). Green recruitment and employee involvement tackle the opportunity by establishing the structures and composition of the workforce that enable green intentions to manifest as action ([Yu, Chavez, Feng, Wong & Fynes, 2020](#); [Fawehinmi et al., 2023](#)). However, crucially, there is no prior study that has identified EGB as the specific mediating mechanism between GHRM and GSCM implementation as the downstream operational outcome, especially in contexts of MNCs in Pakistan as green awareness is inconsistent across organizational levels, regulatory enforcement is lax & MNCs have to balance out both global sustainability and local institutional constraints ([Aftab et al., 2022](#); [Saeed et al., 2021](#)). The present study fills this gap.

Green HRM & Employee Green Behavior

Human resource management is a vital part of the business and is also controlled by environmental factors. Green Human Resource Management (GHRM) is defined as conscious integration of HRM policies as well as practices (recruitment, training, performance appraisal, compensation, employee participation) with the objectives of environmental management, so as to equip, encourage and empower employees to support the objectives through their work behaviors (Renwick, Redman & Maguire, 2013; Amrutha & Gupta, 2020). The field's most cited contribution, the foundational review by Renwick et al. (2013), provided the framework for the AMO (architecture, modelling, and optimization) architecture for GHRM, as well as its core domains of practice. Previous research has either conceptualized GHRM and GSCM as parallels antecedents of environmental performance. Ren, Tang and Jackson (2018) then posited that the effectiveness of GHRM is not only due to the formal design of these practices but similarly to the perception and experience of these practices by employees, which therefore highlights the significance of the employee-level behavioral pathway as tested in this study.

The empirical findings of Masri and Jaaron (2017) have shown that all five core practices of GHRM, namely green recruitment and selection, training and development, performance management, rewards and compensation and employee involvement have positive impact on the environmental performance; further, Amrutha and Gupta (2020) conducted a systematic review of 174 articles and found that EGB is critical mediating mechanism that connects GHRM & sustainability outcomes. In one of the most cited empirical studies in the field (814 citations), Saeed et al. (2018) corroborated this relationship with Pakistani manufacturing industry, showing that GHRM practices in aggregate predict pro-environmental behavior via pro-environmental psychological capital. In MNC context specifically, Arshad et al. (2025) reported the GHRM – sustainability linkage in five major MNCs in Pakistan and Huo et al. (2022) reported sequential GHRM – EGB mediation in 390 employees of manufacturing firms in Pakistan. However, no such research has been existing in Pakistan context to check GHRM as an antecedent of GSCM implementation in MNC context, which has been done in the present study. Accordingly:

H1: Green Human Resource Management practices are positively related to the Employee Green Behavior.

Employee Green Behavior

Employee green behavior (EGB) is defined as behaviors that are relevant to the environment and performed by employees that have a direct or indirect impact on the organizational environmental sustainability (Norton et al., 2015; Zacher et al., 2022). Green behaviors by employees (EGB) can be divided into required (in-role) green behaviors, which are behaviors that are prescribed by formal job tasks, and voluntary (discretionary and proactive) green behaviors, which are not prescribed by formal job tasks (Dumont et al., 2017; Katz et al., 2022). First, Katz et al. (2022) conducted a meta-analysis ($k = 135$, $N = 47,442$) that revealed a common nomological network for both dimensions and concluded that it is an empirically justified practice to use a unified operationalization of EGB when it is used as pathway variable in relationships between organizational practices and outcome, but not as a differentiated end-point. Second, Tang et al. (2023) in a systematic review have also

verified that consolidated EGB scales are best suited if the research question addresses EGB's role as a group in converting HR inputs to organizational outputs. Third, there are unified constructs used in all the studies that use EGB as a mediator, according to [Zhang et al. \(2024\)](#) bibliometric analysis of 275 studies on EGB.

There is strong and cross-contextual empirical support for the GHRM and EGB relationship. GSCM implementation is realized through day-to-day actions of employees at various stages of the value chain, including procurement, production, logistics, and supplier management and is not necessarily an automatic process once GSCM is strategically adopted ([Jabbour & Jabbour, 2016](#); [Graham et al., 2023](#)). Employees with green behavior disposition based on AMO are the ones who are most likely to support and sustain GSCM practices in their work roles and employees without green behavior disposition based on AMO will only implement the GSCM superficially, ([Nureen et al., 2022](#); [Liu et al., 2020](#)). In 394 manufacturers in UK, [Graham et al. \(2023\)](#) verified that employee engagement mechanisms play significant mediator role amid GSCM practices and environmental performance, which is the closest existing empirical evidence for EGB → GSCM pathway. However, none of the studies so far makes EGB as particular mechanism at employee level to implement GSCM. [Amrutha and Gupta \(2020\)](#) made clear in their systematic review the need for such tests. The present study is a response to this call:

H2: There is positive relationship amid employee green behavior & implementation of green supply chain management.

Green Supply Chain Management

Green supply chain management is application of environmental thinking into inter-organization supply chain practices such as internal environmental management, green purchasing, eco-design, customer cooperation, investment recovery & reverse logistics with aim of minimizing environmental externalities throughout life cycle of product ([Zhu & Sarkis, 2004](#); [Srivastava, 2007](#); [Agyabeng et al., 2020](#)). [Jabbour and Jabbour \(2016\)](#) set the theoretical groundwork of the relationship between GHRM and GSCM and proposed that the implementation of GSCM is inherently people intensive and that GHRM is required for effective implementation. This direct GHRM → GSCM relationship has since been empirically confirmed: [Saeed et al. \(2021\)](#) in the manufacturing sector in Pakistan; [Gelagay et al. \(2024\)](#) in manufacturing sector in Ethiopia; and [Kara et al. \(2022\)](#) in the automotive sector in Turkey, each finding positive relationship amid GHRM and GSCM without individual-level behavior mechanism. The present study preserves this direct path, and adds additional, individual-level mediating mechanism that is in line with AMO theory stating that HR practices work both directly, via the organizational systems and structures, and indirectly, via individual behaviors they trigger. Accordingly:

H3: There is a positive relationship between the implementation of GSCM and the practices of the Green HRM.

Employee Green Behavior as a Mediator

Combining the theory, AMO framework suggests that GHRM practices will positively influence the GSCM implementation via two parallel paths: a direct pathway (H3) and an indirect pathway (H1

and H2 combined) through EGB. This mediation structure aligns with AMO's fundamental premise that HR systems exert an influence on organizational outcomes both directly, through the structural changes that they bring about, and indirectly, through the behavioral changes that they trigger in individual employees (Bos et al., 2013; Beltrán et al., 2018). Empirical examples of this mediated chain are Hosain et al. (2025) who demonstrated the mediator role of EGB between GHRM and the environmental performance of manufacturing industry in Bangladesh using SmartPLS and Shahzad et al. (2023) who confirmed mediator effect of EGB between GHRM and sustainable performance. However, none of the previous studies has tried to test mediation of EGB between GHRM and GSCM implementation in context of a Pakistan MNC. The present study attempts to fill gap with following mediation hypothesis:

H4: The Green HRM practices are positively associated with the GSCM implementation with EGB as the mediator.

RESEARCH METHODOLOGY

To test the framework of this study, 5-point Likert scale questionnaire was used to collect data from employees working in selected MNCs operating in Pakistan. The target population of study were individual employees working in seven MNCs operating in Pakistan. Stratified sampling technique was employed by dividing the population into two strata i.e. managerial staff and non-managerial staff. MNCs included in study belonged to five main sectors i.e. Information Technology, Telecom, Food & Beverage, Fast-Moving Consumer Goods & Pharmaceuticals. Initially, 450 questionnaires were distributed among the target participants of study. However, 370 usable questionnaires were returned. This means that the response rate for this survey was 82 percent, which meets the criteria of academic research (Baruch & Holtom, 2008). The demographic statistics indicated that 65% of the respondents were male, while 35% were female. Similarly, majority of the participants fall in 25-44 years age group (25-34 = 37%, 35-44 = 32%, 45-55 = 14%, <25 = 11%, and >55 = 6%). Also, a most of the participants were master's level qualification (51% masters, 39% bachelors, and 10% doctorate), whereas, most of the participants possessed 1-7 years of experience with their respective employers (1-3 = 34%, 4-7 = 32%, 8-12 = 17%, and >12 = 9%). Tables 1 present the industry-wise distribution of respondents.

Table 1 Industry-Wise Distribution of Respondents

Industry	N	%
FMCG	80	21.6%
Food & Beverages	62	16.8%
IT	39	10.5%
Manufacturing	91	24.6%
Pharmaceutical	53	14.3%
Telecommunication	45	12.2%

Measures of Study

Constructs were operationalized over use of well-established and peer-reviewed scales adapted from the literature. The items to measure green human resource management were extracted from

Agyabeng-Mensah et al. (2020) and Yu et al. (2019), which include green training and education, green performance measurement, green reward and promotional schemes, green recruitment, and employee involvement in environmental decision-making. Measure of Employee Green Behavior (EGB) was measured with eleven items adapted from Dumont et al. (2017), Bissing-9 Olson et al. (2013): five items for in-role green behavior (task-embedded environmentally responsible conduct) and six items for extra-role green behavior (voluntary, discretionary environmental action). In this study, EGB is considered as one construct for mediation analysis, as done by Katz et al. (2022) and Zhang et al. (2024). To measure the Green Supply Chain Management (GSCM), eight items, which cover internal environmental management, green purchasing, eco-design, customer cooperation, reverse logistics and investment recovery, were selected from work of Zhu and Sarkis (2004) and Zhu et al. (2008). Each item was scored on five-point (1-5) Likert scale, with 1 representing Strongly Disagree and 5 representing Strongly Agree. The data were analyzed in SPSS and SmartPLS in the following order.

Table 2 KMO and Bartlett's Test of Sphericity

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.950
Bartlett's Test of Sphericity	Approx. Chi-Square	4407.114
	DF	276
	SIG.	.000

Note. Extraction method: PCA. Type: Rotation: Promax with Kaiser Normalization

The KMO value of .950 falls well above the .80 level Kaiser (1974) recommended for factor analysis and Bartlett's test was significant with $p < .001$ ($\chi^2 = 4407.114$, $DF = 276$), indicating the correlation matrix is appropriate for factor analysis. The Promax rotated pattern matrix obtained a good three factor structure: There were no cross loadings greater than .40, which indicates factorial simplicity and construct distinctiveness. The reliability values were above .70 for all the three constructs in the current research study.

Figure 1 Confirmatory Factor Analysis

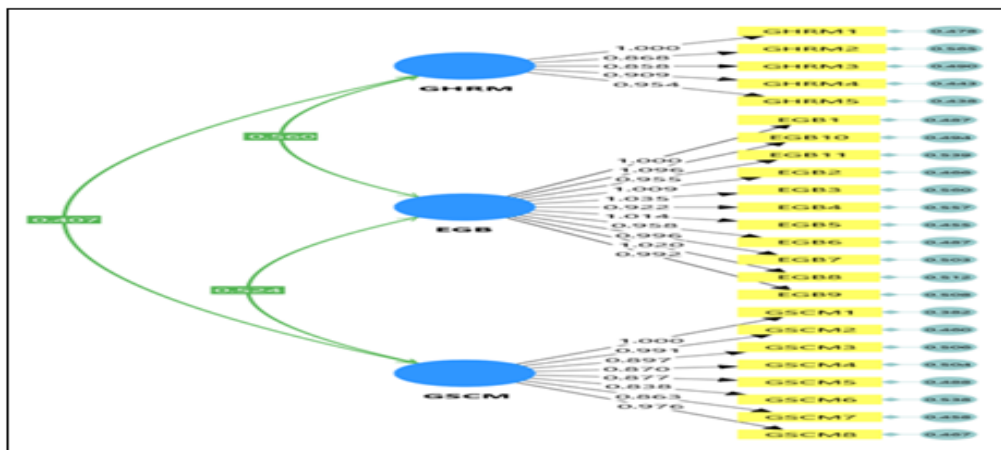


Table 3 Outer Loadings

	EGB	GHRM	GSCM
EGB1	0.718		
EGB10	0.746		
EGB11	0.683		
EGB2	0.729		
EGB3	0.705		
EGB4	0.664		
EGB5	0.734		
EGB6	0.703		
EGB7	0.71		
EGB8	0.716		
EGB9	0.708		
GHRM1		0.756	
GHRM2		0.678	
GHRM3		0.699	
GHRM4		0.737	
GHRM5		0.754	
GSCM1			0.795
GSCM2			0.764
GSCM3			0.714
GSCM4			0.704
GSCM5			0.712
GSCM6			0.679
GSCM7			0.718
GSCM8			0.756

Note. The results of the CB-SEM in SmartPLS 4.1.1.6 are all loadings. Recommended threshold: $\lambda \geq .60$ (Hair et al., 2019).

The outer loadings of all factors are between range .664 and .795 which is more than the minimum range of .60 recommended in CB-SEM literature (Hair et al., 2019). The lowest loading for the whole instrument was on EGB4 ($\lambda = .664$), therefore, this was not removed since it did not significantly enhance model fit or AVE, while reliability of constructs stayed high. Overall model fit indices are shown in Table 4.

Table 4 CB-SEM Model Fit Indices

	Estimated model	Null model
Chi-square	268.896	4527.438
Number of model parameters	51	24
Number of observations	370	n/a
Degrees of freedom	249	276
P value	0.184	0
Chi SQR/DF	1.08	16.404
RMSEA	0.015	0.204
GFI	0.944	n/a

AGFI	0.932	n/a
PGFI	0.783	n/a
SRMR	0.033	n/a
TLI	0.995	n/a
CFI	0.995	n/a
AIC	370.896	n/a
BIC	570.485	n/a

Note. Fit indices were estimated with the CB-SEM in SmartPLS 4.1.1.6. Recommended thresholds: $\chi^2/DF < 3.0$ (Kline, 2016); RMSEA $< .06$ (Hu & Bentler, 1999); CFI, TLI $> .95$ (Hu & Bentler, 1999); SRMR $< .08$ (Hu & Bentler, 1999); GFI, AGFI $> .90$ (Jöreskog & Sörbom, 1996). All model fit indices are very good. The χ^2/DF ratio of 1.080 is far below < 3.0 limit and the non-significant p value ($p = .184$) shows that the model-implied covariance matrix is not appreciably different from the actual covariance matrix an increasingly difficult criterion to satisfy for samples of this size. RMSEA of .015 (90% CI: [.000, .026]) falls well below the .06 upper boundary recommended by Hu and Bentler (1999). Both CFI (.995) and TLI (.995) are greater than .95, which means there is a very close fit. Further support for adequacy of model is provided by SRMR (.033) and GFI (.944). The combination of these indices indicates that the three-factor measurement model is a very good representation of the observed data.

Table 5 Construct Reliability and Convergent Validity

	CA (Standardized)	CA (Unstandardized)	(RHO_C)	AVE
EGB	0.918	0.918	0.918	0.505
GHRM	0.847	0.847	0.847	0.526
GSCM	0.901	0.901	0.902	0.535

Note. CR = composite reliability (PC); AVE = average variance extracted; \sqrt{AVE} = square root of AVE (used for Fornell–Larcker criterion). Recommended thresholds: Cronbach's α and CR $> .70$; AVE $> .50$ (Hair et al., 2019; Fornell & Larcker, 1981).

The alpha values span from .847 (GHRM) to .918 (EGB) and the composite reliability (ρ_c) values are the same as alpha values here, as is appropriate for the CB-SEM estimation approach, and are all well above the .70 minimum (Hair et al., 2019). AVE scores range from .505 (EGB) to .535 (GSCM) and all scores are above the .50 threshold, which is the rule for achieving convergent validity (Fornell and Larcker, 1981). Although this is just a little above the threshold, within the construct's 11 items breadth, which cover two conceptually related but distinguishable behavioral modes, the EGB AVE is acceptable. Two complementary criteria – Fornell–Larcker criterion and the HTMT ratio – were employed to validate the discriminant validity. The results are given in tables 6 and 7.

Table 6 Heterotrait–Monotrait (HTMT) Ratio

	EGB	GHRM	GSCM
EGB			
GHRM	0.563		
GSCM	0.528	0.41	

Note. To confirm the discriminant validity of all HTMT ratios, they should be less than .85 (Henseler et al., 2015) or .90 (Gold et al., 2001). In this connection, no diagonal entries are available from the findings of study.

Table 7 Fornell–Larcker Criterion (Square Root of AVE on Diagonal)

	EGB	GHRM	GSCM
EGB	0.711		
GHRM	0.56	0.725	
GSCM	0.524	0.407	0.731

Note. Values in the diagonal (bold in manuscript) are the square root of the AVE; off-diagonal values are the inter-construct correlation. Therefore, for the purpose of establishing discriminant validity, the diagonal values must be greater than all of the off-diagonal values in the same row and column (Fornell & Larcker, 1981).

HTMT ratios are .563 (GHRM–EGB), .528 (EGB–GSCM), and .410 (GHRM–GSCM). All three are below the conservative .85 suggested by Henseler et al. (2015) and much lower than the more liberal .90 ceiling for conceptually similar constructs (Gold et al. 2001). The square root of each construct’s AVE – EGB (0.711), GHRM (0.725) and GSCM (0.731) surpass all inter-construct correlations, which satisfies the Fornell–Larcker criterion. The inter construct correlation is highest between GHRM and EGB ($r = .560$) and this is lower than the \sqrt{AVE} for each construct (0.725 and 0.711 respectively) as indicating that the three constructs are thus empirically distinct although theoretically related. This suggests a good degree of convergent and discriminant validity criteria, and indicates a sound measurement model.

Figure 2 Structural Model

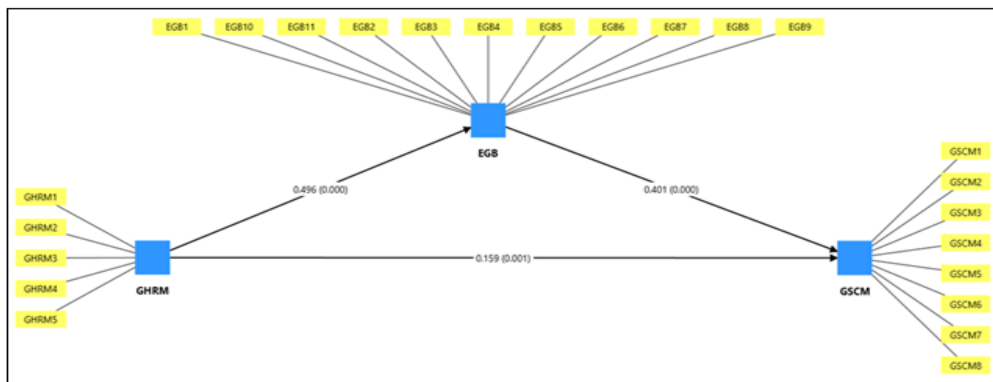


Table 8 Path Coefficients

	OS	SM	SD	TS	PV
EGB -> GSCM	0.401	0.401	0.051	7.826	0
GHRM -> EGB	0.496	0.495	0.039	12.601	0
GHRM -> GSCM	0.159	0.158	0.053	3.019	0.001

Note: β = standardized path coefficient, t-statistics = from 5,000-bootstrap resample. Significance: $p < .05$ = significant; $p < .001$ = highly significant (two-tailed).

The three direct pathways are statistically significant. The results support H1 ($\beta = .496, t = 12.601, p < .001$), suggesting that investment in green training, green performance systems, green rewards, green recruitment, and employee environmental involvement is correlated with a significant increase in employee environmentally responsible behavior. Employees' positive and significant association with GSCM implementation ($\beta = .401, t = 7.826, p < .001$) is consistent with H2, that is, that those that are more behaviorally involved in green practices at individual level are more likely to be involved in and implement green practices at the supply chain level. The direct path from GHRM to GSCM with EGB in the model is significant ($\beta = .159, t = 3.019, p = .001$), supporting H3 and suggesting that GHRM also has effect on GSCM through organizational-level mechanisms, which are not mediated by employee behavioral change. Table 9 illustrates the coefficient of determination (R^2) values for endogenous constructs

Table 9 Coefficient of Determination (R^2)

	OS	SM	SD	TS	PV
EGB	0.246	0.247	0.039	6.313	0.000
GSCM	0.249	0.252	0.042	5.889	0.000

Note. R^2 interpretation: .02 = small, .13 = moderate, .26 = substantial (Cohen, 1988).

The moderate model is EGB, which explains 24.6% of the variance in EGB. EGB is a moderate model, explaining 24.6% of the variance in EGB. GSCM was moderately associated with GHRM + EGB, accounting for 24.9% of the variance in GSCM. The model of GHRM explains 24.6 per cent of the variance in EGB ($R^2 = .246$), and model of GHRM and EGB explains 24.9 per cent of the variance in GSCM implementation ($R^2 = .249$). As R^2 values are both moderate to substantial (Cohen, 1988), this is expected and appropriate since there are a number of other organizational and institutional factors that influence GSCM implementation which lie outside of this study. According to the effect size analysis, the effect of GHRM on EGB has a large Cohen's f^2 which is .327, meaning that GHRM is practically significant impacting on employee green behavior, not just statistically significant. The direct effect of GHRM on GSCM is small ($f^2 = .025$) even after controlling for EGB, suggests partial mediation, indirect effect of EGB on GSCM via GHRM is medium ($f^2 = .162$). In addition to mediation analysis (specific indirect effect), Hayes Process Model (via SmartPLS 4.1.1.6) was employed, which are given in table 10.

Table 10 Specific Indirect Effects

	OS	SM	SD	TS	PV
GHRM -> EGB -> GSCM	0.199	0.199	0.031	6.351	0

Note. Estimates of indirect effects based on 5,000-bootstrap resampling.

The bootstrap distribution was used to assess significance (t-statistic and p-value). The total indirect effect of GHRM on GSCM through EGB is $\beta = .199 (t = 6.351, p < .001)$; the total direct effect is $\beta = .159 (t = 3.019, p = .001)$, confirming partial mediation (Baron & Kenny, 1986; Hayes, 2022). The indirect effect of GHRM on GSCM via EGB is $\beta = .199 (t = 6.351, p < .001)$, providing strong support for the H4. Mediation effects cannot be ruled out as GHRM to GSCM is still statistically significant

even when EGB is fed into the model ($\beta = .159, p = .001$); meaning that EGB plays a significant role but is not the only mechanism through which the relationship between GHRM and GSCM operates. Theoretically, this is consistent with the AMO framework which proposes that HR practices have direct effects on the organizational outcomes, but also have indirect effects via the individual employee's behavior (Bos et al., 2013; Beltrán-Martín et al., 2018). The indirect effect is .199 while the total effect is .556, which suggests that EGB explains around 55.6 per cent of the total impact of the GHRM–GSCM relationship, accounting for the significant share in the mediating process. The overall results of the four hypotheses confirm the hypotheses and show that green HRM investment leads towards the green supply chain behavior mainly over employee green behavior, but also via other behavior types.

DISCUSSION

The study measured the effect of the employee green behavior (EGB) as a behavioral mediator between green human resource management and green supply chain management in the execution of GSCM in Pakistani MNCs. There was strong support for all four hypotheses. The relationship between GHRM and EGB was strong ($\beta = .496, p < .001, f^2 = .327$), which is in line with the AMO framework (Appelbaum et al., 2000); green training develops environmental competence (ability); green appraisal and rewards provide motivation; and participative decision-making mechanisms provide opportunity; all combine to make investment in GHRM result in observable green behavior (Renwick et al., 2013; Bos et al., 2013). This large effect size is extended to an MNC setting with the presence of high differential levels of green awareness across organizational levels and is similar to Dumont et al. (2017) in the China's manufacturing sector and Saeed et al. (2018) in Pakistan. The spectrum of in-role and extra-role EGBs is expanded by employees who experience genuine pledge from their organization towards GHRM, which they respond to with discretionary green behaviors that lie beyond their job specifications (Aboramadan, 2022) and is consistent with Social Exchange Theory (Blau, 1964).

The EGB–GSCM path ($\beta = .401, p < .001; f^2 = .162$) has been identified to bridge the critical gap highlighted by Amrutha and Gupta (2020) in their systematic review of 174 GHRM studies, where they found that there is still a lack of empirical evidence on EGB as the behavioral link between HR systems and operational sustainability outcomes. The medium effect size is a good representation of the structural/ institutional factors that influence the GSCM vital implementation in addition to the individual behavior. The organizational level effects of GHRM on GSCM via policy design, supplier selection criteria, environmental governance structures, independent of individual behavior change (Saeed et al., 2021; Agyabeng et al., 2020), are captured by the residual direct GHRM–GSCM path ($\beta = .159, p = .001$). This dual channel finding builds on a literature which has modeled the GHRM–GSCM relationship solely as a direct channel (Saeed et al., 2021) or merely as a mediated channel (Shahzad et al., 2023; Hosain et al., 2025), but has not formally separated the contribution of the direct and indirect channels. The results indicate that MNCs, despite lack of consistent regulation by the host country, can be considered as institutional entrepreneurs as they spread sustainability norms without the support of the host country's crucial regulatory structure (Nureen et al., 2022; Hameed et al., 2020).

CONCLUSION

The results of this study show that sustainable supply chain management is in fact a human resource matter. EGB is the major channel for GHRM to influence GSCM implementation, with 55.6% of the total influence (organizations cannot green their supply chains without first green their workforce, through AMO aligned HR practices). Formalized GHRM for the Pakistani MNCs, which are facing increasing pressure for the sustainability from all over the world, is not the cost to reputation and compliance but it is a means of building the capacity for GSCM. These findings contribute to the integration agenda advanced by [Jabbour and Jabbour \(2016\)](#) for the field of people management and supply chain sustainability, and provide empirical support to the causally rigorous research program outlined below, which is contextualized in the field of people management. The findings support the integration agenda advanced in the field of the people management and supply chain sustainability by the [Jabbour and Jabbour \(2016\)](#) and provide empirical grounding for the causally rigorous research program outlined below, which is therefore contextually grounded in the field of people management.

Limitations & Future Research

This study is bounded by four limitations which could become a fruitful research agenda in the future. First, because of cross-sectional design, causal conclusions cannot be drawn: It is possible that reversed causation exists, meaning that higher green commitment of the employees leads to higher investment in GHRM, and it is possible that congruence bias exists because of the employees' green perception of HR practices. The longitudinal designs that assess GHRM at Time 1 and the EGB and GSCM outcomes at Time 2 (6-12 months later), quasi-experimental comparisons of pre/post GHRM implementation, & experience-sampling methodology would each offer stronger causal evidence. Second, as mentioned in the literature, the unified EGB operationalization (justified for mediation designs, in the context of designs focusing on mediation) prevents the investigation of differential mediation by in-role versus extra-role green behavior. Three-way interaction in ability, motivation, and opportunity dimensions in a hierarchical AMO model would further enhance the theoretical precision of the model.

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