



Impact of green supply chain management and green human resource management practices on the sustainable performance of manufacturing firms in Pakistan

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Abstract

Using the resource-based view theory, this paper explores the association between green human resource management and green supply chain management. Moreover, the collective impact of green human resource management and green supply chain management on the triple bottom lines (social, environmental, and economic performance) was tested. The current study employed a random sampling technique in evaluating data from 212 firms from the chemical, pharmaceutical, automotive, textile, and food industries. Our main findings include the following. First, green human resource management positively influenced the triple bottom lines. Second, green supply chain management mediates green human resource management and triple bottom lines. Specifically, internal green supply chain management mediates green human resource management practices and sustainable performance. In contrast, external green supply chain management practices only mediate the relationship between green human resource management practices and the environmental and social perspective of sustainable performance. The study provides managerial implications and future recommendations.

Keywords Green human resource management · Green supply chain management · Sustainable performance · Manufacturing industry · Pakistan

Introduction

The adverse effects of manufacturing companies' activities on the natural ecosystem pose a serious concern, which corroborates the need for a feasible process that fulfills social,

environmental, and economic demands (Abdullah and Thurasamy 2015; Diabat et al. 2013; Hussain et al. 2018; Khan et al. 2019). These companies are striving to optimize their scarce resources and efforts to maintain environmentally, economically, and socially appealing products (Ayuso et al. 2014; Sharif et al. 2017). However, balancing these perspectives effectively is challenging (George et al. 2018; Haffar and Searcy 2017).

Complexities arise when designing and implementing an environmental management system as it positively influences an organization's economic executions and resources (Epstein and Buhovac 2014; Sharif et al. 2020b; Suki et al. 2020). The continual decline in environmental quality and natural resources coupled with governmental pressures and competitive edge has compelled manufacturing companies to implement environmentally fulfilling alternatives (Sharif et al. 2020a, b, 2017).

Organizations strategically use green activities like business measures as a moral prerequisite to modify perceived social mentalities (Harris and Crane 2002). Consequently, research recommends overcoming such complexities by sharing green strategies in a cross-functional mode (Godil

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et al. 2021; Wagner and Blom 2011). This research analyzes how to spread green management effectively in supply chain and human resource functions. According to Sheehan (2014), the human resource (HR) is a crucial success factor for implementing policies, and procedures, and enhancing continual improvement. Additionally, HR significantly impacts how an organization performs, and top management sees HR as a strategic edge for organizational success (Kodua et al. 2022). Innovation and sustainability development result from human resource. They effectively utilize organizational resources, lessen threats and obstacles, and maintain competitiveness. Green human resource management (GHRM) combines environmental management with human resource management procedures (Kodua et al. 2022; Zhu et al. 2021). GHRM's primary focus is on using human resource management practices and principles to guarantee sustainable resource consumption and vehemently promote environmentalism (Kodua et al. 2022). Typically, "greening" focuses on using energy wisely with affordable costs and minimal waste (Bombiak 2020).

Supply chain management (GSCM) is an approach to managing a company's supply chain that incorporates environmental concerns throughout the various stages of the process, including product design, sourcing and selecting materials, manufacturing, delivering products, and managing their end-of-life. GSCM is considered a means of effective strategic management that improves manufacturing firms' environmental performance and other sustainability performance targets (Zaid et al. 2018). These functions are not extensively investigated as few studies have studied these two functions and their relationship (Zaid et al. 2018) and (Mousa and Othman 2020).

Thus, research into the transmission of green administration across various organizations and discovering equal outcomes and shared connections between multiple tasks is needed. This research focuses on green human resource management and supply chain objectives to fill this gap.

GHRM and green supply chain (GSC) are found in an idealistic manner when it comes to natural execution. From the literature, it is noticed that there are two reasons for the lack of research: first, scholars have only looked at theoretical findings, indicating that GHRM strategies are a major internal force of green supply chain management (GSCM) practices (Aragón-Correa et al. 2013; Cantor et al. 2012; Dubey et al. 2017), though external pressures on enterprises exist (Wolf 2014). Second, data collected on supply chain management (SCM) and human resource management (HRM) were based mainly on their relationship but rarely touched on the concept of "green" (Chiappetta Jabbour et al. 2017; Gómez-Cedeño et al. 2015; Hohenstein et al. 2014; Huo et al. 2015; Longoni et al. 2018; Nejati et al. 2017; Zaid et al. 2018). As per the literature, there is a greater need for further research to explore the trade-offs of GSCM and

GHRM under the triple bottom line's economic, environmental, and social performance. Studies, including Jabbour and Sousa Jabbour (2016), Fisher et al. (2010), and Acquah et al. (2020), have called for further inquiry. Consequently, the current study seeks to.

- (1) Establish the relationship between GSCM practices and GHRM among manufacturing companies in Pakistan.
- (2) Explore the relationship between GHRM and sustainable performance among manufacturing companies in Pakistan.
- (3) Explore the relationship between internal GSCM and external GSCM on sustainable performance

This research aims to contribute to the literature in the following novel ways. First, we explored the association between GSCM practices and GHRM from emerging economies' perspectives. Second, between GSCM and subsequent literature reports, this study seeks to clarify the causes of the success and failure of GSCM implementation among firms. Also, the study aims to understand better the organizational barriers that make GSCM challenging to adopt and implement.

Consequently, this study uses a mixed study of GHRM and GSCM methods in demystifying sustainable development, providing valuable insights and policy recommendations. This study develops and empirically validates a proposed theoretical framework with GHRM practices, internal GSCM, and external GSCM impacting sustainable performance (environmental, economic, and social performance) in the Pakistani manufacturing context. Mishra (2017), Mousa and Othman (2020), and Zaid et al. (2018) bemoaned the rarity of existential studies on GSCM and GHRM in developing nations.

Literature review and hypothesis development

The current study employs the resource-based view (RBV) theory by Wernerfelt (1984) and the ability, motivation, and opportunity theory by Blumberg and Pringle (1982). These theories are a management paradigm for formulating strategic enterprise tools that could be marshaled to gain a lasting competitive edge. From the RBV and green supply chain (GSC) definitions, there is a greater success when environmental and human resource management work together.

Green human resource management practices and sustainable performance

Green human resource management (GHRM) refers to a series of systems, policies, and practices designed to

stimulate employees' green behavior to establish an environmentally sensitive, resource-efficient, and socially responsible human resource (Al Kerdawy 2019, Kodua et al. 2022).

According to Jabbour and Santos (2008), green human resource management reflects green human resource management practices. This consists of human resource principles and practices that align with the three pillars of sustainability: a balance between the economy, society, and the environment, thus, mitigating the negative influence of businesses on the environment (Yusliza et al.). Greener activities in HRM are critical and should assist organizations in implementing and protecting an environmental management scheme to achieve higher environmental performance (Jabbour et al. 2010; Zhu et al. 2021). Indeed, GHRM plays an integral part in proliferating firms (Nejati et al. 2017). Companies must strike a balance between their expansion and environmental preservation and protection, according to Saeed et al. (2019). Combined with the environmental benefits, implementing a green strategy can increase an organization's attractiveness and retain skills, thus making GHRM an integral part of management (Patel 2014). GHRM has mainly orbited around the influence of green human resource management practices on performance (Longoni et al. 2018; Renwick et al. 2013). RBV is suitable for differentiating asset utilization. This is considered to impact a firm's environmental performance and ultimately enhance its economic performance (Ec.P) (Hameed et al. 2020; Solovida and Latan 2017). Therefore, through understanding GHRM practices, companies can sustainably advance environmental efficiency (Arulrajah et al. 2015). Consequently, we posit that:

H1a: Green human resource management practices are significantly related to environmental performance.

Some researchers conclude that employee motivation and qualification certification result from their green workplace practices, which may improve financial performance (Epstein and Roy 2001; Turban and Greening 1997). Employing individuals with green would attract a higher-quality workforce who will contribute to the organizational environmental reputation (Linnenluecke and Griffiths 2010; Ramus and Steger 2000). This is ideal for developing and encouraging employee environmental activities and interests, motivation, work-related results, retention, and improved performance (Margaretha and Saragih 2013; Wagner 2013, 2015). Margaretha and Saragih (2013) noted that firms are inclined to adopt green and sustainable business practices to improve efficiency, reduce costs, and provide employees with a conducive environment for employee engagement. According to Kucharska and Kowalczyk (2019) and Mehta and Chugan (2015), increased sales and

decreasing costs result from advertising a greener culture. Therefore, we posit that:

H1b: Green human resource management practices are significantly related to economic performance.

Companies stand to benefit in solving environmental problems, including improved employee satisfaction, good stakeholder relationship, positive brand image, and personnel retention (Khurshid and Darzi 2016; Mehta and Chugan 2015). According to Wagner (2013), these factors that improve an organization's social impact emanate from social responsibility programs. Bon et al. (2018) stated that manufacturing companies invest in social programs by strengthening GHRM.

Green human resource management practices can satisfy the environmental needs of employees and significantly improve their living conditions, thus impacting Ec.P (Renwick et al. 2013). Islam and Zhang (2019) confirmed that an improvement in employees' overall well-being results from the impact of the organization's HRM practices and policies. Considering this, we posit that:

H1c: Green human resource management practices are significantly related to social performance.

Green supply chain management practices and sustainable performance

Regarding external GSCM, Diabat et al. (2013) and Green et al. (2012) identified a favorable relationship between green procurement and customer collaboration as part of external GSCM practice and environmental performance. Environmental collaboration and green procurement would help manufacturers and consumers behave more environmentally responsible and reduce inefficiencies, resulting in a positive environmental efficiency of firms (Alkahtani et al. 2021; de Sousa Jabbour et al. 2017; Diabat and Govindan 2011; Fasan et al. 2021). Education and monitoring programs with suppliers can help organizations provide products with low-polluting components, thereby improving the organization's environmental performance (Gimenez et al. 2012). As per the above discussion, we hypothesize that:

H2: green supply chain management is positively related to environmental performance.

H2a: External GSCM is positively related to environmental performance.

H2b: Internal GSCM is positively related to environmental performance.

Existing literature has established a favorable association between economic performance and GSCM methods,

giving the organization a competitive edge (Green et al. 2012; Laosirihongthong et al. 2013; Rao and Holt 2005). Economic efficiency is becoming increasingly relevant, and producers are implementing proactive approaches such as green management, GSCM, and cleaner production methodologies to increase economic performance (Mousa and Othman 2020; Zhu and Sarkis 2007).

Environment-friendly manufacturing methods focus on the internal management green supply chain, leading to higher efficiency, resource depletion reduction, and cost savings (Gimenez et al. 2012; Mardani et al. 2020). For example, Koh et al. (2012) found eco-design as part of internal GSCM means of reducing waste and saving costs, thus positively impacting the organization's economic performance. Similarly, Sroufe (2006) pointed out a strong correlation between environmentally friendly management and cost savings.

Gimenez et al. (2012) emphasized that environmental cooperation with suppliers can improve production efficiency and costs. Additionally, through internal and external GSCM, specific organizational advantages are achieved, including higher sales (Kramer 2007). Holt and Ghobadian (2009) assert that external GSCM, including green purchasing, leads to economic performance (sales and market share, cost savings, and increased profits). Similarly, Carter et al. (2000) found that green purchasing is related to the decreasing cost of goods sold and increasing net income. Hence,

H3: Green supply chain management positively related to economic performance

H3a: External green supply chain management positively related to economic performance.

H3b: Internal green supply chain management positively related to economic performance.

Green practices improve employee working conditions and society (Rani and Mishra 2014). Implementing environmentally favorable manufacturing activities will positively impact the social level of employees and society (Elkington 2004b, a; Zaid et al. 2018; Mousa and Othman 2020). De Giovanni (2012) emphasized that organizations achieve economic goals, consumer protection, market transparency, and environmental protection through environmentally sustainable manufacturing. Therefore, organizations that incorporate GSCM make a positive contribution to social performance. Although empirical research about the relationship between GSCM practices and social performance is rare, eco-friendly practices, according to current empirical evidence, have major social functions, such as improving consumer loyalty (De Giovanni 2012), corporate image (Eltayeb and Zailani 2011), and healthy products, and working environment (Mutreja 2009). Therefore, it is posited that:

H4: Green supply chain management positively related to social performance.

H4a: External green supply chain management positively related to social performance.

H4b: Internal green supply chain management positively related to social performance.

Green human resource management practices and green supply chain management

The RBV, as proposed by Wernerfelt (1984), stipulates that the human resource management process makes employees unique and affects organizational performance. Chen et al. (2009) argue that utilizing skills in supply chain operations (both internal and external) helps the organization achieve its objectives. Furthermore, skilled employees in supply chain management can improve the production chain's performance, resulting in a long-term competitive edge (Ellinger and Ellinger 2014). The interplay of various mechanisms and resources may also bring competitive advantages (Hohenstein et al. 2014). Literature asserts that GSCM practices' successful application mainly relies on green human resource management practices (Chiappetta Jabbour et al. 2017). Thus, the lack of HRM practices leads to unmotivated employees, hindering the application of GSCM practices (Jabbour and de Sousa Jabbour 2016; Mousa and Othman 2020). GHRM is essential in advancing environmental ideology and principles and empowering employees. Longoni et al. (2018) confirmed that the GSCM approach mediates the GHRM approach and environmental performance. From the resource-based theory perspective, a comprehensive analysis of the relationship between these green methods and sustainable outcomes is carried out through the relationship between GRM-GSCM methods and sustainable outcomes.

Based on the above opinions, we posit that:

H5: The GHRM bundle positively relates to external GSCM practices.

H6: The GHRM bundle positively relates to internal GSCM practices.

H7: The internal GSCM practices mediate the relationship between GHRM practices and sustainable performance.

H7a: The internal GSCM practices mediate the relationship between GHRM practices and environmental performance.

H7b: Internal GSCM practices mediate the relationship between GHRM practices and economic performance.

H7c: Internal GSCM practices mediate the relationship between GHRM practices and social performance.

H8: The external GSCM practices mediate the relationship between GHRM practices and sustainable performance.

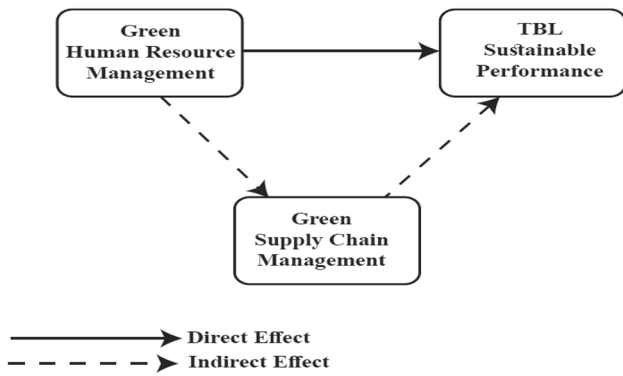


Fig. 1 Framework

H8a: The external GSCM practices mediate the relationship between GHRM practices and environmental performance.

H8b: The external GSCM practices mediate the relationship between GHRM practices and economic performance.

H8c: External GSCM practices mediate the relationship between GHRM and social performance.

Figure 1 illustrates the framework of the study pictorially.

Methodology

Data collection, sample, and procedures

We conducted a survey to test the above hypotheses to understand participants’ views on GSCM and GHRM practices. The participants for the study are top human resource managers and top supply chain managers. We surveyed each respondent separately to avoid discrimination.

Data was collated in Pakistan. The Karachi Stock Exchange of Pakistan (KSE) provided data on organizations’ names, locations, year of establishment, number of employees, and contact information. Manufacturing industries (chemical, food, automotive, textile, and pharmaceutical) on the (KSE) were contacted for the survey. From the KSE, the total registered manufacturing tallied at 554, from which 212 were contacted to partake in this study. Table 1 details the type of organizations contacted for this study.

For the study, we choose only those companies with green practices. These organizations have implemented some green initiatives, controlled their pollution levels, and adopted GSCM and GHRM specifications. To this end, human resource and supply chain managers were contacted for this research. We perceived that the human resource and supply chain managers are the best to provide accurate information that reflects the organizations’ situation.

Table 1 Organizations

Type of companies	Number of companies
Automotive	22
Chemical	28
Food	25
Pharmaceutical	13
Textile	124

Before the actual rollout of the survey, three senior professionals checked for errors, literal and literary meaning, questionnaire consistency, and survey item validity based on the pilot test outcome. Three hundred fifty questionnaires were sent out to the target audience. Two hundred sixty-five were received, representing a 75.5% response rate.

Measures

The study’s constructs responses were collated using a 5-point Likert scale which ranged from 1 (very low extent) to 5 (very high extent). GHRM practice is an independent variable with three dimensions (green training and involvement, green hiring, and green performance and compensation). We used an eleven-item GHRM practices scale adopted from Zaid et al. (2018) and Mousa and Othman (2020). GSCM practices were used as a mediating variable, having two dimensions: internal green supply chain management and external green supply chain management. The internal GSCM construct had internal environmental management as a dimension. In examining this, the study used six items modified from Zhu et al. (2013) and Zhu et al. (2008).

External GSCM construct had two dimensions: green purchasing and environmental cooperation. Green purchasing and environmental cooperation had five and six questionnaire items adapted from Zaid et al. (2018) and Mousa and Othman (2020).

Triple bottom line sustainable performance served as a dependent variable. Sustainable performance constructs had three dimensions: environmental performance, economic performance, and social performance, with items adapted from Zaid et al. (2018), Mousa and Othman (2020), Zhu et al. (2005), and Green and Inman (2005).

Analysis and results

In this study, PLS-SEM was employed in analyzing the data using SmartPLS 3.3.3. SmartPLS could identify conceptual framework assumptions and statistical properties simultaneously (Hair Jr et al. 2017; Peng and Lai 2012). PLS-SEM has been used extensively in empirical studies across different

disciplines, including pro-environmental behaviors (Adu-Gyamfi et al. 2022a, b, c; Cudjoe et al. 2022; Nketiah et al. 2022).

Measurement model assessment

The first step of PLS-SEM analysis is evaluating the measurement model to establish the reliability and validity of the construct. Therefore, the construct's reliability, convergence, and discriminant validity indicators were assessed. Measurement model scales for green human resource management practices, internal green supply chain management, external green supply chain management, and sustainable performance elements are exhibited in Tables 2, 3, and 4. Construct's item loading, composite reliability (CR), and average variance extraction (AVE) outcomes are exhibited in Table 2. According to Hair et al. (2010), indicator loading must be at least 0.50, of which all the factor loadings satisfy this criterion. Pagell and Shevchenko (2014) recommended that the threshold value for composite reliability is 0.7, and all the reflective construct's composite reliability was greater than 0.7. Hence, the reliability of constructs is achieved.

Similarly, the heterotrait-monotrait ratio (HTMT) was used to ascertain the constructs' discriminant validity. From Table 3, all the HTMT values were lesser than the upper threshold of 0.85, confirming the discriminant validity of constructs (Henseler et al. 2015).

Structural model analysis

Structural model evaluation was done in two steps. First, we examined multicollinearity by assessing the construct's variance inflation factor (VIF), as shown in Table 4. According to Fornell and Larcker (1981), the VIF of factors should be less than 5. Results for this study confirm no multicollinearity.

Next, we determined the quality and strength of the structural model using Peng and Lai (2012) recommendation. All test results were adequate. The findings of R^2 , relative effect size (f^2), and the Stone-Geisser Q^2 of the GHRM bundle construct are listed in Table 5, and all the values for Stone-Geisser Q^2 exceed the threshold of 0.

Finally, the path coefficient and its significance were evaluated. Table 6 represents the beta and t values for direct relation. The proposed hypotheses were tested by running a bootstrap of 5000 (Ramayah et al. 2018).

As per Table 6 and Fig. 2, hypotheses H1a, H1b, and H1c were accepted as it confirms a favorable relationship involving GHRM practices and sustainable performance elements. In H1a, results evidence that the relationship between the GHRM bundle and environmental performance

Table 2 Measurement model assessment

Constructs	Indicators	Loading	CR	AVE
Green hiring	GH1	0.863	0.859	0.753
	GH2	0.872		
Green performance management and compensation	GPC1	0.749	0.851	0.534
	GPC2	0.770		
	GPC3	0.727		
	GPC4	0.782		
	GPC5	0.615		
Green training and involvement	GTI1	0.730	0.820	0.533
	GTI2	0.663		
	GTI3	0.757		
	GTI4	0.765		
Internal environmental management	IEM1	0.666	0.843	0.512
	IEM2	0.694		
	IEM3	0.607		
	IEM4	0.695		
	IEM5	0.754		
	IEM6	0.700		
Green purchasing	GP1	0.748	0.850	0.533
	GP2	0.801		
	GP3	0.748		
	GP4	0.641		
	GP5	0.704		
Environmental cooperation	EC1	0.743	0.859	0.504
	EC2	0.740		
	EC3	0.748		
	EC4	0.740		
	EC5	0.633		
	EC6	0.646		
Environmental performance	EP1	0.723	0.852	0.535
	EP2	0.703		
	EP3	0.792		
	EP4	0.733		
	EP5	0.703		
Economic performance	Ec.P1	0.716	0.840	0.512
	Ec.P2	0.762		
	Ec.P3	0.698		
	Ec.P4	0.708		
	Ec.P5	0.691		
Social performance	SP1	0.705	0.842	0.516
	SP2	0.709		
	SP3	0.693		
	SP4	0.731		
	SP5	0.752		

was positive ($\beta = 0.303$, $t = 2.865$, P -value = 0.004). Furthermore, we observed a highly significant relationship between the green human resource management bundle and economic performance ($\beta = 0.324$, $t = 4.499$,

Table 3 Heterotrait-monotrait ratio (HTMT)

Construct item	EC	Ec.P	EP	GH	GP	GPC	GTI	IEM	SP
EC	----								
Ec.P	0.718	----							
EP	0.777	0.755	----						
GH	0.692	0.802	0.806	----					
GP	0.791	0.709	0.695	0.622	----				
GPC	0.751	0.627	0.662	0.741	0.573	----			
GTI	0.713	0.681	0.664	0.730	0.645	0.605	----		
IEM	0.759	0.801	0.770	0.702	0.789	0.643	0.715	----	
SP	0.666	0.799	0.792	0.837	0.694	0.583	0.632	0.728	----

P-value = 0.000). The GHRM bundle significantly affected social performance ($\beta = 0.318, t = 3.847, P\text{-value} = 0.000$), thus confirming H1a, H1b, and H1c. Hypotheses H2a and H2b are accepted as they were statistically significant. The effect of external GSCM on environmental performance was significant ($\beta = 0.239, t = 2.552, P\text{-value} = 0.011$), hence supporting hypothesis H2a. H2b results uncovered a positive relationship between internal GSCM and environmental performance ($\beta = 0.213, t = 4.149, P\text{-value} = 0.000$). We observed a highly significant link between internal GSCM and economic performance ($\beta = 0.454, t = 6.876, P\text{-value} = 0.000$), supporting H3b but an insignificant influence of external GSCM on economic performance ($\beta = 0.016, t = 0.299, P\text{-value} = 0.765$) hence, H3a not supported.

Furthermore, hypothesis H4a showed a significant influence of external GSCM on social performance ($\beta = 0.265, t = 3.593, P\text{-value} = 0.000$). The effect of the internal GSCM on social performance was also moderately significant ($\beta = 0.127, t = 2.464, P\text{-value} = 0.014$).

Hypothesis H5 and H6 were also accepted. There was a positive impact of green human resource management practices on adopting external and internal green supply chain management. The effect of GHRM on external GSCM was highly significant ($\beta = 0.755, t = 30.954, P\text{-value} = 0.000$); hence, hypothesis H5 was supported. Hypothesis H6 was confirmed as we evidenced a significant link involving the

GHRM bundle and internal GSCM ($\beta = 0.734, t = 25.751, P\text{-value} = 0.000$).

Mediation analysis

Memon et al. (2018) suggested that research must explore exact indirect effects rather than total indirect effects in frameworks where several mediators are present. Accordingly, this study evaluated the variables’ mediational (indirect) role using SmartPLS 3.3.3 software, as exhibited in Table 7.

As per the table above, hypotheses H7a, H7b, and H7c were accepted as internal GSCM mediates the link between GHRM practices and sustainable performance. H7a is supported as GSCM mediates the relationship between GHRM practices and environmental performance ($\beta = 0.156, t = 4.223, P\text{-value} = 0.000$). H7b revealed that internal GSCM mediates the relationship between GSCM practices and economic performance ($\beta = 0.333, t = 6.882, P\text{-value} = 0.000$). Furthermore, internal GSCM mediates the relationship between GHRM practices and social performance ($\beta = 0.093, t = 2.472, P\text{-value} = 0.014$), supporting H7c. Hypotheses H8a ($\beta = 0.181, t = 2.463, P\text{-value} = 0.014$) and H8c ($\beta = 0.200, t = 3.474, P\text{-value} = 0.001$) were accepted, but H8b ($\beta = 0.012, t = 0.027, P\text{-value} = 0.766$)

Table 4 Assessment of formative constructs

Second-order construct	First-order construct	Weight	<i>t</i> -value	VIF
GHRM bundle	GH	0.21	8.73	3.16
	GTI	0.145	11.57	3.37
	GPC	0.14	13.74	2.59

Table 5 Communality, *R*-squared, and redundancy

Construct item	R2 adj	Q2	f 2 (EP)	f 2 (Ec.P)	f 2 (SP)
GHRM bundle	–	0.603	0.153	0.170	0.100
Int-GSCM	0.530	0.343	0.081	0.369	0.163
Ext-GSCM	0.564	0.384	0.100	0.015	0.012
EP	0.464	0.413	–	–	–
Ec.P	0.502	0.411	–	–	–
SP	0.417	0.412	–	–	–

Table 6 Model direct effect results

Relationship	Hyp	(β)	Standard error	T-value	P-value	Results
GHRM bundle—> EP	H1a	0.303	0.106	2.865	0.004	Accept
GHRM bundle—> ECP	H1b	0.324	0.072	4.499	0.000	Accept
GHRM bundle—> SP	H1c	0.318	0.083	3.847	0.000	Accept
Ext-GSCM—> EP	H2a	0.239	0.094	2.552	0.011	Accept
Int-GSCM—> EP	H2b	0.213	0.051	4.149	0.000	Accept
Ext-GSCM—> ECP	H3a	0.016	0.053	0.299	0.765	Reject
Int-GSCM—> ECP	H3b	0.454	0.066	6.876	0.000	Accept
Ext-GSCM—> SP	H4a	0.265	0.074	3.593	0.000	Accept
Int-GSCM—> SP	H4b	0.127	0.051	2.464	0.014	Accept
GHRM bundle-> Ext-GSCM	H5	0.755	0.024	30.954	0.000	Accept
GHRM bundle—> Int-GSCM	H6	0.734	0.029	25.751	0.000	Accept

was rejected, thus confirming that external GSCM only mediates the relationship between GHRM practices and environmental and social performance, but not the

relationship between GHRM practices and economic performance.

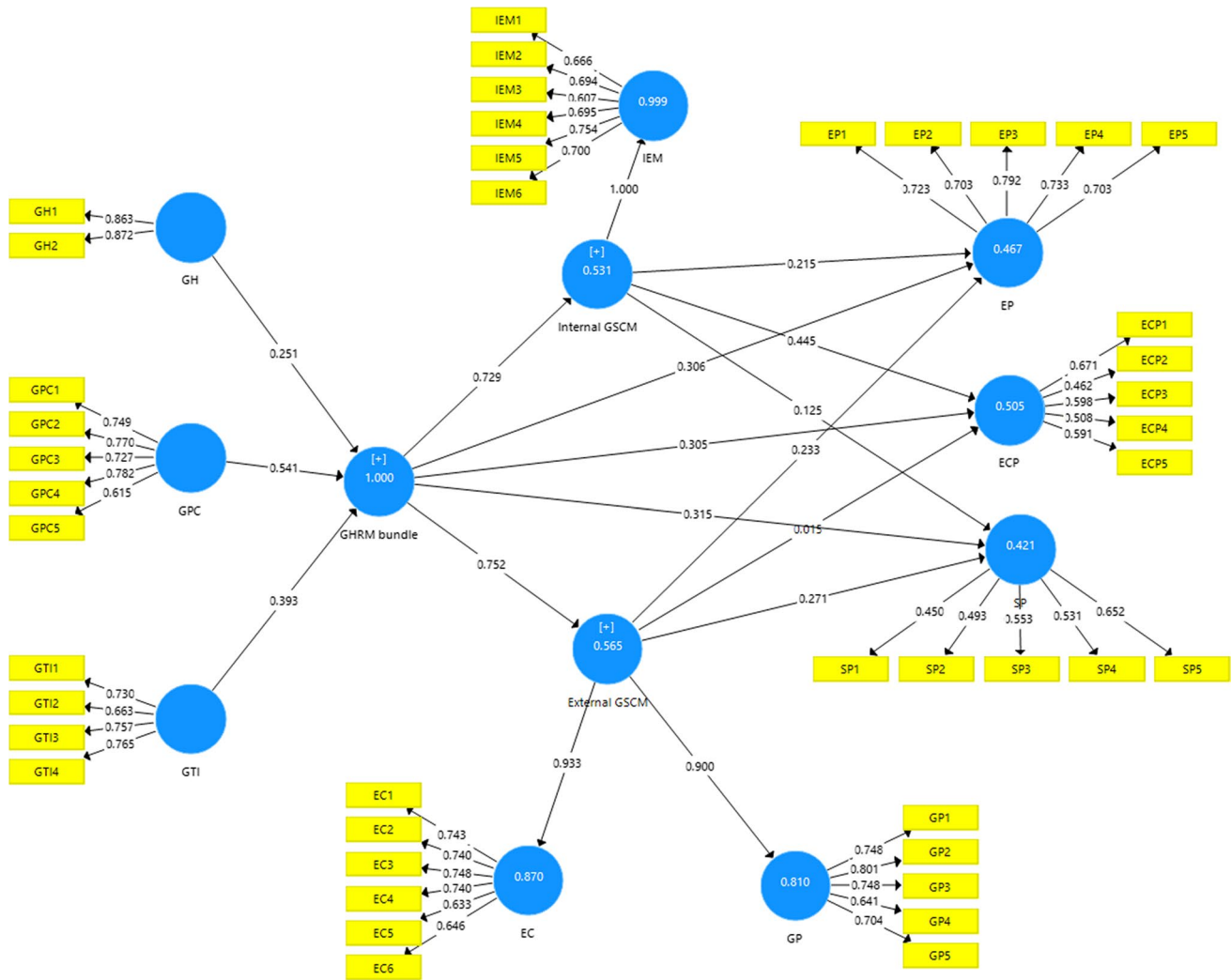


Fig. 2 Pictorial view of hypotheses

Table 7 Indirect effect results

Relationship	Hyp	(β)	Standard error	T-value	P-value	Results
GHRM bundle—> Int-GSCM—> EP	H7a	0.156	0.037	4.223	0.000	Accept
GHRM bundle—> Int-GSCM—> ECP	H7b	0.333	0.048	6.882	0.000	Accept
GHRM bundle—> Int-GSCM—> SP	H7c	0.093	0.038	2.472	0.014	Accept
GHRM bundle—> Ext-GSCM—> EP	H8a	0.181	0.073	2.463	0.014	Accept
GHRM bundle-> Ext-GSCM-> ECP	H8b	0.012	0.040	0.027	0.766	Reject
GHRM bundle—> Ext-GSCM—> SP	H8c	0.200	0.058	3.474	0.001	Accept

Discussion and implications

Discussion

The study elucidates a clearer comprehension of an organization's moral obligations to the natural environment. Green management efficiency was extensively explored in this study. We examined various organizational functions related to environmental, economic, and social performance. Empirical evidence showed a favorable relationship involving green human resource management practices and environmental performance. The findings confirmed that effective propagation of environmental philosophy and values with green human resource management strategies would foster employee engagement and expertise in environmental management (Cantor et al. 2012, Mousa and Othman 2020; Zaid et al. 2018). This finding aligns with Mousa and Othman (2020), which found a positive relationship between green human resource management practices and environmental performance among Palestinian healthcare companies.

There was a positive relationship between green human resource management practices and economic performance (H1b). This means that an organization with a motivated and dedicated workforce can add economic value to an organization (Carroll and Shabana 2010). Also, H1c was supported, confirming a positive relationship between green human resource management practices and social performance. Implementing green practices reduces costs, enhances sustainability, and focuses on sustainable social benefits, improving organization and corporate reputation, community health, and safety (Vyas 2016; Mousa and Othman 2020; Zaid et al. 2018). This confirms an earlier study by Zaid et al. (2018) among manufacturing firms in Palestine.

H2b, H3b, and H4b hypotheses were accepted, depicting a favorable connection between internal GSCM and environmental, economic, and social performance. There exists a correlation between internal green supply chain management and the high performance of inputs and assets (Schmidheiny and Timberlake 1992), thereby reducing costs via recycling and energy-saving measures (Zhu and Sarkis 2007; Zhu et al. 2005), rework and waste avoidance (Kitazawa and Sarkis 2000), and enhanced quality which creates new products and processes (Yang et al. 2010). Furthermore,

these activities remain critical in strengthening the organization's reputation in the eyes of stakeholders, including staff, vendors, consumers, and the government (Abdullah and Thurasamy 2015). In addition, organizations can achieve many social advantages through a positive image, such as improving employees' morale, customer loyalty, and satisfaction (Eltayeb and Zailani 2011). No relationship existed between external green supply chain management and economic performance. External green supply chain management is only associated with environmental performance and social, thus supporting H2a and H4a, but not H3a. Bowen et al. (2001) pointed out that economic efficiency can be achieved but after improving environmental performance, thus in the long term in their study on operating units in the UK. This finding resonates with that of Mousa and Othman (2020), Rao and Holt (2005), Zaid et al. (2018), and Zhu et al. (2013). However, long-term positive effects on companies (environmentally friendly) are often observed. For example, ethically selecting suppliers can often improve an organization's reputation, thereby increasing sales (Geng et al. 2017; Longoni et al. 2018).

The relationship between GHRM practices and GSCM methods remains critical, reflecting the effect of cross-functional environmental management processes on long-term success. The results clearly show that GHRM practices and GSCM cannot independently affect environmental, economic, and social performance but can be achieved through an expected intermediary effect. Moreover, the findings of this study indicate that hypotheses H5 and H6 exhibited a favorable link between the GHRM practices and green supply chain management practices. These results are in consonance with the results of Longoni et al. (2018), Mousa and Othman (2020), Nejati et al. (2017), Teixeira et al. (2016), Zaid et al. (2018), who had similar results in different studies on firms in Italy, Palestine, Brazil, and Palestine respectively.

From the RBV, the relationship between human resource management and green management can be instrumental in helping organizations lessen barriers to applying GSCM practices (Teixeira et al. 2016). It also incorporates internal and external sustainable supply chain management methods to promote green enterprising (Mishra 2017). Although human resource management is key to the success of corporate green functions, Del Brío et al. (2007), Haddock-Millar

et al. (2016), Teixeira et al. 2016, and Zaid et al. (2018) emphasized that growth, employee empowerment, and environmental awareness are paramount to GSCM in the organization.

In terms of mediation, H7a and H8a hypotheses were accepted. The results show that applying internal and external green supply chain management practices and disseminating environmental ideology and standards will enhance environmental performance. (Paulraj 2011)) states that internal resources should guide green supply chain management methods buttressing this study's cross-functional environmental management systems. These findings align with previous studies, which concluded that cross-functional integration remains a pivotal requirement to ensure successful environmental management (Boiral 2003; Wong 2013). Integrating human resource practices is essential for companies to grow green as it lowers the obstacles to implementing GSCM. Green training systems should pay more attention to GSCM (Lin and Ho 2011, Sarkis et al. 2010), as it can potentially increase the organization's EP.

Regarding economic performance, hypothesis H7b was significant. There was a favorable connection between green human resource management practices and internal GSCM utilization. This causes a favorable connection between green human resource management practices and economic performance. These results have supported the connection between the green human resource management package and Ec.P by boosting internal GSCM; an expression of an implicit strategic edge derived from Internal-GSCM (Longoni et al. 2018; Mousa and Othman 2020; Zaid et al. 2018). Mishra (2017) states that implementing joint green human resource management practices and green supply chain management can achieve a competitive environmental advantage in their study on India's manufacturing firms. It serves the organization by improving sales and enhancing innovation. Companies can reduce their major cost by highlighting these practices. Economic performance can be improved by implementing environmental ideology and practicing Green human resource management practices, providing a theoretical basis for this mediation relationship (Mousa and Othman 2020; Nejati et al. 2017; Zaid et al. 2018). Green human resource management practices play an important role in circulating environmental ideology and standards. It also provides opportunities for employees to execute environmental ideology and standards for better economic performance (Ahmad 2015; Jabbour and de Sousa Jabbour 2016; Jackson et al. 2014). Green human resource management may support the ecosystem and the talent pool's appeal and retention (Govindan et al. 2016; Patel 2014). Similarly, hypothesis H7c was accepted, showing a significant and favorable connection between the GHRM bundle practices and internal green supply chain management utilization. This leads to a favorable connection between the green human resource management

approach and social performance. Such benefits include a positive image, brand enhancement, employee productivity, and dedication (Mishra 2017). Based on previous research, we may infer that tying green human resource management activities to corporate social responsibility would effectively demonstrate the creation of a robust ecosystem (Mousa and Othman 2020; Zaid et al. 2018).

Hypothesis H8b was not accepted; thus, external GSCM does not mediate the relationship between the GHRM bundle and economic performance. GHRM procedure and GSCM are relatively new (Masri and Jaaron 2017; Mousa and Othman 2020; Zaid et al. 2018), especially in Pakistan. The "resistance transition phenomenon" (Nejati et al. 2017), known to be the greatest impediment to environmental change, may account for this finding, especially when green supply chain management is adopted (Govindan et al. 2016). According to literature, resistance to reform is characterized by the challenge of breaking old habits of the dominant society (Tichy 1983). As a result, senior management must recognize and expect some opposition to ensure sustainability and long-term growth (Nejati et al. 2017). Jabbour et al. (2010), assert that only green active organizations can minimize resistance to sustainable development through environmental training. Therefore, supply chain managers should heed these GHRM practices (Jabbour and de Sousa Jabbour 2016). An alternate explanation is the high cost of GHRM activities. Mishra (2017), Mousa and Othman (2020), and Zaid et al. (2018) found cost to be a major obstacle for manufacturing companies in implementing GHRM practices.

Implications

Theoretical implications

The current study applied the resource-based view to analyze the combined influence of green supply chain management and green human resource management practices in the context of manufacturing organizations in Pakistan — a developing Asian economy. The current study adds to the literature on sustainable manufacturing and environmental sustenance. Literature is advancing as the current study investigates and integrates green practices among the relationship of green human resource management and supply chain management from the manufacturing sector within the paradigms of a sustainable environment. Our comprehension of how manufacturing organizations should tactically advance their human resource and supply chain functions to enhance their environmental sustainability has been expanded by the characterizations of these links, which stipulate theoretical optimization and validation of green human resource management and green supply chain management practices in a manufacturing setting. Though some literature exists on green human resource management

and supply chain management (Jabbour and de Sousa Jabbour 2016; Jackson et al. 2011; Kannan et al. 2014; Zaid et al. 2018), this study is the earliest to explore a developing country like Pakistan. Thus providing a developing economy perspective in expanding literature. More so, this study used internal environmental management as the only dimension under internal green supply chain management and green purchasing and environmental cooperation as dimensions under external green supply chain management to reflect the situation in Pakistan. Finally, the study contributed to creating a framework for assisting manufacturing managers in promoting environmentally sustainable practices by preventing waste production and facilitating the implementation of green initiatives, thereby improving productivity and service quality.

Policy and managerial implications

The paper introduces new methods for improving Pakistan's manufacturing sector's long-term environmental efficiency. To achieve better environmental performance, there should be directives from top management in practically implementing the integration of human resource management and supply chain management concepts in the face of environmental sustainability. The study's findings suggest a collaborative investment in green human resource management practices for employees' improvement, knowledge enhancement, and motivation. The findings suggest a useful guideline for business leaders in promoting sustainable environmental performance. The findings support internal green supply chain management for long-term performance.

Policymakers in green human resource management can use the findings from this study to make critical decisions. First, this study evaluates how green human resource management is implemented in the manufacturing sector, especially in developing countries, to understand the green human resource management bundle better. Once a decision-maker clearly understands the sustainability pillars, they can prioritize green practices that will positively impact them. Green practices can be exploited fully by manufacturing companies by investing more. Second, green human resource management practices were explored in relation to sustainability in the manufacturing sector, extending previous studies which found positive associations between green human resource management packages and sustainability. Furthermore, managers should make employees aware of the positive impact of green practices on sustainability. Such practices include the reduction of waste, recycling, and energy-saving. In addition, the links between green strategic policies and human resource practices for improving sustainable performance have to be clarified and streamlined. It is also recommended that these organizations have green conformance managers to ensure and facilitate the implementation of green environmental management

strategies cross-functionally. The role of the green conformance manager should be institutionalized within organizations to champion the achievement of sustainable performance. Hence, the green conformance manager role in manufacturing organizations must therefore support the establishment of a commitment to a sustainable performance by promoting a culture of environmental responsibility among executives and employees.

Supply chain managers need to be aware of human resource management procedures. Senior management must also be conscious that opposition to change might be a barrier to implementing green supply chain management; this impediment can be removed by using green hiring and selection practices and adequate environmental training for staff members. To access the resources that can expedite green supply chain management, it is recommended to build strong bonds and establish positive relationships with government bodies. The Pakistani setting places a higher premium on the government on government intervention and support. Caniato et al. (2012) recommend that government implementation of green supply chain management practices be governed by legislation. The government should therefore make it easier for the industrial sector to comply with laws and let them work with green practices freely. For policymakers, frequent and proper monitoring is recommended to ensure that manufacturing organizations institutionalize directives and enacted policy directives to accelerate sustainable performance. Also, the responsible government agency for environmental and social protection could organize periodic training and courses for industry players and stakeholders to understand the need for green supply chain management and green human resource management practices and their accompanying advantages for sustainability.

Conclusion

Resource optimization and the promotion of environmentally friendly production have influenced organizations to strive towards superior and sustainable performance by applying specific GHRM and GSCM practices. Deploying green management procedures into an organization's human resource management and supply chain is critical in achieving sustainability and a green environment. Integrating green human resource into an organization's supply chain improve its competitiveness. Consequently, the current study paper explores the association between green human resource management and green supply chain management on sustainable performance from the perspective of the triple bottom lines of social, environmental, and economic performance. Using the partial least square-structural equation modeling (PLS-SEM), data from 212 manufacturing companies from the chemical,

pharmaceutical, automotive, textile, and food industries were evaluated. The structural analysis confirmed that green human resource management positively influences the triple bottom lines. GSCM mediates the connection between GHRM and triple bottom lines. Specifically, internal GSCM favorably mediates GHRM practices and sustainable performance, whereas external GSCM practices only mediate the relationship between GHRM practices from the environmental and social perspective of sustainable performance. The study further demonstrates that GHRM and GSCM exert their effects jointly, not independently. From the findings, it is recommended that organizations have comprehensive management and cross-functional implementations within systems and organizational units for potent and robust environmental management. It is also recommended that these organizations have green conformance managers to ensure and facilitate the implementation of green environmental management strategies cross-functionally.

There are some limitations that need consideration subsequently. Firstly, this study was conducted in Pakistan's manufacturing sector. Future research can expand to other sectors and industries. Also, the current study can be replicated in other developing countries to test the generalizability of findings. Future studies can focus on specific dimensions of supply chain management and human resource management, including hiring, green training, performance, selection, reward, and recruitment.

Author contribution This idea was given by Saira Naseer and HuamingSong. Saira Naseer analyzed the data and wrote the complete paper. Gibbson Adu-Gyamfi was responsible for the revision. Sidra Naseer and Kashif Abbass read and approved the final version.

Data availability The data sets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Declarations

Ethical approval Not applicable.

Consent to the participate Not applicable.

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