



Antecedents of Open Ambidextrous Innovation Practices: Investigating the Mediating Mechanism of Green Dynamic Capabilities

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Article Information	Abstract
Article history: Submitted: 17 th Dec, 2024 Accepted: 20 th Dec, 2024 Published: 31 st Dec, 2024	<i>Socially responsible human resource management (SRHRM) has developed as a crucial approach to environmental sustainability. However, a substantial gap exists in comprehending its direct influence on open ambidextrous innovation practices. This study seeks to address this gap by investigating the relationship between SRHRM and open ambidextrous innovation practices, with attention to the mediating role of green dynamic capabilities. Data was collected from employees working in a software house using the stratified random sampling technique. A cross-sectional study was conducted on Pakistani software houses to investigate the interrelationships between SRHRM, green dynamic capabilities, and open ambidextrous innovation practices. Three-wave data supports the indirect effect of green dynamic capabilities on the relationship between SRHRM and open ambidextrous innovation practices. Drawing on the resource-based view theory, this research studied the relationship by which SRHRM is linked to green dynamic capabilities and boosts open ambidextrous innovation practices within the organization.</i>
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Introduction

The growing environmental changes and advancing technology collectively compel organizations to include sustainability-related measures in the strategy formulation process and in routine operations (Abid et al., 2023; Sadaqat et al., 2022). This integration requires a wise interplay between innovation practices and SRHRM (SHRM), which is defined as "the set of HRM practices that incorporate the external CSR activities of the firm as an important component for employee management" (Territory et al., 2006). Organizations continuously adapt to the evolving environment to achieve economic, social, and business-related targets (Abid et al., 2020; Rank et al., 2022; Contreras & Abid, 2022; Ilyas et al., 2022). At the internal level, SRHRM (Boğan & Dedeoğlu, 2020) incorporates practices and policies for stimulating employee well-being, ethical behavior, and environmental sustainability to achieve an organizational culture that prioritizes inclusivity and sustainability. However, organizations hold limited resources and capabilities to

meet the ongoing demands of customers, counter the competition, adopt technological breakthroughs, and reach organizational goals profitably. To maintain a competitive advantage and achieve sustainability goals, open ambidextrous innovation is vital to pursue, explore, and exploit the innovation through external collaboration (Contreras et al., 2021; Srisathan, 2023). Open ambidextrous innovation (OAI) is defined as an organization's ability to simultaneously pursue both exploratory and exploitative innovation by leveraging external collaboration and knowledge-sharing (Wang et al., 2020). Developing new service systems and products and generating novel ideas require discovering new regions with creative thinning, which is part of exploratory innovation. The importance of external partnerships, i.e., suppliers, customers, research institutions, etc. When this openness is combined with ambidexterity, a dynamic framework can be formed to balance the risk and stability associated with efficient experimentation for exploiting opportunities and exploring technological advancements. The achievement of the stated balance is contingent upon robust HR practices (Omid & Dal, 2022) and dynamic capabilities to make a smooth transition according to market demands. In this scenario, green dynamic capabilities (GDC) denote the ability of a firm to reconfigure, integrate, and organize the organizational resources to achieve the sustainability of the environment. Previously, green human resource management (Shen & Jihua Zhu, 2011; Murillo-Ramos, 2023) has been recognized as a necessary approach to achieving environmental sustainability at the organizational level. However, there is a significant gap in comprehending the direct impact of SRHRM on open ambidextrous innovation practices. While the potential of green human resource management (Barrena-Martínez, 2019) in supporting eco-friendly work settings is highlighted, the existing effects of these advantages in terms of organizational sustainability are not investigated (Abid et al., 2022). The SRHRM influences the aspects of sustainability in terms of green dynamic capabilities, which have not been adequately investigated. Furthermore, the role of green dynamic capabilities as a mediator between the relationship of SRHRM (Newman, 2016) and open ambidextrous innovation presents an area of exploration. While it was hypothesized that green human resource management substitutes green product innovations, the degree to which this innovation is contributed through green dynamic capabilities is an underexplored phenomenon (Kiranantawat & Ahmad, 2023; Chen et al., 2024; Chen et al., 2023; Abbas, 2024; Huang et al., 2024; Ullah et al., 2024). This gap indicates a critical need for a research study to comprehend these relationships and offer a foundation to amplify the role of SRHRM at a strategic role to drive sustainability with open ambidextrous innovation effectively. Moreover, the role of green dynamic capabilities in the transitioned corporate landscape is significant in emphasizing social responsibility and environmental stewardship. In contrast, the literature presents SRHRM as a homogenous concept. This oversight causes a substantial challenge to successfully implement SRHRM, as organizations lack the comprehensive direction on how green dynamic capabilities can catalyze open ambidextrous innovation practices. While the independent roles of SRHRM and green dynamic capabilities to promote innovation and sustainability are studied in the literature, the mediating role of green dynamic capabilities between SRHRM and open ambidextrous innovation practices is crucial for aiming to form an interconnected strategy that controls HRM practices to nurture sustainable and innovative outcomes. Our observation of the phenomenon advances the research question: How do green dynamic capabilities mediate the relationship between SRHRM and open ambidextrous innovation practices? This research study aims to contribute to the green human resource management domain by providing insights that are practically relevant and theoretically robust insights for organizations. In order to achieve the stated objective, our study employed resource-based view (RBV) theoretical frameworks. This comprehensive thematic lens for

investigating the strategic role of SRHRM in enhancing sustainable open ambidextrous innovation practices through green dynamic capabilities is the key element that strengthens this study's rationale. The findings will provide valuable insights for managers and policymakers on aligning HR practices with strategic innovation objectives to foster long-term organizational sustainability.

Hypotheses Development

Highlighting cooperation, inclusivity, employee development, and SRHRM generates a conducive environment (Zhou & Zheng, 2024) for both idea generation and idea refinement. In this context, various creative perspectives for policy formulation to enhance diversity and work-life balance are given, empowering employees to contribute creatively. Furthermore, SRHRM inspires the right corporations (Stahl, 2020), considered the backbone of open innovation networks, to share resources and knowledge among organizational alliances. Therefore, SRHRM improves employees' motivation and trust level (Úbeda-García et al., 2021), reinforcing the organization's capability to innovate sustainably due to aligning individual goals with organizations. According to the resource-based view, organizational capacity to achieve competitive advantage can be enhanced through employing SRHRM; therefore, it can be referred to as a strategic asset of an organization (Ansari et al., 2021). In strategic management, the resource-based view (RBV) is a theoretical framework that highlights the importance of an organization's capabilities and resources in attaining and sustaining competitive advantage (Barney, 1991). A firm can gain a competitive edge if it contains rare resources that cannot be duplicated and valuable. These resources can be tangible (e.g., physical assets, capital) or intangible (e.g., intellectual property, organizational culture, knowledge). The focus of the organization is on internal rather than external attributes. These attributes are not easy for competitors to replicate.

Human capital development is the core of SRHRM, which integrates employee well-being, diversity, and policies to promote ethics (Aguinis et al., 2020). These characteristics can formulate organizational policies that are valuable, difficult to imitate, and rare resources (Sancho et al., 2018). These policies can nurture human resources (Jia et al., 2019) and deliver a productive atmosphere for open ambidextrous innovation practices. Employees are engaged in collaborative networks to facilitate open innovation networks as the sense of responsibility, shared purpose, and trust are the founding grounds of this cooperation. In this context, external knowledge can be leveraged due to the synergy of SRHRM (Chaudhary, 2020; Sial et al., 2023). The organization can adapt to a dynamic environment with maintained ethical standards, innovative capabilities, and sustainability principles.

Hypothesis 1: Socially responsible HRM is positively related to open ambidextrous innovation practices.

SRHRM contributes to environmental sustainability through dynamic capabilities when embedded in the organization's culture. Employee empowerment, ethical practices, and sustainability (Zhu et al., 2023) to engage the workforce are emphasized by SRHRM (Feng et al., 2022). SRHRM (Amjad et al., 2021; Zhang et al., 2022) provides employees with environmental awareness, green training, green mindfulness, and skills to do innovation. Adopting these traits enhances employees' green dynamic capabilities, which are necessary to scan the environment to identify opportunities (Fallah Shayan et al., 2022) and capitalize on these opportunities by reconfiguring them. The culture of environmental engagement (Ashfaq et al., 2022; Xing et al., 2020) and ongoing learning is promoted by SRHRM (Waring & Lewer, 2004; López-Fernández, 2018). This approach also aligns organizational standards with ethical codes to meet stockholders' expectations. Employee well-being and the organization's sustainability interest are achieved with

a synergetic strategy (Hassan et al., 2024). According to the resource-based view (RBV), SRHRM (Voegtlin & Greenwood, 2016) is a strategic resource for developing the green capabilities of organizations and attaining competitive advantage. SRHRM refines human capital (Yu et al., 2018; Beji et al., 2020) by including innovative training programs for skill development. These programs bring commitment, competencies, and innovation capacity to take sustainability measures at the individual level.

Hypothesis 2: Socially responsible HRM is positively related to green dynamic capabilities.

Green dynamic capabilities (Dangelico et al., 2017) provide agility to organizations, translated into open ambidextrous innovation practices (Yousaf, 2021) as the knowledge and skills essential to integrate sustainability into innovation determinations depend on the green dynamic capabilities. Previous studies show that green dynamic capabilities support practical cooperation (Jiang et al., 2018; Mazon et al., 2022) through supply chains, permitting businesses to align with external partners. This assimilation reassures the development and implementation of both forms of green innovations to enhance organizational resilience (Ma et al., 2022). These findings propose that capitalizing on green dynamic capabilities benefits sustainability and drives ambidextrous innovation (Mubeen et al., 2024), placing organizations to realize long-term accomplishment in environmentally and competitively oriented industries.

Hypothesis 3: Green dynamic capabilities positively relate to open ambidextrous innovation practices.

Green dynamic capabilities mediate SRHRM and open ambidextrous innovation practices by altering organizational commitments to sustainability into actionable innovation strategies (Sharma et al., 2009; Lee et al., 2023). Employee involvement in novel initiatives is the core of SRHRM, promoting ethical practices and sustainable choices and creating grounds for social and environmental mindfulness. Green dynamic competencies enable businesses to pick the evolving opportunities to promote innovation (Lin & Chen, 2017; Yuan & Cao, 2022). These capabilities smooth the innovation process due to strategically managed SRHRM (Latan et al., 2022). This balanced approach to innovation strategy supports radical and incremental improvement. When the collaboration is transfused across the boundaries of the organizations, green dynamic capabilities (Zhang et al., 2020) streamline the organization's strategic focus and workforce efforts to meet corporate goals (Gangi et al., 2021; Dong & Zhong, 2021). To engage employees in green initiatives, sustainability training and ethical practices must be injected into the organizational culture, which is only implemented through the policies of SRHRM (Pimenta, 2024). Here, green dynamic capabilities maximize employee engagement (Qiu et al., 2020; Dangelico et al., 2017) and integrate employees' refined capabilities to drive an open, ambidextrous innovation process. Furthermore, green dynamic capabilities (Singh et al., 2022) serve dual objectives (Chen & Chang, 2013): enhancing current processes, novel innovation, and efficient management of internal and external resources.

Hypothesis 4: Green dynamic capabilities mediate the relationship between socially responsible HRM and open ambidextrous innovation practices.

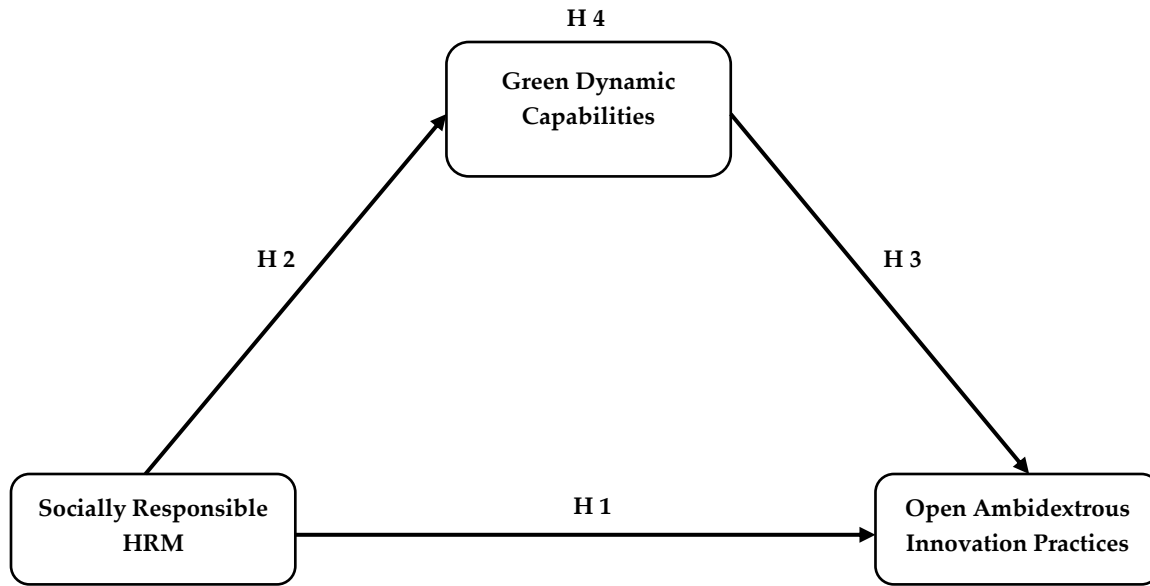


Figure 1: Research Model

Method

A mono-method quantitative research was conducted using structured questionnaires (T1, T2, and T3). The mono-method quantitative approach is considered over the mixed method and qualitative because we were interested in understanding the role of predetermined predictors on specific outcomes compared to exploring the predictors from scratch, for which these studies have more importance. The current study, a pilot study of a big project, is done in a field setting during normal working hours since none of the constructs under examination required any type of manipulation. We collected responses using structured questionnaires with predefined scales corresponding to all three study constructs. These structured questionnaires ensured empiricism and objectivity and enabled us to generalize the study results.

A cross-sectional study is carried out using time-lagged data with a gap of 3 weeks with the aim of reducing the common method bias. Data is collected from employees working in a software house using the stratified random sampling technique. A sample is drawn using two stratus, i.e., gender and department, based on the numbers generated randomly. At time 1, we collected demographics and socially responsible HRM data. At time 2, we collected information about green dynamic capabilities. We also obtained information about open ambidextrous innovation practices.

The procedure for data collection was identical at each stage. The researcher visited the company and communicated the purpose of the study to the sample employee. The researcher met the team members to explain the project and distributed the questionnaire. The respondents were requested to complete the questionnaires and return them to the team without identification. We ensured the confidentiality of the participants, informed the voluntary participation in the study, and ensured the minimal involvement of the team leads. A total of 278 complete questionnaires were received. The majority of the participants were male, 189 (68%). Among a total of 278 respondents, 34 % of employees were married. The average tenure in the current organization was 6.707 (SD 6.04). The respondents' age range is 21 to 59 years, with an average age of 34.64 (SD 8.535).

Measures:

Socially responsible HRM was measured using a 6-item scale adopted by Shen and Benson (2016). The scale is anchored at 1 = strongly disagree and 5 = strongly agree. Green dynamic capabilities were measured using a 6-item scale adopted from (Rodrigo-Alarcón, 2018). The scale is anchored at 1 = never and 5 = always. Open ambidextrous innovation practices were measured using a 6-item scale adopted from Srisathan et al. (2023). The scale is anchored at 1 = strongly disagree and 5 = strongly agree.

Results

Analytical Strategy:

We have applied Partial least squares structural equation modeling (PLS-SEM) to test our study hypotheses. It has been recognized as the most rigorous, general, and fully developed research modeling. It is beneficial in small sample sizes to test complex models (consisting of many variables having numerous items) and even support formative constructs (Elahi et al., 2020).

Internal Consistency:

In Table 1, we presented the reliability statistics of GDC, OAIP, and SRHRM. The Cronbach's Alpha for GDC, OAIP, and SRHRM are 0.872, 0.821, and 0.772, respectively. Similarly, Dijkstra–Henseler's rho (rho_A) for GDC, OAIP, and SRHRM are 0.875, 0.824, and 0.777, respectively. The Composite Reliability (CR) for GDC, OAIP, and SRHRM are 0.904, 0.870, and 0.845, respectively. Based on these three reliability statistics, the values for the study variables fall within the acceptable range of 0.70.

Table 1: Internal Consistency

Variables	Items	Cronbach's Alpha	rho_A	Composite Reliability
GDC	6	0.872	0.875	0.904
OAIP	6	0.821	0.824	0.870
SRHRM	5	0.772	0.777	0.845

Note: Green Dynamic Capabilities (GDC), Open Ambidextrous Innovation Practices (OAIP), Socially Responsible HRM (SRHRM)

Convergent Validity:

We used Average Variance Extracted (AVE) and outer loadings of the indicators to evaluate the convergent validity (Fornell & Larcker, 1981). The AVEs for GDC, OAIP, and SRHRM are 0.610, 0.528, and 0.521, respectively, meeting the minimum threshold of 0.50 (Table 2).

Table 2: Average Variance Extracted (AVE)

Variables	Average Variance Extracted (AVE)
GDC	0.610
OAIP	0.528
SRHRM	0.521

Note: Green Dynamic Capabilities (GDC), Open Ambidextrous Innovation Practices (OAIP), Socially Responsible HRM (SRHRM)

The outer loadings of GDC, OAIP, and SRHRM items ranged from 0.695 to 0.806. These loadings show a strength of association among items representing the corresponding variables. The loadings of the majority of the items fall above the threshold limit of 0.70 (Fornell & Larcker, 1981). Only loadings of items OAIP1 = 0.695 and SRHRM6 = 0.698 falls slightly below this threshold. Since the values are near the threshold, they are retained for subsequent analysis. Only one item, SRHRM1, is removed during the algorithm testing as the loading falls below the acceptable limit.

Table 3: Outer Loadings

Variables	Items	Loadings	Variable	Items	Loadings
Green Dynamic Capabilities	GDC1	0.806	Socially Responsible HRM		
	GDC2	0.784			
	GDC3	0.775			
	GDC4	0.771		SRHRM2	0.721
	GDC5	0.771		SRHRM3	0.740
	GDC6	0.778		SRHRM4	0.745
Open Ambidextrous Innovation Practices	OAIP1	0.695		SRHRM5	0.705
	OAIP2	0.700		SRHRM6	0.698
	OAIP3	0.747			
	OAIP4	0.740			
	OAIP5	0.711			
	OAIP6	0.764			

Discriminant Validity:

Discriminant validity was evaluated by the Fornell-Larcker Criterion, Heterotrait-Monotrait Ratio of Correlations (HTMT), and Cross Loading. Based on the Fornell-Larcker Criterion, discriminant validity was confirmed as the square root of the AVE for each construct exceeded the inter-construct correlations. For example, the square root of AVE of GDC is 0.781, greater than GDC's correlation with OAIP = 0.569 and SRHRM = 0.382). The results demonstrated that GDC, OAIP, and SRHRM share more variance with their own items than with other variables (Table 4).

Table 4: Fornell-Larcker Criterion

Variables	GDC	OAIP	SRHRM
GDC	0.781		
OAIP	0.569	0.727	
SRHRM	0.382	0.359	0.722

Note: Green Dynamic Capabilities (GDC), Open Ambidextrous Innovation Practices (OAIP), Socially Responsible HRM (SRHRM)

The discriminant validity among the study variables was also ensured as the Heterotrait-Monotrait Ratio (HTMT) was below the acceptable threshold of 0.85 (Table 5).

Table 5: Heterotrait-Monotrait Ratio (HTMT)

Variables	GDC	OAIP	SRHRM
GDC	-		
OAIP	0.667	-	
SRHRM	0.459	0.439	-

Note: Green Dynamic Capabilities (GDC), Open Ambidextrous Innovation Practices (OAIP), Socially Responsible HRM (SRHRM)

Table 6 provides the cross-loadings values, which show the association among various items with respect to the variables. These values demonstrate that all the measured items were loaded significantly to their respective variables (values in bold), whereas these items show lower loadings on other variables in the study.

Table 6: Cross-Loadings of Items

Items	GDC	OAIP	SRHRM
GDC1	0.806	0.498	0.349
GDC2	0.784	0.453	0.230
GDC3	0.775	0.478	0.287
GDC4	0.771	0.419	0.298
GDC5	0.771	0.432	0.291
GDC6	0.778	0.375	0.328
OAIP1	0.416	0.695	0.248
OAIP2	0.358	0.700	0.242
OAIP3	0.423	0.747	0.255
OAIP4	0.444	0.740	0.216
OAIP5	0.380	0.711	0.275
OAIP6	0.450	0.764	0.322
SRHRM2	0.282	0.273	0.721
SRHRM3	0.294	0.258	0.740
SRHRM4	0.312	0.315	0.745
SRHRM5	0.257	0.164	0.705
SRHRM6	0.222	0.258	0.698

Model Fit:

The model fit analysis reveals the Standardized Root Mean Square Residual (SRMR) value of 0.077, which is below the acceptable threshold of 0.08 (Ringle et al., 2015). This highlights that the model's predicted values are closely aligned with the actual values, thereby boosting assurance of its accuracy.

Hypotheses Testing:

Our results state that SRHRM positively relates to OAIP ($\beta = 0.165$, $t = 3.181$, $p = 0.001$, $p < .01$), supporting Hypothesis 1. Our results state that SRHRM is positively related to GDC ($\beta = 0.382$, $t = 6.721$, $p = 0.000$, $p < .01$), supporting Hypothesis 2. Our results state that GDC positively relates to OAIP ($\beta = 0.506$, $t = 8.886$, $p = 0.000$, $p < .01$), supporting Hypothesis 3. Our

results state that GDC mediates the relationship between SRHRM and OAIP (Estimate = 0.194, $t = 5.077$, $p = 0.000$, $p < .01$), supporting Hypothesis 4. SRHRM lays the foundation for green capabilities through sustainable, ethical practices. Green capabilities then turn these efforts into actions and help organizations innovate sustainably.

7. Results of PLS-SEM

Paths	Hypotheses	Estimates	T Statistics	P Values	CI [LL 2.5%]	CI [UL 97.5%]
SRHRM -> OAIP	H 1	0.165	3.181	0.001	0.063	0.267
SRHRM -> GDC	H 2	0.382	6.721	0.000	0.274	0.500
GDC -> OAIP	H 3	0.506	8.886	0.000	0.396	0.622
SRHRM -> GDC -> OAIP	H 4	0.194	5.077	0.000	0.128	0.278

Discussion

Discussing resource-based view (RBV) theory (Taher, 2012; Connor, 2002) with study variables, we studied how and when SRHRM is related to open ambidextrous innovation practices through green dynamic capabilities. Our results demonstrate that SRHRM is positively related to open ambidextrous innovation practices. It means that when a company values and supports its employees by prioritizing fairness in HR policies, it creates a culture that fosters collaboration, creativity, and the capability to maintain a balance of ongoing improvements with new innovations. Our results found that SRHRM is positively related to green dynamic capabilities. It means that when a company encourages employees to focus on sustainability through a supportive culture, it improves overall green performance by enabling them to respond effectively to environmental opportunities and challenges. Green dynamic capabilities are positively related to open ambidextrous innovation practices. This means that a company with strong green capabilities can efficiently balance, be open to collaboration, and use its resources to innovate while being eco-friendly. SRHRM drives new organizational capabilities so that employees make prominent decisions as they know how to engage in activities suitable for the environment and organization (Zhao et al., 2023).

Theoretical and Practical Contribution:

Our research contributes to the literature on positive psychology by integrating the resource-based view theory (RBV) and sustainability, highlighting how socially responsible HRM practices can promote green dynamic capabilities and innovation. Our study underscores the importance of socially responsible HRM in achieving long-term organizational sustainability, hence offering novel insights into the social dimension of organizational innovation. We used time-lagged data to minimize the common method variance and to address causality among the relationships, offering a robust theoretical understanding of the prescribed relationships. This study expands our understanding by investigating the research framework within the software company, an industry characterized by global pressure and rapid innovation, hence giving industry-specific insights into the broader literature.

Software houses can promote targeted training and resource allocation to support green dynamic capabilities. For sustainable competitive advantage and driving growth, top management should adopt open, ambidextrous innovation practices to balance short-term goals with long-term innovations. Top management should leverage socially responsible HRM practices to build green

dynamic capabilities, enhance employee engagement, and foster innovation. Software houses can integrate socially responsible HRM as a useful method to promote workplace culture aligned with sustainability objectives and ensure long-term advantage in a rapidly evolving industry.

Limitation and Direction for Further Research:

In the present study, we relied on time-lagged data from a software house, which may limit the generalizability of the findings to other contexts because of different innovation practices and operational dynamics. Future studies could investigate the model across diverse industries using multisource data collection. Furthermore, longitudinal data from multiple industries could enhance the depth of understanding and generalizability. Our reliance on quantitative methods may only partially capture the nuanced perspectives and contextual factors influencing the association among study constructs. Future studies could adopt qualitative, diary study, and mixed-method approaches to explore how qualitative insights from respondents are helpful and how these can complement quantitative findings (Contreras & Abid, 2022).

Additionally, investigating the intervening role of other contextual factors, like industry-specific technological trends and organizational culture, may offer a deeper understanding of the mechanism driving sustainable innovation. Furthermore, future studies should investigate the individual-level study constructs and managerial practices in shaping open ambidextrous innovation. Moreover, the moderating role of job roles and demographics could give more nuanced insights into their influence.

Conclusion:

The current study aims to investigate the impact of SRHRM on green dynamic capabilities and open ambidextrous innovation practices. We also wanted to see the role of green dynamic capabilities in promoting open ambidextrous innovation practices. Finally, we also investigate the mediating role of green dynamic capabilities in the relationship between SRHRM and open ambidextrous innovation practices. Our study findings demonstrate that when a company values and supports its employees by prioritizing fairness in HR policies, it creates a culture that fosters collaboration, creativity, and the capability to maintain a balance of ongoing improvements with new innovations. We also found that the company encourages employees to focus on sustainability through a supportive culture, thereby improving overall green performance by enabling them to effectively respond to environmental opportunities and challenges. This study also highlighted the importance of green dynamic capabilities as a company with strong capabilities can efficiently balance and be open to collaborate and use its resources to innovate while being eco-friendly.

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