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Eco-innovation through Strategic Integration: A Capability-based Approach to Green Transformation in SMEs

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ABSTRACT

The study examines the relationship between green orientation, big data analytics capability, and green absorptive capacity in enhancing sustainable innovation, with green management practices serving as a mediating variable in response to the increasing demand for sustainable innovation. This study bridges an existing knowledge gap by providing insights into the interplay between internal strategic and technological capabilities that drive eco-innovation in SMEs from the perspectives of the Dynamic Capability View, Natural Resource-Based View, and Practice-Based View. A positivist, hypothetical-deductive approach was adopted, and data were collected from 340 employees of manufacturing SMEs in Bangladesh using stratified random sampling. Data were analysed using SPSS v26 and SmartPLS 4.0. These results provide empirical evidence that green orientation and big data analytics capability can significantly facilitate the development of green innovation, while green absorptive capacity influences green innovation indirectly through the promotion of green management practices. The mediating role of green management practices indicates that they play an important role in translating strategic orientation into innovation outcomes. The study provides important implications for investors and policymakers by highlighting the need to invest and develop sustainability-oriented information-based competencies and management systems within SMEs. These constructs have been integrated and lean into an integrated framework that is distinctive in

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that it captures the interactive effects and strategic relevance of internal capabilities in achieving sustainable competitiveness.

Keywords: Big data analytics, green absorptive capacity, green innovation, green management practices, green orientation, sustainable development goals (SDGS)

INTRODUCTION

In recent years, green innovation has become a significant component of enterprises' global strategic agendas, particularly in developing economies (Al-Swidi et al., 2024; Al-Husain et al., 2025; Arslan et al., 2022; Begum et al., 2023). Environmental shifts caused by growing challenges, increasing regulatory pressure, and the international discourse on sustainable growth, including the United Nations' Sustainable Development Goals (SDGs), have influenced new trends in business practices (Chau et al., 2024). Specifically, Industry, Innovation and Infrastructure (SDG 9), Responsible Consumption and Production (SDG 12) and Climate Action (SDG 13) have become key reference frameworks guiding businesses toward environmentally friendly practices aimed at fostering sustainability (Bresciani et al., 2023; Chen et al., 2025). Moreover, the path to green innovation is challenging, particularly for SMEs in developing countries, as they often operate under conditions of resource scarcity, limited technological endowments, and institutional deficiencies (Wang et al., 2023; Ma et al., 2025a). These firms are also constrained by inadequate management skills, limited access to green technologies and insufficient knowledge on how to effectively implement green strategies (Bresciani et al., 2023; Dhaigude & Kamath, 2025).

Furthermore, by concentrating on manufacturing SMEs in Bangladesh, this study joins the burgeoning literature on eco-innovation (Al-Husain et al., 2025; Alhumud & Elshaer, 2024; Jell-Ojobor & Raha, 2022). At the same time, however, Bangladeshi SMEs are like no other in their struggle from resource scarcity, incomplete legal regulations, lack of technological infrastructure and ad hoc management practices. It is these conditions that set the stage for the translation of each firm's strategic orientation, digital technologies and external green knowledge into actual innovation results (Khan et al., 2024). An examination of this context provides for a finer grasp on how internal capabilities in the form of green entrepreneurial orientation, big data analytics capability and green absorptive capacity must come through green management practices before they can yield any worthwhile green innovation. By locating the discussion within Bangladeshi manufacturing SMEs, this study moves past eco-innovation and sustainability literature that is limited to developed economies and endeavours to provide insight that is sensitive to the context in which capabilities must be deployed under institutional and resource constraints (Dhaigude & Kamath, 2025; Dong et al., 2024).

This study highlights the synergy between strategic capabilities comprising of entrepreneurial orientation, data analytics, and absorptive capacity has been created in a complementary way to facilitate green transformation among eco-innovation in SMEs (Ma et al., 2025b; Wamba et al., 2017). The strategic capabilities are synergistic and lead to greater eco-innovation by creating complementary effects that enhance their respective contributions. Green Entrepreneurship Orientation (GEO) offers strategic intents, BDAC offers information-based perspectives for making informed decisions regarding green, and the GAC facilitates the assimilation and implementation of external environmental knowledge (Khan et al., 2024; Zhang et al., 2025). These capabilities together can make an integrated system where the entrepreneurial vision is the driving force in data analytics and absorption of knowledge, leading to more productive green practices and innovation results. This complementarity is consistent with the Dynamic Capability View that focusses on the orchestration of capabilities, and the Practice-Based View, which describes how such synergy is converted into routinised actions that bring about sustainable change (Dhaigude & Kamath, 2025; Haile, 2025).

The contribution of this study is the two-pronged utilisation the DCV and NRBV to demonstrate how SMEs can employ internal strategic capabilities and technological skills to induce eco-innovation. While previous studies have discussed individual capacities, we broaden the discussion to their facilitating complementarities and to mediating mechanisms for GM practices. The basis of this theory is also relevant in a developing country setting (Bangladesh), given that SMEs are facing unique challenges and opportunities for green innovation. Such a marrying of theories provides a solid foundation that contributes to the body of knowledge and offers practical action points for fostering sustainability within SMEs. The study questions below are being investigated to achieve these objectives:

RQ1 : What is the impact of internal strategic orientations and capabilities on green innovation in SMEs?

RQ2 : What is the role of Green Management Practices as a mediator between internal capabilities and green-innovation outcomes?

RQ3 : Which internal systems enable long-term innovation in SMEs?

LITERATURE REVIEW

Theoretical Foundations

The study combines the Dynamic Capability View, Natural Resource-Based View and Practices Based View to understand SME eco-innovation through strategy, resources and practice (Khan et al., 2024; Zhang et al., 2025). DCV stresses organisational flexibility, NRBV emphasises resource-based stability, and PBV is oriented towards routinised green routines (Khan et al., 2024; Yu et al., 2025; Zhang et al., 2025).

Combined, they offer a comprehensive approach of capability building, resource allocation, and implementation. The model considers contextual impediments in Bangladeshi SMEs, namely resource scarcity, regulatory uncertainty and knowledge gaps influencing green transformation (Ma et al., 2021; Makhloufi et al., 2022a; Roshid et al., 2025). Synthesising these perspectives, then strategic readiness and green management practices are used to enhance eco-innovation under constraints so that SMEs may be prepared for either environmental pressure or have the possibility of sustainable operations (Siddiqi et al., 2025; Yu et al., 2025).

Altogether, the integrated framework suggests that ecological innovation in SMEs occurs only when there is strategic alignment between corporate strategy (GEO), technological intelligence (BDAC), and learning capability (GAC), the three of which materialise through Green Management Practices (GMPs) (Khan et al., 2024; Yu et al., 2025). GEO supplies a strategic view and environmental commitment, BDAC provides insights into what is happening in the environment from a data perspective, while GAC integrates outside knowledge with the added benefit of teamwork (Tuan, 2023). These capabilities can be translated through GMPs to become the actions of routine organisational practice. This interaction draws inspiration from dynamic capability view logic, natural resource-based view ideas and practice-based view's emphasis on process integration, all suggesting that eco-innovations come about not just by one capability at a time (good company), but after many different efforts are coordinated (Tuan, 2023; Yu et al., 2025).

Integration of Theoretical Frameworks

Big data analytics capability (BDAC) and green absorptive capacity (GAC) represent two analytically distinguishable, however, mutually supportive combinations (Al-Swidi et al., 2024; Yin et al., 2022). A firm's capability means BDAC and GAC are independent of each other. It means a company can have one without the other (Begum et al., 2023; Yu et al., 2025). At the same time, companies that possess both capabilities will be much better situated to respond effectively under stress and environmental crisis (Soomro et al., 2024). In the aggregation of such data, which is ultimately technological skill independent, BDAC refers to a firm's ability to gather environmental and operational data on a massive scale (Karim et al., 2024). In turn, this information is processed in real-time to provide evidence-based for green decision making (Begum et al., 2023; Rashid et al., 2025). On the other hand, GAC reflects a firm's capacity for learning. In terms of information with respect to green (alternative from industry trade associations, suppliers or governments) absorbed from the external environment, although data has been processed to produce an analytical answer (as is the case for BDAC), and although knowledge drives insights (an emphasis in GAC) (Begum et al., 2023; Yu et al., 2025).

Conceptually, BDAC allows a firm to find ways to raise eco-efficient performance based on available data. But practically, there is no way that the organisation will be able to institutionalise such lessons without a well-developed GAC. These capabilities should be kept apart conceptually so as not to affect the clarity with which environmentally oriented business innovation research is put forward in an explanatory fashion (Riaz et al., 2024; Song & Yu, 2018).

Green Entrepreneurship Orientation on Green Management Practices and Green Innovation

The proactive strategic posture displayed by SMEs regarding the combination of environmental sustainability into entrepreneurial behaviour, such as opportunity identification, risk bearing, innovation and resource marshalling, is known as green entrepreneurship orientation (GEO) (Al-Swidi et al., 2024; Makhloufi et al., 2022; Tuan, 2023). GEO focusses on the aggressive integration of environmental goals into the fir's strategy and operations, resulting in a pledge for green business solutions and breakthroughs (Makhloufi et al., 2022, Momayez et al., 2023). The interaction between GEO and GMPs can be examined from the perspectives of DCV (Dynamic Capability View) and NRBV (Natural Resource-Based View). In the lens of DCV, HGEO enables organisations to adjust their processes and resources for environmental performance, hyper-geographically efficiently by minimising the frictions for capturing as well as implementing green innovation (Makhloufi et al., 2022). This relationship is also reinforced in the NRBV by arguing that firms with high environmental commitments (like GEO) may achieve a persistent competitive advantage by organising resources and capabilities to develop eco-innovations (Yu et al., 2025).

When employees are active advocates of green chances, they enable the SMEs to begin structural action and obtain small successes like test projects regarding waste reduction or energy dispensation that could be up-scaled and regularised into general GMPs (Yin et al., 2022; Soomro et al., 2024). The Bottom-up GEO activation is a key enabler in the GMP and, thereby, also for Green Innovations (GI). When employees assimilate and apply GEO in their daily operations, they generate a culture of constant improvement and are on the path to introduce more sustainable ways of conducting business and new forms of eco-products or processes (Makhloufi et al., 2022). Several studies have also studied the positive association between GEO and green innovation (Yu et al., 2025; Zhang et al., 2024). High GEO firms are likely to embed GMPs and innovations that would lead to the adoption of cleaner technologies, eco-designs or circular practices (Makhloufi et al., 2022; Mondal et al., 2024; Tuan, 2023; Yin et al., 2022). The empirical findings provide evidence of the impact path from GEO to GMPs and green innovation through diverse SME environments (Song & Yu, 2018; Yu et al., 2025; Zhang et al., 2020). Thus, it was hypothesised:

H1 : Green entrepreneurship orientation has a positive and significant impact on green innovation.

H2 : Green entrepreneurship orientation has a direct and positive effect on green management practices.

Big Data Analytics Capability, Green Management Practices, and Green Innovation

Big data analytics capability (BDAC) reflects the potential of a firm to gather, piece together and yield useful information from large, varied and dynamic amounts of data (Alkhatib, 2024; Mishra et al., 2021; Rashid et al., 2025). It includes technology tools, architecture, people (data scientists and analysts) and organisational routines (data governance and decision protocols) that can facilitate quick decisions and quick changes (Karim et al., 2024; Watto et al., 2025). BDAC can help GMPs (Green Management Practices) by improving observability and enabling better decision-making support, as well as accelerating experimentation (Anin et al., 2024; Waqas & Tan 2023; Watto et al., 2025).

The theoretical underpinning for this linkage is based on the dynamic capabilities view (DCV) that organisations need to reconfigure their resources to keep pace with changes in their environment (Al-Swidi et al., 2024; Nguyen et al., 2025). BDAC and Green Absorptive Capacity are dynamic capabilities that enable SMEs to utilise insights from data to innovate towards sustainability. The natural resource-based view (NRBV) also indicates that environmental resources and capacities are essential for sustainable competitive advantage (Çelik et al., 2025). These theories suggest that BDAC, GMPs, and GI are closely related, and the study results are consistent with the (SDGs), especially SDG 9 (Industry, Innovation and Infrastructure) and SDG 12 (Responsible Consumption and Production) by encouraging innovative sustainability both sustainable innovation from an environmental perspective as well as green practices (Siddiqi et al., 2025; Yu et al., 2025). Thus, it was hypothesised that:

H3 : Big Data Analytics Capability has a positive and significant effect on Green Innovation.

H4 : Big Data Analytics Capability has a positive and significant effect on Green Entrepreneurship Orientation.

Green Absorptive Capacity, Green Management Practices, and Green Innovation

Green absorptive capacity (GAC) represents a firm's capability to identify, internalise and utilise extrinsic environmental knowledge for ecological and commercial gains (Ahmad et al., 2022; Qu et al., 2022; Shehzad et al., 2024a; Siddiqi et al., 2025). While GAC expands the original absorptive capacity framework (Akhtar et al., 2024; Siddiqi et al., 2025; Yu et al., 2025), it emphasises cognitive or eco-sustainability-related information of cleaner production technologies, compliance with regulations, shared design for capacity, and best practices among suppliers (Cheng et al., 2024; Makhloufi, 2024; Nguyen et al., 2025; Riaz et al., 2024). These micro foundations enable firms to put in place Green Management Practices (GMPs) like environmental audits, eco- design initiatives and sustainable purchasing practices that further resource efficiency as a couple of aqueducts for Green Innovation (Baquero, 2024; Begum et al., 2023; Nguyen et al., 2025).

GAC promotes GMPs and Green Innovation (GI) by bringing environmental concerns into the clear and active (Çelik et al., 2025; Kim et al., 2025). The first is awareness of, and exposure to, environmental knowledge, which enables employees to perceive and address environmentally challenges such as energy wasted (sedans) or waste streams, thus realising opportunities for improvement (Čelik et al., 2025; Kim et al., 2025; Zhang et al., 2024). Second, it allows the firm to convert this knowledge into codified processes and performance metrics that will serve in shaping routines which generate adaptive behaviours throughout the organisation (Makhloufi, 2024). Third, the current application of this knowledge in product development cycles mitigates uncertainty and enhances learning, supporting both progressive innovation (energy efficiency) and radical innovation (eco-design and recyclable products) (Čelik et al., 2025; Kim et al., 2025). Empirical evidence supports GAC in terms of the adoption of environmental management practices and eco-innovation outcomes (Kim et al., 2025; Wang et al., 2024). In resource-scarce settings such as Bangladeshi manufacturing SMEs, GAC can be used by these firms to leverage external knowledge from suppliers, NGOs and regulatory organisations to develop low-cost and context-specific green innovations that elevate the environmental performance of firms, which will also result in enhanced competitiveness (Lee et al., 2024; Siddiqi et al., 2025; Yu et al., 2025). Thus, it was hypothesised that:

H5 : Green Absorptive Capacity has a positive and significant effect on Green Innovation.

H6 : Green Absorptive Capacity has a positive and significant effect on Green Entrepreneurship Orientation.

The Mediating Role of Green Management Practices

Green management practices are a mediator since these strategic capabilities, like GEO, BDAC, and GAC, do not directly transform into eco-innovation unless structured practices are operationalised (Bidmeshk et al., 2025; Bresciani et al., 2023). Using the Practice-Based View, capabilities reflect the potential, whereas GMPs reflect the routines and processes that transform the potential into actual environmental effects (Kim et al., 2025; Shehzad et al., 2024b; Zaid & Sleimi, 2023). The logic of the Dynamic Capability View can be supported with the fact that the capabilities should be implemented in the form of organisational processes to generate value.

Equally, the Natural Resource-Based View proposes that resource-based benefits can only become actualised when they are embedded in a practice that diminishes the impact of the environment. AS such, GMPs are the channel via which strategic capabilities determine eco-innovation such that there is an alignment between purpose, capability, and action (Karim et al., 2024; Karmaker et al., 2023; Kim et al., 2025; Yusof et al., 2024).

The mediating role of GMPs has reinforced the association between the antecedents and GI. High GEO firms are likely to take a proactive attitude toward environmental responsibility (Barón Dorado et al., 2022; Kim et al., 2025). But unless GMPs are on the books, this entrepreneurial energy may lack a clear direction and become merely idealistic. GMPs serve as the requisite architecture for converting entrepreneurial motives to replicable routines overlaying sustainable product and process innovations (Barón Dorado et al., 2022; Karim et al., 2024). Similarly, BDAC facilitates the creation of useful environmental knowledge, but GMPs provide the necessary management structure to ensure that this knowledge is pursued in a consistent manner over time (Aref, 2024). For instance, energy waste identification with BDAC ought to be inculcated into GMPs through energy audits or process monitoring systems to enhance GI (Arslan et al., 2022). Further, GAC, which specifically attends to absorbing and converting external environmental knowledge, needs GMPs to allow this knowledge to permeate formal practices and convert it into repeatable routines that enable eco-innovation (Siddiqi et al., 2025).

Recent studies have stressed the critical role of digital technology capabilities, absorptive capacity and renewable orientation for eco-innovation (Al-Swidi et al., 2024; Kim et al., 2025; Makhloufi, 2024). But, overall, they look only at these capability combinations in isolation or simply consider the direct effects each has on environmental innovation. Building on the previous literature of eco-innovation, we show in this paper that green management practices serve as a crucial mediating factor, especially in a resource-stressed SME (Bidmeshk et al., 2025; Karim et al., 2024). This result suggests that, even though BDAC or GEO interprets both direct and alternative outcomes, GAC will only genetically green business innovation practice under other conditions (Yusof et al., 2024). Now that we have shown why those firms which understand their own knowledge resources better should nevertheless still benefit from formalising routines, we will have a bit more idea of how, in a filled cattle-market, internal capabilities can finally transform themselves into innovations that are durable and beneficial to society (Siddiqi et al., 2025). This finding offers a more detailed understanding of when internal capabilities translate into effective sustainable innovation, especially in developing countries where organisational structures are still being formed (Bidmeshk et al., 2025; Karim et al., 2024). Thus, it was hypothesised that:

H7 : Green Management Practices have a positive and significant effect on Green Innovation.

H8 : Green Management Practices mediates the relationship between Green Entrepreneurship Orientation and Green Innovation.

H9 : Big Data Analytics Capability mediates the relationship between Green Entrepreneurship Orientation and Green Innovation.

H10 : Green Absorptive Capacity mediates the relationship between Green Entrepreneurship Orientation and Green Innovation.

Figure 1 illustrates the conceptual framework of the study, showing that Green Entrepreneurship Orientation, Big Data Analytics Capability, and Green Absorptive Capacity directly influence Green Management Practices and Green Innovation. Additionally, Green Management Practices act as a mediating mechanism that further drives Green Innovation.

METHODOLOGY

Data Collection Process and Sampling Procedure

The study was based on a positivist hypothetical-deductive method as applied by others in the strategic management and innovation research field. This study was a quantitative study, and a structured questionnaire was used to collect the data. A random sampling procedure was used to obtain an adequate number of manufacturing SMEs in Dhaka city and adjacent industrial areas. A stratified random sampling was used to collect the data. There was the use of a stratified random sampling method to facilitate representativeness. The stratification was based on the size of the firms (small vs. medium) and the type of industry, which reflected differences in the level of technology usage and the practice of green innovations. The firms have been randomly selected within every stratum based on manufacturing SMEs in Dhaka and the surrounding industrial zones.

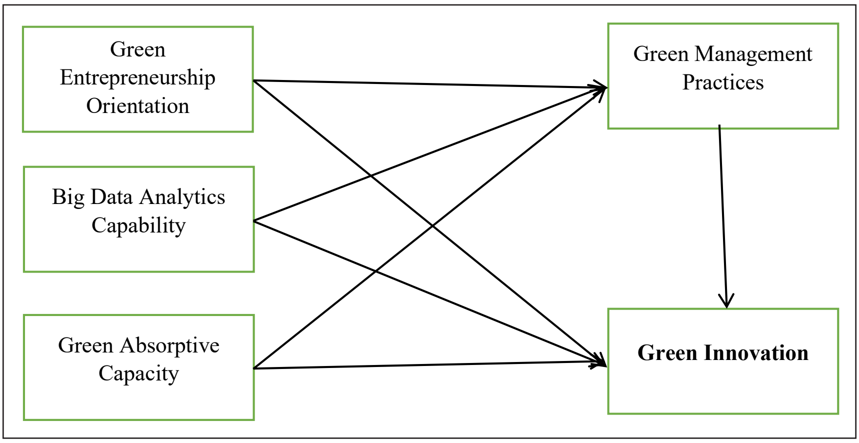

Figure 1. The conceptual framework of the study

The unit of analysis was employees since they are the ones who must implement green practices and activities in innovation.

The items on the measure were generated with reference to earlier validated measurement scales and adjusted to suit the context of this study. All constructs were measured using 5-point Likert-type scales (1 = strongly disagree to 5 = strongly agree), for consistency and ease of comparison. A pilot evaluation (30 responses) was performed among a sample of SME employees to evaluate the clarity, reliability and context appropriateness of the items before the main survey. Minor guided changes in wording and arrangement of items were informed by feedback from the pilot study.

The questionnaire was administered in hardcopy and online to personnel at SMEs, providing access to a broader audience. To promote participation and reduce potential nonresponse bias, reminders were sent later in data collection. A highly effective response rate was achieved, with 340 useable questionnaires out of the total 400 distributed. The sample size exceeds the threshold for Partial Least Squares Structural Equation Modelling (PLS-SEM) according to the sample to items ratio (Hair et al., 2019), thus providing ample statistical power for hypothesis testing.

To minimise social desirability bias and improve the quality of responses, confidentiality and anonymity was guaranteed. The respondents reported that they would use the information for academic research and voluntary participation was requested. The data collection took three months, which was adequate to collect data as robust and representative as possible from the selected SMEs.

Instrumentation

The questionnaire was developed based on the validated scales of past research and adapted to the SMEs and Bangladeshi context. Four items that were selected from modified and revised items of the study by Song and Yu (2018), and Zhang et al. (2020). To measure BDAC, four adapted from Gupta and George (2016), Wamba et al. (2017), and Mikalef et al. (2020) to measure Big Data Analytics Capability (BDAC). GAC was measured by four items developed and revised based on Chen et al. (2014), and Camisón and Forés (2010), four items reworded from Chen et al. (2014), and Camisón and Forés (2010). Five items from the study of Zhu et al. (2008), Yu et al. (2017), and Saeidi et al. (2018) to assess Green Management Practices (GMP). Five items to measure Green Innovation (GI) were adapted from Chen et al. (2006), Xie et al. (2016), and Song and Yu (2018). Responses to each item were recorded on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). A pilot study of 30 SME personnel was conducted to further fine-tune the wording, reliability, and determination of face validity before actual data collection.

Data Analysis Tools

The collected data were processed with the help of SPSS version 26, where preliminary tests were conducted (descriptive statistics, missing values, normality tests, and reliability tests), and SmartPLS 4.0, where hypothesis testing was performed using PLS-SEM. The reason behind the selection of PLS-SEM is that it is used when complex models are required, when the sample sizes are small, and when the data has a non-normal distribution, which is primarily the case with social science studies.

RESULTS

Demographic Characteristics of Respondents

Table 1 represents the demographic features of respondents. The researchers surveyed 340 people in the manufacturing firms in Bangladesh. Most of the participants were males (61.8 percent), and females comprised 38.2 percent. The age group of 25-34 years belongs to 41.2 percent, and the age group of 35-44 years belongs to 27.9 percent, had the greatest number. With respect to education, 44.1 percent had a bachelor's degree, 27.9 percent had a master's degree, and 20.6 percent held a diploma/technical certificate. In terms of work experience, 27.9% had 6-10 years of industry experience and 30.9% had 2-5 years. The primary jobs of the respondents were production/operations (35.3%), and supply chain/logistics (17.6%). The number of job opportunities was divided between the staff at the entry-level (35.3%), supervisors/team leaders (27.9%), and middle management (25.0%). Most of them worked in textile/garments (44.1%), and then in food and beverage (20.6%).

Normality and Biasness Analysis

As a measure of the robustness of the dataset, several diagnostic tests were conducted and included normality test, non-response bias, multicollinearity and social desirability bias. The Kolmogorov-Smirnov and Shapiro-Wilk tests were first used for evaluating the normality of the data. As the significance values of all the graphs in Table 2 obtained are less than 0.05, it shows that the normality assumption has been violated in the data. Thus, nonparametric and variance-based methods, such as PLS-SEM, were considered as appropriate approaches to be employed in the subsequent analysis. Second, non-response bias was monitored by comparing the mean and standard deviation of the first 30 and the last 30 responses (Wallace & Cooke, 1990). As the results (Table 2) showed, since there was not a significant difference between the two groups, and these findings suggest that non-response bias did not exist, and the sample size was large enough for generalisation of findings to the target population.

The multicollinearity and common method bias were tested by the variance inflation factor (VIF) in turn of Kock (2015) parameter. The issue of multicollinearity and common method variance was not a concern as the highest VIF value for the measurement model was below 3.3 (Table 7). The 7-item scale form of Fischer and Fick (1993) was used after the survey. Its relation to the construct under study was not significant, as indicated by the results of the regression analysis (Table 2); thus, social desirability is an irrelevant variable in our study.

Table 1
Respondent's demographic profile

Characteristics	Frequency	Percentage	Characteristics	Frequency	Percentage
Gender			**Work Experience (Years in the Industry)**		
Male	210	61.80	Less than 2 years	45	13.20
Female	130	38.20	2–5 years	105	30.90
Age Group			6–10 years	95	27.90
Below 25 years	50	14.70	11–15 years	60	17.60
25–34 years	140	41.20	More than 15 years	35	10.30
35–44 years	95	27.90	**Department / Functional Area**		
45–54 years	40	11.80	Production / Operations	120	35.30
55 years and above	15	4.40	Research and Development (R & D)	35	10.30
Education Level			**Supply Chain / Logistics**	**60**	**17.60**
Diploma/Technical Certificate	70	20.60	Finance and Accounting	40	11.80
Bachelor's Degree	150	44.10	Human Resources (HR)	25	7.40
Master's Degree	95	27.90	Marketing / Sales	30	8.80
Doctoral Degree (DBA)	10	2.90	Sustainability / Environmental Management	15	4.40
Others	15	4.50	Others	15	4.40
Job Position / Designation			**Type of Manufacturing Company**		
Entry-level Staff	120	35.30	Textile / Garments	150	44.10
Supervisor / Team Leader	95	27.90	Food and Beverage	70	20.60
Middle Management	85	25.00	Electronics / Electrical	45	13.20
Senior Management / Executive	40	11.80	Chemical / Pharmaceutical	50	14.70
			Steel / Heavy Industry	25	7.40
			Others		
Total: 340					

Table 2
Normality and biasness analysis

Test of Normality: Kolmogorov-Smirnova Shapiro-Wilk						
	Statistic	**Df**	**Sig.**	**Statistic**	**df**	**Sig.**
Green Entrepreneurship Orientation	0.112	340	0.000	0.771	340	0.001
Big Dara Analytics Capacity	0.142	340	0.000	0.751	340	0.001
Green Absorptive Capacity	0.147	340	0.000	0.767	340	0.000
Green Management Practices	0.131	340	0.000	0.711	340	0.001
Green Innovation	0.114	340	0.000	0.723	340	0.000
Non-response bias: Early Respondents Late Respondents						
	Mean	**SD**			**Mean**	**SD**
Green Entrepreneurship Orientation	3.7654	0.7654			3.4312	0.7645
Big Dara Analytics Capacity	3.2314	0.7123			3.5431	0.7851
Green Absorptive Capacity	3.6513	0.8651			3.7861	0.6527
Green Management Practices	3.7821	0.6781			3.6531	0.8765
Green Innovation	3.6543	0.7893			3.7653	0.7861
Social desirability bias						
	TO	**EO**	**I**	**IU**	**SP**	
Sig.	0.634	0.653	0.745	0.611	0.761	

Model Measurement, Validity, and Reliability

Table 3 presents the measurement model assessment of the study. The reliability of the indicators based on factor loadings ranged (substantially) above the cutoff score of.70 (Hair, et al., 2019), which were somewhat lower but remained because they thematically added to the theory. The reliability of the inner consistency was confirmed through Cronbach alpha values (CA) (0.711-0.843), composite reliability (CR) (0.798-0.901), where the positive threshold of 0.70 was reached in all cases under study (Hair et al., 2014). The items that have loadings that are slightly less than 0.70 were kept since they are theoretically necessary and offer construct validity. The existing literature recommends keeping the indicators at or above 0.60 in the case of AVE and CR within the recommended levels; that guarantees the overall reliability and convergent validity of the measurement model. The convergent validity was established as the AVEs of all constructs were beyond 0.50, indicating that more than half of the variances in those indicators were captured by their corresponding constructs.

The quality of fit of the model has been examined. The R^2 value of Green Management Practices was 0.443, and the R^2 value rose to a higher level for Green Innovation (0.572). In response to common method bias, we did a complete collinearity test along with VIF. The variance inflation factors were less than 3.3, thereby showing that multicollinearity and CMB risk do not exist. It is generally suggested as a method of PLS-SEM research for the validity of the structural model.

Table 3
Measurement of model assessment

Constructs	Items	Loading	AVE	CR	Alpha	R-Square	NFI	SRMR
Green Entrepreneurship Orientation	GEO1	0.668						
	GEO2	0.737	0.578	0.845	0.758			
	GEO3	0.814						
	GEO4	0.814						
Big Dara Analytics Capacity	BDAC1	0.723						
	BDAC2	0.758	0.500	0.798	0.711			
	BDAC3	0.743						
	BDAC	0.588						
Green Absorptive Capacity	GAC1	0.759						
	GAC2	0.859	0.658	0.885	0.826			
	GAC3	0.846						
	GAC4	0.776						
Green Management Practices	GMP1	0.756						
	GMP2	0.807						
	GMP3	0.835	0.615	0.889	0.843	0.443		
	GMP4	0.803						
	GMP5	0.715						
Green Innovation	GI1	0.775						
	GI2	0.783						
	GI3	0.835	0.647	0.901	0.863	0.572	0.876	0.068
	GI4	0.789						
	GI5							

Note. AVE: Average Variance Extracted; CR: Composite Reliability; NFI: Normed Fit Index; SRMR: Standardised Root Mean Square Residual

As Cohen (1988) and Chin (1998) suggest, these values fall into moderate to large amounts of variation accounted for by the exogenous constructs. With respect to the model fit, the Normed Fit Index (NFI) value was 0.876, which is close to the 0.90 recommended level for fit acceptance, indicating a good level of fit (Chin, 1998). The Standardised Root Mean Square Residual SRMR was 0.068, the cut-off for good model fit is < 0.08, and therefore the model fits well (Hair et al., 2016). PLS-SEM was selected based on it being resistant to non-uniform distributions of data, thus it can be used in the study. The algorithm is based on bootstrapping and partial least squares estimation, which is not based on the assumptions of normality, making the algorithm valid in parameter estimation and significance testing even when previous tests have shown that there are normality problems.

Discriminant Validity

Fornell-Larcker Criterion Analysis

The results of the Fornell-Larcker criterion analysis are presented in Table 4. A rectangle of the diagonal presents the square root AVE in bold (with a range from 0.710 to 0.811). All these values are above the corresponding inter-construct correlations in both rows and columns, indicating that the constructs own more variance of related indicators than irrelevant ones. It suggests that discrimination validity is fine. Therefore, the constructs under study are unambiguous and valid with respect to the Fornell and Larcker (1981) criteria.

Heterotrait-Monotrait (HTMT) Analysis

Table 5 presents the findings of the Heterotrait-Monotrait (HTMT) ratio of correlations, which is deemed a stricter test of evaluating discriminant validity in a structural equation model. The threshold proposed by Henseler (2005) has not been determined as a value of 0.85, which is a conservative cut-off point of the HTMT values. All the HTMT values in the given research were found to be lower than this value, which validates that all the study constructs are empirically dissimilar. This result also supports the finding of discriminant validity in the measurement model.

Predictive Relevance and Effect Size of the Model

The structural model was tested for its robustness and predictive capabilities using PLS-SEM according to Hair et al. (2019). Several diagnostic indices were obtained, such as Variance Inflation Factor (VIF), Cohens f^2, Stone Geisers Q^2, root mean square error RMSE, and mean absolute error MAE. First, we calculated the values of VIF with consideration for multicollinearity. Table 6 indicates that all the VIF estimates were much less than the conservative value of 5.0 and thus confirmed the non-existence of a collinearity problem in this model.

Secondly, Cohen's f^2 values were examined to ascertain the sizes of the influences of exogenous constructs on endogenous variables. The results indicate relatively lower associations between the construct of Big Data Analytics Capability and Green Innovation and Green Management Practices. A medium effect of Green Absorptive Capacity on Green Innovation and Green Management Practices was observed. The mediating effect of Green Entrepreneurship Orientation on Green Innovation and Green Management Practices was moderate. Third, all endogenous constructs Q^2 values in Stone-Geisser were larger than 0, indicating the model has predictive relevance. Lastly, predictive accuracy measures (RMSE and MAE) showed that all the endogenous constructs had acceptable measures of error, which also supported the strength of the model.

Table 4
Fornell-Larcker criterion analysis for discriminant validity

		1	**2**	**3**	**4**	**5**
1	Big Data Analytics Capability	**0.706**				
2	Green Absorptive Capacity	0.321	**0.811**			
3	Green Entrepreneurship Orientation	0.403	0.346	**0.760**		
4	Green Innovation	0.463	0.441	0.534	**0.804**	
5	Green Management Practices	0.455	0.512	0.533	0.725	0.784

Note. The diagonal values represent the square root of the AVE of each construct and are greater than the corresponding inter-construct correlations in the same row and column

Table 5
Heterotrait-Monotrait (HTMT) analysis for discriminant validity

		1	**2**	**3**	**4**	**5**
1	Big Data Analytics Capability					
2	Green Absorptive Capacity	0.421				
3	Green Entrepreneurship Orientation	0.547	0.434			
4	Green Innovation	0.605	0.516	0.653		
5	Green Management Practices	0.607	0.613	0.649	0.844	

Note. *Discriminant validity exists if the HTMT<0.85 (Henseler, 2005)

Table 6
Values of the Stone Geisser indicator (Q^2) and Cohen's indicator (f^2) of the model in the SEM

Constructs	**Q^2 Predict**	**RMSE**	**MAE**	**Green Innovation (f^2)**	**Green Management Practices(f^2)**
Big Data Analytics Capability				0.067	0.067
Green Absorptive Capacity				0.163	0.163
Green Entrepreneurship Orientation				0.156	0.156
Green Innovation	0.385	0.791	0.558		
Green Management Practices	0.425	0.764	0.552		

Note. Large effect> 0.35; Medium effect > 0.15; Small effect > 0.02 (Cohen, 1988). N.B.: f^2 values represent the effect size of each exogenous construct on the corresponding endogenous variable

Structural Model Assessment

The Standardised Results of SEM calculations are illustrated in Figure 2. The structural model was tested based on PLS-SEM with bootstrapping of 4,999 resamples to examine the significance of the hypothesised relationships. All outer loadings of the composites were large and significant, thus supporting indicator reliability. The R^2 statistics for the dependent variables were high, displaying a great explanatory power of the model.

Hypotheses Testing (Direct and Indirect Effects)

The reinvented hypothesis-focused findings based on bootstrapping with 4,999 resamples by SmartPLS 4.0 for path structures are demonstrated in Table 7. Analysis results such as Standardised path coefficients (β), t-values and p-values, 95% confidence intervals are provided for hypothesis validation. As seen in Table 7, H1 is supported; a positive and significant relationship is found between GEO and GI ($\beta = 0.172$, $t = 3.186$, $p < 0.05$). These results confirm the previous observations of Wamba et al. (2022) and Mikalef et al. (2020), although the important role of data analytics to support green innovation is emphasised. This reflects that green entrepreneurship orientation influences employees to adopt green innovation.

Moreover, H2 is supported, which shows that there is a positive and significant relationship found between Green Entrepreneurship Orientation and Green Management Practices (GMPs) ($\beta = 0.333$, $t = 6.655$, $p < 0.001$).

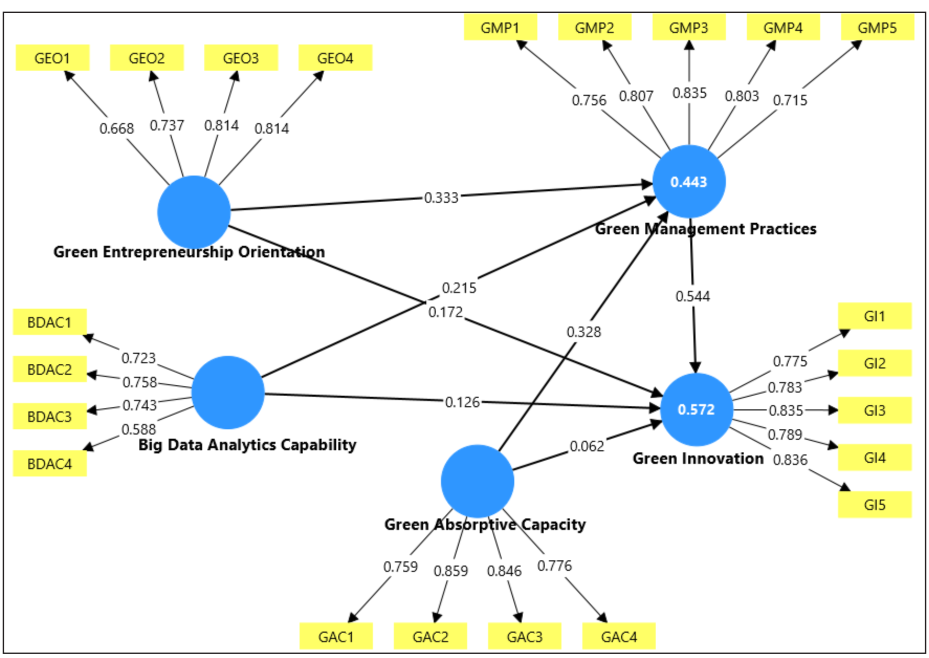

Figure 2. Standardised results of SEM calculations

Table 7
Results of direct effect hypotheses

Hypotheses	Relationships	Std Beta	2.5% CI	97.5% CI	VIF	t-value	p-value	Decision
H1	Green Entrepreneurship Orientation → Green Innovation	0.172	0.068	0.285	1.473	3.186	0.001	Supported
H2	Green Entrepreneurship Orientation → Green Management Practices	0.333	0.237	0.431	1.273	6.655	0.000	Supported
H3	Big Data Analytics Capability → Green Innovation	0.126	0.041	0.218	1.333	2.795	0.005	Supported
H4	Big Data Analytics Capability → Green Management Practices	0.215	0.123	0.312	1.251	4.519	0.000	Supported
H5	Green Absorptive Capacity → Green Innovation	0.062	-0.032	0.159	1.382	1.263	0.207	Rejected
H6	Green Absorptive Capacity → Green Management Practices	0.328	0.219	0.431	1.189	6.078	0.000	Supported
H7	Green Management Practices → Green Innovation	0.172	0.068	0.285	1.797	3.186	0.001	Supported

Note. CI: Confidence Interval; VIF: Variance Inflation Factor. All VIF values are below the recommended threshold, indicating no multicollinearity issues

The previous studies of Makhloufi et al. (2022), Anin et al. (2024), and Ma et al. (2025b) support this finding. This finding suggests that green entrepreneurship enhances green management practices, which accelerates the SMEs green innovation adoption. H3 is also supported, which claims that there is a positive and significant relationship between Big Data Analytics Capability and Green Innovation ($\beta = 0.126$, $t = 2.795$, $p < 0.05$). The previous studies of El Manzani and El Idrissi (2025), Kalyar et al. (2024), and Wu et al. (2025) support this finding. This finding suggests that the Big Data Analytics Capability of employees of any firm enhances Green Innovation adoption. Moreover, H4 is supported, which shows that there is a positive and significant relationship between Big Data Analytics Capability and Green Management Practices ($\beta = 0.215$, $t = 4.519$, $p < 0.001$). The previous studies of Shi et al. (2023), Rahaman et al. (2024), and Mikalef et al. (2020) support this finding. This finding suggests that Big Data Analytics Capability enhances employees' green management practices, which lead them to adopt green innovation.

As seen in Table 7, H5 is not supported, which shows that there is no relationship between Green Absorptive Capacity and Green Innovation ($\beta = 0.062$, $t = 1.263$, $p > 0.05$). The previous studies of Hong et al. (2019), Kim et al. (2025), and Dantas et al. (2025) support this finding. Rejection of this hypothesis suggests that mere absorptive capacity alone is inadequate and some more organised form of capital utilisation, such as formal management practices (GMPs), may be needed to make absorbed knowledge productive. Furthermore, Hypothesis 6 is supported, which suggests that GAC and GMPs have a positive and significant association (β = 0.328, t = 6.078, $p < 0.001$). The previous studies of Zahra et al. (2022) and Lin et al. (2020a) support this finding. This means that SMEs acquiring external green knowledge have more tendency to adopt eco-friendly management practices.

The lack of a significant direct connection between GAC and green innovation draws attention to some important theoretical issues. With GAC, a firm can obtain and absorb environmental knowledge. Nonetheless, this capability is largely dormant if it is not built into the firm's management system. In the case of SMEs and of many enterprises in the developing world, green knowledge is often improvisational and discontinuous. Without green management practices, such as environmental monitoring systems, Standardised procedures, and performance metrics, absorbed knowledge may not be readily introduced into either research results' production or product innovation processes. Thus, GAC influences green innovation completely through green management practices. This confirms the practice-based view; it is not just capabilities that account for organisational results, but routines will drive them.

Moving forward, H7 is confirmed, which suggestd that there was a positive and significant connection between GMPs and green innovation (β = 0.172, t=3.186, $p < 0.001$). This finding is consistent with the previous of Singh et al. (2021) and Tan et al. (2023), which highlight the importance of GMPs for green innovation. SMEs' prospects of becoming environmentally sustainable innovators will increase if they implement GMP systems.

Table 8 shows the results of the indirect effect hypotheses. As seen in Table 8, H8 is supported, where indirect effect sizes and bootstrapped confidence intervals were reported to confirm mediation. GEO → GMP → GI showed a significant indirect effect (β = 0.181, t = 5.624, $p < 0.001$, CI [0.119, 0.245]), supporting full mediation. This indicates that GEO influences GI primarily through GMP rather than directly, supporting the mediation hypothesis. This suggests that entrepreneurial orientation alone does not guarantee eco-innovation; it must be operationalised through structured green practices.

Table 8
Results of indirect effect hypotheses

Hypotheses	Relationships	Std Beta	2.5% CI	97.5% CI	t-value	p-value	Decision
H8	Green Entrepreneurship Orientation → GMP→ Green Innovation	0.181	0.119	0.245	5.624	0.000	Supported
H9	Big Data Analytics Capability → GMP→ Green Innovation	0.117	0.067	0.171	4.381	0.000	Supported
H10	Green Absorptive Capacity → GMP→ Green Innovation	0.179	0.109	0.251	4.859	0.000	Supported

Note. GMP: Green Management Practices; CI: Confidence Interval

This finding is in line with Schaltegger and Wagner (2011), and Yusof et al. (2023).

Furthermore, H9 is supported, where indirect effect sizes and bootstrapped confidence intervals were reported to confirm mediation. BDAC → GMP → GI showed a significant indirect effect (β = 0.117, t = 4.381, p < 0.001, CI [0.067, 0.171]), supporting partial mediation. This indicates that BDAC influences GI primarily through GMP rather than solely through direct effects, reinforcing the mediation hypothesis. The confidence interval does not include zero, confirming the robustness of this effect. This suggests that analytics capability alone does not guarantee eco-innovation; it must be embedded within green management practices. This finding is consistent with Dubey et al. (2021) and Mikalef et al. (2020), who highlight the synergy between data analytics and sustainability.

Moreover, H10 is supported, where indirect effect sizes and bootstrapped confidence intervals were reported to confirm mediation. GAC → GMP → GI showed a significant indirect effect (β = 0.179, t = 4.859, p < 0.001, CI [0.109, 0.251]), supporting full mediation. This indicates that GAC influences GI primarily through GMP rather than directly, reinforcing the mediation hypothesis. The confidence interval does not include zero, confirming the robustness of this effect. This suggests that absorptive capacity alone does not guarantee eco-innovation; it must be institutionalised through structured green management practices. This finding aligns with Zahra and George (2002) and Lin et al. (2020b), who argue that absorptive capacity must be realized through formal processes to lead to actual innovation.

The Importance of Performance Map Analysis (IPMA) for Startup Performance

Table 9 and figure 3 present the Importance-Performance Map Analysis (IPMA) results for startup performance. IPMA examined both the strategic relevance and performance appraisal of four constructs, which included GMP (Green Management Practice), GEO (green entrepreneurial orientation), BDAC (big data analytics capability) and GAC to leverage green-driven innovation for SMEs in Bangladesh (Wu et al., 2025). GMP demonstrates the largest importance (0.544) with moderate performance (24.527), GEO performs strongly important (0.353), yet he lowed performance (22.833),

Table 9
Importance-Performance Map Analysis (IPMA)

Constructs	Importance	Performances
Big Data Analytics Capability	0.243	25.57
Green Absorptive Capacity	0.241	25.535
Green Entrepreneurship Orientation	0.353	22.047
Green Management Practices	0.544	24.527

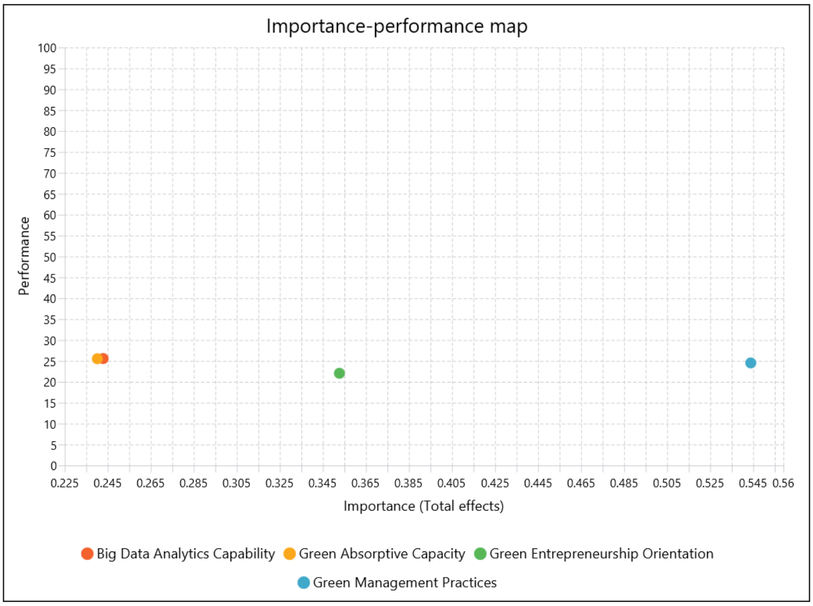

Figure 3. Importance Performance Map Analysis (IPMA)

which reflects that the under-use of entrepreneurial values and GWE has the lowest importance (0.273) but strong performance, reflecting maximise on entrepreneurial value. Operationally, BDAC (0.243; 25.57) and GAC (0.241; 25.535) do well, but the strategic impact of them is moderate. SMEs need to reinforce green culture and make more effective use of BDAC and GAC for better innovation performance.

CONCLUSION

This study determines the key components which influence green innovation and sustainable performance in Bangladeshi SMEs, such as GEO (Green Entrepreneurship Orientation), BDAC (Big Data Analytics Capability), GAC (Green Absorptive Capacity) and GMPs (Green Management Practices). The empirical results strongly support the notion that these internal competences and strategic orientations are important stimulants of green innovation in SMEs. The study validates that Green Entrepreneurship Orientation, Big Data Analytics Capability and Green Management Practices all have a positive and significant relationship with Green Innovation. This finding also supports concepts from theory that internal strategic competencies like these are instrumental in a path toward sustainable innovation, because they make clear that SMEs effectively can pick up and implement eco-friendly practices. Results also support the natural resource-based view (NRBV) that contends that resources which are rare, valuable and hard to imitate provide a competitive advantage to firms.

The findings indicate that not only factors such as GEO, BDAC, and GMPs promote green innovation, but they are also essential to maintain a long-term sustainable competitive advantage. It is this internal factor that competitors often find hard to replicate, which can help SMEs to distinguish themselves in a greener market.

The study also complements dynamic capabilities theory that relates dynamic capability with SMEs' ability to adapt, integrate and reconfigure resources in green innovation, that enable higher performance achievement among SMEs. The study also reconfirms that the effective implementation of green innovation strategies is not only about the adoption of new technologies but about promoting a dynamic and evolutionary process towards sustainability. By utilising such strategic competencies, SMEs can enhance environmental sustainability as well as attain substantial competitive edge, thereby contributing to wider goals of sustainable development. Furthermore, the study uncovers useful recommendations for SMEs that a high green entrepreneurship orientation, supported by enhanced capabilities in Big Data Analytics, green absorptive capacity and green management practices, is an important determinant of green innovation. Managers and policymakers who are interested in promoting sustainable growth for SMEs, especially those in countries at earlier stages of development such as Bangladesh, should focus on these factors (Chen et al., 2024; Dantas et al., 2025; Yousaf, 2021).

IMPLICATION OF THE STUDY

Theoretical Implications

Theoretical implications of the study are also remarkable since RBV and DCT have been integrated to investigate the antecedents of green innovation in the SME segment within a developing country like Bangladesh. The presence of RBV can be explained with the internal strategic resources, such as green entrepreneurship orientation (GEO), big data analytics capability (BDAC) and green absorptive capacity (GAC), which form an innovation catalyst. These credentials are something valuable, rare, and inimitable for which support the RBV concentration on internal resources to be unique in to produce competitive advantage. Ultimately, this study contributes to dynamic capabilities theory by showing that GMPs serve as a mediating mechanism through which internal resources are turned into tangible sources of innovation. Empirical evidence suggests that some capabilities (green entrepreneurial orientation and data analytics) have direct impacts on innovation, whereas absorptive capacity should be operationalised by institutionalised practices (GMPs) to employ an effect. This is potentially a significant finding in that it also suggests the possible production or transformation of resources into true resources when effectively subsumed under formal management routines if collected as part of an integration process such as absorptive capacity.

Implications for SMEs

Bangladeshi SMEs may employ energy-saving processes, waste segregation, recycling and green procurement technologies to institutionalise the eco-innovation. Supplementary performance monitoring tools and the capacity to leverage big data analytics capability (BDAC) and green absorptive capacity (GAC) allow firms to pursue data-driven sustainability and effectively integrate external environmental knowledge. A combination of cost-effective analytics and staff training contributes to BDAC development, while associating environmental data with decisions increases its accuracy. The GAC can be empowered through these forms of global networking and knowledge exchange. Process innovations need to be applied across the board and be complemented with other initiatives, such as zero-waste projects, green supplier certifications. GMPs are essential in the translation of knowledge into practice as absorptive capacity alone is not an instigator for innovation but it must be enacted through formalised structures. By embedding foreign learning into operational practices, sustainable impact and local competitiveness achieved in emerging markets.

Implications for Policymakers

These findings can be taken advantage of by policymakers in less developed nations who would like their small and medium-sized enterprises to practise a structured green management. Tax breaks, the provision to enjoy environmental systems management training programmes at a subsidised price and data infrastructure support to enable making things happen will make such a strategy feasible. Policies that promote green absorptive capacity should include provisions for creating platforms on which SMEs can share their experiences, guidelines adapted to local circumstances and research institutions involved in improving the coordination. Constructing standardised frameworks for SME sustainability reporting would take the next step in the organisational routines, enabling them to become more environmentally sensitive.

Limitations and Directions for Future Research

This study has limitations. The impact of absorptive capacity on green innovation is likely to be context-specific, e.g., formal GMP implementation in economies like Bangladesh. Alternative mediators and informal practices need to be explored in future studies, and generalisability across regions should be tested with longitudinal or comparative research. To enhance capability-based eco-innovation models, researchers might integrate constructs (e.g., green HRM, green organisational culture, and digital orientation), together with big data analytics capability and green absorptive capacity. Theories such as institutional theory could also help us to better understand the effects of external pressures on SMEs' green behaviour.

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APPENDIX

Measurement Items and Sources

Green Entrepreneurship Orientation (GEO) (Zhang et al., 2020; Song and Yu, 2018):

1. Our firm actively seeks business opportunities with environmental benefits.
2. We prioritize ecological responsibility in entrepreneurial decision-making.
3. Employees are encouraged to propose innovative green ideas.
4. Our firm proactively develops sustainable business models.
5. We emphasise long-term ecological sustainability over short-term gains.

Big Data Analytics Capability (BDAC) (Gupta and George, 2016; Wamba et al., 2017; Mikalef et al., 2020):

1. Our employees have strong analytical skills to interpret big data for decision-making.
2. We effectively integrate big data into our business processes.
3. Our firm uses big data insights to enhance environmental sustainability.
4. Employees utilise big data tools to identify eco-innovation opportunities.
5. We continuously improve our data-driven decision-making capability.

Green Absorptive Capacity (GAC) (Chen et al., 2014; Camisón and Forés, 2010):

1. Our firm quickly identifies and acquires new environmental knowledge.
2. Employees effectively share and disseminate green knowledge internally.
3. We regularly integrate external ecological knowledge into our processes.
4. Our employees have the ability to apply environmental knowledge to new contexts.
5. The firm continuously updates its practices with the latest sustainability insights.

Green Management Practices (GMP) (Zhu et al., 2008; Yu et al., 2017; Saeidi et al., 2018):

1. Our company implements eco-friendly operational practices.
2. Employees are trained regularly on green management systems.
3. We actively measure and monitor environmental performance indicators.
4. Green practices are embedded in our daily decision-making processes.
5. We collaborate with stakeholders to achieve sustainability goals.

Green Innovation (GI) (Chen et al., 2006; Xie et al., 2016; Song and Yu, 2018):

1. Our products are designed with environmentally friendly features.
2. We adopt innovative processes to reduce energy consumption.
3. Our firm invests in technologies that minimise environmental impact.
4. Employees actively contribute to the development of green products and processes.
5. We continuously improve our operations to align with environmental standards.