

Biostatistical Analytics Capability, Digital Readiness, and Green Innovation Capability as Predictors of Sustainable Business Growth

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ABSTRACT

This study examines how biostatistical capability, environmental sustainability, green innovation capability (GIC), and digital readiness contribute to sustainable business growth (SBG) among small and medium-sized enterprises (SMEs), considering the moderating role of organizational agility. Drawing on dynamic capability theory, the study develops an integrated framework linking analytical, environmental, innovative, and digital capabilities with business growth. Quantitative data were collected through a structured questionnaire, yielding 182 valid responses from total distributed questionnaires. The proposed relationships were examined using partial least squares structural equation modeling (PLS-SEM). The findings indicate that biostatistical capability positively influences environmental sustainability, while environmental sustainability and digital readiness positively influence SBG. GIC also exhibits a positive relationship with business growth, although its statistical significance requires further verification. Organizational agility demonstrates a significant positive direct relationship with SBG. Regarding moderation, one interaction effect is positive and significant, whereas two interaction effects are statistically nonsignificant. This study contributes to SME sustainability research by integrating analytical, environmental, innovative, digital, and adaptive capabilities within a unified framework. The findings highlight the importance of evidence-based decision-making, environmental responsibility, digital preparedness, and organizational adaptability in supporting sustainable business development.

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1. Introduction

Small and medium-sized enterprises (SMEs) are important contributors to economic activity, employment, and innovation (Elgammudi et al., 2026; Zhang et al., 2026); however, sustained growth increasingly requires them to balance commercial results with environmental responsibility. Sustainable business growth (SBG) involves improving profitability, market share, and product or service quality while managing the environmental consequences of operations (Tomahuw et al., 2023). Statistical and data-analytics tools can help firms interpret operational information, identify inefficiencies, and make better-informed resource decisions (Anwar et al., 2024; Aslam et al., 2025). Digital readiness prepares an organization's people, structures, and culture for digital transformation, while green innovation capability (GIC) supports the redesign of products and processes to reduce waste, emissions, and resource consumption (Chen, 2008; Samsuden et al., 2024). Therefore, environmental sustainability is relevant not only to ecological responsibility but also to the resilience and long-term prospects of SMEs (Rehman et al., 2022).

However, challenges can arise when SMEs try to adopt digital technologies and promote environmental intentions into lasting business results (Shahadat et al., 2023). Finances, specialized knowledge, and management capacity may be limiting investments in analytics systems, digital skills, and cleaner technologies. Even if require information is available, it depends on the ability of managers to interpret the data and apply insights to operational decisions (Ragazou et al., 2023). Recent SME research indicates that the capability of big data analytics and green innovation are linked to sustainable

performance, and how strategic change can help explain these relationships (Anwar et al., 2024; Aslam et al., 2025). Nonetheless, sustainable practices do not guarantee better growth, they need to be aligned with customer needs, operational interests and evolving market and technological factors. The challenge now is to grasp how SMEs can integrate analytical skills, digital readiness, and green innovation to promote environmental sustainability and business expansion.

Previous studies offer some valuable but somewhat fragmented findings. Rehman et al. (2022) explored the concepts of environmental sustainability orientation, CSR, green capability, and environmental performance in SMEs, while Badghish and Soomro (2024) focused on the adoption of AI and its impact on sustainable business performance. Green innovation is an important firm-level capability identified by Chen (2008), and a framework connecting green dynamic capability, green innovation, creativity, and organizational agility with SME sustainability performance was proposed by Kiranantawat and Ahmad (2023). The study by Samsuden et al. (2024) also revealed that the research on digital capability is diverse in terms of firm type, industry, and country. The studies demonstrate the relevance of individual capacities but do not focus on the specific combination explored in this study such as biostatistical analytics capability, digital readiness, GIC, environmental sustainability, and SBG in a single model. Another boundary condition that needs attention is organizational agility, as it can influence the likelihood of environmental sustainability, green innovation and digital readiness to translate into growth, because the organization needs to be agile to respond quickly and reconfigure resources. This study builds on previous research by considering organizational agility as a moderator of these three relationships instead of assuming that these effects are the same for all SMEs.

Therefore, this study investigates the relationship between biostatistical analytics capability and environmental sustainability and the positive relationship between environmental sustainability, GIC, and digital readiness on SBG of SMEs. It also examines the moderating effects of organizational agility on the relationships between environmental sustainability and growth, GIC and growth, and digital readiness and growth. The results provide a holistic understanding of the relationship between analytical, digital, environmental and adaptive capabilities, and the growth prospects of SMEs. It is theoretically linked to research streams that are typically studied in isolation and helps to explain the contingent nature of agility. In practice, it can support the SME owner or manager in making decisions based on evidence, preparing for digitalization, innovating for the environment and reconfiguring resources on time.

2. Theoretical Foundation and Hypotheses Development

Dynamic capability theory is a theory (Cavusgil et al., 2007) that explains how the capability of biostatistical analytics can help the SMEs analyze business data, find inefficiencies in the environment, and enhance environmental sustainability. SBG can be achieved by means of resource efficiency and environmentally responsible operations, which can be achieved through environmental sustainability. GIC is the ability to develop cleaner processes and resource saving practices (Ar, 2012; Fernando et al., 2019); digital readiness is the ability to incorporate digital technologies into organizational processes. The abilities can bolster the ability of SMEs to adapt and pursue sustainable growth (Teece et al., 1997). Organizational agility is also an important complementary capability as it allows firms to quickly adapt to market changes, embrace new technologies, and realign resources. Thus, agility could reinforce the links between environmental sustainability, GIC, and digital readiness and SBG. This theoretical reasoning aligns with the concept of organizational agility as a moderator between organizational capabilities and SME sustainability performance proposed by Kiranantawat and Ahmad (2023). Hence, the proposed framework is supported by the coherent framework of Dynamic Capabilities Theory, which explains the role of organizational capabilities in sustainable growth and the contingent role of agility.

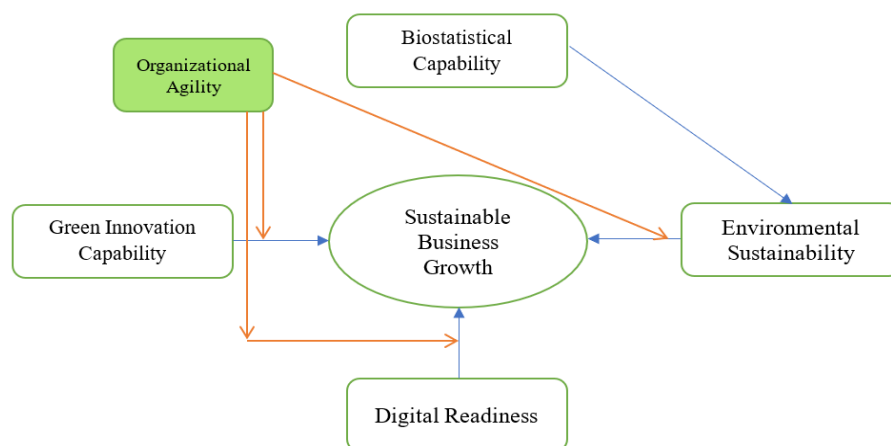


Figure 1: Framework of the Study Showing the Relationship Between Biostatistical Capability, Green Innovation Capability, Digital Readiness and Sustainable Business Growth

2.1 Biostatistical Capability, Environmental Sustainability and Sustainable Business Growth

Biostatistical capability is the capability and willingness to use statistical methods in business activities (Al Daabseh et al., 2023), such as analyzing data, interpreting pattern and evidence, and supporting decision making based on evidence. In this study, it is the organization's commitment to learning, adopting and applying biostatistical tools to enhance operational and environmental decisions (Li et al., 2024). Environmental sustainability is defined as an organization's efforts to reduce the environmental effects of its activities by recycling waste, conserving water and electricity, training employees on environmental issues, engaging in environmental programs, implementing low impact manufacturing technologies, sustainable supply-chain practices and incorporating environmental issues into business planning (Rehman et al., 2022). SBG is the improvement of business outcomes, especially market share, corporate profitability, and product or service quality, in the pursuit of long-term business development (Badghish & Soomro, 2024). The proposed relationship indicates that biostatistical capability may enable SMEs to detect inefficiencies in their resources, assess their environmental performance and make informed choices about their environmental practices. SMEs can use statistical tools to analyse their operations and environmental data to find ways to cut down on waste, save resources and track environmental outcomes (Mitropoulos, 2026). Therefore, enhanced biostatistical skills can help promote environmental sustainability, which in turn can support sustainable business development by promoting responsible business practices and resource efficiency. Furthermore, SBG refers to an organization's ability to achieve continuous business development while maintaining strong organizational performance (Alshareef & Emeagwali, 2026). It is reflected in increased market share, improved corporate profitability, and enhanced product or service quality (Badghish & Soomro, 2024).

Biostatistical capability helps SMEs use statistical methods to analyze their organizational data (Tsiu et al., 2025), to recognize patterns in their operations, and to take decisions based on evidence. In the context of dynamic capabilities theory, analytical capabilities can be used to uncover opportunities for improvement and reconfigure resources to meet environmental challenges (Teece, 2007). SMEs can use information on resource usage, waste generation, energy efficiency, and production processes to pinpoint environmental inefficiencies and take necessary corrective measures (İncekara, 2022). The study by Anwar et al. (2024) on the adoption of big-data analytics and its impact on decision quality and environmental performance in SMEs underscores the importance of analytical capabilities in environmental management. Likewise, Aslam et al. (2025) examined the connection between big-data analytics capability, green innovation and sustainable SME performance. Thus, improved biostatistical capacity can help to monitor the environment, make informed decisions and help to use resources more efficiently, which can contribute to environmental sustainability.

Hypothesis 1 (H1): Biostatistical capability has a positive influence on environmental sustainability.

Environmental sustainability is the practice of organizations that reduce the impact on the environment by conserving resources, reducing waste, preventing pollution, and operating in an environmentally responsible manner (Tereshchenko et al., 2023). These practices can help SMEs achieve SBG by optimizing operations, fostering better relationships with stakeholders, and promoting responsible resource management (Tereshchenko et al., 2023). Based on dynamic capabilities theory, firms can embed environmental issues into organizational processes and adjust their operations to meet changing requirements of stakeholders (Teece, 2007). Rehman et al. (2022) explored the environmental sustainability orientation and CSR in relation to environmental performance of SMEs, emphasizing environmental capabilities. Additionally, Badghish and Soomro (2024) explored the factors influencing the sustainable performance of SMEs, highlighting the importance of technological integration and organizational skills. Together, these findings indicate that environmentally sustainable practices can contribute to the long-term growth of businesses by enhancing efficiency and organizational resilience.

Hypothesis 2 (H2): Environmental sustainability has a positive influence on SBG.

2.2 Green Innovation Capability and Sustainable Business Growth

GIC refers to an organization's ability to develop and implement environmentally friendly processes and practices (Putri et al., 2025). It involves reducing hazardous emissions, recycling waste, conserving energy and water, and minimizing raw material consumption (Chen, 2008). GIC is the capability of an SME to create and apply environmentally friendly products, processes and practices that decrease pollution and resource use. This is a feature that can help sustain business growth through better operational efficiency, product differentiation and competitiveness. In the field of green core competence, Chen (2008) pointed out that green innovation is an important factor, and it is worthy of being mentioned as a strategic factor for the development of organizations. In a more recent study, Aslam et al. (2025) studied the link between green innovation and big-data analytics capability as a factor influencing the performance of sustainable SMEs. Likewise, Schrank and Kijkasiwat (2024) studied green innovation and the performance of SMEs, where they found that green innovation is a key factor influencing firm performance. Green innovation can be seen as a way for SMEs to respond to

environmental expectations and market opportunities (Teece, 2007). Therefore, growth is one of the important objectives of an organization (Hashmi & Abdullah, 2026) which can be achieved through green innovation. Consequently, higher GIC will be expected to be helpful to SBG.

Hypothesis 3 (H3): GIC has a positive influence on SBG.

2.3 Digital Readiness and Sustainable Business Growth

Digital readiness refers to an organization's preparedness to adopt and integrate digital technologies into its business activities. It includes hiring digitally competent employees, developing flexible organizational structures, and promoting knowledge sharing to support digital transformation (Aldhi et al., 2025; Tiana et al., 2024). Digital readiness is a state of readiness of an SME to adopt digital technologies via an organization, digitally competent employees and a culture that facilitates knowledge sharing and transformation (Susanti & Adawiyah, 2026). This preparedness allows companies to leverage digital tools to enhance operational coordination, access information, customer needs, and opportunities for new business. Wang and Zhang (2025) concluded that sustainable innovation capability is essential for digital transformation to improve sustainable organizational performance, highlighting the significance of organizational and technological factors. Likewise, Badghish and Soomro (2024) studied the adoption of technology and sustainable business performance of SMEs, which also emphasized the importance of technological capabilities in organizational outcomes. Companies can gain from their capacity to sense opportunities and alter their internal processes in response to changes in the environment (Teece, 2007). Therefore, SMEs that are more digitally ready could be better equipped to enhance efficiency, competitiveness and SBG.

Hypothesis 4 (H4): Digital readiness has a positive influence on SBG.

2.4 The Role of Organizational Agility

Organizational agility refers to an organization's ability to respond quickly and effectively to changing market conditions, customer needs, and technological developments (Alketbi et al., 2026). It involves timely decision-making, rapid implementation of action plans, and flexible reconfiguration of organizational resources (Atobishi et al., 2024). Organizational agility is the capacity of an SME to adapt quickly to evolving customer needs, technological advancements, and market dynamics, adjusting strategies and resource allocation as needed. While environmental sustainability can help to enhance resource efficiency and stakeholder relationships, its role in business growth might rely on the extent to which an organization can convert environmental practices into operational and strategic measures. Firms need to continually restructure their resources and routines to maintain performance in response to changing circumstances (Teece, 2007). Kiranantawat and Ahmad (2023) included organizational agility as a moderator in their conceptual framework between green dynamic capabilities and SME sustainability performance. Their work can help to highlight agility as a state that can affect the contribution of organizational capabilities to sustainability outcomes. Therefore, agile SMEs could be more capable of commercializing environmental improvements, making operational adjustments and responding to market opportunities, which could help to further link environmental sustainability to SBG.

Hypothesis 5 (H5): Organizational agility moderates the relationship between environmental sustainability and SBG.

GIC helps SMEs launch green products, enhance production processes and reduces the waste and resource usage (Raji et al., 2026). However, if the firms do not be able to innovate rapidly and adapt to the market conditions, then the GIC does not necessarily lead to business growth. Organizational agility can help make this transformation possible by allowing for quick decisions (Obizue et al., 2026), swift resource shifting, and adaptability in operational approaches. Kiranantawat and Ahmad (2023) suggested that organizational agility is a moderator between green dynamic capabilities and SME sustainability performance, which could be an important consideration for organizational responsiveness. In addition, based on the studies on digital competence and green innovation performance, the agility-related competencies can be helpful for the innovation activities of firms (Tika et al., 2026; Zokaei Kuhbanani et al., 2026). This study suggests that agile SMEs can benefit from green innovations more effectively, which can contribute to SBG, based on the dynamic capabilities' theory (Teece, 2007).

Hypothesis 6 (H6): Organizational agility moderates the relationship between GIC and SBG.

Digital readiness prepares SMEs with competent staff, flexible structures and knowledge-sharing practices to embed digital technologies into their processes. However, digital readiness does not necessarily equate to business growth in all organizations (Haruna et al., 2026) as companies vary in their capacity to take advantage of technological opportunities and adapt to shifting circumstances. This relationship can be enhanced by organizational agility, which allows SMEs to react quickly to customer needs, integrate digital tools into their business processes, and adapt resources to new opportunities. To reinforce the significance of contextual conditions in the outcome of digital transformation, Wang and Zhang (2025) showed how digital transformation and environmental dynamism were related to sustainable innovation and organizational performance. Likewise, Jing et al. (2023) pointed out the links between digital competence, organizational agility, and green

innovation performance. Therefore, this study suggests that the positive relationship between digital readiness and SBG is reinforced by organizational agility.

Hypothesis 7 (H7): Organizational agility moderates the relationship between digital readiness and SBG.

3. Methodology

3.1 Research Design

The study employed a quantitative, cross-sectional research design to explore the relationships between biostatistical capability, environmental sustainability, GIC, digital readiness, organizational agility and SBG in small and medium-sized enterprises (SMEs). The quantitative approach was suitable for this study since it was designed to test theoretically derived hypotheses and to evaluate direct and moderating relationships between latent constructs. A structured questionnaire was used to gather the data, and the proposed relationships were analyzed with structural equation modeling.

3.2 Population and Sample Size

The target population included SMEs and eligible respondents were people with knowledge of their SMEs' operations, environmental efforts, digital readiness and business performance. This comprised SME owners, managers and other relevant organizational staff. A total of 250 questionnaires were distributed, 182 valid responses were received and retained for analysis. Therefore, the response rate was 72.8%. The proposed model consisted of 182 samples, six constructs and seven hypothesized relationships. PLS-SEM can be used to estimate models with multiple latent variables and moderation effects (Hair, 2017).

3.3 The Sampling Technique and Data Collection Process

The respondents were recruited using non-probability sampling method. A convenience sampling was used because respondents were readily available and willing to respond. A well-structured questionnaire was sent to the potential participants and the filled questionnaires were checked for completeness and suitability. Responses with significant missing data or that did not meet the criteria for the study were not included in the final data set. Responses were voluntary and respondents were explained about the academic purpose of the study and the confidentiality of their responses.

3.4 Measurement of Variables

Six constructs were measured with 27 items on a questionnaire, which were adapted from previously published studies. Biostatistical capability was assessed by four items adapted from Li et al. (2024), which included organizational intentions to use, learn, and work with biostatistical tools in business operations. The four items adapted from Chen (2008) were used to measure the GIC, including the reduction of hazardous emissions, waste recycling, resource consumption, and raw material use. Digital readiness was measured by three items based on Aldhi et al. (2025): digitally competent personnel, flexible organizational structures, and knowledge sharing culture. To assess environmental sustainability, eight questions were adapted from Rehman et al. (2022) and included in the questionnaire: recycling, resource conservation, environmental training, environmental programs, low impact manufacturing, stakeholder communication, environmentally friendly suppliers and sustainability integration into business operations. SBG was evaluated based on three items adapted from Badghish and Soomro (2024) which include the increase in market share, profit, and quality of products or services. Organizational agility was evaluated based on five items adapted from Atobishi et al. (2024) which included responsiveness to customer needs, timely technology implementation, resource reconfiguration, strategic adaptability, and responses to change. All the variables were measured through Likert scale. All the measures are reported in Table 2.

Table 1(a): Questionnaire Items

Variables and Sources	Questionnaire Items	
Biostatistical Capability Li et al. (2024)	1.	"My organization has the plan to apply all biostatistics tool in business activities.
	2.	My organization has the plan to work hard on biostatistics tool.
	3.	My organization has the plan to attend every biostatistics tool session for business perspective.
	4.	My organization has the plan to study every biostatistics tool to apply in business.
Green Innovation Capability Chen (2008)	1.	The process of the company effectively reduces the emission of hazardous substances or waste.
	2.	The process of the company recycles waste and emission that allow them to be treated and re-used.
	3.	The process of the company reduces the consumption of water, electricity, coal or oil.
	4.	The process of the company reduces the use of raw materials.

Table 1(b): Questionnaire Items

Variables and Sources	Questionnaire Items	
Digital Readiness Aldhi et al. (2025)	1.	My organization support the hiring of digitally competent officials to drive digital transformation.
	2.	My organization support designing agile and flexible structures to engage effectively in digital transformation.
	3.	My organization support cultivating an open culture of idea and knowledge sharing to facilitate digital transformation.
Environmental Sustainability Rehman et al. (2022)	1.	My organization practice recycling of wastes.
	2.	My organization practice water and electricity conservation.
	3.	My organization offer training to our employees on environmental awareness.
	4.	My organization participates in environmental programs.
	5.	My organization practice low impact manufacturing technology.
	6.	My organization communicates with customers/buyers on sustain- ability issue.
	7.	My organization deal with environment-friendly suppliers.
	8.	Sustainability is an integral part of our business plans and operation.
Sustainable Business Growth Badghish and Soomro (2024)	1.	Our organization market share has increased.
	2.	Our organization corporate profitability has increased.
	3.	Our organization product/service quality has increased in the market comparatively.
Organizational Agility Atobishi et al. (2024)	1.	My organization carries out a specific action plan in order to meet customer needs without any delay.
	2.	My organization is implementing an action plan on how to use the new technology without delay.
	3.	My organization can reconfigure its resources in the proper time.
	4.	My organization can change strategic things in the proper time.
	5.	My organization ability to quickly respond to changes."

4. Data Analysis

The reliability and convergent validity are shown in Table 2. The outer loadings are between 0.733 and 0.930 and Cronbach's alpha values are between 0.876 and 0.938 and composite reliability values are between 0.915 and 0.949. All values are above the generally recommended thresholds for indicator reliability and internal consistency ([F. Hair Jr et al., 2014](#); [Hameed et al., 2021](#)). In addition, the average variance extracted (AVE) from the instruments range from 0.700 to 0.809, which is higher than the minimum value of 0.50 ([Henseler & Chin, 2010](#); [Razzaq et al., 2026](#)). The results show good measurement reliability and convergent validity for all six constructs.

Table 2: Construct-Level Reliability and Validity with Indicator Loadings

Construct	Measurement Items and Outer Loadings	Cronbach's A	Rho_A	Composite Reliability	AVE
Biostatistical Capability	BioC1 (0.831), BioC2 (0.895), BioC3 (0.903), BioC4 (0.896)	0.904	0.904	0.933	0.778
Digital Readiness	DR1 (0.899), DR2 (0.919), DR3 (0.879)	0.882	0.885	0.927	0.809
Environmental Sustainability	ES1 (0.825), ES2 (0.839), ES3 (0.847), ES4 (0.842), ES5 (0.873), ES6 (0.865), ES7 (0.860), ES8 (0.733)	0.938	0.939	0.949	0.700
GIC	GIC1 (0.819), GIC2 (0.882), GIC3 (0.862), GIC4 (0.852)	0.876	0.879	0.915	0.729
Organizational Agility	OA1 (0.845), OA2 (0.847), OA3 (0.903), OA4 (0.888), OA5 (0.880)	0.922	0.923	0.941	0.762
SBG	SBG1 (0.880), SBG2 (0.930), SBG3 (0.886)	0.881	0.882	0.927	0.808

Note. α = Cronbach's alpha; rho_A = Dijkstra–Henseler reliability; AVE = average variance extracted. Outer loadings are reported in parentheses.

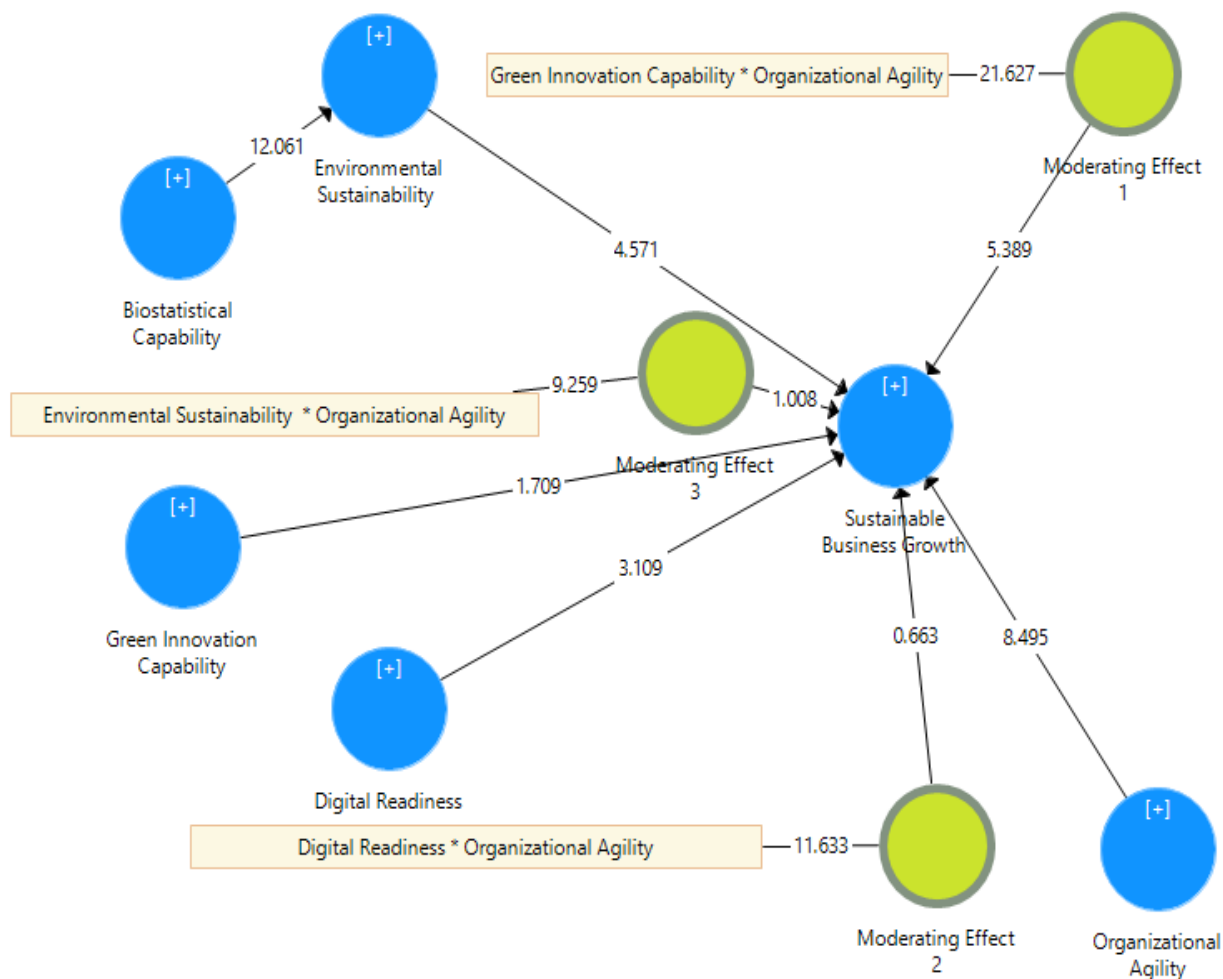
The heterotrait–monotrait ratio (HTMT) and variance inflation factors (VIF) are reported for discriminant validity and for the assessment of collinearity, respectively, in Table 3. The values of HTMT are in the range of 0.558 to 0.846, which is lower than the recommended value of 0.90 ([Henseler et al., 2015](#)). Thus, the findings suggest that there is discriminant validity among the study constructs. The reported VIF values are less than 3.3 indicating that the collinearity is not greater than the specified level. Reporting the actual VIF values would give more transparency on the extent of collinearity.

Table 3: Discriminant Validity (HTMT) and Collinearity Assessment (VIF)

Construct	BC	DR	ES	GIC	OA	SBG	VIF
Biostatistical Capability (BC)	—						<3.3
Digital Readiness (DR)	0.599	—					<3.3
Environmental Sustainability (ES)	0.621	0.801	—				<3.3
GIC	0.809	0.575	0.558	—			<3.3
Organizational Agility (OA)	0.649	0.799	0.846	0.664	—		<3.3
SBG	0.622	0.764	0.806	0.614	0.632	—	<3.3

Note: HTMT = Heterotrait–Monotrait Ratio; VIF = Variance Inflation Factor.

The structural model of the study constructs is shown in Figure 2. The proposed framework is supported by the positive paths from biostatistical capability to environmental sustainability and from environmental sustainability to SBG. The Figure 2 also shows the relationships between digital readiness, GIC, and organizational agility. Based on the statistical results reported in Table 4, the overall visual summary of the estimated direct and moderating relationships is presented in Figure 2.

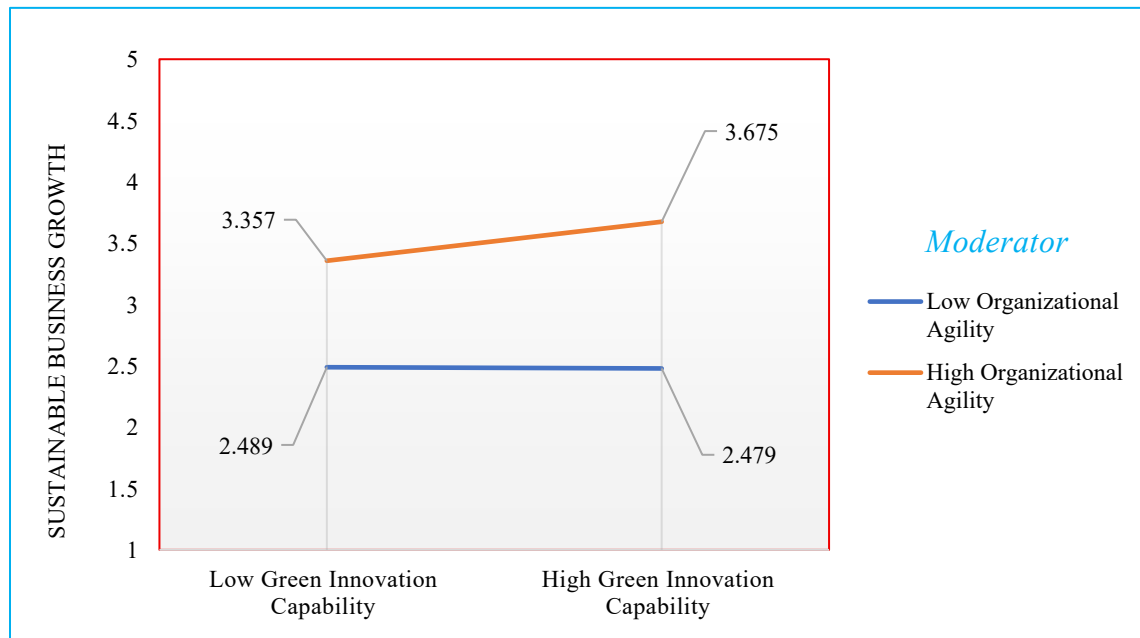
**Figure 2:** Model Results

The path coefficients and significance statistics for the hypothesized relationships are shown in Table 4. The results indicated that biostatistical capability was positively associated with environmental sustainability ($\beta=0.577$, $t=12.061$) which supported H1. The relationship of environmental sustainability to SBG is also positive ($\beta=0.374$, $t=4.571$) supporting H2. Based on the reported test statistics, digital readiness is positively related to SBG ($\beta=0.094$, $t=3.109$), which supports H4. The coefficient of the GIC is positive ($\beta=0.077$) in relation to SBG, which supported H3. The first moderating effect is positive and significant ($\beta=0.082$, $t=5.389$) while the second and third moderating effects are statistically nonsignificant ($p=0.254$ and $p=0.158$, respectively). Hence, H5 is supported, however, H6 and H7 are not supported.

Table 4: Results (Direct and Moderation)

	β	Mean	SD	T Statistics	P Values
Biostatistical Capability -> Environmental Sustainability	0.577	0.573	0.048	12.061	0
Digital Readiness -> SBG	0.094	0.104	0.03	3.109	0
Environmental Sustainability -> SBG	0.374	0.374	0.082	4.571	0
GIC -> SBG	0.077	0.077	0.045	1.709	0.045
Moderating Effect 1 -> SBG	0.082	0.082	0.015	5.389	0
Moderating Effect 2 -> SBG	0.051	0.054	0.078	0.663	0.254
Moderating Effect 3 -> SBG	-0.087	-0.091	0.086	1.008	0.158

Figure 3 shows the relationship between GIC and organizational agility with respect to SBG. The results plotted show that higher growth scores are obtained in high organizational agility compared to low organizational agility at both low and high levels of GIC. However, the lines indicate that the slope between GIC and business growth could be lower when agility is high. Therefore, the direction and meaning of this interaction can be determined by the interaction coefficient in Table 4.

**Figure 3:** Moderation Effect (Organizational Agility* GIC -> SBG)

5. Discussion

This study examined how biostatistical capability, environmental sustainability, GIC, and digital readiness contribute to SBG among small and medium-sized enterprises (SMEs), considering the moderating role of organizational agility. Therefore, findings provide insights into how analytical, environmental, innovative, and digital capabilities contribute to SBG among SMEs. The results are interpreted through Dynamic Capabilities Theory, which explains how organizations develop and reconfigure resources to respond to changing environments and sustain performance (Teece, 2007).

The results show that there is a positive and significant relationship between biostatistical capability and environmental sustainability which supports H1. This finding indicates that analytical skills can be used to detect resource inefficiencies, track environmental practices and to take evidence-based operational decisions in SMEs. This finding aligns with that of Anwar et al. (2024), who investigated the association between big-data analytics capability and decision quality and environmental performance of SMEs. It also aligns with Dynamic Capabilities Theory, emphasizing the need for building analytical resources to deal with operational and environmental challenges (Teece, 2007).

Moreover, result highlighted that environmental sustainability has a positive relationship with SBG which supported H2. This means that environmentally responsible practices can lead to better profitability, market share and product or service quality. The results are consistent with the study conducted by Rehman et al. (2022) which identified the importance of environmental sustainability orientation and green capability on environmental performance in SMEs. However, the present study goes beyond this discussion by associating environmental sustainability with business growth and not just environmental performance. The findings indicate that environmental responsibility can be combined with commercial goals, if it is part of the organization's activities. Similarly, previous studies highlighted the positive relationship between

environmental sustainability and business performance (Abbas et al., 2019; Li et al., 2017; Manning et al., 2019).

The coefficient of the relationship between GIC and SBG is positive, indicating a positive relationship, supported H3. The finding is aligned with the idea of green innovation by Chen (2008) that green innovation is essential to build green core competence and enhance the green image of firms. These results are consistent with previous studies showing the positive role of GIC with business performance (Duque-Grisales et al., 2020; Fernando et al., 2019). Furthermore, digital readiness is positively related to SBG, and the correlation is statistically significant, which supports H4. The coefficient is relatively small, but it indicates that digital competence of employees, flexible organization and knowledge sharing can help SMEs to better coordinate and capitalize on market opportunities. This result aligns with Badghish and Soomro (2024) who studied on technological adoption and sustainable business performance of SMEs. It also reinforces the idea that digital readiness is a key organizational pillar for coping with evolving business contexts.

The first reported interaction effect is positive and significant, whereas the second and third effects are nonsignificant. Therefore, H5 is supported, however, H6 and H7 are not supported. The pattern indicates that agility can reinforce the role of environmental sustainability in growth, but it cannot do the same for green innovation and digital readiness. In the conceptual framework of SME sustainability performance, Kiranantawat and Ahmad (2023) highlighted organizational agility as a key factor that underpinned the relevance of the study in the capability-based research. The nonsignificant interactions suggest that the role of agility might be different depending on the specific capability. This indicates that agility may not uniformly strengthen the effects of all organizational capabilities, as some capabilities may independently contribute to performance without requiring additional support from agility.

6. Conclusion

This study examined how biostatistical capability, environmental sustainability, GIC, and digital readiness relate to SBG among small and medium-sized enterprises (SMEs), while considering the moderating role of organizational agility. The findings demonstrate that biostatistical capability positively influences environmental sustainability, highlighting the importance of analytical capabilities in supporting environmentally responsible practices. Environmental sustainability is also a positive factor for SBG, indicating that environmental responsibility can be linked to business growth goals. The digital readiness shows a positive and statistically significant correlation with SBG, highlighting the importance of technological readiness in the current business landscape. The statistical significance of the positive relationship between GIC and SBG is positive. The agility of the organization also has a strong positive direct correlation with SBG. As for moderation, one interaction is significant and positive, while the other two interactions are nonsignificant. Overall, the study contribution to the research field of SME sustainability as it has combined analytical, environmental, innovative, digital and adaptive capacities in one framework. The results highlight the need for coordinated organizational capabilities to enable sustainable business development, that are related to environmental responsibility, informed decision making and responsiveness to the changing business conditions.

6.1 Policy Implications

The results have several implications for policy makers, SME support institutions and business managers. Policymakers should strive to enhance the analytical skills of SMEs by providing them with easy-to-access statistical training, managerial development programs and real time guidance on how to leverage operational and environmental data. These can be useful for organizations to detect inefficiencies in resources and enhance environmental decision making. Second, environmental support programs should promote the integration of recycling, energy and water saving, waste reduction and environment-friendly sourcing in the regular business of SMEs. Environmentally friendly measures can be promoted through financial support and technical cooperation, especially for small and medium-sized enterprises. Third, digital transformation policies should not only highlight technology acquisition but also digital competencies of employees, flexibility of organizations and knowledge sharing. Fourth, technical consultancy, innovation partnerships and support for cleaner production processes should be encouraged in SME development programs to foster green innovation. Finally, managerial training should build organizational agility through enhancing quick decision making, reconfiguring resources and reacting to customer and technological changes. However, agility interventions should be specific to the agility skill being developed as the reported moderation effects were not consistently observed. These implications collectively call for a coordinated effort in enhancing the competitiveness of SMEs, while promoting environmental sustainability and sustainable business development.

7. Future Research Directions

The current research has few limitations which can be addressed in future research. First, the sample size was 182

valid responses, and larger samples and statistical power analysis will enhance precision and allow for analysis of differences by SME size in future studies. Second, the cross-sectional design precludes causal inferences, and longitudinal studies could explore the development of capabilities and business growth over time. Third, the questionnaire was based on organizational practices as reported; future studies might consider using objective environmental, financial and operational indicators. Fourth, the biostatistical capability items focus on planned use of statistical tools, and future research should focus on the development and validation of measures of actual analytical skills and their use. Lastly, the moderation results need to be further verified; future studies should replicate the interaction tests and explore other organizational factors that could affect the interactions between analytical, digital, environmental, and growth-related capabilities.

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