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Sustainable Business Performance in Islamic Boarding Schools: Strategic Capabilities, Entrepreneurship, and Green Innovation

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A B S T R A C T

This study addresses the limited empirical evidence on the integrated role of Resource-Based Theory (RBT), Islamic Spiritual Entrepreneurship, and Green Innovation in understanding sustainable business performance in Islamic boarding schools (pesantren). It examines an integrated model in which Electronic Human Resource Management, Strategic Human Resource Management, Knowledge Management, and Organizational Agility are associated with Competitive Advantage, which is further associated with sustainable business performance through Islamic Spiritual Entrepreneurship and Green Innovation. A quantitative cross-sectional survey was conducted among 320 managers of pesantren business units participating in the Ministry of Religious Affairs' Business Incubation Program in Aceh and Lampung Provinces. Data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM). The findings indicate that Electronic Human Resource Management, Strategic Human Resource Management, Knowledge Management, and Organizational Agility are positively and significantly associated with Competitive Advantage, with Knowledge Management showing the largest standardized path coefficient. Competitive Advantage is also positively and significantly associated with sustainable business performance, Islamic Spiritual Entrepreneurship, and Green Innovation. The indirect-effect results further indicate that Islamic Spiritual Entrepreneurship and Green Innovation significantly mediate the association between Competitive Advantage and sustainable business performance. These findings extend the application of RBT by incorporating Islamic values and environmental innovation as contextual mechanisms associated with sustainable business performance in pesantren. Practically, the findings suggest that pesantren managers and policymakers may strengthen digital HR management, strategic organizational capabilities, Islamic entrepreneurship, and green innovation as part of efforts to support competitive and sustainable pesantren-based enterprises.

1. Introduction

Islamic boarding schools (pesantren) have increasingly evolved beyond their traditional role as Islamic educational institutions into community-based organizations that also participate in local economic development. Through business units in agriculture, cooperatives, halal food production, services, and micro, small, and medium enterprises (MSMEs), pesantren have the potential to combine economic activities with educational, social, and religious missions (Anjani et al., 2025). This transformation creates an important managerial challenge. Sustainable business performance cannot be achieved merely by establishing business units; it requires pesantren to develop organizational capabilities that enable them to manage human resources, knowledge, digital systems, and organizational change while maintaining their distinctive Islamic identity. Although government programs have supported pesantren through business incubation and economic empowerment initiatives, only a proportion have been able to transform these opportunities into competitive and sustainable business organizations (Rofiaty, 2019). This continuing disparity between economic potential and organizational capability suggests that the central issue is not simply whether pesantren engage in business, but how they build and deploy strategic capabilities to sustain their business activities (Mukhid et al., 2022).

The scale of the pesantren sector further underscores the importance of this issue. According to the Ministry of Religious Affairs, Indonesia had 42,369 pesantren serving nearly three million students in 2025 (Maheswara, 2025). However, this large institutional base should not be interpreted as evidence that pesantren are homogeneous or equally prepared to operate sustainable businesses. Their organizational structures, resources, managerial competencies, and forms of economic activity vary considerably. This variation makes sustainable pesantren business management an important organizational question rather than merely a question of institutional scale.

Aceh and Lampung provide relevant empirical settings for examining this question. These provinces have among the largest concentrations of pesantren in Sumatra, with 1,925 pesantren in Aceh and 1,353 in Lampung according to the Ministry of Religious Affairs (2024). Both provinces have also experienced initiatives related to halal entrepreneurship, Islamic cooperatives, community economic empowerment, and pesantren-based business development. Nevertheless, the existence of substantial pesantren populations and economic initiatives does not necessarily explain how these institutions convert organizational resources into sustainable business outcomes. Existing evidence concerning pesantren in these contexts has more frequently addressed entrepreneurship education, community empowerment, and institutional development than the organizational mechanisms through which strategic capabilities are transformed into sustained business performance (Fakhrudin et al., 2024; Juliansyah et al., 2026). Aceh and Lampung therefore offer relevant contexts for examining this organizational process without assuming that the findings are representative of all pesantren in Indonesia.

The existing strategic management literature provides substantial evidence that organizational capabilities are important foundations of competitive advantage. Strategic Human Resource Management (SHRM), for example, emphasizes the alignment of human resources with organizational strategy, whereas Electronic Human Resource Management (e-HRM) extends this alignment through digital systems and processes (Alqarni et al., 2023; Shamout et al., 2022; Tawfig & Kamarudin, 2021). Knowledge Management (KM) enables organizations to acquire, share, and apply knowledge for learning and innovation, while Organizational Agility (OA) facilitates rapid responses to environmental uncertainty and changing market conditions (Bekos et al., 2025; Bux et al., 2025; Nyuga & Tanova, 2024). Taken together, these perspectives are consistent with Resource-Based Theory (RBT), which proposes that competitive advantage can emerge from the development and effective deployment of valuable organizational resources and capabilities (Barney, 1991). However, the existing literature has frequently examined these capabilities as separate strategic resources and predominantly within conventional commercial organizations. Consequently, although previous research provides evidence on individual capability–performance relationships, less is known about how multiple organizational capabilities may operate together in organizations whose economic objectives coexist with religious and educational missions (Chahal et al., 2020).

This limitation is particularly relevant to the pesantren context. Studies of sustainable competitive advantage have examined a range of organizational settings, including manufacturing firms (Vuković et al., 2025), SMEs (Wang et al., 2025), higher education institutions (Hart et al., 2024), and financial institutions (Judijanto et al., 2025). In contrast, research on pesantren has more commonly focused on entrepreneurship education (Irfan & Roesminingsih, 2024), community empowerment (Fakhrudin et al., 2024; Kurniady et al., 2024), and institutional transformation. These studies provide valuable insights into the economic and organizational development of pesantren, but they provide comparatively limited quantitative evidence on how a combination of strategic organizational capabilities is associated with competitive advantage and sustainable business performance (Harjawati et al., 2026). Moreover, conventional RBT-based models primarily explain how organizational resources and capabilities contribute to competitive advantage, whereas less attention has been given to how competitive advantage may subsequently be associated with business practices that simultaneously reflect religious values and environmental sustainability. Thus, the unresolved issue concerns not only whether e-HRM, SHRM, KM, and OA are associated with competitive advantage, but also how competitive advantage may be connected to entrepreneurship and innovation that are consistent with the distinctive institutional mission of pesantren.

To address this gap, the present study extends the RBT perspective by examining Islamic Spiritual Entrepreneurship (ISE) and Green Innovation (GI) as contextual mechanisms associated with the relationship between Competitive Advantage (CA) and Sustainable Business Performance. ISE is particularly relevant because pesantren are not conventional commercial organizations; their entrepreneurial activities are embedded in Islamic values, spiritual purposes, and social responsibilities. Previous research on Islamic entrepreneurship suggests that entrepreneurial activity can incorporate religious values and ethical considerations identity (Aouati & Arabeche, 2023; Grine et al., 2015). Similarly, Green Innovation emphasizes environmentally responsible products, processes, and business practices and has been associated with organizational sustainability (Batool, 2024; Doghan et al., 2022). Bringing these perspectives together with RBT provides a contextual extension of the conventional resource–competitive advantage–performance framework. In this model, RBT explains the relevance of organizational capabilities for competitive advantage, while ISE and GI provide contextual pathways through which competitive advantage may be associated with sustainable business practices in a faith-based organizational setting.

The proposed mediation framework is grounded in a resource-deployment logic. Strategic organizational capabilities represent the internal resource and capability base, while Competitive Advantage represents the strategic position associated with the effective deployment of those capabilities. ISE and GI are then examined as potential mechanisms through which competitive advantage is associated with sustainable business practices and outcomes (Novitasari & Agustia, 2023). This framework therefore extends the analytical focus from how organizational capabilities are associated with competitive advantage to how that advantage may be connected with spiritually grounded entrepreneurship and environmentally oriented innovation. Such an extension is relevant because competitive advantage alone does not necessarily indicate that an organization has translated its strategic strengths into practices that support long-term sustainability (Cheah et al., 2024).

Accordingly, this study develops and empirically tests an integrated sustainable business management model for pesantren in Aceh and Lampung. The model positions Electronic Human Resource Management, Strategic Human Resource Management, Knowledge Management, and Organizational Agility as strategic organizational capabilities associated with Competitive Advantage, while Islamic Spiritual Entrepreneurship and Green Innovation are examined as potential mediating mechanisms in the association between Competitive Advantage and Sustainable Business Performance. The study therefore moves beyond isolated capability–performance relationships by examining an integrated process in which organizational capabilities are associated with competitive advantage and competitive advantage is subsequently examined in relation to spiritually aligned entrepreneurship, environmental innovation, and sustainable business performance.

The study contributes in three related ways. First, theoretically, it extends the application of RBT by incorporating Islamic Spiritual Entrepreneurship and Green Innovation as contextual mechanisms in the relationship between Competitive Advantage and Sustainable Business Performance. Second, empirically, it provides quantitative evidence from pesantren, an organizational setting that has received comparatively less attention in strategic management research than conventional commercial organizations. Third, contextually, it examines how faith-based educational institutions may combine strategic organizational capabilities, Islamic entrepreneurial values, and environmental innovation in developing sustainable business activities. Rather than claiming that these relationships are entirely new, the study contributes by examining their integrated configuration in the pesantren context and by addressing the unresolved question of how organizational capabilities and competitive advantage may be associated with sustainable performance in organizations whose economic activities coexist with educational, religious, and social missions.

Literature Review and Hypothesis Development

1.1. Background Theory

Resource-Based Theory (RBT), proposed by Wernerfelt (1984) and developed by Barney (1991), explains sustainable competitive advantage as the result of effectively developing and deploying valuable internal resources and capabilities. Under the VRIN framework, resources that are valuable, rare, difficult to imitate, and non-substitutable can provide a basis for sustained competitive advantage (Barney, 1991; Kozlenkova et al., 2014; Lubis, 2022). Contemporary RBT research extends this perspective beyond tangible assets to include human capital, knowledge, digital capabilities, organizational culture, and innovation (Muhammad et al., 2025; Nyuga & Tanova, 2024).

In this study, Strategic Human Resource Management, Electronic Human Resource Management, Knowledge Management, and Organizational Agility are conceptualized as strategic organizational capabilities that enable pesantren to develop and deploy their internal resources to achieve Competitive Advantage (Alqarni et al., 2023; Bekos et al., 2025; Shamout et al., 2022). However, RBT alone primarily explains how resources and capabilities generate competitive advantage; it provides less explanation of how that advantage is transformed into sustainable performance in organizations whose economic activities are simultaneously shaped by religious and social missions.

This limitation is particularly relevant to pesantren, which possess distinctive intangible resources rooted in Islamic values, social responsibility, and ethical practices (Mukhid et al., 2022; Nurhasanah et al., 2024). Therefore, this study extends RBT by incorporating Islamic Spiritual Entrepreneurship (ISE) and Green Innovation (GI) as mechanisms linking Competitive Advantage to Sustainable Business Performance. ISE explains how competitive advantage can be translated into entrepreneurial activities consistent with Islamic values (Aouati & Arabeche, 2023; Grine et al., 2015), while GI captures how organizational advantages can be converted into environmentally responsible products, processes, and practices (Batool, 2024; Doghan et al., 2022). Accordingly, the proposed framework extends the conventional RBT logic from capability, competitive advantage to a broader process of capability, competitive advantage, ISE/GI, sustainable business performance.

1.2. Hypothesis Development

1.2.1. Electronic Human Resource Management

Electronic Human Resource Management (e-HRM) refers to the use of digital technologies to support human resource functions, including recruitment, training, performance management, and administration. By integrating HR processes and information, e-HRM can improve operational efficiency, decision-making, transparency, and organizational responsiveness (Alqarni et al., 2023; Shamout et al., 2022). It also enables organizations to strengthen their capabilities and adapt to digital transformation (Arulrajah, 2017). From an RBT perspective, e-HRM represents a digital organizational capability that can support Competitive Advantage. In pesantren, e-HRM can facilitate the coordination of human resources across educational and business activities while remaining aligned with Islamic values.

H1: Electronic human resource management has a positive effect on the competitive advantage of the Islamic boarding school business

1.2.2. Strategic Human Resource Management

Strategic Human Resource Management (SHRM) aligns human resource practices with organizational strategy to develop valuable organizational capabilities and competitive advantage. By strengthening employee commitment, workforce competencies, innovation, and collaborative culture, SHRM can create strategic resources that are difficult to imitate (Agustian et al., 2023; Tawfig & Kamarudin, 2021). From an RBT perspective, SHRM represents a strategic capability through which human resources can be effectively developed and deployed to strengthen Competitive Advantage. In pesantren, SHRM can support competent human resource development while maintaining alignment with Islamic values and the institution’s educational and business missions.

H2: Strategic human resource management has a positive effect on the competitive advantage of the Islamic boarding school business

1.2.3. Knowledge Management

Knowledge Management (KM) refers to the systematic process of creating, sharing, and utilizing organizational knowledge to support learning, innovation, and strategic decision-making. By transforming knowledge into organizational capabilities, KM enables organizations to adapt to dynamic environments and strengthen Competitive Advantage (Nyuga & Tanova, 2024; Rahmat & Ahman, 2025; Tri Juniarti et al., 2024). From an RBT perspective, organizational knowledge represents an intangible strategic resource that can be developed and deployed to create value. In pesantren, KM can facilitate the preservation and sharing of managerial knowledge, best practices, and Islamic values, thereby strengthening organizational adaptability and innovation.

H3: Knowledge management has a positive effect on the competitive advantage of the Islamic boarding school business

1.2.4. Organizational Agility

Organizational Agility (OA) refers to an organization's capability to sense environmental changes, respond rapidly to market dynamics, and adapt its strategies accordingly. By enhancing responsiveness, decision-making, and innovation, OA enables organizations to address technological and market uncertainty and strengthen Competitive Advantage (Alqarni et al., 2023; Bekos et al., 2025; Bux et al., 2025). From an RBT perspective, agility represents a dynamic organizational capability that enables the effective deployment and reconfiguration of resources in changing environments. In pesantren, OA can support adaptation to economic, technological, and social changes while maintaining alignment with Islamic values and institutional missions.

H4: Organizational agility has a positive effect on the competitive advantage of the Islamic boarding school business

1.2.5. Competitive Advantage

Competitive Advantage (CA) refers to an organization's strategic position resulting from the effective deployment of valuable, rare, inimitable, and non-substitutable resources and capabilities (Barney, 1991). Rather than representing performance itself, CA reflects the ability to create and maintain distinctive value relative to competitors (Lukovszki et al., 2020). In pesantren, such advantage may arise not only from managerial capabilities but also from distinctive intangible resources, including Islamic values, institutional reputation, social trust, and community relationships.

In this study, CA is positioned as an intermediate strategic outcome through which organizational capabilities can be translated into sustainable business practices. Competitive advantage provides pesantren with the organizational position and resources to develop Islamic Spiritual Entrepreneurship (ISE) and Green Innovation (GI). ISE represents the translation of competitive resources into entrepreneurial activities consistent with Islamic values and social responsibility (Aouati & Arabeche, 2023; Grine et al., 2015). while GI represents their translation into environmentally responsible products, processes, and practices (Alqarni et al., 2023; Liang et al., 2025). Thus, CA serves as the link between strategic organizational capabilities and the mechanisms through which pesantren pursue Sustainable Business Performance.

H5: Competitive advantage has a positive effect on the sustainable Islamic boarding school business

H6: Competitive advantage has a positive effect on Islamic spiritual entrepreneurship in Islamic boarding schools

H7: Competitive advantage has a positive effect on green innovation in Islamic boarding schools

1.2.6. Islamic Spiritual Entrepreneurship

Islamic Spiritual Entrepreneurship (ISE) integrates entrepreneurial activities with Islamic ethical and spiritual values, emphasizing economic value creation alongside social responsibility and welfare. It encourages entrepreneurial decision-making that balances business objectives with ethical responsibility, social justice, and long-term sustainability (Grine et al., 2015; Szromek, 2020; Tawfig & Kamarudin, 2021). In this study, ISE is positioned as a mechanism through which Competitive Advantage can be translated into value creation consistent with Islamic principles. Competitive resources, such as institutional reputation, trust, and organizational capabilities, can provide the foundation for entrepreneurial practices guided by amanah, ikhlas, and maslahah (Aouati & Arabeche, 2023). In pesantren, ISE therefore represents the process through which competitive advantage is transformed into spiritually grounded entrepreneurial practices that contribute to Sustainable Business Performance.

H8: Islamic spiritual entrepreneurship has a positive effect on sustainable Islamic boarding school business

H9: Islamic spiritual entrepreneurship mediates the influence of competitive advantage on sustainable Islamic boarding school business

1.2.7. Green Innovation

Green Innovation (GI) refers to the development and adoption of environmentally responsible products, processes, and managerial practices that improve resource efficiency and reduce environmental impacts. As a strategic capability, GI can strengthen organizational sustainability through innovation, environmental responsibility, and improved resource efficiency (Muhammad et al., 2025; Ren & Mia, 2025). In this study, GI is positioned as a mechanism through which Competitive Advantage can be translated into sustainable business practices. Competitive resources and capabilities can enable pesantren to develop environmentally responsible innovations in response to changing economic and environmental demands (Alqarni et al., 2023; Baeshen et al., 2021; Doghan et al., 2022). In pesantren, GI may include waste management, renewable energy, and environmentally friendly technologies, reflecting the Islamic principle of hifz al-bi'ah (environmental stewardship). Thus, GI represents the process through which competitive advantage is converted into environmentally responsible practices that support Sustainable Business Performance.

H10: Green innovation has a positive effect on the sustainable Islamic boarding school business

H11: Green innovation mediates the influence of competitive advantage on sustainable Islamic boarding school business

2. Methods

2.1. Research Design

This study employed a quantitative, cross-sectional survey design to examine the relationships among Electronic Human Resource Management, Strategic Human Resource Management, Knowledge Management, Organizational Agility, Competitive Advantage, Islamic Spiritual Entrepreneurship, Green Innovation, and Sustainable Business Performance in Islamic boarding schools (pesantren). PLS-SEM was employed because the study investigates a predictive model involving multiple latent constructs and mediation relationships. Data were collected from managers and staff directly involved in pesantren business activities in Aceh and Lampung Provinces.

2.2. Research Setting and Population

The study was conducted in Aceh and Lampung Provinces, which have among the largest numbers of Islamic boarding schools (pesantren) in Sumatra. The study focused on pesantren that participated in the Islamic Boarding School Business Incubation Program organized by the Ministry of Religious Affairs of the Republic of Indonesia during 2021–2024. The eligible institutional population consisted of pesantren that participated in the program and operated an active business unit. The unit of analysis was the pesantren business organization, while the respondents were managers or staff directly involved in managing and operating the business activities.

2.3. Participants and Sampling

Purposive sampling was employed to select respondents who met the study's eligibility criteria (Harahap et al., 2023). Respondents were required to: (1) represent a pesantren that participated in the Ministry of Religious Affairs Business Incubation Program during 2021–2024; (2) be involved in an active pesantren business unit; and (3) be managers or staff directly involved in managing business activities. The questionnaire comprised 32 indicators measuring eight constructs. A total of 421 questionnaires were distributed to eligible respondents in Aceh and Lampung. After screening for eligibility, completeness, and response consistency, 320 valid questionnaires were retained for the final analysis, while 101 responses were excluded. The final sample size was determined based on the number of eligible and valid responses obtained during the data-collection period and was considered adequate for estimating the proposed PLS-SEM model given its structural complexity and number of constructs and indicators. Accordingly, the analysis was conducted using 320 valid observations.

2.4. Research Instrument and Pilot Testing

The research instrument consisted of eight constructs measured by 32 indicators, adopted and adapted from established studies to suit the pesantren business context. All items were measured using a five-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. Before the main survey, a pilot test involving 30 respondents with characteristics similar to the target population was conducted to assess the validity and reliability of the measurement items. The pilot results indicated that the measurement items met the required validity and reliability criteria; therefore, no items were removed or revised before the main data collection.The main questionnaire is then distributed online via Google Form, shared through WhatsApp groups, and promoted through Instagram Ads to reach respondents more effectively (targeted advertising) (Amira & Nurhayati, 2019).

Table 1. Variables, Indicators, and Sources

No	Variable	Indicators	Source
1	Electronic Human Resource Management	Speed of work response Employee availability Convenience of digital systems Administrative efficiency	(Alqarni et al., 2023; Shamout et al., 2022)
2	Strategic Human Resource	Competency-based selection Employee training	(Agustian et al., 2023; Tawfig &

No	Variable	Indicators	Source
	Management	Objective performance assessment Facilities and compensation The role of leaders in HR decision-making	Kamarudin, 2021)
3	Knowledge Management	Knowledge utilization Information sharing Evaluation of knowledge Identify knowledge	(Nyuga & Tanova, 2024; Tri Juniarti et al., 2024)
4	Organizational agility	Response to change Adaptation with partners Flexibility of work processes	(Alqarni et al., 2023; Bekos et al., 2025)
5	Islamic Spiritual Entrepreneurship	Business according to the teachings of Islam Business as worship Blessing income Gratitude Honesty in transactions	(Aouati & Arabeche, 2023; Grine et al., 2015)
6	Green Innovation	Eco-friendly materials Minimal waste production Green technology Innovation increases profits	(Baeshen et al., 2021; Ren & Mia, 2025)
7	Competitive Advantage	Product value for customers Advantages are hard to replicate Unique strategy Irreplaceable advantages	(Barney, 1991; Kozlenkova et al., 2014)
8	Sustainable Business	Sustainable waste management Long-term economy-oriented investments Social and environmental welfare	(Doghan et al., 2022; Muhammad et al., 2025)

2.5. *Data Analysis*

Data were analyzed using PLS-SEM. The measurement model was assessed using outer loadings (>0.70), Cronbach's alpha and Composite Reliability (>0.70), AVE (>0.50), and discriminant validity. The structural model was evaluated using VIF (<5), path coefficients, R^2, f^2, and bootstrapping. Hypotheses were supported when the bootstrapped path coefficient was significant ($p < 0.05$) (Hair et al., 2017). Mediation analysis examined the indirect effects of Competitive Advantage on Sustainable Business Performance through Islamic Spiritual Entrepreneurship and Green Innovation.

2.6. *Model Development*

This research model was developed by adapting those of Alqarni et al. (2023) and Sinarti et al. (2025). In this study, the model is adjusted to suit the business context of an Islamic boarding school in Indonesia. The research model is illustrated in Figure 1.

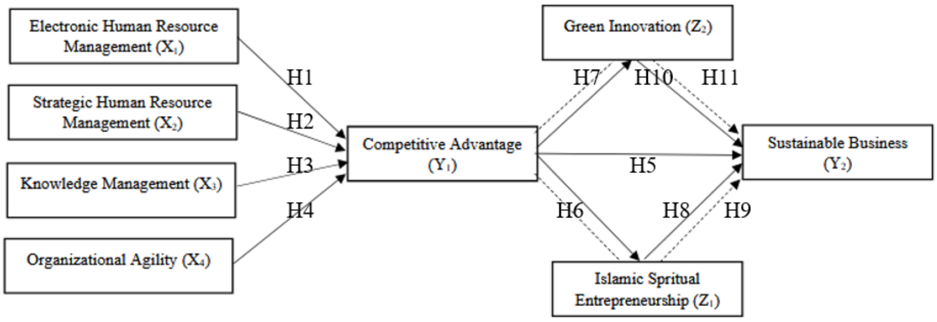

Figure 1. Research Models

3. Results

3.1. Demographic Analysis of Respondents

A total of 320 managers of Islamic boarding school business units participated in this study, comprising 55.31% female and 44.69% male respondents. The respondents were from Aceh (57.81%) and Lampung (42.19%). In terms of the types of business units managed, the largest proportion of respondents managed trade and cooperative businesses (38.75%), followed by service businesses (35.31%), ecotourism and eco-friendly creative products (11.25%), agriculture and livestock (5.00%), education and training (2.19%), and other business sectors (7.50%). Regarding managerial experience, 58.44% of respondents had more than six years of involvement in managing Islamic boarding school business units, while 16.88% had 3–5 years of experience and 24.69% had less than three years of experience. These figures provide an objective overview of the respondents' demographic and managerial experience profiles.

Table 2. Respondent Data Results

Characteristic	Frequency	Percentage (%)
Gender		
Male	143	44.69
Female	177	55.31
Total	**320**	**100**
Province of Origin		
Aceh	185	57.81
Lampung	135	42.19
Total	**320**	**100**
Types of Islamic Boarding School Business Units Managed		
Agriculture/Livestock	16	5.00
Trade/Cooperatives	124	38.75
Services (Catering, Laundry, Transportation)	113	35.31
Education/Training	7	2.19
Ecotourism/Eco-Friendly Creative Products	36	11.25
Other	24	7.50
Total	**320**	**100**
Managerial Experience in Islamic Boarding School Business Units		
<3 Years	79	24.69
3–5 Years	54	16.88
>6 Years	187	58.44
Total	**320**	**100**

3.2. Measurement Model Analysis (Outer Model)

The measurement model was evaluated using the Partial Least Squares Structural Equation Modeling (PLS-SEM) approach to assess the reliability and convergent validity of the reflective constructs (Razak et al., 2024). As shown in Table 3, all constructs demonstrated satisfactory internal consistency reliability. Cronbach’s alpha values ranged from 0.946 to 0.964, while Composite Reliability (CR) values ranged from 0.964 to 0.974. These values exceed the recommended threshold of 0.70, indicating adequate internal consistency reliability (Hair et al., 2014). Convergent validity was assessed based on the outer loadings and Average Variance Extracted (AVE). The outer loadings of all indicators ranged from 0.902 to 0.961, exceeding the recommended threshold of 0.70 (Ascarya & Tekdogen, 2022).. In addition, the AVE values ranged from 0.866 to 0.912, which are substantially above the minimum criterion of 0.50. These results indicate that the indicators explain a sufficient proportion of variance in their respective constructs and provide evidence of satisfactory convergent validity.

Table 3. Outer Model Results

Variable	**Code**	**Loadings**
Electronic Human Resource Management (Cronbach's α= 0.951 CR= 0.964 and AVE= 0.871)		
Employees who work to manage the business have a fast response time	X1.1	0.925
Employees are always available when needed	X1.2	0.935
Employees are satisfied with the system's ease of use for business activities	X1.3	0.943
Employees help speed up the administrative process in business management	X1.4	0.931
Strategic Human Resource Management (Cronbach's α= 0.961 CR= 0.970 and AVE= 0.866)		
Employee selection according to the required competencies	X2.1	0.918
Employees receive training to upskill	X2.2	0.919
Employee performance appraisal is carried out objectively and measurably	X2.3	0.935
Adequate facilities and benefits are provided to employees	X2.4	0.931
When it comes to employee management, organizational leaders have a role in determining business decisions	X2.5	0.949
Knowledge Management (Cronbach's α= 0.964 CR= 0.974 and AVE= 0.903)		
Employees utilize their knowledge to get the job done	X3.1	0.948
Fellow employees share information and work experience	X3.2	0.945
Organizations conduct regular evaluations of their knowledge	X3.3	0.959
Organizations can identify the knowledge that plays a critical role in achieving business success	X3.4	0.949
Organizational Agility (Cronbach's α= 0.946 CR= 0.965 and AVE= 0.902)		
Organizations are quick to respond to changing customer needs	X4.1	0.957
Organizations quickly adapt to new partners	X4.2	0.946
Work processes are easily changed as needed	X4.3	0.947
Islamic Spiritual Entrepreneurship (Cronbach's α= 0.954 CR= 0.967 and AVE= 0.879)		
Islamic teachings guide business activities	Z1.1	0.937
Business activities are considered part of worship	Z1.2	0.953
The income obtained is expected to bring blessings	Z1.3	0.957

Variable	Code	Loadings
Employees are grateful for the results of their efforts	Z1.4	0.943
Information and transactions are done honestly	Z1.5	0.951
Green Innovation (Cronbach's α= 0.962 CR= 0.971 and AVE= 0.869)		
Eco-friendly raw materials are used in production	Z2.1	0.961
The production process produces minimal waste	Z2.2	0.952
Organizations seek to develop technologies to support sustainability	Z2.3	0.948
Green innovation increases organizational profits	Z2.4	0.948
Competitive Advantage (Cronbach's α= 0.962 CR= 0.972 and AVE= 0.898)		
The resulting product/service provides significant benefits to customers	Y1.1	0.952
Competitors rarely possess an organization's advantage	Y1.2	0.902
Organizational strategies and innovations are complex for competitors to replicate.	Y1.3	0.940
Another product or strategy cannot replace organizational excellence	Y1.4	0.952
Sustainable Business (Cronbach's α= 0.952 CR= 0.969 and AVE= 0.912)		
Organizations manage waste and emissions sustainably	Y2.1	0.921
Investments are made with economic sustainability in mind	Y2.2	0.935
The organization pays attention to the welfare of employees and the surrounding community	Y2.3	0.913

Discriminant validity was assessed using the Heterotrait–Monotrait ratio (HTMT). The HTMT criterion is used to evaluate whether the constructs in the model are empirically distinct from one another. A value below 0.90 indicates adequate discriminant validity (Hair et al., 2014). As presented in Table 4, all HTMT values are below the recommended threshold of 0.90. The highest HTMT value is 0.855, observed between X4 and Y2, which remains below the 0.90 threshold. Therefore, the results indicate that all constructs demonstrate adequate discriminant validity and are sufficiently distinct from one another.

Table 4. Heterotrait-Monotrait Ratio (HTMT) Result

Variable	X1	X2	X3	X4	Y1	Y2	Z1	Z2
X1								
X2	0.683							
X3	0.558	0.488						
X4	0.777	0.516	0.346					
Y1	0.753	0.656	0.351	0.671				
Y2	0.721	0.474	0.228	0.855	0.531			
Z1	0.665	0.810	0.588	0.672	0.601	0.743		
Z2	0.712	0.542	0.375	0.788	0.665	0.810	0.731	

3.3. Structural Model Analysis (Inner Model)

The structural model was evaluated using collinearity statistics, path coefficients (β), t-statistics, p-values, coefficient of determination (R^2), and effect size (f^2). Collinearity was assessed using the Variance Inflation Factor (VIF) to ensure that multicollinearity did not affect the structural model. For the one-tailed test of directional hypotheses, a relationship was considered statistically significant when the t-statistic exceeded 1.65 and the p-value was below 0.05. The f^2 values of 0.02, 0.15, and 0.35 indicate small, medium, and large effect sizes, respectively, whereas R^2 values of 0.75, 0.50, and 0.25 indicate substantial, moderate, and weak explanatory power, respectively (Billah, 2022).

Collinearity was assessed using the Variance Inflation Factor (VIF) to determine whether multicollinearity exists among the predictor constructs in the structural model. As presented in Table 5, the VIF values range from 1.000 to 2.752. The highest VIF value is found for the relationship X3 → Y1, with a VIF of 2.752, while the lowest VIF values are observed for Y1 → Z1 and Y1 → Z2, both with a VIF of 1.000. All VIF values are below the recommended threshold of 5.00, indicating that there is no problematic multicollinearity among the predictor constructs. Therefore, the structural model can be considered free from multicollinearity concerns, and the estimated path coefficients are not substantially affected by collinearity among the predictors.

Table 5. Collinearity Statistics (VIF)

Relationship	VIF	Conclusion
X1 → Y1	1.483	No multicollinearity problem
X2 → Y1	1.995	No multicollinearity problem
X3 → Y1	2.752	No multicollinearity problem
X4 → Y1	2.088	No multicollinearity problem
Y1 → Y2	1.748	No multicollinearity problem
Y1 → Z1	1.000	No multicollinearity problem
Y1 → Z2	1.000	No multicollinearity problem
Z1 → Y2	1.558	No multicollinearity problem
Z2 → Y2	1.246	No multicollinearity problem

The results presented in Table 6 show that X1, X2, X3, and X4 have positive and significant effects on Y1. X1 has a positive and significant effect on Y1 ($\beta = 0.178$, $t = 3.040$, $p = 0.002$), with a small effect size ($f^2 = 0.127$). X2 also has a positive and significant effect on Y1 ($\beta = 0.327$, $t = 3.782$, $p < 0.001$), with a large effect size ($f^2 = 0.485$). X3 has a positive and significant effect on Y1 ($\beta = 0.348$, $t = 3.377$, $p = 0.001$), with a small effect size ($f^2 = 0.036$). X4 has a positive and significant effect on Y1 ($\beta = 0.135$, $t = 2.132$, $p = 0.033$), with a medium effect size ($f^2 = 0.213$).

Among the four predictors of Y1, X3 demonstrates the largest standardized path coefficient ($\beta = 0.348$), indicating the strongest direct relationship with Competitive Advantage in terms of the standardized path coefficient. However, X2 has the largest effect size ($f^2 = 0.485$), indicating the greatest contribution to the explained variance of Y1 according to the f^2 criterion. Thus, the largest β and the largest f^2 are attributed to different predictors and should be interpreted separately.

Furthermore, Y1 has a positive and significant effect on Y2 ($\beta = 0.911$, $t = 75.853$, $p < 0.001$), with a small effect size ($f^2 = 0.050$). Y1 also has positive and significant effects on Z1 ($\beta = 0.878$, $t = 53.505$, $p < 0.001$) and Z2 ($\beta = 0.902$, $t = 71.972$, $p < 0.001$), with large effect sizes of $f^2 = 0.746$ and $f^2 = 0.465$, respectively. In addition, Z1 has a positive and significant effect on Y2 ($\beta = 0.258$, $t = 3.879$, $p < 0.001$), with a medium effect size ($f^2 = 0.230$), while Z2 has a positive and significant effect on Y2 ($\beta = 0.456$, $t = 6.210$, $p < 0.001$), with a small effect size ($f^2 = 0.089$). The R^2 values indicate substantial explanatory power for all endogenous constructs. The R^2 value is 0.909 for Y1, 0.915 for Y2, 0.771 for Z1, and 0.813 for Z2. These findings indicate that the structural model explains a substantial proportion of the variance in all endogenous constructs.

Table 6. Path Coefficients Results

Relationship	β	T Statistics	P Values	f^2	Effect Size	Decision
X1 → Y1	0.178	3.040	0.002	0.127	Small	Supported
X2 → Y1	0.327	3.782	<0.001	0.485	Large	Supported
X3 → Y1	0.348	3.377	0.001	0.036	Small	Supported
X4 → Y1	0.135	2.132	0.033	0.213	Medium	Supported
Y1 → Y2	0.911	75.853	<0.001	0.050	Small	Supported
Y1 → Z1	0.878	53.505	<0.001	0.746	Large	Supported
Y1 → Z2	0.902	71.972	<0.001	0.465	Large	Supported
Z1 → Y2	0.258	3.879	<0.001	0.230	Medium	Supported
Z2 → Y2	0.456	6.210	<0.001	0.089	Small	Supported

Table 7 presents the results of the mediation analysis examining the indirect effects of the independent variables through the mediating construct. The results indicate that the indirect effect of X1 → Z → Y1 is positive and statistically significant, with a path coefficient (β) of 0.076, a t-statistic of 2.123, and a p-value of 0.034. Since the t-statistic exceeds the critical value of 1.65 and the p-value is below 0.05, the indirect effect is significant. Therefore, Z significantly mediates the relationship between X1 and Y1, and the corresponding hypothesis is supported. Similarly, the indirect effect of X2 → Z → Y1 is positive and significant, with a path coefficient (β) of 0.149, a t-statistic of 2.464, and a p-value of 0.014. These results indicate that the indirect effect meets the criteria for statistical significance. Thus, Z significantly mediates the relationship between X2 and Y1, and the corresponding hypothesis is supported.

Table 7. Specific Indirect Effects

Mediation Relationship	B	T Statistics	P Values	Decision
X1 → Z → Y1	0.076	2.123	0.034	Supported
X2 → Z → Y1	0.149	2.464	0.014	Supported

The coefficient of determination (R^2) indicates substantial explanatory power for all endogenous constructs. Y1 has an R^2 value of 0.909, indicating that 90.9% of its variance is explained by the predictor constructs in the model. Y2 has an R^2 value of 0.915, indicating that 91.5% of its variance is explained by its predictors. Meanwhile, Z1 and Z2 have R^2 values of 0.771 and 0.813, respectively. Based on the proposed criteria, all endogenous constructs demonstrate substantial explanatory power.

Table 8. Coefficient of Determination (R^2)

Endogenous Construct	R^2	Explanatory Power
Y1 – Competitive Advantage	0.909	Substantial
Y2 – Sustainable Business	0.915	Substantial
Z1 – Islamic Spiritual Entrepreneurship	0.771	Substantial
Z2 – Green Innovation	0.813	Substantial

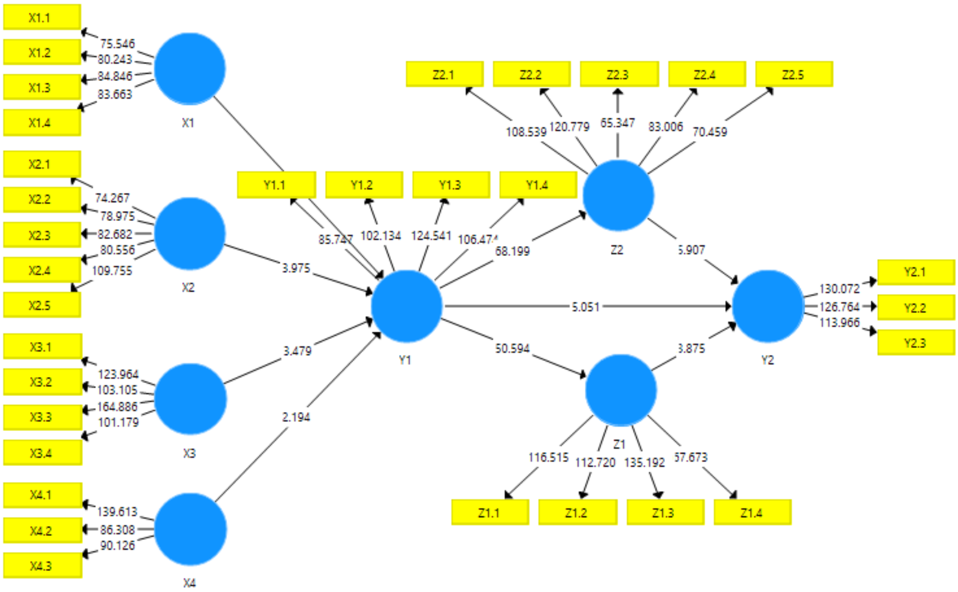

Figure 2. Structural Models

4. Discussion

The findings indicate that Electronic Human Resource Management (E-HRM), Strategic Human Resource Management (SHRM), Knowledge Management (KM), and Organizational Agility (OA) are significantly associated with the Competitive Advantage of Islamic boarding schools (pesantren). These results suggest that competitive advantage is related to the integration of digital HR practices, strategic workforce management, knowledge utilization, and organizational responsiveness. This finding extends previous research by providing a more integrated perspective within the pesantren context.

E-HRM was significantly positively associated with Competitive Advantage, suggesting that pesantren with more developed digital HR practices tend to have stronger competitive positions. This finding is consistent with Alqarni et al. (2023) and Shamout et al. (2022), who emphasized the relevance of digital HR systems for organizational efficiency, employee development, and decision-making. The present study extends these findings by highlighting the strategic relevance of E-HRM in pesantren, where digital practices must remain aligned with educational and Islamic missions. However, given the cross-sectional design, this association should not be interpreted as a causal effect

SHRM was significantly positively associated with Competitive Advantage. This finding suggests that pesantren with HR practices aligned with organizational strategy tend to demonstrate stronger competitive positions. The result is consistent with Tawfig & Kamarudin (2021) and Agustian et al. (2023), who highlighted the relevance of strategic workforce planning, competency development, leadership, and employee commitment to organizational capabilities. The present study extends these findings by showing that the strategic relevance of SHRM in pesantren is also embedded in values such as amanah, ikhlas, and institutional commitment. This combination represents a distinctive organizational context that may differentiate pesantren from conventional organizations. However, given the cross-sectional design, this relationship should be interpreted as an association rather than a causal effect.

KM was also significantly positively associated with Competitive Advantage. This finding suggests that knowledge creation, sharing, and application are related to stronger competitive positions. The result is consistent with Nyuga & Tanova (2024), Tri Juniarti et al. (2024), and Rahmat & Ahman (2025), who emphasized knowledge sharing, organizational learning, and knowledge utilization as important organizational capabilities. The finding extends previous research by showing that KM in pesantren encompasses not only managerial knowledge but also institutional experience, business practices, community knowledge, and Islamic values. These knowledge resources may support innovation, adaptability, and business decision-making, although their effects cannot be interpreted causally because of the cross-sectional research design.

OA was significantly positively associated with Competitive Advantage. This finding suggests that pesantren with greater organizational agility tend to demonstrate stronger competitive positions in responding to environmental, technological, and market changes. The result is consistent with Alqarni et al. (2023), Bux et al. (2025) and Bekos et al. (2025), who identified organizational agility as an important capability associated with organizational responsiveness and performance. The present study extends these findings by highlighting the relevance of agility in pesantren business units, which operate across educational, social, religious, and economic objectives. Thus, organizational agility appears particularly relevant to pesantren in responding to changing community needs and market conditions while maintaining their institutional identity and Islamic values. Given the cross-sectional design, however, this relationship should be interpreted as an association rather than a causal effect.

Competitive Advantage was also significantly positively associated with Sustainable Business Performance. This finding is consistent with the Resource-Based Theory perspective that valuable and difficult-to-imitate resources and capabilities are associated with stronger organizational performance (Barney, 1991). The result is also consistent with Baeshen et al. (2021) and Sharma et al. (2025), who reported a positive relationship between competitive capabilities and sustainable organizational performance. The present study extends this evidence by positioning Competitive Advantage as an important organizational condition associated with Sustainable Business Performance in pesantren. In this context, competitive advantage is associated with the integration of professional management, knowledge, agility, Islamic values, innovation, and effective resource utilization. However, this relationship should not be interpreted as causal because the study uses a cross-sectional design.

Competitive Advantage was significantly positively associated with Islamic Spiritual Entrepreneurship (ISE). This finding suggests that pesantren with stronger competitive positions tend to report higher levels of entrepreneurial practices aligned with Islamic ethical and spiritual principles. This result is consistent with Grine et al. (2015), who emphasized the integration of economic objectives, ethical responsibility, and social welfare in Islamic entrepreneurship, and with Aouati & Arabeche (2023), who highlighted the role of Islamic values in entrepreneurial practices. The present finding extends this literature by showing that, in the pesantren context, competitive advantage can coexist with entrepreneurial practices grounded in amanah, ikhlas, and maslahah. Thus, competitiveness does not necessarily imply commercialization at the expense of religious identity but may be compatible with the educational and social mission of pesantren. However, given the cross-sectional design, this relationship should be interpreted as an association rather than a causal effect.

Competitive Advantage was also significantly positively associated with Green Innovation (GI). This finding suggests that pesantren with stronger competitive positions tend to report greater engagement in environmentally responsible products, processes, and managerial practices. The result is consistent with Liang et al. (2025), Baeshen et al. (2021) and Doghan et al. (2022), who highlighted the relationship between competitive capabilities, green innovation, resource efficiency, and sustainable performance. The present study extends these findings by highlighting the relevance of green innovation in pesantren, where environmental responsibility can be considered alongside economic and institutional objectives. Practices such as waste reduction, efficient resource use, and environmentally friendly technologies may be associated with operational efficiency and institutional reputation. Nevertheless, this relationship should not be interpreted causally because of the cross-sectional research design.

ISE was significantly positively associated with Sustainable Business Performance. This finding suggests that higher levels of Islamic Spiritual Entrepreneurship tend to be associated with stronger sustainable business performance. The result is consistent with Mubarak (2014) and Aryadi & Rahmawati (2019), who highlighted the relevance of Islamic entrepreneurial values to ethical responsibility, stakeholder trust, legitimacy, and long-term business orientation. In the pesantren context, the integration of amanah, ikhlas, and maslahah into business practices may be associated with stronger relationships with students, communities, customers, and other stakeholders. This finding therefore extends previous research by highlighting the relevance of spiritual and ethical values in understanding sustainable business performance within faith-based educational organizations. However, given the cross-sectional design, this relationship should be interpreted as an association rather than a causal effect.

Regarding the mediation analysis, the interpretation of ISE as a mediator should depend on the verified indirect-effect results. If the indirect effect of Competitive Advantage on Sustainable Business Performance through ISE is statistically significant, the finding would suggest that ISE accounts for part of the association between Competitive Advantage and Sustainable Business Performance. This interpretation would extend the Resource-Based Theory perspective by highlighting the potential relevance of spiritual and ethical dimensions in the relationship between organizational resources and performance. Nevertheless, the indirect effect should be interpreted as a statistical association rather than evidence of a causal mechanism, particularly given the cross-sectional research design.

GI was significantly positively associated with Sustainable Business Performance. This finding suggests that higher levels of green innovation tend to be associated with stronger sustainable business performance. The result is consistent with Imam et al. (2019), Baeshen et al. (2021) and Doghan et al. (2022), who highlighted the relevance of green innovation to resource efficiency, environmental responsibility, and organizational sustainability. The present finding extends this literature by highlighting the relevance of green innovation in pesantren, where environmental responsibility can be considered alongside economic and institutional objectives. In this context, practices related to resource efficiency, waste reduction, and environmentally responsible technologies may support sustainable business practices while remaining consistent with the principle of hifz al-bi'ah. However, given the cross-sectional design, this relationship should be interpreted as an association rather than a causal effect.

Regarding the mediation analysis, the role of GI as a mediator should be interpreted based on the verified indirect-effect results. If the indirect effect of Competitive Advantage on Sustainable Business Performance through GI is statistically significant, the finding would suggest that GI accounts for part of the association between Competitive Advantage and Sustainable Business Performance. This result would extend the Resource-Based Theory perspective by highlighting the relevance of environmental innovation in the relationship between organizational capabilities and sustainable performance. Nevertheless, the indirect effect should be interpreted as a statistical association rather than evidence of a causal mechanism because of the cross-sectional research design.

Taken together, the findings provide an integrated perspective on the factors associated with Sustainable Business Performance in pesantren. E-HRM, SHRM, KM, and OA are significantly associated with Competitive Advantage, while Competitive Advantage is associated with Sustainable Business Performance and with the two contextual dimensions examined in this study, namely ISE and GI. Where the indirect effects are statistically verified, ISE and GI may further explain part of the association between Competitive Advantage and Sustainable Business Performance. This integrated perspective extends conventional Resource-Based Theory by incorporating spiritual, ethical, and environmental dimensions into the understanding of organizational competitiveness and sustainable performance in faith-based educational organizations.

4.1. *Theoretical Contributions*

Theoretically, this study extends Resource-Based Theory by demonstrating that strategic capabilities do not influence sustainable performance only through Competitive Advantage. In the pesantren context, Competitive Advantage is further translated into sustainable outcomes through Islamic Spiritual Entrepreneurship and Green Innovation. The study therefore introduces a more contextualized resource-to-performance mechanism that incorporates spiritual values and environmental sustainability. This contribution expands the application of Resource-Based Theory beyond conventional commercial organizations to faith-based educational institutions with multiple social, religious, and economic missions.

4.2. *Practical Implications*

The findings provide several practical implications. First, pesantren should strengthen digital HR systems to improve workforce coordination, transparency, and decision-making. Second, strategic HR development should focus on employee competencies, leadership, and commitment while maintaining Islamic institutional values. Third, pesantren should establish knowledge-sharing mechanisms to preserve organizational experience and support innovation. Fourth, organizational agility should be strengthened to enable business units to respond to technological, market, and community changes. Finally, policymakers, particularly the Ministry of Religious Affairs, can strengthen business incubation programs by integrating digital HR management, strategic capability development, knowledge management, Islamic entrepreneurship, and green innovation. Such an integrated approach can help pesantren develop sustainable businesses while strengthening their contribution to local economic development and the halal ecosystem.

4.3. *Limitations and Future Research*

This study has several limitations. First, the cross-sectional design limits the ability to establish causal relationships over time. Future research could employ longitudinal designs to examine how organizational capabilities, Competitive Advantage, Islamic Spiritual Entrepreneurship, and Green Innovation develop over time. Second, the study focuses on pesantren in Aceh and Lampung, which may limit the generalizability of the findings to other regions of Indonesia. Comparative studies involving pesantren from different provinces could provide broader evidence. Third, the study relies on self-reported questionnaire data, which may introduce common method or respondent bias. Future research could combine survey responses with objective indicators of business performance and environmental practices. Finally, future studies could examine additional contextual factors, such as Islamic leadership, institutional support, digital financial capability, or entrepreneurial orientation, to further explain sustainable business development in pesantren.

5. Conclusion

This study finds that Electronic Human Resource Management, Strategic Human Resource Management, Knowledge Management, and Organizational Agility are significantly associated with Competitive Advantage in Islamic boarding schools. Among these capabilities, Knowledge Management has the largest standardized path coefficient (β) for Competitive Advantage. Competitive Advantage is also significantly associated with Sustainable Business Performance, Islamic Spiritual Entrepreneurship, and Green Innovation. The mediation results should be interpreted based on the verified indirect effects for ISE and GI. Where these indirect effects are significant, the findings suggest that ISE and GI account for part of the association between Competitive Advantage and Sustainable Business Performance. Overall, the findings extend the Resource-Based Theory perspective by highlighting the relevance of organizational capabilities, Islamic values, and environmental responsibility in understanding Competitive Advantage and Sustainable Business Performance in the pesantren context.

Practically, the findings suggest that pesantren business units may consider strengthening digital HR management, strategic HR practices, knowledge management, organizational agility, Islamic entrepreneurship, and green innovation as interconnected organizational priorities. For the Ministry of Religious Affairs, the findings may inform business incubation and capacity-building programs that incorporate professional and values-based management practices. However, these implications should be considered within the limitations of the study. The cross-sectional design does not allow causal conclusions, while self-reported data may introduce respondent bias. Furthermore, the focus on pesantren in Aceh and Lampung may limit the transferability of the findings to other geographical contexts. Future research could employ longitudinal or mixed-method designs, include pesantren from broader geographical settings, and examine additional factors such as digital leadership and Islamic organizational culture. Within these limitations, this study provides an integrated perspective on the associations among organizational capabilities, Competitive Advantage, Islamic Spiritual Entrepreneurship, Green Innovation, and Sustainable Business Performance in Islamic boarding schools.

Declarations

Author Contribution Statement
Muhammad Arif conceived the study, conducted the data analysis, and drafted the manuscript. Darwis Harahap contributed to the research design, data interpretation, and manuscript revision. Ahmad Afandi contributed to the theoretical framework and critically reviewed the manuscript. Hengki Alvauzi Tanjung supervised the research, provided methodological guidance, and approved the final manuscript. All authors read and approved the final version of the manuscript.
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The authors declare no competing interests.

Additional Information
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