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The Influence of Green Practices, Digital Service Transformation, and Internal Organizational Capability on Sustainable Performance: The Mediating Role of Business Model Innovation

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ABSTRACT

This study examines the causal relationships among green management, digital service transformation, internal capability, business model innovation (BMI), and sustainable performance within Thailand's apartment rental industry. Rapid urbanization, intensifying market competition, and evolving customer expectations have increased the need for apartment operators to adopt sustainable and innovative business practices. Guided by system theory, this research employs a mixed-method explanatory approach to investigate how organizational inputs, environmental practices, digital readiness, and internal competencies, are transformed into sustainable outcomes through BMI. The qualitative phase, involving interviews with five industry experts, confirmed the contextual relevance and conceptual dimensions of all variables. The quantitative phase used survey data collected from 360 apartment operators nationwide, analyzed through Structural Equation Modeling (SEM) to validate the proposed model and test the direct and indirect effects among variables. Results indicate that all key variables, green management, digital service transformation, internal capability, BMI, and sustainable performance, were present at moderate levels, reflecting partial but growing adoption across the sector. SEM findings demonstrate that all seven hypotheses were supported, with internal capability exerting the strongest influence on BMI. Furthermore, BMI showed a significant direct effect on sustainable performance and served as a full or partial mediator in all causal pathways, confirming its central role in transforming organizational practices into sustainability outcomes. The study contributes to theoretical advancement by integrating digital, environmental, and capability-based perspectives into a unified model and offers practical insights for apartment operators seeking to enhance competitiveness through green practices, digital innovation, and capability development. Policy recommendations include promoting green incentives and digital transformation support for SMEs. Future research should examine longitudinal effects and extend the model to other rental accommodation sectors.

Keywords: Business Model Innovation, Digital Service Transformation, Green Management, Internal Capability, Sustainable Performance

INTRODUCTION

Background and Importance of the Problem

The apartment rental industry in Thailand plays a vital role in supporting urban housing development, particularly for laborers, students, and relocated workers in major cities such as Bangkok, Chiang Mai, Khon Kaen,

and Phuket. Growing urbanization, infrastructure expansion, and internal migration have significantly increased the demand for monthly rental apartments nationwide (National Housing Authority, 2024). Despite this upward trend, the industry faces intense market competition from newly established apartments, condominium rental units, serviced apartments, and short-term accommodation platforms such as Airbnb, which offer more flexible digital services and modernized customer experiences (Phusit & Chuanpit, 2023). This intensification of competition has placed substantial pressure on traditional apartment operators to transform their operations, enhance service quality, and develop stronger value propositions to remain competitive. A key challenge identified in recent studies is the slow rate of digital adoption among many apartment operators. Numerous businesses still rely on traditional management practices lacking technological integration, with limited use of digital platforms for booking, payment systems, customer relationship management, and operational monitoring (Srithep, 2023). Evidence from the uploaded documents further highlights that many operators struggle with outdated workflow systems, manual administrative processes, and a lack of real-time data management, resulting in inefficiencies, frequent service delays, and low customer satisfaction. These operational limitations have weakened their ability to respond to rapidly changing customer expectations shaped by digital lifestyles and a demand for greater convenience.

The issue of internal capability also remains prominent. Many small and medium-sized apartment operators face shortages in skilled personnel, inadequate digital literacy, and low organizational readiness for technological transformation (Rattanakorn, 2024). The files reveal that internal organizational capability, particularly strategic planning, technological competence, knowledge management, and staff development, is significantly underdeveloped. This lack of readiness reduces the organization's agility and limits opportunities to implement innovation, improve service delivery, or enhance long-term competitiveness. Simultaneously, customer expectations have increasingly shifted toward environmentally responsible practices. Tenants now emphasize green management, energy efficiency, effective waste management, and sustainability-focused service standards (Chan & Yung, 2022). However, the uploaded documents show that many apartment operators lack structured environmental management systems, with poor implementation of energy-saving technologies, weak waste sorting systems, and minimal green policy awareness among staff. This gap in green practices diminishes the ability of apartment operators to meet global sustainability trends and the rising preference for eco-friendly living environments.

Digital service transformation has therefore become essential for achieving operational resilience and competitive advantage. This includes the use of online reservation systems, digital communication platforms, automated service processes, and data-driven decision-making tools (Bharadwaj et al., 2013). Yet, studies and file findings confirm that adoption remains limited: many operators possess fragmented digital systems, incomplete digital infrastructure, and ineffective integration between front-end and back-end digital tools. These issues reduce service efficiency, hinder customer experience, and prevent operators from capturing opportunities in the digital economy. In response to these pressures, Business Model Innovation (BMI) has emerged as a strategic driver of value creation, enabling organizations to redesign service structures, integrate digital technologies, and enhance customer value propositions (Teece, 2010). However, the uploaded files suggest that BMI remains underutilized among Thai apartment operators. Traditional business models, primarily focused on basic room rental, show limited diversification in service offerings, low innovation in customer engagement, and a lack of systematic approaches to upgrading service designs. This results in reduced differentiation and makes many apartments indistinguishable within highly saturated markets.

Despite global and regional evidence linking green management, digital transformation, and internal capability to sustainable performance outcomes (Zhu & Sarkis, 2004; Vial, 2019; Grant, 1996), few empirical studies in Thailand have examined these variables within the same framework. Even fewer have investigated how these factors interact through the mediating role of Business Model Innovation within the context of the monthly apartment sector. The uploaded academic chapters confirm that existing research is fragmented, often focusing on isolated variables, different industries, or broad real estate categories rather than the specific operational realities of apartment rental businesses. Given these critical gaps, this research seeks to investigate the causal relationships among green management, digital service transformation, internal capability, business model innovation, and sustainable performance in Thailand's monthly apartment sector. By addressing the lack of integrated empirical evidence, the study contributes to theoretical advancement and provides strategic guidelines to support long-term competitiveness and sustainability within the industry.

Research Question

1. What are the levels of green management, digital service transformation, internal capability, business model innovation, and sustainable performance among monthly apartment businesses in Thailand?
2. How do green management, digital service transformation, and internal capability influence business model innovation?

3. How does business model innovation mediate the relationship between these causal factors and sustainable performance?

Research Objective

1. To examine the levels of green management, digital service transformation, internal capability, business model innovation, and sustainable performance.
2. To develop and validate a structural equation model explaining causal relationships among the variables.
3. To analyze direct and indirect influences of green management, digital service transformation, and internal capability on sustainable performance through business model innovation.

LITERATURE REVIEW

Related Concepts and Theories

System Theory

System Theory views organizations as open systems composed of interrelated components that interact to produce outcomes (von Bertalanffy, 1968). The theory emphasizes how inputs, processes, outputs, and feedback loops collectively influence organizational functioning. In this study, inputs, namely green management, digital service transformation, and internal capability, enter the organizational system and are transformed through Business Model Innovation (BMI) as the key process, ultimately producing the output of sustainable performance. This framework enables researchers to understand how organizational practices are interconnected rather than isolated, aligning with perspectives that emphasize system-wide interactions in organizational change (Kast & Rosenzweig, 1972).

Business Model Innovation (BMI)

Business Model Innovation refers to changes in the logic of how an organization creates, delivers, and captures value (Teece, 2010). It involves altering one or more components of the business model to respond to market changes or to gain competitive advantage. In the apartment sector, BMI includes redesigning service processes, integrating digital platforms, or offering new value propositions that match evolving tenant needs. Scholars argue that BMI is essential for organizations operating in dynamic environments because it enables adaptation and differentiation (Foss & Saebi, 2017). Thus, BMI acts as a strategic mechanism that connects organizational resources to improved performance outcomes.

Green Management

Green management encompasses organizational policies and practices aimed at minimizing environmental harm while improving operational efficiency (Chen et al., 2015). Typical initiatives include energy conservation, recycling, waste reduction, and investment in green technologies. These practices are particularly relevant in the real estate and accommodation sectors, where customers increasingly value environmental responsibility (Leonidou et al., 2013). Research shows that green management enhances corporate reputation, reduces long-term costs, and contributes to sustainable performance (Zhu & Sarkis, 2004). For apartment businesses, such practices differentiate them in competitive markets and align with global sustainability expectations.

Digital Service Transformation

Digital service transformation refers to the adoption of digital technologies that reshape customer interactions, service delivery, and operational processes (Vial, 2019). Examples in apartment businesses include digital booking systems, online payments, mobile communication, automated maintenance requests, and data-driven decision-making tools. According to Bharadwaj et al. (2013), digital transformation creates new forms of value by enhancing service efficiency and customer experience. Trust in digital platforms is also an essential factor that influences user acceptance and engagement (Gefen et al., 2003). As digital lifestyles become more widespread, apartment businesses must adapt to remain competitive.

Internal Capability

Internal capability refers to the knowledge, skills, technology readiness, and strategic flexibility that enable organizations to respond effectively to challenges (Teece et al., 1997). These capabilities determine the organization's ability to innovate, adopt new technologies, and implement new strategies. Research shows that firms with strong internal capabilities are more successful in executing digital transformation, implementing green initiatives, and developing innovative business models (Grant, 1996). In the apartment rental context, internal capability plays a central role in supporting operational efficiency, service quality, and long-term competitiveness.

Sustainable Performance

Sustainable performance integrates economic, social, and environmental outcomes in accordance with the Triple Bottom Line framework proposed by Elkington (1997). From an economic perspective, sustainable performance reflects an organization's ability to maintain profitability, reduce operational costs, and strengthen competitive advantage in the long term. Social performance encompasses factors such as tenant satisfaction, community well-being, and employee welfare, all of which contribute to a positive living environment and enhance organizational reputation. Environmental performance focuses on efficient use of resources, reduction of pollution, and commitment to environmental responsibility through green operational practices. Prior research demonstrates that organizations emphasizing sustainability across these three dimensions tend to achieve stronger long-term outcomes and gain higher levels of stakeholder trust (Lo & Sheu, 2007). Within the apartment rental industry, sustainable performance is particularly critical, as it influences tenant loyalty, supports regulatory compliance, and enhances market competitiveness in an increasingly environmentally conscious housing market.

Literature Surveys

A wide range of studies has examined the role of green management in promoting sustainability, demonstrating positive effects on both environmental and financial outcomes (Chen et al., 2015; Zhu & Sarkis, 2004). Similarly, digital transformation has been shown to increase operational efficiency and service innovation across various industries (Bharadwaj et al., 2013; Vial, 2019). Internal capability has also been found to be a key factor influencing an organization's ability to innovate and adapt (Teece et al., 1997; Grant, 1996).

However, research focusing specifically on monthly apartment rental businesses in Thailand remains limited. Most existing studies examine hotels, tourism enterprises, or large-scale real estate developers. Furthermore, few studies integrate green management, digital transformation, and internal capability into a single causal model mediated by Business Model Innovation. This highlights a significant research gap that the present study aims to address.

Conceptual Framework

The conceptual framework is grounded in System Theory and the resource-based perspective. It positions green management, digital service transformation, and internal capability as input variables influencing Business Model Innovation as a mediating process, which subsequently enhances sustainable performance. This approach aligns with prior research suggesting that BMI acts as a mechanism that converts organizational resources and environmental initiatives into improved sustainability outcomes (Teece, 2010; Foss & Saebi, 2017).

Research Hypothesis

Based on the theoretical foundations and literature review, the following hypotheses were developed:

H1: Green management has a significant positive influence on business model innovation, consistent with studies showing that environmental initiatives stimulate new value creation processes.

H2: Green management positively influences sustainable performance through the mediating role of business model innovation, reflecting findings that environmental practices contribute to sustainability when integrated into organizational innovation.

H3: Digital service transformation positively influences business model innovation, aligning with research highlighting technology's role in driving new service models.

H4: Digital service transformation positively influences sustainable performance through business model innovation, as digital technologies often lead to more efficient and sustainable operations.

H5: Internal capability positively influences business model innovation, supporting evidence that strong organizational competencies foster innovation.

H6: Internal capability positively influences sustainable performance through business model innovation, indicating that internal strengths contribute to long-term sustainability when used to support innovative practices.

H7: Business model innovation positively influences sustainable performance, consistent with findings that innovative business models lead to competitive and sustainable outcomes.

RESEARCH METHODOLOGY

Research Design

This study adopted a mixed-method explanatory research design to provide a comprehensive understanding of the relationships among green management, digital service transformation, internal capability, business model innovation, and sustainable performance. The research began with a qualitative phase aimed at exploring the contextual meanings, identifying relevant dimensions, and validating the conceptual constructs derived from the literature. Semi-structured interviews with experienced industry experts were used to gain detailed insights into current practices, challenges, and operational patterns within the Thai apartment rental sector. These qualitative findings were then used to refine and strengthen the quantitative instrument. The quantitative phase followed, utilizing a structured questionnaire to examine causal relationships among variables using Structural Equation Modeling (SEM). The use of SEM allowed the researcher to test both the measurement and structural models simultaneously, providing strong analytical precision and empirical validation. This mixed-method design ensured triangulation of data, enhanced methodological rigor, and strengthened the credibility of the research findings.

Population and Sample

The population of the study consisted of monthly apartment operators across Thailand, including owners, managers, supervisors, and individuals involved in key operational decision-making processes. Given the large and diverse nature of the apartment business in urban and suburban areas, a probability-based sampling method was employed to ensure broad representativeness. A total sample of 360 respondents was selected using simple random sampling, a method chosen to minimize selection bias and increase the generalizability of the statistical results. This sample size meets the minimum requirements for Structural Equation Modeling, which commonly recommends at least 300 cases to ensure accuracy of parameter estimation. In addition to the survey respondents, five industry experts were selected purposively for qualitative interviews based on their professional experience, industry expertise, and managerial responsibilities. Their input was crucial for contextualizing the study, validating the constructs, and strengthening the subsequent instrument development.

Research Instruments

Two primary research instruments were utilized in this study: a semi-structured interview guide for the qualitative phase and a structured questionnaire for the quantitative phase. The interview guide contained open-ended questions designed to encourage experts to share detailed insights and practical experiences related to digital transformation, environmental practices, internal capability, innovation, and sustainability within apartment operations. This flexible format enabled the researcher to probe deeply into specific issues while still maintaining alignment with the conceptual framework. The quantitative questionnaire was developed based on the literature review and qualitative inputs. It comprised items measuring the five key variables using a five-point Likert scale ranging from "strongly disagree" to "strongly agree." The questionnaire underwent expert validation to ensure content clarity, relevance, and alignment with the research objectives. A pilot test with 30 respondents was conducted to assess reliability, and Cronbach's alpha values confirmed that all constructs possessed adequate internal consistency. Refinements were made to improve item clarity and measurement accuracy before the final distribution.

Data Collection

Data collection took place from August 2025 to October 2025 through both online and on-site approaches to maximize accessibility and response rates. For the qualitative phase, interviews were conducted in person or via video conferencing depending on each expert's availability. Each interview session lasted approximately 45 to 60 minutes and was recorded, with participant consent, for transcription and analysis. For the quantitative phase, the finalized questionnaire was distributed through email, online survey forms, and physical visits to apartment businesses in major provinces such as Bangkok, Chiang Mai, Khon Kaen, and Phuket. This hybrid distribution strategy facilitated wider geographic coverage and enhanced the reliability of the sample. Of the questionnaires returned, 360 were considered valid and complete for statistical analysis. Ethical considerations were maintained throughout the data collection process, including informed consent, voluntary participation, anonymity, and confidentiality of responses. Participants were assured that their information would be used solely for academic purposes.

Statistics Used for Data Analysis

The data analysis procedure incorporated a range of statistical techniques aligned with the study's mixed-method design and SEM requirements. Descriptive statistics, including mean, standard deviation, frequency, and percentage, were used to summarize demographic characteristics and determine the overall level of each research variable. The reliability of measurement scales was evaluated using Cronbach's alpha and composite reliability, while validity assessments included content validity, convergent validity through factor loadings and Average Variance Extracted (AVE), and discriminant validity using the Fornell–Larcker criterion. Confirmatory Factor Analysis (CFA) was then performed to validate the measurement model and ensure that observed variables appropriately represented their corresponding latent constructs. Following satisfactory measurement validation, Structural Equation Modeling (SEM) was applied to test the hypothesized causal relationships among variables. The SEM procedure enabled simultaneous evaluation of both direct and indirect effects, providing robust insights into the mediating role of Business Model Innovation. Model fit indices such as CFI, TLI, GFI, RMSEA, and χ^2/df were used to determine overall goodness-of-fit. Additionally, mediation effects were examined using bootstrapping techniques to obtain confidence intervals for indirect effects, ensuring statistical accuracy and analytical robustness.

DATA ANALYSIS AND FINDINGS

Introduction

This chapter presents the findings derived from both qualitative and quantitative analyses conducted through the mixed-method approach. The qualitative phase was used to validate the conceptual dimensions of the study's variables and ensure contextual relevance to the apartment rental industry in Thailand. These insights formed the foundation for refining the quantitative instrument. The quantitative phase subsequently examined the causal relationships within the proposed model using Structural Equation Modeling (SEM). The results include respondent demographic profiles, descriptive statistics, measurement model evaluation, structural model testing, and hypothesis assessment. The integration of both data sources enhances the validity and robustness of the research findings.

Results of Qualitative Data

The qualitative analysis was conducted through thematic coding of expert interviews, which confirmed the relevance and completeness of all conceptual dimensions. Experts emphasized that green management in apartment operations involves four main components: (1) energy management practices such as LED lighting and energy-efficient appliances, (2) recycling systems for waste sorting, (3) waste reduction initiatives including digital receipts and minimal packaging, and (4) investment in green technologies such as solar panels and water-saving devices. These practices were described as increasingly important for improving operational costs and meeting tenant expectations for sustainability.

Regarding digital service transformation, experts highlighted that apartment operators must enhance digital access through online reservation and communication channels, improve service flexibility via mobile applications, increase integration of digital platforms for payments and maintenance reporting, and strengthen digital trust by ensuring service reliability, data security, and transparency. These dimensions reflect the growing digital expectations of modern tenants. For internal capability, experts agreed that three critical dimensions, strategic capability, technological readiness, and human competency, are essential for effective innovation and long-term competitiveness. Small operators were reported to struggle considerably with digital literacy and strategic planning, indicating a systemic limitation in organizational readiness. Both Business Model Innovation (BMI) and sustainable performance constructs were validated as essential elements for the apartment sector, with experts noting that innovative service models and integrated digital processes significantly enhance environmental, social, and economic outcomes.

Results of Quantitative Data

Respondent Profiles

A total of 360 apartment operators participated in the survey. The demographic distribution indicates that the majority of respondents were female (54.72%), followed by male respondents (45.28%). Most were aged between 31–40 years, reflecting a demographic group actively involved in SME-level property management. A large proportion of respondents identified themselves as business owners (60.56%), while others were managers or supervisors. The majority managed small-sized apartments with fewer than 20 rooms (73.61%) and reported

managing operations themselves (67.50%), which aligns with the characteristics of small family-owned rental properties in Thailand.

Table 1 Respondent Demographic Profile

Variable	Category	Percentage (%)
Gender	Female	54.72
	Male	45.28
Age Group	31–40 years	Largest proportion
Position	Business owner	60.56
Apartment Size	< 20 rooms	73.61
Management Structure	Owner-managed	67.50

These demographic characteristics suggest that small-scale and owner-managed apartments dominate the monthly rental market, which has implications for digital adoption and internal capability development.

Descriptive Statistics of Variables

Descriptive analysis revealed that all variables, green management, digital service transformation, internal capability, BMI, and sustainable performance, were rated at a **moderate level**. This indicates that while many operators have begun adopting digital tools or green practices, implementation remains inconsistent and insufficient.

Table 2 Descriptive Statistics of Variables

Variable	Mean	Interpretation
Green Management	Moderate	Limited adoption of green operations
Digital Service Transformation	Moderate	Partial digitalization; lack of integration
Internal Capability	Moderate	Skill and technology gaps remain
Business Model Innovation	Moderate	Innovation still developing
Sustainable Performance	Moderate	Sustainable outcomes not fully realized

This moderate rating suggests systemic challenges in technological readiness, environmental management, and innovation capacity, supporting the concerns raised during the qualitative phase.

Measurement Model Evaluation (CFA)

Confirmatory Factor Analysis demonstrated that all constructs met acceptable standards for reliability and validity. Factor loadings exceeded 0.70, while Composite Reliability (CR) values were above the recommended threshold of 0.70. Average Variance Extracted (AVE) values were greater than 0.50 for all constructs, confirming convergent validity. Discriminant validity testing using the Fornell–Larcker criterion indicated clear distinction among the variables. Goodness-of-fit indices met recommended thresholds, confirming that the measurement model fit the data well.

Table 3 CFA Model Fit Indices

Fit Index	Recommended Value	Result	Interpretation
χ^2/df	< 3.00	Acceptable	Good fit
CFI	> 0.90	Exceeded threshold	Good fit
TLI	> 0.90	Exceeded threshold	Good fit
RMSEA	< 0.08	Within acceptable range	Good fit
GFI	> 0.90	Acceptable	Good fit

Overall, the measurement model demonstrated robust reliability and validity.

Structural Equation Modeling Results

SEM analysis confirmed that all seven hypotheses were supported, indicating strong relationships among the variables. Internal capability demonstrated the strongest effect on BMI, suggesting that organizational readiness, technological literacy, and staff competency are critical determinants of innovation. Furthermore, BMI exhibited a strong direct effect on sustainable performance, indicating that redesigned value creation and digitalized service processes contribute significantly to environmental, social, and economic outcomes.

Table 4 Summary of Hypothesis Testing

Hypothesis	Path	Supported	Interpretation
H1	Green Management → BMI	Yes	Green practices enhance innovation
H2	Green Management → Sustainable Performance (via BMI)	Yes	BMI mediates green–sustainability link
H3	Digital Transformation → BMI	Yes	Digital tools promote innovation
H4	Digital Transformation → Sustainable Performance (via BMI)	Yes	Digitalization improves sustainability
H5	Internal Capability → BMI	Yes	Strongest predictor of BMI
H6	Internal Capability → Sustainable Performance (via BMI)	Yes	Internal capability drives long-term performance
H7	BMI → Sustainable Performance	Yes	Innovation improves sustainability outcomes

The mediation analysis further revealed that BMI served as either a partial or full mediator across all causal paths leading to sustainable performance. This underscores BMI's essential role as the mechanism through which organizational practices translate into sustainable outcomes.

Summary of Results

The findings indicate that apartment operators in Thailand currently demonstrate moderate levels of green management, digital service transformation, internal capability, business model innovation, and sustainable performance. While initial efforts are present, significant gaps persist in technological integration, environmental practices, and innovation capacity. The SEM results confirm that internal capability plays the most influential role in driving BMI, followed by digital transformation and green management. BMI itself emerges as a pivotal factor that enhances sustainable performance both directly and indirectly. Its mediating role across all causal paths highlights the importance of redesigning business models to meet modern market demands and sustainability requirements. These insights provide a clear direction for strategic improvements in the apartment rental industry.

CONCLUSION, DISCUSSION, AND RECOMMENDATION

Conclusion

This study successfully developed, examined, and validated a comprehensive structural model aimed at understanding how green management, digital service transformation, and internal capability contribute to sustainable performance through the mediating role of Business Model Innovation (BMI) within Thailand's apartment rental sector. The findings provide strong evidence that organizations are gradually shifting from traditional operational practices toward more innovative, digitally integrated, and sustainability-oriented business models. Through a mixed-method approach, incorporating qualitative insights and empirical testing using Structural Equation Modeling (SEM), the study offers theoretical clarity, methodological rigor, and practical implications for both academia and the apartment rental industry.

Objective 1: To examine the levels of green management, digital service transformation, internal capability, business model innovation, and sustainable performance.

The results revealed that all variables were at a moderate level. This suggests that apartment operators in Thailand have begun adopting sustainability practices, digital tools, and innovation initiatives but remain in the early or developmental stages of implementation. Green management practices such as energy efficiency and waste reduction were present but inconsistently applied. Digital service transformation, while increasingly recognized as essential, showed partial adoption, particularly in online communication and e-payment systems. Internal capability, especially staff skills, strategic planning, and technological readiness, was identified as the most underdeveloped area, limiting the ability of operators to fully implement innovation. BMI and sustainable performance similarly reflected moderate development, indicating potential for improvement but also highlighting clear opportunities for strategic advancement.

Objective 2: To develop and validate a structural equation model explaining causal relationships among the variables.

The study's measurement and structural models demonstrated excellent fit across all goodness-of-fit criteria. Confirmatory Factor Analysis (CFA) confirmed strong reliability, convergent validity, and discriminant validity for all constructs. The SEM analysis validated the hypothesized causal pathways, showing that the model accurately

represents the interactions between green management, digital transformation, internal capability, BMI, and sustainable performance in the apartment rental context. The validation of this structural model contributes meaningfully to existing literature by integrating sustainability, digital innovation, and internal organizational capabilities into a unified causal framework specifically tailored to Thailand's apartment rental industry, an area previously underexplored in academic research.

Objective 3: To analyze direct and indirect influences of green management, digital service transformation, and internal capability on sustainable performance through business model innovation.

All three input variables were found to have significant positive effects on BMI, with internal capability emerging as the strongest predictor. This indicates that organizational readiness, staff competency, and technological literacy are critical determinants of successful business model innovation. The results also confirmed that BMI has a significant direct effect on sustainable performance and serves as a key mediating mechanism for all causal pathways. BMI partially mediated the effects of digital transformation and internal capability on sustainability outcomes, while in some cases fully mediated the influence of green management. This mediating role supports the theoretical perspectives of system theory and business model innovation literature, which highlight organizational processes as essential channels through which resources and practices translate into performance outcomes.

Overall, the study empirically demonstrates that sustainable performance in the apartment rental sector cannot be achieved through isolated efforts such as digital adoption or environmental practices alone. Instead, sustainability is attained when these practices are strategically integrated and transformed through innovative business models. By fulfilling all research objectives, the study provides a holistic understanding of how Thai apartment operators can enhance their sustainability performance through coordinated improvements in green management, digital transformation, internal capability, and business model innovation.

Discussion

Green Management

The findings indicate that green management practices, such as energy management, recycling, waste reduction, and investment in green technologies, positively influence business model innovation, supporting the perspectives highlighted in prior studies. Research by Chen et al. (2015) and Leonidou et al. (2013) emphasized that environmental practices not only reduce operational costs but also enhance organizational legitimacy and customer trust. The results of this study reinforce these insights by demonstrating that apartment operators who adopt green initiatives are more likely to develop innovative service models that align with sustainability-oriented customer expectations. Additionally, the mediating role of BMI reflects the argument of Zhu and Sarkis (2004), who found that environmental initiatives contribute to sustainability outcomes only when integrated into organizational processes. In the context of Thailand's apartment sector, where many operators still lack formal green policies, these findings suggest that structured environmental management is a strategic lever to drive both innovation and sustainability.

Digital Service Transformation

The empirical evidence confirms that digital service transformation significantly enhances BMI and indirectly improves sustainable performance. This aligns with the theoretical insights of Bharadwaj et al. (2013), who argued that digital technologies reshape service models by enabling new forms of value creation and improving service efficiency. Likewise, Vial (2019) emphasized that digital transformation triggers organizational change through digital tools, platforms, and data-driven processes. The current findings extend these theories to the apartment rental context, where digital tools such as online reservation systems, mobile payments, and communication applications are highly valued by digitally oriented tenants, especially younger generations. The study confirms that digital platforms increase service convenience, real-time communication, and operational transparency, thereby enhancing customer experience and supporting innovative service design. Moreover, the mediating role of BMI supports Teece's (2010) argument that technology adoption must be embedded within a redesigned business model to fully generate performance benefits.

Internal Capability

Internal capability emerged as the strongest predictor of business model innovation, reflecting the foundational concepts of resource-based theory. Grant (1996) and Teece et al. (1997) argued that internal capabilities, particularly knowledge, skills, and technological readiness, form the basis of sustainable competitive advantage by enabling organizations to adapt, transform, and innovate. These theoretical propositions are strongly supported by the empirical findings, which show that apartment operators with greater staff competency, strategic capability,

and technological readiness are more capable of implementing innovative business models. The moderate level of internal capability found in the descriptive analysis is consistent with reports that many SMEs in Thailand lack digital literacy and structured innovation processes. This reinforces the idea that digital transformation and green management initiatives cannot be effectively implemented without sufficient internal capability, echoing findings from Foss and Saebi (2017), who emphasized the critical role of organizational competence in supporting business model change.

Business Model Innovation

The results highlight BMI as a central mechanism that drives sustainable performance and mediates all causal relationships within the model. This finding is consistent with Teece (2010), who stated that BMI is the key mechanism through which organizations generate value in dynamic environments. Similarly, Foss and Saebi (2017) emphasized that BMI enables firms to adapt their value creation and delivery processes to changing market demands. The empirical results confirm these theoretical insights by showing that BMI significantly enhances environmental, social, and economic aspects of sustainable performance. In the apartment sector, BMI involves redesigning service offerings, integrating digital platforms, improving customer interaction, and embedding sustainability into operational processes. This aligns with the Triple Bottom Line framework (Elkington, 1997), as the study demonstrates that innovative business models contribute to economic efficiency, social well-being, and environmental responsibility. By acting as a mediator, BMI enables green management, digital transformation, and internal capability to translate into meaningful sustainability outcomes, reinforcing the system theory perspective that organizational inputs influence outputs through internal processes (von Bertalanffy, 1968; Kast & Rosenzweig, 1972).

Recommendation

Recommendations for Practitioners

Apartment operators should prioritize the systematic adoption of environmentally friendly practices to strengthen both operational efficiency and customer trust. Energy-saving systems, such as LED lighting, smart meters, solar panels, and water-efficient fixtures, should be implemented to reduce long-term costs and demonstrate environmental responsibility. Recycling programs and waste-management systems should be clearly organized, supported by signage, waste-sorting stations, and staff participation to ensure consistent implementation. Additionally, the adoption of green technologies, including environmentally certified materials and air-quality improvement devices, can further enhance the living environment and appeal to eco-conscious tenants.

Digital transformation should be integrated into daily operations by incorporating essential digital tools such as online booking systems, mobile or QR payment services, digital lease agreements, and mobile applications for maintenance requests. These tools not only enhance convenience and customer satisfaction but also improve transparency and reduce administrative workload. To support smooth implementation, operators must invest in staff training programs focused on digital literacy, customer service, and operational efficiency. Skilled and knowledgeable staff is crucial for the successful adoption of digital technologies and the overall transformation of business operations.

Furthermore, practitioners should consider ongoing redesign of their business models to create distinctive value propositions. This may include introducing bundled services, offering flexible rental packages, integrating community-building activities, or developing user-centric digital platforms that improve tenant experience. Business Model Innovation (BMI) should be viewed not as a one-time action but as a continuous strategic process that allows apartment businesses to differentiate themselves in a competitive market and better meet evolving customer expectations.

Recommendations for Policy Makers

Policy makers play an instrumental role in shaping the sustainability and digital readiness of the apartment rental sector. Government agencies should provide tax incentives, low-interest loans, or grants to encourage the adoption of green building practices such as energy-efficient construction, renewable energy systems, and environmentally friendly materials. These initiatives can reduce financial barriers for SMEs, accelerate industry-wide sustainability improvements, and contribute to national environmental goals.

Support for digital transformation is equally important. Policy makers should design and implement specialized programs that help small and medium-sized apartment operators upgrade their technological infrastructure. This may include digital literacy workshops, subsidies for adopting property management software, or public–private partnerships that develop standardized digital platforms for rental housing. Establishing clear regulatory guidelines on digital transactions and data protection can also enhance trust and create a secure environment for digital adoption.

Moreover, policies promoting knowledge sharing, sector benchmarking, and innovation-driven competition can enhance operational standards across the industry. Encouraging collaboration between universities, technology companies, and real estate associations can support research, develop industry-specific digital solutions, and provide training that strengthens the overall capability of apartment operators.

Recommendations for Future Research

Future research should broaden the scope to include other types of rental accommodations such as hostels, condominiums, serviced apartments, and co-living spaces. These markets share some similarities with monthly rental apartments but differ in customer behavior, digital adoption levels, and sustainability practices. Comparative studies across multiple segments can generate deeper insights into how different business structures influence sustainability outcomes.

Longitudinal studies are also recommended to capture long-term impacts of green management, digital transformation, internal capability, and BMI on sustainable performance. Since sustainability and innovation are dynamic processes that evolve over time, longitudinal data would enable researchers to observe causal effects more accurately and understand how organizational strategies adapt to external changes such as technological shifts or regulatory reforms.

Additionally, future research may incorporate customer satisfaction, tenant loyalty, perceived service quality, and brand trust as additional outcome variables. These factors are essential for long-term competitiveness and can help clarify the mechanisms through which digital transformation and BMI influence both financial and non-financial performance. Researchers may also explore moderating variables, such as firm size, market location, competitive intensity, or leadership style, to gain a more nuanced understanding of how contextual factors influence sustainability-driven business transformation.

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