

THE INFLUENCE OF KNOWLEDGE-ORIENTED LEADERSHIP ON KNOWLEDGE MANAGEMENT STRATEGY AND GREEN INNOVATION

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ABSTRACT

Leadership influences green innovation, but the degree of its impact depends on the leadership behaviors exhibited during these processes. This study examined how knowledge-oriented leadership, a new leadership style, affects green innovation, emphasizing the mediating roles of a knowledge management strategy that includes knowledge exploitation and exploration. Cross-sectional, time-lagged data were collected from 325 SME managers in Lagos State, Nigeria's commercial hub. The responses were analyzed using the partial least squares method for hypothesis testing. The results indicate that knowledge-oriented leadership significantly affects green innovation. Knowledge exploitation was significantly related to green innovation, whereas exploration's impact was insignificant. However, the combined effect of knowledge exploitation and exploration was significantly associated with green innovation. Indirect effects showed that knowledge-oriented leadership influences green innovation through knowledge exploitation and a combined exploitation-exploration approach. The mediating role of knowledge exploration was positive but not statistically significant. The study concludes that knowledge-oriented leadership can dynamically balance knowledge management strategies, with a primary focus on knowledge exploitation to foster green innovation. This research contributes to the leadership and sustainability literature by providing empirical evidence that knowledge-oriented leadership supports a sustainability focus and leverages knowledge management strategies to help SMEs fulfill environmental responsibilities through innovation. The main recommendation is that managers recognize the critical role of knowledge-oriented leadership behaviors in fostering green innovation and participate in leadership development programs to cultivate these behaviors. These programs should also include sustainability-focused training to effectively integrate this leadership approach with green initiatives and practices.

KEYWORDS: Green innovation, knowledge exploitation, knowledge exploration, knowledge-oriented leadership, knowledge management strategy.

JEL CLASSIFICATION: M10, O13, O31, Q01, Q50

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INTRODUCTION

The Industrial Revolution spurred economic growth and development across nations, but it also strained the natural environment by significantly increasing resource consumption, leading to ecological deterioration and climate change. The sharp decline in the quality of the natural environment, driven by growing degradation and pollution, has led many organizations to shift their operations to more eco-friendly systems (Mutlu & Bakoğlu, 2025). However, this objective cannot be achieved without leveraging green knowledge and innovation, both of which are influenced by organizational leadership. Leadership not only predicts but also explains variations in organizational behavior. Not all leadership styles are significant or predictive, as some may facilitate or inhibit green practices. Furthermore,

Nigerian firms face challenges in applying green concepts due to limited knowledge of how they work (Ononye et al., 2022).

Knowledge management strategy offers a practical way to leverage valuable insights to guide thinking and action. The success or failure of organizations depends on their ability to acquire, create, share, and apply knowledge. Therefore, not every organization can operate sustainably without green knowledge. Since knowledge is power, knowledge-based advantages can be obtained from its utility. It would not be wrong to say that a leadership style that enables the transformative use of diverse knowledge can help firms gain these advantages. Knowledge-oriented leadership is a contemporary leadership style that can help organizations achieve this objective. This leadership emphasizes the creation, sharing, and application of knowledge (i.e., environmental knowledge) within organizations to drive sustainable competitive advantage (Al Koliby et al., 2025).

Knowledge-oriented leadership influences knowledge-related processes, such as knowledge management, innovation, and organizational learning (Ononye, 2025). Therefore, this leadership style is vital in helping firms leverage knowledge for sustainable transformation and organizational development. It is crucial for guiding innovation activities, especially given the significant risks and uncertainties associated with using new knowledge to create value. Firms need to adopt the right leadership approach not only to pursue green initiatives but also to capitalize on the opportunities they present. The study argues that top management should practice knowledge-oriented leadership to develop and implement effective knowledge management (KM) strategies essential for green innovation. Innovation is a knowledge-driven activity, which makes it practical to assess the salience of a leadership style that drives an organization's KM effort.

Empirical research indicates that KM processes serve as intermediaries in relationships between knowledge-oriented leadership and innovation (Rehman & Iqbal, 2020; Zia, 2020). Hosseini et al. (2019) suggested that the KM strategy significantly affects the direction, efficiency, and effectiveness of KM practices and processes. However, there is a limited understanding of the specific KM strategies this leadership style employs to maximize green innovation efforts. These strategies include exploration, which involves searching, discovering, and developing new knowledge for experimentation, and exploitation, which aims to refine, recombine, or extend existing knowledge. Organizations operating in highly dynamic environments face the challenge of strategically adjusting KM processes to explore new knowledge opportunities, adapt to future changes, or exploit current knowledge frameworks to meet present needs. This difficulty arises from the inherent tension between exploration and exploitation strategies in supporting innovation with vital knowledge. Furthermore, the literature offers little clarity on whether explorative and exploitative KM influence the leadership-innovation relationship. Little is also known about the leadership behaviors that lead organizations to favor either strategy or to balance both.

This study also focuses on Nigerian small and medium-sized enterprises (SMEs), which constitute over 80% of economic activity and account for about 60-70% of total waste generated (Fahad et al., 2022). Evidence shows SMEs are slowly adopting green practices, despite contributing more to ecological degradation than large firms (Fahad et al., 2022; Jun et al., 2019). This attitude partly explains Nigeria's low ranking (140 of 180 countries) on the Environmental Performance Index (EPI) in 2024 (Adesua-Lincoln, 2025). As Yousaf (2021) notes, some SMEs struggle with green innovation because their sustainability-related knowledge processes are misaligned, leading to a lack of understanding of how to develop and sustain such practices (Polas et al., 2023). Additionally, Nigerian SMEs find it difficult to compete in markets while adopting green innovation, due to high risks, uncertainty, limited resources, and knowledge gaps (Tseng et al., 2013). The lack of effective leadership is one of the challenges to SME sustainability. Studies (Gumel, 2019; Okeke, 2019) recommend that Nigerian SMEs benefit from a blend of transformational and transactional leadership styles, reinforcing the significance of

knowledge-oriented leadership, which combines the strengths of both styles (Donate & Sánchez De Pablo, 2015). This underscores the urgency of identifying the sustainability implications of knowledge-oriented leadership to enable SMEs to build leadership capacity.

The study advances existing research by illustrating the contextual importance of KM strategies in aligning leadership influences with green innovation. KM strategies clarify the relational dynamics between knowledge-oriented leadership and green innovation. Since leadership styles vary in their impact on innovation, organizations need to develop specific leadership styles to effectively coordinate sustainability efforts, such as green innovation, while staying aligned with the evolving knowledge environment. In this context, the importance of knowledge-oriented leadership is highlighted for the development and maintenance of green innovation practices. The study also identifies the main factors that drive the development of context-specific practices, such as green innovation. Furthermore, it emphasizes Nigerian SMEs, a context that has received limited attention despite their vulnerability and significant environmental impact. The primary aim is to explore how knowledge-focused leadership influences green innovation, with an emphasis on the mediating role of KM strategies.

The rest of this paper is organized as follows. Section 1 discusses the theoretical foundations and develops the study's hypotheses. Section 2 describes the research methodology, while sections 3 and 4 present the results and discussion of the findings. Finally, the paper concludes with main conclusions, including theoretical and practical implications, limitations, and suggestions for future research.

1 THEORETICAL BASES

1.1 Conceptual clarifications

Knowledge-oriented leadership involves behaviors that promote the creation, sharing, and use of knowledge to guide and support organizational change. It integrates transformational leadership—encouraging a compelling vision and intellectual stimulation to foster new thinking—with transactional leadership, which relies on performance standards and rewards to increase engagement in knowledge-related processes. By emphasizing communication and motivation, this leadership style fosters a collaborative environment that strengthens knowledge flow and quality. As a result, knowledge-oriented leadership is equipped to develop mechanisms that turn knowledge into value. By combining transformational and transactional traits, such leaders can effectively tackle the challenges of organizational change and innovation. By embracing a blended leadership style, knowledge-oriented leaders can be effective in various situations by adjusting their leadership behaviors to situational demands (Shamim et al., 2019).

KM strategies involve specific plans for managing knowledge flows to benefit the organization and its critical stakeholders. This decision enhances an organization's ability to acquire, store, share, create, and apply green knowledge, thereby increasing sustainability outcomes (Yu et al., 2022). It defines and guides the KM process and framework for productive knowledge use and for achieving knowledge-related goals. Knowledge exploitation and exploration are important strategies that promote positive organizational results, especially within an innovation context (González-Ramos et al., 2023). Knowledge exploitation emphasizes refining and leveraging existing knowledge, skills, and paradigms to create short-term value aligned with current conditions and constraints. It is associated with convergent thinking to perfect and extend current knowledge as well as ensure stability and control. In contrast, exploration focuses on the search for, acquisition of, and creation of new knowledge, skills, resources, and opportunities that provide sustainable, long-term benefit. This approach is linked to divergent thinking, experimentation, risk-taking, innovation, flexibility, and radical change because it is new to the organizations and has not been used before. Organizational leadership needs to engage in both

exploitation and exploration simultaneously to achieve ambidexterity, allowing organizations to adapt their knowledge resources to current and future needs. However, the level of engagement should change dynamically, as maintaining a static balance between the two strategic orientations is practically impossible (Zhu & Chen, 2012).

Green innovation is the intentional application of transformed knowledge to deliver benefits significant enough to reduce a firm's environmental footprint and enhance environmental sustainability. This innovation extends beyond technology, encompassing changes in management practices, workflows, and products. It is intricately linked to sustainable development, environmental management, and the attainment of goals related to energy conservation, waste reduction, waste prevention, waste recycling, and eco-friendly product design (Wang et al., 2022). Rasheed et al. (2025) emphasized the importance of embedding environmental considerations into innovation processes to develop sustainable solutions for environmental challenges. Reducing a firm's ecological footprint leads to long-term superior financial, social, and environmental performance (Ononye et al., 2022). A recent study (Mutlu & Bakoğlu, 2025) noted that to leverage this advantage, firms must constantly rethink and reframe their strategies by integrating knowledge into green innovation processes. Firms that consistently improve their strategic approach to sustainability seek to gain long-term competitive advantage.

1.2 Hypothesis development

Recent studies (Al Koliby et al., 2025; Banmairuroy et al., 2022; Ononye & Maduemezia, 2024) have shown that knowledge-oriented leadership has a significant positive impact on innovation, indicating that leadership focused on maximizing knowledge use can effectively transform it into value. Chaithanapat et al., (2022) recognize that knowledge-oriented leadership employs KM processes to enhance innovation quality. While quality often aligns with meeting environmental expectations, KM processes foster a shift in collective thinking and knowledge application to achieve better outcomes amid evolving environmental challenges and opportunities. This leadership can successfully develop and initiate a value-based framework that enables organizations to create, share, and utilize knowledge to meet their environmental goals through innovative means. Furthermore, they could be effective leaders because they alternate between behaviors and adapt their leadership style to the changing contextual conditions and demands of innovative work. The duality of behaviors, as demonstrated by their transformational and transactional qualities, makes them dynamic and highly functional in managing the complexities of green innovation processes. Qualified managers play a crucial role in advancing green innovation through their understanding of green solutions and their capacity to evaluate benefits for both organizations and the environment (Urbaniec, 2015). These managers determine which values are strategically significant and prioritize them in their strategies. Consequently, they can develop and leverage core resources and capabilities to create innovations that support environmental sustainability (Prokop et al., 2024). While a knowledgeable leader is crucial for successful innovation, limited research has explored how knowledge-based leadership affects sustainability outcomes and contributes to sustainable growth. It remains uncertain whether this leadership approach creates an ideal environment for enhancing environmental initiatives (Al Koliby et al., 2025). Drawing on dynamic capability theory, the study argues that this leadership can integrate, develop, reconfigure, and structure strategic knowledge resources and capabilities to drive greater innovation (value creation) in response to the rising environmental impact of SMEs. Consequently, the study proposes that:

- H1: Knowledge-oriented leadership positively influences green innovation.

Additionally, research shows that the influence of knowledge-oriented leadership on innovation remains consistent when KM practices are properly developed and maintained within organizations (Donate & Sánchez De Pablo, 2015; Gürlek & Çemberci, 2020; Naqshbandi & Jasimuddin, 2018; Rehman & Iqbal, 2020). Hosseini et al. (2019) found that the knowledge management strategy plays a crucial role in the effectiveness of KM practices by aligning them with organizational goals, especially

those related to the natural environment. KM practices need their own strategy to realize their influence. Green innovation could benefit from applying the right KM strategies, as it defines what knowledge is and how it is used to create value. Arguably, without a well-developed KM strategy, the logic of green innovation will not be properly articulated to achieve desired environmental benefits. There is an intricate association between strategy and sustainable development, which demonstrates organizational commitment to environmental protection (Ahmed et al., 2021).

Findings have been inconsistent on the effect of knowledge exploitation and exploration on innovation. Escobar-Castillo et al. (2025) found that knowledge exploration affects innovation, but the effect of knowledge exploitation was insignificant. They suggested that a flexible and organic structure provides a conducive environment for experimentation, diversification, and creativity. Li et al. (2018) found that knowledge exploration, rather than exploitation, is beneficial for achieving breakthroughs in innovation. They also noted that focusing on both knowledge strategies is not effective for achieving breakthrough innovation; however, it may be the best approach to avoiding poor innovations. Zhu and Chen (2012) found that both knowledge exploitation and exploration promote innovation, and do so in a complementary or synergistic manner by adding value to each other. The effect is the strongest when both strategic approaches are emphasized in an innovation context. As such, firms focusing on a single KM strategy exhibit an intermediate level of innovation performance. Guisado-González et al. (2017) found that knowledge exploitation and exploration had a complementary effect on innovation. While these studies focused on general innovation, it is reasonable to suggest an effect for context-specific innovation activities, since developing and sustaining continuous green innovation depends on a constant flow of knowledge across different fields, ideally achieved through knowledge exploitation and exploration.

Based on the above, the study contends that SMEs struggling to cope with changing sustainability needs and demands are prompted to consider their KM strategies. In turn, this strategy can stimulate creative thinking to materialize green innovation. Likewise, the natural resource-based view sees organizations as assemblages of knowledge resources, and SMEs' primary role is to develop and integrate environmental knowledge into their processes to generate value. Organizations with a clear KM strategy can utilize KM processes to harness this strategic asset and advance green initiatives. In line with these considerations, the following hypotheses were proposed.

- H2: Knowledge exploitation is positively related to green innovation.
- H3: Knowledge exploration is positively related to green innovation.
- H4: A KM strategy comprising exploitation and exploration is positively related to green innovation.

Leadership plays a key role in strategic decision-making by incorporating knowledge and sustainability issues into formal strategic goals. This integration guides the direction and future of KM and innovation. Leaders who focus on knowledge can effectively promote green practices, such as green innovation, by aligning strategies with environmental sustainability. Knowledge-oriented leadership often builds exchange-based relationships centered on contingent rewards that promote knowledge exploitation, while also fostering intellectual stimulation through an inspiring vision that supports knowledge exploration. Consequently, this type of leadership fosters an appropriate KM orientation that balances the organization's short- and long-term needs with respect to its environmental impact. Furthermore, it ensures that the KM strategy is responsive to emerging and evolving environmental challenges through green innovation, thereby supporting organizational sustainability.

The major advantage of this type of leadership is that it provides access to diverse knowledge resources within an organization, including green knowledge. Therefore, knowledge-oriented leadership advances KM practices by adapting KM strategies to foster green innovation. Anantatmula (2008) noted that KM leadership is crucial for implementing KM strategies and that organizations need to select leaders who

demonstrate knowledge-focused behaviors and skills before developing and executing KM strategies. This research highlights the importance of knowledge-oriented leadership in KM, as it develops and implements strategies to facilitate KM practices for value creation. Studies (Gonzalez & De Melo, 2018a; Gonzalez & Melo, 2018b) found that supportive leadership influences innovation mainly through knowledge exploitation rather than knowledge exploration. This suggests that leadership could differentially affect the roles of knowledge exploitation and exploration in driving innovation. However, Baškarada et al. (2016) proposed that transactional leadership aligns more with knowledge exploitation, while transformational leadership supports knowledge exploration. Consequently, a leadership style that combines both—knowledge-oriented leadership—may support an ambidextrous KM strategy, allowing leaders to alternate approaches based on situational needs. While simultaneous ambidexterity, in which knowledge exploitation and exploration occur simultaneously, may be impractical, contextual ambidexterity enables leaders to choose when to focus on either strategy, helping adapt KM practices to changing work conditions and demands (Asif, 2019; Baškarada et al., 2016). Knowledge-oriented leaders respond to environmental uncertainties by selecting the appropriate KM strategy to guide KM practices. Aligning KM with changing externalities develops organizational capacity to meet their environmental responsibility through enhanced innovation (Restuputri et al., 2024). The flexibility of this leadership style in selecting and applying strategies creates opportunities for organizational learning, driven by the constant tension between exploration and exploitation (Asif, 2019).

Studies (Chaithanapat et al., 2022; Donate & Sánchez De Pablo, 2015; Naqshbandi & Jasimuddin, 2018; Zia, 2020) indicate that knowledge-oriented leadership influences innovation practices through KM, suggesting an intermediary role for KM exploitation and exploration as strategic tools leaders use to direct KM activities. This study extends this research by demonstrating the mediational value of KM strategies in enhancing context-specific innovation practices, such as green innovation. The study argues that knowledge-oriented leaders bridge the gap between knowledge and its practical application by selecting an appropriate KM strategy that meets contextual work demands and aligns with environmental expectations. Al Koliby et al. (2025) also found that this leadership style drives green innovation, in part, through an environmental strategy. This suggests that other strategies could trigger a positive relationship. Nguyen (2025) stressed the significant role of KM processes in relationships involving sustainability-oriented leadership and green innovation. Given these findings, strategies that drive KM processes are equally important for green innovation (Zhu & Chen, 2012). Arguably, knowledge-oriented leaders flexibly adapt their leadership behaviors to either increase or decrease knowledge variance in response to the current needs of green innovation tasks. The KM strategies, though complementary, address different innovation requirements that the other cannot fulfill.

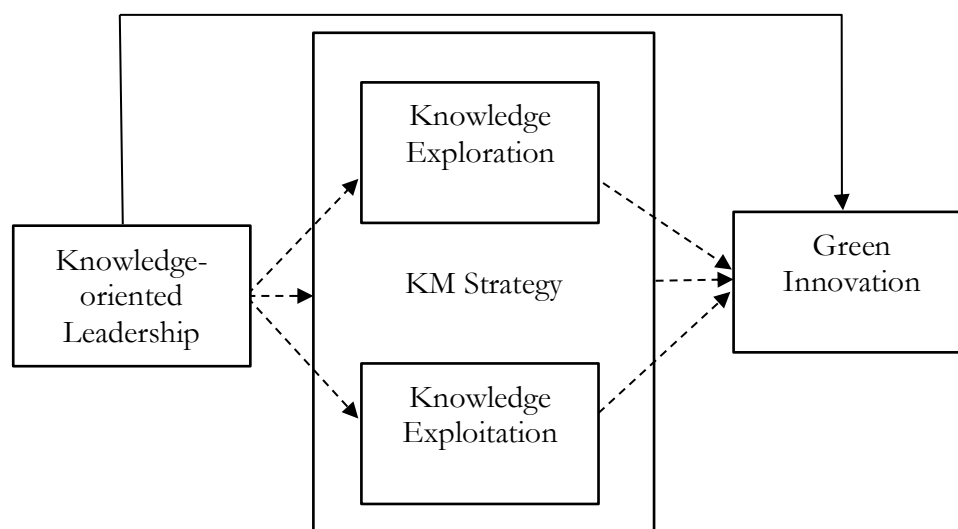
Drawing on dynamic capability theory, knowledge-oriented leadership enhances an organization's ability to realign its KM strategies in response to evolving environmental challenges. Strategy is not static but develops through sensing and responding to environmental issues (Al Koliby et al., 2025). Therefore, strategic alignment is essential for developing an effective KM strategy that encourages green innovation. Arguably, knowledge-oriented leadership enhances an organization's capacity for transformation, while a KM strategy turns this capacity into tangible results. According to the natural resource-based perspective, organizations have unique resources (tangible and intangible) that provide sustainable competitive advantages. Knowledge is one of the critical intangible resources that enable a firm to succeed and survive (Donate & Sánchez De Pablo, 2015). Therefore, strategies, processes, and practices that enable the effective management and use of this strategic resource to create value are crucial for sustainable organizational transformation and growth. In this context, a KM strategy functions as a deliberate mechanism for deploying resources to support green innovation goals through effective KM practices. Dynamic capability theory complements the natural resource-based view by emphasizing the organization's capacity to adapt, reconfigure, and integrate resources in response to changing environments. Possibly, knowledge-oriented leadership can be viewed as a core internal dynamic capability that strategically promotes the creation, sharing, and application of contextual

knowledge essential for sustainable transformation through green innovation. In doing so, they purposefully use ambidextrous strategies to varying degrees to exploit and explore knowledge, thereby capturing and creating value that aligns with their ecological priorities. It is expected that organizations will achieve better results by developing strategic ambidexterity. In view of the foregoing statement, the following hypotheses were proposed.

- H5: Knowledge-oriented leadership positively influences green innovation through knowledge exploitation.
- H6: Knowledge-oriented leadership positively influences green innovation through knowledge exploration.
- H7: Knowledge-oriented leadership positively influences green innovation through a KM strategy comprising exploitation and exploration

The hypotheses formulated above were summarized and depicted in Figure 1. It illustrates that knowledge-oriented leadership offers numerous strategic possibilities that improve information flow and enhance green innovation, helping organizations reduce their environmental impact. The direct and indirect relationships are depicted with the solid and dotted lines, respectively.

Figure 1 Research model



(Source: Authors' Own, 2026)

2 METHODOLOGY

The study aimed to investigate the relationship between knowledge-oriented leadership and green innovation, mediated by a KM strategy comprising knowledge exploitation and exploration, among SMEs in Nigeria. This study was a quantitative research that involved a cross-sectional survey of managers in Nigerian SMEs. It focused on SMEs that emphasize environmental sustainability, with data collected exclusively in Lagos State, Nigeria's commercial capital. SMEs in this region are currently facing environmental problems due to high levels of industrial and commercial activity. Furthermore, managers were selected because they are in a position to provide adequate information about their policies and practices, particularly regarding knowledge management and sustainability decisions (Wang et al., 2022). The purposive sample included SMEs that have implemented green initiatives in operations. SMEs operating for more than five (5) years were also considered because Nigerian SMEs struggle to remain sustainable beyond this period due to poor survival strategies (Ononye et al., 2025). Furthermore, it ensures that participating SMEs have clearly established policies and procedures to

achieve sustainability objectives. This sampling ensured that the study used credible information to draw linkages among the constructs (Wang et al., 2023).

Screening questions were used to ensure the recruitment of SMEs that fit the nature of this study. Using Yamane's sample size formula, a sample of 387 SMEs was obtained from a population of 11,643 SMEs in Lagos, Nigeria. Phone calls were made to determine eligibility. Because of the challenges in identifying this sample, the snowball sampling method was also used to identify firms that met the research criteria. Informed consent was obtained before administering the survey instrument. Participants were assured that their participation was voluntary and that they could withdraw from the survey at any time. The survey was conducted from July to October 2024, using a time-lagged design with 2-month intervals to reduce bias. At time 1, the questionnaire included the independent and mediating variables, and at time 2, it measured the dependent variables. The research used a single informant from each participating SME, which poses a challenge for our results due to common method bias (CMB). To evaluate the CMB, Harman's single-factor test was conducted, and the results showed that the first factor explained 33.71% of the covariance among the measures (Podsakoff et al., 2012). As a result, the study determined that CMB did not pose a significant problem for the data. Additional methods, such as temporal separation, response anonymity, different scale formats, and the use of previously validated scales to enhance conceptual clarity and consistency, were employed to reduce bias (Al Koliby et al., 2025).

The researchers shared the Google Forms survey links for the respondents to complete the questionnaire. Using an e-questionnaire was appropriate because it is cost-effective, flexible, convenient, and quick to reach participants. Moreover, the digital penetration in the country, especially in Lagos State, is very high (National Bureau of Statistics, 2024). In view of this, the participants are likely to be familiar with filling out forms online. At the end of the survey, we received 325 usable questionnaires, yielding an 84% response rate. According to the 10-times rule, for a 22-item questionnaire, a minimum of 220 responses is required for stable estimation (Hair et al., 2021). Therefore, a sample of 325 was considered adequate. The demographic profile of the respondents revealed that 171 (52.6%) were males and 154 (47.4%) were females, with a mean age of 39.6 years and a mean tenure of 11.4 years. A majority of respondents had a bachelor's degree (227), followed by a master's degree (92), and other professional certifications (6). The respondents' designations included general managers (39), managers (116), deputy managers (103), and assistant managers (67). The average firm age is 12.9 years, with business activities distributed as follows: manufacturing (81), trade (66), agriculture (64), hospitality (42), technology (29), education (23), and transportation and logistics (20).

The study employed a 5-point Likert scale to rate responses to the 22-item questionnaire. The study adapted items from previously validated scales to ensure contextual and content consistency. The 6-item knowledge-oriented leadership scale was taken from Donate and Sánchez De Pablo (2015). The 5-item scales measuring knowledge exploitation and exploration were obtained from Jansen et al. (2009) and Zhao et al. (2020). Green innovation was measured by a 6-item scale developed by Cao & Chen (2019). Please see the Appendix for the measurement items. After the questionnaire development, it was presented to and reviewed by 3 independent management experts from two universities for face validity. 4 SME managers reviewed the survey to ensure the items were clear, concise, and relevant, and confirmed the appropriateness of the research instrument. Consequently, the questionnaire underwent a pre-test on 30 respondents to assess the internal consistency of the constructs. The Cronbach alpha test, facilitated by SPSS 20.0, revealed that knowledge-oriented leadership (0.783), KM exploitation (0.744), KM exploration (0.790), and green innovation (0.736) exceeded the acceptable limit of 0.70, indicating that all variables were internally consistent (J. Hair & Alamer, 2022). In view of this, the study began a comprehensive survey with the final questionnaire.

The partial least squares approach to structural equation modeling was applied for data analysis and hypothesis testing. The multivariate method is suitable for research aimed at predicting and explaining relationships among variables in a complex model. Another reason is that it provides reliable estimates or results even when the sample size is small (J. Hair & Alamer, 2022). Although the sample size (325) for this study is adequate, it is quite small relative to the population, making partial least squares modelling an appropriate choice for analysis. The two-step procedure, facilitated by SmartPLS 4, simultaneously assessed the measurement model to confirm its psychometric properties and estimate the structural model for hypothesis testing. To interpret the data, the guidelines in Hair et al. (2022) were applied.

3 RESULTS

Preliminary tests were conducted in SPSS 20 before the two-step data analysis procedure was initiated. First, the dataset was checked to determine whether the sample is adequate for factor analysis. The Kaiser-Meyer-Olkin measure (knowledge-oriented leadership = 0.751, KM exploitation = 0.784, KM exploration = 0.802, and green innovation = 0.766) indicated that all constructs exceeded the acceptable threshold of 0.70, and the Bartlett's Test of Sphericity scores were all significant at the 95% confidence level. These results suggest that the dataset is factorable. Second, data normality was checked to ensure stable correlations. The skewness and kurtosis values were within the acceptable range of ± 2 , indicating multivariate normality in the dataset (Hahs-Vaughn & Lomax, 2020). Third, a multicollinearity test was performed to ensure that the measures are not highly correlated, which could affect the reliability of the results. The variance inflation factor (VIF) values were below the critical threshold of 3.30, indicating no problematic multicollinearity (Kock, 2015). See Table 2 for the VIF values. The multicollinearity and normality tests were performed in SmartPLS 4.

Table 1 presents the descriptive statistics of the constructs. Respondents strongly agree that SME managers exhibit knowledge-oriented leadership behaviors. Knowledge exploitation levels were high, but knowledge exploration in SMEs was considered moderate. Green innovation was prominent, as evidenced by the high agreement with its measures.

Table 1 Descriptive Statistics

Constructs	Items	Mean	SD	Agreement Level
Knowledge-oriented leadership	6	4.126	0.981	High
Knowledge exploitation	5	3.937	0.914	High
Knowledge exploration	5	3.512	0.776	Moderate
Green innovation	6	3.885	0.933	High

(Source: Authors' own elaborations)

After this initial assessment, the study proceeded to implement the confirmatory factor analysis of the measurement model. Here, the factor loadings (FL), composite reliability (CR), Cronbach's alpha (CA), and average variance extracted (AVE) were used to measure item reliability, construct reliability, and convergent validity, respectively. Discriminant validity was assessed by the Fornell-Larcker criterion and Heterotrait-Monotrait Ratio of Correlations (HTMT). In Table 2, the FLs exceeded the acceptable reliability threshold of 0.70. Construct reliability was achieved, as the CR and CA values were within the acceptable threshold of 0.70. AVE above 0.60 indicates satisfactory convergent validity, and the scores met this requirement.

Table 2 Reliability, Validity, and Multicollinearity

Constructs	Factor Loading	Composite Reliability	Cronbach's Alpha	AVE	VIF
Knowledge-oriented leadership	0.761-0.803	0.767	0.724	0.712	1.343
Knowledge exploitation	0.773-0.818	0.840	0.783	0.746	1.568
Knowledge exploration	0.807-0.865	0.862	0.828	0.663	1.225
Green innovation	0.736-0.797	0.795	0.736	0.676	1.153

(Source: Authors' own elaborations)

Table 3 Discriminant Validity

Constructs	1	2	3	4	HTMT
1. Knowledge-oriented leadership	0.844				0.749
2. Knowledge exploitation	0.381	0.864			0.663
3. Knowledge exploration	0.249	0.207	0.814		0.684
4. Green innovation	0.276	0.214	0.470	0.822	0.714

(Source: Authors' own elaborations)

According to J. Hair and Alamer (2022), discriminant validity is achieved when the square root of the AVE of a variable is higher than its interconstruct correlations. In Table 3, the study used the Fornell-Larcker criterion to demonstrate that the measurement model met this requirement, indicating the presence of discriminant validity. The HTMT values also reinforced the discriminant validity, as the resulting values were within the acceptable limit of ≤ 0.85 . Based on the measurement model results, its psychometric properties were deemed satisfactory. Subsequently, the model fit was evaluated using the standard root mean square residual (SRMR) and the normed fit index (NFI). The decision rule states that SRMR values ≤ 0.08 and NFI values close to 1 represent an acceptable fit. The SRMR (0.061) and NFI (0.873) indicate the model fit with the observed data was acceptable. The study advanced to estimating the structural model for hypothesis testing.

Table 4 KM Strategy as a Higher-Level Construct

Constructs	β (<i>p</i> -value)	Decision
1. Knowledge exploitation $\rightarrow$ KM strategies	0.620 (0.000)	Significant
2. Knowledge exploration $\rightarrow$ KM strategies	0.385 (0.000)	Significant
R^2	0.722	Substantial
Standardized Root Mean Square Residual	0.079	Good fit
Normed Fit Index	0.806	Good fit

(Source: Authors' own elaborations)

Table 4 showed that KM exploitation ($\beta = 0.620$, $p = 0.000$) and exploration ($\beta = 0.385$, $p = 0.000$) are significantly and positively associated with a KM strategy. Arguably, A KM strategy represents a higher-level construct that organizes and integrates KM exploitation and exploration activities to achieve expected organizational objectives. Concerning the predictive relevance, KM exploitation and exploration explained 72.2% of the variance in a KM strategy. This level of explanatory power is deemed substantial. The model fit was assessed using the standardized root mean square residual

(SRMR) and the normed fit index (NFI). The SRMR (0.079) was within the acceptable limit of ≤ 0.08 , and the NFI (0.806) was near 1, indicating a good fit (J. Hair & Alamer, 2022).

Table 5 Model Evaluation Indicators

Constructs	R ²	Q ²
KM Strategies	0.768	0.494
Green innovation	0.581	0.347

(Source: Authors' own elaborations)

Table 6 Hypothesis Testing

Hypothesis	Direct			Indirect		
	β	T value	p-value	β	T value	p-value
1. KOL $\rightarrow$ GI	0.391	3.065	0.004			
2. Knowledge exploitation $\rightarrow$ GI	0.448	5.488	0.000			
3. Knowledge exploration $\rightarrow$ GI	0.112	1.814	0.053			
4. KM strategy $\rightarrow$ green innovation	0.264	2.735	0.002			
5. KOL $\rightarrow$ exploitation $\rightarrow$ GI				0.135	3.273	0.000
6. KOL $\rightarrow$ exploration $\rightarrow$ GI				0.081	1.362	0.176
7. KOL $\rightarrow$ KM strategy $\rightarrow$ GI				0.109	2.098	0.037

Note: $p \leq 0.05$; KOL = knowledge-oriented leadership; GI = green innovation

(Source: Authors' own elaborations)

Table 5 shows that the R² values indicate knowledge-oriented leadership accounts for 76.8% of the variation in KM strategies, which is considered substantial. Q² also demonstrates that this leadership style has a high predictive relevance for KM strategies. Additionally, both knowledge-oriented leadership and KM strategies explain 58.1% of the variation in green innovation. The explanatory power is deemed moderate. Q² further suggests that both this leadership style and KM strategies have good predictive relevance for explaining changes in green innovation. The recommendations of Chin et al. (2008) and J. Hair and Alamer (2022) were used in interpreting these results.

The bootstrap method using 5000 subsamples was used to assess the significance of the hypothesized paths. The direct effects among the constructs were estimated before the contextual effect. In Table 6, knowledge-oriented leadership positively influences green innovation ($\beta = 0.391$, $3.065 > 1.96$, $p < 0.05$), thereby supporting H1. Similarly, knowledge exploitation ($\beta = 0.448$, $5.488 > 1.96$, $p < 0.05$) significantly impacts green innovation, whereas exploration strategy ($\beta = 0.112$, $1.814 < 1.96$, $p > 0.05$) does not, leading to the acceptance of H2 and rejection of H3. Nonetheless, the combination of both strategies, as represented by KM strategy, is significantly associated with green innovation ($\beta = 0.264$, $2.735 > 1.96$, $p < 0.05$). Therefore, H4 was supported. Additionally, knowledge-oriented leadership influences green innovation primarily through knowledge exploitation ($\beta = 0.135$, $3.273 > 1.96$, $p < 0.05$) rather than through exploration ($\beta = 0.081$, $1.362 < 1.96$, $p > 0.05$). Therefore, H5 was supported, and H6 was rejected. The results also showed that the joint effect of knowledge exploitation and exploration mediated the significant influence of this leadership style on green innovation ($\beta = 0.109$, $2.098 > 1.96$, $p < 0.05$), thereby supporting H7.

4 DISCUSSION

The study found that knowledge was positively and significantly influenced by green innovation. The strong correlation indicates that leadership grounded in a robust, value-based knowledge framework profoundly influences green innovation activities in SMEs. By combining elements of both transformational and transactional leadership styles, this duality approach adapts strategic knowledge resources to help organizations focus on environmental protection, optimizing the use of organizational insights to uncover beneficial sustainability paths for SMEs. This finding aligns with scholars (Al Koliby et al., 2025; Banmairuoy et al., 2022; Ononye & Maduemezia, 2024), who reported that knowledge-oriented leadership evolves with changing perspectives to foster valued outcomes such as innovation. Therefore, it can provide sustainability-focused leadership by reconfiguring knowledge resources and assets to promote green innovation (Nguyen, 2025).

The study found that knowledge exploitation enhanced green innovation, whereas the exploration strategy did not yield a similar effect. SMEs, while flexible, may lack sufficient knowledge resources to pursue entirely new green innovations in their industry and instead focus on leveraging existing ones within their current understanding. Consequently, their strategic focus tends to be on knowledge exploitation rather than exploration to foster green innovation. The study also found that the synergistic effect of both strategies is crucial for promoting green innovation. Knowledge exploration is effective when used to complement exploitation, rather than as a standalone strategy. Accordingly, SMEs should primarily emphasize knowledge exploitation while also recognizing the long-term benefits of exploration in achieving greater green innovation. Employing both strategies is important, but they should be implemented to varying degrees, given limited knowledge resources and the high investment required for a balanced approach. Li et al. (2018) noted that focusing on both strategies may not lead to breakthrough innovation, but it may be the best approach to avoid poor innovation. These findings are inconsistent with those of Li et al. (2018) and Escobar-Castillo et al. (2025), who reported that knowledge exploration affects innovation, but the effect of knowledge exploitation was insignificant. It agrees with Zhu and Chen (2012) and Guisado-González et al. (2017), who found a complementary effect of KM strategies on innovation.

The study also revealed that knowledge exploitation rather than exploration provided a significant context for knowledge-oriented leadership to advance green innovation activities. Furthermore, the synergistic effect of both KM strategies played a significant intervening role in this regard. Considering the peculiarities of SMEs, this leadership style offers distinct strategic paths to promote green innovation, with the most effective approach focusing on integrating sustainability into knowledge exploitation. In a resource-constrained environment, there may be a need to prioritize stability and control to minimize variability in green innovation results among SMEs. While knowledge-oriented leadership might not fully support exploration as a standalone KM strategy, it can use exploration alongside its main KM approach to avoid missing out on new green innovation opportunities that offer long-term benefits. This strategic plan is essential because the two strategies compete for limited resources and time, which SMEs often lack. An exploitation strategy can provide a stable knowledge system that supports targeted exploration, which is essential for green innovation.

According to Matussek (2023), the importance of knowledge exploitation and exploration depends on the organizational objectives. Therefore, knowledge-oriented leaders may pursue organizational objectives in different ways and with different strategies. It is worth noting that managers who demonstrate knowledge-oriented leadership can flexibly balance and adjust KM strategies, as they exhibit behaviors associated with both exploitation and exploration strategies (Al Koliby et al., 2025). The findings somewhat align with research (Gonzalez & De Melo, 2018a; Gonzalez & Melo, 2018b) on how supportive leadership influences innovation differently through knowledge exploitation rather than exploration. Similarly, it found congruence with Al Koliby et al. (2025), who also found that this knowledge-oriented leadership drives green innovation, in part, through an organizational strategy. It

also concurs with Nguyen (2025), who noted that KM processes serve as a mechanism for aligning sustainability-oriented leadership with green innovation. The findings are also consistent with arguments drawn from dynamic capability theory and the natural resource-based perspective, which state that knowledge-oriented leadership enhances an organization's ability to realign its KM strategies in response to evolving environmental challenges. In this way, SMEs can utilize the most critical intangible resources, knowledge, to create value through innovation.

CONCLUSIONS

The study examined how knowledge-oriented leadership frames KM strategy to influence green innovation, using data from 325 SME managers in Lagos State, Nigeria. The data was analyzed with the partial least squares method. The analysis showed that knowledge-oriented leadership influences green innovation through two main strategies: knowledge exploitation and exploitation-exploration. Using the exploration strategy alone was positive but did not significantly channel the influence of this leadership style on green innovation. Although knowledge exploitation is considered a relatively important strategy for sustainability, the significance of knowledge exploration becomes apparent when the two are used in tandem to direct efforts and resources toward new green innovations. This approach allows managers to remain flexible within a framework of formality and control that supports green innovation. Since SMEs operate under resource constraints in a highly competitive and dynamic environment, SME managers who demonstrate knowledge-oriented leadership prioritize strategies that avoid high-risk investments in strategic resources. The study concluded that knowledge-oriented leadership can dynamically balance KM strategies, focusing mainly on knowledge exploitation to promote green innovation.

This study advances theoretical understanding of how knowledge-oriented leadership, a new leadership style, influences green innovation in SMEs in Nigeria, emphasizing the mediating role of KM strategies, including exploitation and exploration. It also demonstrated that knowledge-oriented leadership can embrace a sustainability focus by leveraging KM strategies to help SMEs meet their environmental goals in innovative ways. It also broadens the applicability of the dynamic capability perspective and the natural resource-based view by framing knowledge-oriented leadership as an internal dynamic capability that helps SMEs generate and leverage contextual knowledge, such as green knowledge, for innovation. By doing so, it combines both theories into a single framework to explain the strategic role of this leadership style in adapting and implementing strategies that mobilize green knowledge resources for innovation. Although Al Koliby et al. (2025) examined the mediating roles of environmental strategy in the relationship between this leadership style and green innovation, this study extends those findings by highlighting the importance of KM strategies for strategic alignment. It demonstrates that knowledge exploitation and a combined exploitation-exploration approach enhance the effectiveness of this leadership style in promoting green innovation. Finally, it adds to the literature on leadership and innovation in an African country context by providing evidence from Nigerian SMEs, laying the foundation for future comparative research to explore whether these findings are consistent across different cultural and institutional settings.

Several practical considerations are relevant for SME managers, particularly in Nigeria, where resource limitations present obstacles to sustainable transformation. First, managers need to recognize the critical role of knowledge-oriented leadership behaviors in fostering green innovation and should participate in leadership development programs to cultivate these behaviors. These programs should also include sustainability-focused training to effectively integrate this leadership approach with green initiatives and practices. Second, because KM strategies are central to the leadership-innovation link, managers should incorporate sustainability activities into their core KM plans to turn intentions into tangible green innovations. Furthermore, they should view knowledge exploitation as the most crucial

strategic route to enhance green innovation efforts, while also considering exploration as a long-term KM strategy. Its application should be complementary and implemented within a framework of stability, formality, and control. Nevertheless, managers need to learn to modulate their behavior in line with shifts in focus between exploitation and exploration.

The study had several limitations worth noting. First, the cross-sectional data did not allow observation of the constructs' evolution over time. Therefore, the use of longitudinal data is recommended to establish causality among the constructs. The study was limited to Lagos State, Nigeria, a developing country in Africa. Although it is the commercial hub of the country, scholars should broaden their research to other Nigerian states to enable a more holistic investigation and verify the consistency of the findings. The study focused on KM strategy as a mediating construct in the leadership-innovation relationship; future research should determine its influence on the different stages of green innovation. Other moderating constructs should also be introduced, such as organizational culture, structure, and environmental dynamism.

RESEARCH ETHICS, INFORMED CONSENT, AND CONFLICT OF INTEREST STATEMENT

This study was conducted in accordance with the ethical standards of the authors' institutions and applicable national regulations. Formal research ethics committee approval was not required, as the study involved an anonymous questionnaire survey of adult SME managers and did not collect sensitive personal data. All participants were informed about the purpose of the study, the voluntary nature of their participation, their right to withdraw at any time, and the assurance of confidentiality and anonymity; informed consent was obtained before they accessed and completed the questionnaire. The authors declare no conflict of interest.

REFERENCES

- Adesua-Lincoln, A. (2025). Challenges to environmental sustainability and circular economy practices of Nigerian small and medium enterprises. *Journal of Sustainable Business*, 10, Article 6. <https://doi.org/10.1186/s40991-025-00110-9>
- Ahmed, R. R., Streimikiene, D., & Zheng, X. (2021). The impact of proactive environmental strategy on competitive and sustainable development of organizations. *Journal of Competitiveness*, 13(4), 5–24. <https://doi.org/10.7441/joc.2021.04.01>
- Al Koliby, I. S., Al-Swidi, A. K., Al-Hakimi, M. A., & Farhan, S. A. G. (2025). How green knowledge-oriented leadership drives green innovation in SMEs: The mediating role of environmental strategy and the moderating role of green AI capability. *Cogent Business & Management*, 12(1), 2520914. <https://doi.org/10.1080/23311975.2025.2520914>
- Anantatmula, V. S. (2008). Leadership role in making effective use of KM. *VINE*, 38(4), 445–460. <https://doi.org/10.1108/03055720810917705>
- Asif, M. (2019). Exploring the role of exploration/exploitation and strategic leadership in organizational learning. *International Journal of Quality and Service Sciences*, 11(3), 409–423. <https://doi.org/10.1108/IJQSS-04-2018-0038>
- Banmairuoy, W., Kritjaroen, T., & Homsombat, W. (2022). The effect of knowledge-oriented leadership and human resource development on sustainable competitive advantage through organizational innovation's component factors: Evidence from Thailand's new S-curve industries. *Asia Pacific Management Review*, 27(3), 200–209. <https://doi.org/10.1016/j.apmr.2021.09.001>
- Baškarada, S., Watson, J., & Cromarty, J. (2016). Leadership and organizational ambidexterity. *Journal of Management Development*, 35(6), 778–788. <https://doi.org/10.1108/JMD-01-2016-0004>

- Cao, H., & Chen, Z. (2019). The driving effect of internal and external environment on green innovation strategy: The moderating role of top management's environmental awareness. *Nankai Business Review International*, 10(3), 342–361. <https://doi.org/10.1108/NBRI-05-2018-0028>
- Chaithanapat, P., Punnakitikashem, P., Khin Khin Oo, N. C., & Rakthin, S. (2022). Relationships among knowledge-oriented leadership, customer knowledge management, innovation quality and firm performance in SMEs. *Journal of Innovation & Knowledge*, 7(1), 100162. <https://doi.org/10.1016/j.jik.2022.100162>
- Chin, W. W., Peterson, R. A., & Brown, S. P. (2008). Structural equation modeling in marketing: Some practical reminders. *Journal of Marketing Theory and Practice*, 16(4), 287–298. <https://doi.org/10.2753/MTP1069-6679160402>
- Donate, M. J., & Sánchez de Pablo, J. D. (2015). The role of knowledge-oriented leadership in knowledge management practices and innovation. *Journal of Business Research*, 68(2), 360–370. <https://doi.org/10.1016/j.jbusres.2014.06.022>
- Escobar-Castillo, A., Velandia-Pacheco, G., Vasquez-Peñaloza, L., Navarro-Manotas, E., Logreira-Vargas, C., & Felipe-Huerta, Y. (2025). Knowledge exploitation and exploration: Underlying dimensions of innovation capability in Colombian and Spanish SMEs. *Procedia Computer Science*, 265, 662–667. <https://doi.org/10.1016/j.procs.2025.07.236>
- Fahad, S., Alnori, F., Su, F., & Deng, J. (2022). Adoption of green innovation practices in the SMEs sector: Evidence from an emerging economy. *Economic Research-Ekonomska Istraživanja*, 35(1), 5486–5501. <https://doi.org/10.1080/1331677X.2022.2029713>
- Gonzalez, R. V. D., & de Melo, T. M. (2018a). The effects of organization context on knowledge exploration and exploitation. *Journal of Business Research*, 90, 215–225. <https://doi.org/10.1016/j.jbusres.2018.05.025>
- Gonzalez, R. V. D., & de Melo, T. M. (2018b). Inovação por exploração e exploração do conhecimento: Um estudo empírico do setor automobilístico. *Gestão & Produção*, 25(1), 1–15. <https://doi.org/10.1590/0104-530x3899-17>
- González-Ramos, M. I., Guadamillas, F., & Donate, M. J. (2023). The relationship between knowledge management strategies and corporate social responsibility: Effects on innovation capabilities. *Technological Forecasting and Social Change*, 188, 122287. <https://doi.org/10.1016/j.techfore.2022.122287>
- Guisado-González, M., González-Blanco, J., & Coca-Pérez, J. L. (2017). Analyzing the relationship between exploration, exploitation and organizational innovation. *Journal of Knowledge Management*, 21(5), 1142–1162. <https://doi.org/10.1108/JKM-01-2017-0039>
- Gumel, B. I. (2019). Mitigating the challenges of small and medium enterprises in Nigeria. *SEISENSE Journal of Management*, 2(3), 82–99. <https://doi.org/10.33215/sjom.v2i3.129>
- Gürlek, M., & Çemberci, M. (2020). Understanding the relationships among knowledge-oriented leadership, knowledge management capacity, innovation performance and organizational performance: A serial mediation analysis. *Kybernetes*, 49(11), 2819–2846. <https://doi.org/10.1108/K-09-2019-0632>
- Hahs-Vaughn, D. L., & Lomax, R. G. (2020). *An introduction to statistical concepts* (4th ed.). Routledge. <https://doi.org/10.4324/9781315624358>
- Hair, J., & Alamer, A. (2022). Partial least squares structural equation modeling (PLS-SEM) in second language and education research: Guidelines using an applied example. *Research Methods in Applied Linguistics*, 1(3), 100027. <https://doi.org/10.1016/j.rmal.2022.100027>
- Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2022). *A primer on partial least squares structural equation modeling (PLS-SEM)* (3rd ed.). SAGE.
- Hosseini, S. S., Nikkhah Tekmedash, Y., Karami, A., & Jabarzadeh, Y. (2019). The impact of knowledge management strategy on service innovation performance in private and public hospitals. *Iranian Journal of Management Studies*, 12(1), 1–24. <https://doi.org/10.22059/ijms.2018.249784.672966>

- Jansen, J. J. P., Vera, D., & Crossan, M. (2009). Strategic leadership for exploration and exploitation: The moderating role of environmental dynamism. *The Leadership Quarterly*, 20(1), 5–18. <https://doi.org/10.1016/j.leaqua.2008.11.008>
- Jun, W., Ali, W., Bhutto, M. Y., Hussain, H., & Khan, N. A. (2019). Examining the determinants of green innovation adoption in SMEs: A PLS-SEM approach. *European Journal of Innovation Management*, 24(1), 67–87. <https://doi.org/10.1108/EJIM-05-2019-0113>
- Kock, N. (2015). Common method bias in PLS-SEM: A full collinearity assessment approach. *International Journal of e-Collaboration*, 11(4), 1–10. <https://doi.org/10.4018/ijec.2015100101>
- Li, D., Lin, J., Cui, W., & Qian, Y. (2018). The trade-off between knowledge exploration and exploitation in technological innovation. *Journal of Knowledge Management*, 22(4), 781–801. <https://doi.org/10.1108/JKM-09-2016-0401>
- Matusek, M. (2023). Exploitation, exploration, or ambidextrousness—An analysis of the necessary conditions for the success of digital servitisation. *Sustainability*, 15(1), 324. <https://doi.org/10.3390/su15010324>
- Mutlu, C., & Bakoglu, R. (2025). Ambidexterity in green innovation: Organisational consequences of exploration and exploitation strategies. *Istanbul Management Journal*, (99), 152–170. <https://doi.org/10.26650/imj.2025.1551508>
- Naqshbandi, M. M., & Jasimuddin, S. M. (2018). Knowledge-oriented leadership and open innovation: Role of knowledge management capability in France-based multinationals. *International Business Review*, 27(3), 701–713. <https://doi.org/10.1016/j.ibusrev.2017.12.001>
- National Bureau of Statistics. (2024). *Telecoms data: Active voice and internet per state, porting and tariff information (Q3 2023)*. <https://www.nigerianstat.gov.ng/elibrary/read/1241437>
- Nguyen, T. P. L. (2025). Sustainability-oriented leadership, knowledge management processes and green innovation in service companies. *Journal of Knowledge Management*, 29(9), 2986–3010. <https://doi.org/10.1108/JKM-10-2024-1241>
- Okeke, V. I. (2019). *Leadership style and SMEs sustainability in Nigeria: A multiple case study* [Doctoral dissertation, Walden University]. Walden Dissertations and Doctoral Studies. <https://scholarworks.waldenu.edu/dissertations/6465>
- Ononye, U. H. (2025). Knowledge-oriented leadership and change management: Examining the roles of knowledge management behaviours and innovation culture. *Management Research and Practice*, 17(4), 53–65.
- Ononye, U. H., Akan, D. C., & Olayemi, O. O. (2025). Enhancing successor preparedness: Succession strategies impacting organizational survival through successors' self-efficacy in Nigeria. *Informing Science: The International Journal of an Emerging Transdiscipline*, 28, Article 25. <https://doi.org/10.28945/5598>
- Ononye, U. H., & Maduemezia, I. (2024). Knowledge-oriented leadership, psychological safety, employee voice, and innovation. *Informing Science: The International Journal of an Emerging Transdiscipline*, 27, Article 1. <https://doi.org/10.28945/5244>
- Ononye, U., Ndudi, F., Aloamaka, J., Mba, M., & Ejumudo, T. (2022). Examining the role of quality performance and entrepreneurial orientation on green manufacturing and financial performance. *Environmental Economics*, 13(1), 50–60. [https://doi.org/10.21511/ee.13\(1\).2022.05](https://doi.org/10.21511/ee.13(1).2022.05)
- Podsakoff, P. M., MacKenzie, S. B., & Podsakoff, N. P. (2012). Sources of method bias in social science research and recommendations on how to control it. *Annual Review of Psychology*, 63, 539–569. <https://doi.org/10.1146/annurev-psych-120710-100452>
- Polas, M. R. H., Tabash, M. I., Bhattacharjee, A., & Dávila, G. A. (2023). Knowledge management practices and green innovation in SMEs: The role of environmental awareness towards environmental sustainability. *International Journal of Organizational Analysis*, 31(5), 1601–1622. <https://doi.org/10.1108/IJOA-03-2021-2671>
- Prokop, V., Stejskal, J., Gerstlberger, W., Zapletal, D., & Nhan, D. T. T. (2024). Linking firms' green mode and process innovations: Central and Eastern European region case. *Journal of Competitiveness*, 16(1), 167–183. <https://doi.org/10.7441/joc.24.01.10>

- Rasheed, M., Liu, J., & Ali, E. (2025). Incorporating sustainability in organizational strategy: A framework for enhancing sustainable knowledge management and green innovation. *Kybernetes*, 54(4), 2363–2388. <https://doi.org/10.1108/K-08-2023-1606>
- Rehman, U. U., & Iqbal, A. (2020). Nexus of knowledge-oriented leadership, knowledge management, innovation and organizational performance in higher education. *Business Process Management Journal*, 26(6), 1731–1758. <https://doi.org/10.1108/BPMJ-07-2019-0274>
- Restuputri, D. P., Masudin, I., Septira, A. P., Govindan, K., & Widayat, W. (2024). The role of knowledge management to improve organizational performance through organizational ambidexterity within the uncertainties. *Business Process Management Journal*, 30(7), 2237–2282. <https://doi.org/10.1108/BPMJ-08-2023-0614>
- Shamim, S., Cang, S., & Yu, H. (2019). Impact of knowledge-oriented leadership on knowledge management behaviour through employee work attitudes. *The International Journal of Human Resource Management*, 30(16), 2387–2417. <https://doi.org/10.1080/09585192.2017.1323772>
- Tseng, M.-L., Wang, R., Chiu, A. S. F., Geng, Y., & Lin, Y.-H. (2013). Improving performance of green innovation practices under uncertainty. *Journal of Cleaner Production*, 40, 71–82. <https://doi.org/10.1016/j.jclepro.2011.10.009>
- Urbaniec, M. (2015). Towards sustainable development through eco-innovations: Drivers and barriers in Poland. *Economics & Sociology*, 8(4), 179–190. <https://doi.org/10.14254/2071-789X.2015/8-4/13>
- Wang, L., Ur Rehman, A., Xu, Z., Amjad, F., & Ur Rehman, S. (2023). Green corporate governance, green finance, and sustainable performance nexus in Chinese SMEs: A mediation moderation model. *Sustainability*, 15(13), 9914. <https://doi.org/10.3390/su15139914>
- Wang, S., Abbas, J., Sial, M. S., Álvarez-Otero, S., & Cioca, L.-I. (2022). Achieving green innovation and sustainable development goals through green knowledge management: Moderating role of organizational green culture. *Journal of Innovation & Knowledge*, 7(4), 100272. <https://doi.org/10.1016/j.jik.2022.100272>
- Yousaf, Z. (2021). Go for green: Green innovation through green dynamic capabilities: Accessing the mediating role of green practices and green value co-creation. *Environmental Science and Pollution Research*, 28(39), 54863–54875. <https://doi.org/10.1007/s11356-021-14343-1>
- Yu, S., Abbas, J., Álvarez-Otero, S., & Cherian, J. (2022). Green knowledge management: Scale development and validation. *Journal of Innovation & Knowledge*, 7(4), 100244. <https://doi.org/10.1016/j.jik.2022.100244>
- Zhao, K., Zong, B., & Zhang, L. (2020). Explorative and exploitative learning in teams: Unpacking the antecedents and consequences. *Frontiers in Psychology*, 11, 2041. <https://doi.org/10.3389/fpsyg.2020.02041>
- Zhu, Z., & Chen, J. (2012). Balancing explorative and exploitative learning under open innovation: An empirical study in China. *International Journal of Technological Learning, Innovation and Development*, 5(4), 385–397. <https://doi.org/10.1504/IJTLID.2012.050739>
- Zia, N. U. (2020). Knowledge-oriented leadership, knowledge management behaviour and innovation performance in project-based SMEs: The moderating role of goal orientations. *Journal of Knowledge Management*, 24(8), 1819–1839. <https://doi.org/10.1108/JKM-02-2020-0127>

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APPENDIX: MEASUREMENT ITEMS

Knowledge-oriented leadership

1. Managers create an environment for responsible employee behaviour and teamwork.
2. Managers act as knowledge leaders by demonstrating openness, accepting mistakes as part of the learning process, and mediating to achieve organizational objectives.
3. Managers encourage experiential learning and accept mistakes within reasonable limits.
4. Managers serve as advisers, while control mechanisms function primarily to assess the achievement of organizational objectives.
5. Managers facilitate the acquisition of knowledge from external sources.
6. Managers recognize and reward employees who share and apply their knowledge.

Knowledge exploitation

In the past three years, your firm has.

1. leveraged knowledge from employees or external sources to improve current operations.
2. encouraged the sharing of new but related knowledge (whether created by employees or acquired from external sources) to enhance work efficiency or product functionality.
3. relied on existing knowledge, methods, and solutions to solve problems.
4. Invested in skill enhancement to effectively exploit existing opportunities.
5. Emphasized the best use of current knowledge and skills for performing tasks.

Knowledge exploration

In the past three years, your firm has

1. Searched for new possibilities with respect to products, processes, or markets.
2. Generated new ideas with opportunities and benefits that are completely new
3. Encouraged experimentation with different ideas for getting things done.
4. Demonstrated commitment to error learning to enhance understanding and problem-solving.
5. Developed many new skills for innovative problem-solving.

Green innovation

1. The firm adjusts its business practices and operations to reduce environmental damage.
2. Although not mandated by the government, the firm still undertakes environmental remedial actions.
3. The firm adjusts its business practices or operations to reduce waste and emissions.
4. The firm adjusts its business practices or operations to recycle non-renewable raw materials, chemicals, and components.
5. The firm reduces its use of traditional fuels by substituting for less-polluting energy sources.
6. The firm adjusts its business practices or operations to reduce energy consumption.