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How Creative Engagement and Innovation Drive Growth in Manufacturing SMEs in South Africa

Eugine Tafadzwa Maziriri[1], Tinashe Chuchu[2] Brighton Nyagadza[3]

1 Department of Management and Entrepreneurship (DME), University of the Western Cape, Robert Sobukwe Rd, Bellville, Cape Town, 7535, South Africa
2 Division of Marketing, University of the Witwatersrand, 1 Jan Smuts Avenue, Braamfontein 2000, Johannesburg, South Africa
3 Business, Management and Health Studies, York St John University, London Campus, London, England, UK

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ABSTRACT

This study examines how green transformational leadership drives business growth in South Africa's manufacturing SMEs. Using a quantitative survey of 304 managers and PLS-SEM analysis, the research establishes a clear pathway: green leadership fosters creative process engagement, which in turn drives green product and process innovations. These innovations enhance the firm's innovative performance, ultimately contributing to SME business growth. Crucially, the findings reveal that top management support moderates and strengthens the relationship between a firm's innovative performance and its business growth. By focusing on an emerging economy context, this research offers novel insights into the interplay between green leadership, creativity, and sustainable business outcomes. It provides actionable recommendations for leaders and policymakers seeking to integrate sustainability into their strategic growth initiatives.

Corresponding author:
Eugine Tafadzwa Maziriri
eemaziriri@uwc.ac.za

SARI PATI

Penelitian ini mengkaji bagaimana kepemimpinan transformasional hijau mendorong keterlibatan proses kreatif untuk memacu inovasi produk dan proses yang ramah lingkungan, yang pada akhirnya meningkatkan kinerja inovatif dan pertumbuhan bisnis UKM di sektor manufaktur Afrika Selatan. Melalui survei kuantitatif terhadap 304 manajer UKM dan dianalisis menggunakan PLS-SEM, studi ini menemukan bahwa kepemimpinan hijau secara signifikan mempromosikan keterlibatan dalam proses kreatif. Keterlibatan ini mendorong inovasi produk dan proses hijau, yang kemudian meningkatkan kinerja inovatif perusahaan dan secara positif mempengaruhi pertumbuhan bisnis UKM. Lebih lanjut, dukungan dari manajemen puncak terbukti memperkuat hubungan antara kinerja inovatif dan pertumbuhan bisnis. Penelitian ini memberikan wawasan baru tentang keterkaitan antara kepemimpinan hijau, kreativitas, dan hasil bisnis berkelanjutan dalam konteks negara berkembang, serta menawarkan rekomendasi praktis bagi para pemimpin yang ingin mengintegrasikan keberlanjutan ke dalam strategi pertumbuhan mereka.

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INTRODUCTION

Small and medium-sized enterprises (SMEs) are crucial to the global economy, accounting for over 60% of jobs worldwide. An estimated 310 million SMEs exist in emerging markets, making up more than 95% of all global organisations (Arghashi and Okumuş 2022). In South Africa, small and medium-sized enterprises (SMEs) account for 97.5% of businesses, providing approximately 58% of employment and contributing between 34% and 38.8% of the total gross domestic product (Zuma, 2023). Often viewed as the backbone of the economy (Wiid and Cant, 2021), SMEs are also critical suppliers of components to larger manufacturing firms, which find sourcing from SMEs more cost-effective than internal production (Pride et al., 2023). Studies show that SMEs play a crucial role in alleviating poverty, stimulating economic growth, promoting community development, and enhancing social stability, making them pivotal to sustainable development (Khoase et al., 2020; Nieuwenhuizen, 2018). Given their significant impact on economic growth and sustainability, SMEs should also assess the environmental consequences of their operations. Perez, Ejaz, and Ejaz (2023) emphasise that numerous researchers are focused on developing technologies for waste and water recycling, utilising renewable energy sources, modernising environmental practices, minimising carbon emissions, and enhancing overall ecological efficiency and performance. In addition, many organisations are adopting green transformational leadership, an approach focused on implementing ecological regulations to improve the productivity of environmental resources (Begum et al. 2022).

Demonstrating empirical evidence of the impact of green transformational leadership on engagement in creative processes and its subsequent influence on green process and product innovation is crucial. This data can elucidate the role of manufacturing SMEs in the economy and showcase the advantages of adopting green transformational leadership. Further investigation is required to assess how green process and product innovation affect innovative performance and the growth of SMEs, thereby justifying additional academic inquiry. Much existing research relies on data from diverse countries, such as China, the United Arab Emirates (UAE), Turkey, India, and South Korea. For instance, Zhang, Xu, and Wang (2020) investigated the impact of green transformational leadership on employee creativity in the Chinese steel sector, while Singh et al. (2020) examined the relationships among 669 manufacturing SMEs in the UAE, emphasising green transformational leadership, green innovation, and environmental performance. Furthermore, Çop, Olorunsola, and Alola (2021) assessed the role of green transformational leadership on staff in four- and five-star hotels in Turkey, highlighting the significance of green work engagement in enhancing team resilience. Pradhan and Jena (2019) conducted research involving leaders from two manufacturing companies in Eastern India, examining how meaningful work mediates the connection between transformational leadership and innovative work behaviour. Hoon-Song et al. (2012) investigated the relationships among job engagement, leadership effectiveness, and the outcomes of grasping production processes within a corporate setting in South Korea.

Limited research in South Africa investigates the impact of green transformational leadership on engagement in creative processes and how this, in turn, affects green process innovation and product development. A lack of understanding exists regarding the influence of green product and process innovations on the creative performance and growth of small to medium-sized enterprises (SMEs) in South Africa, underscoring the need for empirical studies. While local studies, such as those by Mukonza and Swarts (2019), have focused on promoting green organisational behaviour through green transformational leadership, Engelbrecht and Samuel (2019) analysed the effects of perceived organisational support, fairness, and trust on employee retention. Meanwhile, Fatoki (2021) investigated the relationship between

environmental awareness and the competitive advantages of green businesses in South Africa's hotel sector. Maziriri (2020) investigated the role of green packaging and advertising as predictors of competitive advantage for manufacturing small and medium-sized enterprises (SMEs) in the nation.

While these studies offer valuable insights, they do not specifically examine the impact of green transformational leadership on engagement in the creative process, green process innovations, and green product innovations. Additionally, previous research, both locally and internationally, has neglected to assess how a comprehensive model of green process and product innovation impacts innovative performance and the growth of manufacturing small and medium-sized enterprises (SMEs). Therefore, this study aims to address this gap by examining the role of essential green practices in boosting innovative performance and business growth within the South African SME manufacturing sector, using a sample of managers from these SMEs. The primary objective is to evaluate the impact of green practices on the innovative performance and business growth of small and medium-sized enterprises (SMEs) in the South African manufacturing industry.

This article is structured as follows: The section titled 'Theoretical underpinning' reviews the theoretical literature, followed by developing the conceptual model and hypotheses in 'Conceptual model and hypotheses formulation'. The section on 'Research methods and design' discusses the research methodology, while 'Results of structural equation modelling' presents the analysis and findings. The results are then discussed in the 'Discussion' section, and finally, 'Implications of the study' provides recommendations and highlights future research opportunities.

Context on the South African Manufacturing Sector

South Africa's manufacturing sector plays a critical role in national economic growth and employment, contributing significantly to GDP while serving as the backbone of industrialisation (Department of Trade, Industry and Competition [DTIC], 2023). However, manufacturing SMEs in the Gauteng province home to the largest concentration of industrial activity in the country face mounting sustainability pressures linked to energy insecurity, carbon emissions, waste management, and water scarcity (Naidoo and Gasparatos, 2018; Nhamo et al., 2020). Frequent power disruptions, high production costs, and tightening environmental regulations have forced firms to adopt greener technologies and production methods to remain competitive (Sithole and Moyo, 2022). At the same time, growing consumer and stakeholder awareness around sustainability has intensified the demand for eco-friendly products and responsible corporate practices (Chinomona and Sandada, 2021). These challenges underscore the urgent need for leadership approaches that promote creative problem-solving and green innovation. Consequently, understanding how green transformational leadership and creative engagement drive sustainable innovation in this context is not only theoretically meaningful but also practically vital for the long-term resilience and competitiveness of South African manufacturing SMEs (Makhitha and Dlodlo, 2021; Ndlovu et al., 2023).

THEORETICAL UNDERPINNING

This study draws upon a dual-theory framework that integrates Schumpeter's Innovation Theory and the Natural Resource-Based View (NRBV) to explain how green transformational leadership drives creative process engagement and green innovation in manufacturing SMEs. While Schumpeter's theory emphasises creativity and entrepreneurial dynamism as engines of economic progress, the NRBV highlights how firms can achieve competitive advantage through environmentally responsible resource use. The integration of these two perspectives allows for a multidimensional understanding of green innovation-linking creative agency (Schumpeterian perspective) with ecological stewardship (NRBV perspective). The interplay of these theories offers a robust framework

for exploring green leadership and innovation in manufacturing SMEs. Schumpeter's innovation theory highlights the role of entrepreneurial creativity and innovation as catalysts for economic growth, aligning perfectly with the study's emphasis on green product and process innovations. It showcases how transformative leadership fosters a culture of creative engagement, underscoring the crucial role of leadership in promoting innovative practices. In contrast, the NRBV theory incorporates environmental factors into business operations. This theory enriches the study by illustrating that sustainable practices meet regulatory standards, elevate competitive advantage, and enhance overall firm performance. Together, these theories form a cohesive framework that explains not only why innovation drives growth but also how leadership and creativity ensure that growth is sustainable, inclusive, and ecologically responsible.

Schumpeter's innovation theory

Joseph Schumpeter's (1934) Innovation Theory positions innovation as the principal force of economic change and industrial evolution. Entrepreneurs drive "creative destruction" by recombining existing resources to create new products, processes, or markets. In this study, Schumpeter's ideas underpin the relationship between green transformational leadership and creative process engagement. Leadership that stimulates intellectual curiosity and risk-taking mirrors the Schumpeterian entrepreneur's role in fostering innovation through creativity and recombination. Langroodi (2021) notes that Schumpeter's economic theory fosters a critical synergy among various aspects, economic, historical, political, and social that influence the operation and growth of capitalism. For both existing firms and new ventures, diverse internal and external resources and connections are crucial for acquiring, integrating, and commercialising knowledge (Audretsch et al. 2022). Botchie, Nukpezah, and Fosu-Mensah (2022) point out that the essential differentiation between inventions and innovations has deepened the comprehension of technological changes, emphasising that innovation-transforming the output achievable from a specific input- is a key element of technological progress. Through empirically linking leadership-driven creative engagement to green product and process innovation, the study extends Schumpeter's framework beyond traditional technological or economic innovation to encompass eco-innovation. It highlights that creativity, when guided by sustainability-oriented leadership, becomes not only a source of competitive differentiation but also a driver of green transformation in resource-constrained economies. This contextual expansion situates Schumpeter's theory within the realities of emerging economies such as South Africa, where innovation must reconcile growth with environmental stewardship.

Natural resource-based view

Hart's (1995) Natural Resource-Based View extends the traditional resource-based view by recognising the environment as both a constraint and an opportunity for firms. The Natural Resource-Based View (NRBV) examines how resources, processes, and products derived from these resources impact the environment. In this study, the NRBV informs how green innovation mediates the link between leadership and business growth. Green transformational leadership cultivates capabilities such as creative thinking, ecological awareness, and cross-functional collaboration through intangible assets that are valuable, rare, inimitable, and non-substitutable (VRIN). These capabilities enable SMEs to design low-impact products, optimise processes, and build reputational capital aligned with sustainability goals. The NRBV framework aims to elucidate the relationships among a company's resources, competencies, and its external environment. This theory outlines three strategic competencies concerning resource allocation: product stewardship, sustainable development, and pollution prevention. The pollution prevention strategy focuses on reducing commercial emissions, waste, and contamination. The product stewardship approach aims to diminish the environmental

impact of products throughout their life cycles, assessing environmental considerations at every stage of manufacturing, from raw material sourcing to product use and disposal. Lastly, the sustainable development strategy underscores the importance of creating low-impact products and innovations. These core principles of green innovation aim to safeguard the environment and encourage more sustainable energy practices (Rehman et al. 2021).

Rehman et al. (2021) suggest that the Natural Resource-Based View (NRBV) offers unique advantages in activities that are challenging to replicate, by effectively utilising human, physical, and organisational resources. The NRBV supports manufacturers in reducing the use of hazardous materials and replacing them with eco-friendlier options. Empirical findings further enrich the NRBV by demonstrating that top management support strengthens the effect of innovation on growthrevealing a complementary strategic alignment dimension not fully captured in traditional NRBV models. This suggests that sustainability-oriented leadership is not merely an environmental imperative but also a strategic capability that transforms ecological constraints into drivers of competitiveness and business growth.

Theoretical Integration and Extension

Through integrating these frameworks, the study contributes theoretically in several significant ways. First, it bridges the economic-ecological divide by connecting Schumpeter's innovation dynamics with the NRBV's sustainability logic, showing that green creativity can simultaneously drive firm performance and planetary well-being. Second, it reconceptualises leadership as a green resource by positioning green transformational leadership as a meta-capability that mobilises both creative human capital and ecological stewardship within organisations. Finally, the study extends innovation theory by embedding sustainability within the innovation-growth nexus, thereby adapting Schumpeter's principles to the realities of resource-limited manufacturing SMEs in emerging markets such as South Africa. Collectively, these insights offer a novel theoretical synthesis that advances both the innovation and sustainability discourse by demonstrating how leadership-driven creativity can function as a strategic pathway toward sustainable competitive advantage.

CONCEPTUAL MODEL AND HYPOTHESES FORMULATION

The conceptual model in this study illustrates the relationships among the key variables under examination (Figure 1). Following this, the hypotheses for the current review will be discussed.

Green transformational leadership and creative process engagement

Green transformational leadership inherently motivates subordinates to participate in creative processes and decision-making. This approach enables them to understand environmental challenges from multiple perspectives and develop innovative solutions (Zhang et al. 2020). Additionally, Begum et al. (2022) found a notable impact of green transformational leadership on engagement in creative endeavours, demonstrating a strong positive correlation with creativity. These outcomes are consistent with the findings of Sidney et al. (2022), who indicated that green transformational leadership and green staff innovation have lasting effects. Nabi, Liu, and Hasan (2023) explored the connection between transformational leadership and radical creativity among followers, emphasising the significance of engaging in the creative process and the expectations leaders set for creativity. Consequently, considering the previous discussion and existing empirical evidence, this study suggests the following hypothesis:

H1: There is a positive and significant connection between green transformational leadership and creative process engagement.

Creative process engagement, green product innovation and green process

This research suggests that involving employees

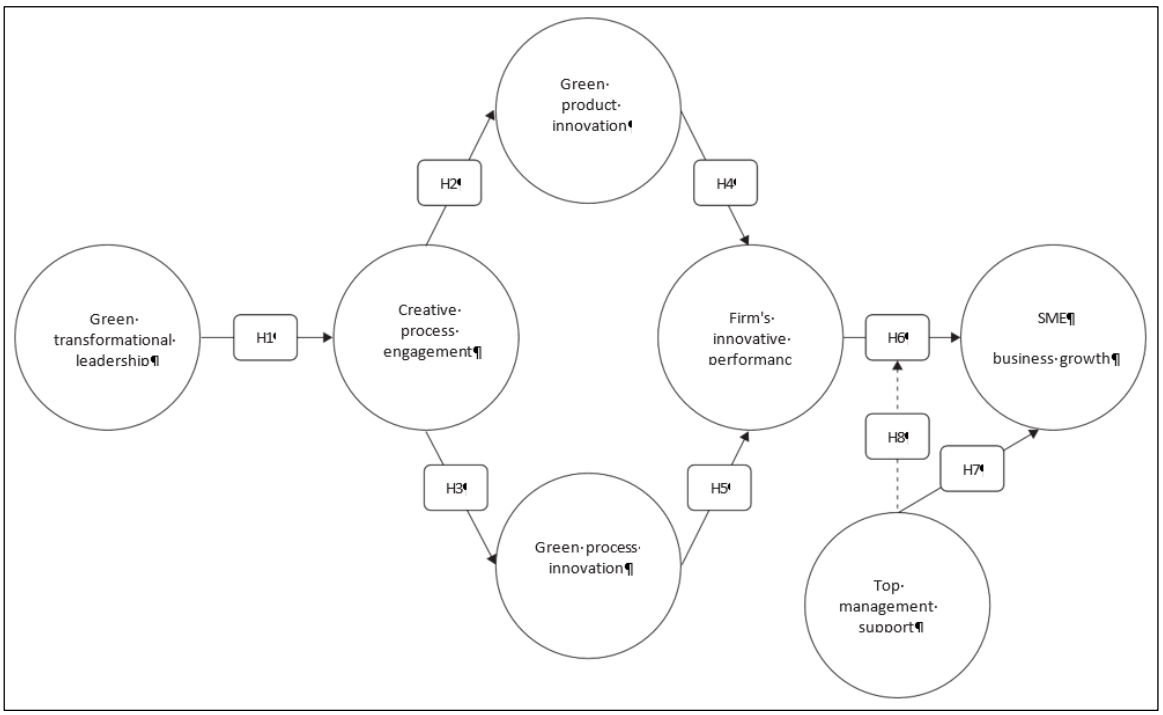


Figure 1. The conceptual model
Source: Authors own work

in the creative process is essential for driving both green process and product innovations. While many manufacturing firms are implementing environmentally friendly strategies focused on their products and processes, the literature has largely overlooked the organisational factors that enable the development and execution of these green strategic initiatives (Ziegler and Nogareda 2009). As environmental challenges intensify, companies face increasing pressure to innovate and adopt innovative methods to remain competitive and successful in the market (Cheng and Yang, 2019). Creative processes, crucial for innovation (Cheng and Yang 2019), are necessary for developing unique and effective eco- friendly products and processes (Shalley and Gilson 2004; Zhang et al. 2020). Both green process and product innovations require different levels of change in employee attitudes. For instance, green process innovation involves the integration of cleaner production techniques and end-of-pipe technologies that substitute for pollutant-producing materials; without these innovations, progress may stall. Conversely, green product innovation often calls for more significant transformation, encompassing technical design, research and development, and persuading customers to opt for environmentally friendly options (Dangelico and Pujari 2010). Zhang et al. (2020) note that employee participation in the creative process focuses on generating ideas and strategies for developing eco- friendly products and processes. Consequently, organisations are increasingly emphasising employee engagement in creative processes to discover sustainable solutions. This approach aligns with the pursuit of innovative solutions through creativity (Mahmood et al. 2019), where active involvement in the creative process enables employees to recognise pertinent practices, gather insights, and leverage data to formulate new methods and techniques that propel both green process and product innovations. Given these explanations and empirical support, we can hypothesise that:

H2: Creative process engagement positively and significantly impacts green product innovation.

H3: Creative process engagement positively and significantly impacts green process innovation.

Green product innovation and the firm's innovative performance

Accessing and integrating knowledge from external sources is becoming increasingly crucial for fostering internal product innovation (Ardito and Petruzzelli, 2017; Chesbrough, 2003). The Resource-Based View (RBV) theory emphasises that a company's resources and capabilities are key factors in achieving sustainable innovation advantages (Leskovar-Spacapan and Bastic 2007). Building on this, firms seeking to maximise economic gains can leverage green product innovation to boost their overall innovative performance. Research by Fatema and Islam (2023) shows a strong positive link between product innovation and performance in manufacturing firms in India. Moreover, consumer preferences are shifting, as there is a growing willingness to invest in eco-friendly and sustainable products, which enhances a firm's environmental innovation performance by minimising energy use, waste, and environmental risks (Horbach, Oltra and Belin 2013). Therefore, firms must adapt to these evolving consumer attitudes by emphasising green product innovation initiatives, thus improving their innovative performance in economic and environmental aspects. Consequently, this study posits the following hypothesis:

H4: Green product innovation positively and significantly impacts a firm's innovative performance.

Green process innovation and the firm's innovative performance

The hypothesis posits that companies implementing green process innovation will likely enhance their innovative performance. Research supports this claim, revealing that firms with robust organisational capabilities in managing innovation, as highlighted by Piening and Salge (2015), are more inclined to pursue process innovation, which is linked to greater profitability. Additionally, studies, including those by Fatema and Islam (2023), show a positive correlation between process innovation and overall performance in manufacturing firms in India, showcasing the potential benefits of adopting innovative practices. Moreover, research by Ma, Hou, and Xin (2017) identifies additional advantages of green process innovation, including enhanced industry influence, improved government relations, and increased employee retention. While these benefits may not yield immediate financial gains, they significantly contribute to the firm's long-term competitiveness and sustainability. Therefore, this hypothesis asserts that investing in green process innovation can offer various advantages, ultimately bolstering a company's market standing and ensuring its longevity. Thus, the following hypothesis has been developed:

H5: Green process innovation positively and significantly impacts a firm's innovative performance.

The firm's innovative performance and small and medium-sized enterprise business growth

This hypothesis proposes a positive relationship between a firm's innovative performance and the growth of SMEs. Drawing on various studies and empirical evidence, it suggests that firms that prioritise innovation management techniques are likely to achieve sustainable, superior performance. Baldwin and Johnson (1996) offer foundational support for this claim, emphasising the critical role of innovation in enhancing overall firm performance. Furthermore, Lin and Chen (2007) bolster this hypothesis by demonstrating that organisational innovation significantly contributes to total sales for firms. This indicates that innovative firms are better equipped to generate revenue and sustain growth compared to their less innovative peers. Additionally, Le et al. (2023) provide evidence that SMEs with a focus on innovation tend to outperform those without such a focus, reinforcing the idea that innovation is vital for SME growth. Coad and Rao (2008) also support this hypothesis by showing that the positive effects of

innovative activities on firm growth are particularly pronounced among the fastest-growing companies. This suggests that innovative firms are more likely to experience accelerated growth compared to non-innovative ones. Moreover, empirical surveys by Coad (2009) and others, including Crépon et al. (1998) and Ortega-Argilés, Potters and Vivarelli (2011), consistently reveal a positive correlation between innovation and firm growth. Audretsch, Coad, and Segarra (2014) further endorse the hypothesis by suggesting that firm-level innovation is likely to positively influence sales growth and productivity growth. This implies that firms investing in innovation not only expand their sales but also enhance productivity, improving their growth prospects. Thus, based on the arguments above supported by empirical evidence, this study hypothesises that:

H6: The firm's innovative performance positively and significantly impacts SME business growth

Top management support and business growth

Top management support is crucial for driving business growth in South African manufacturing SMEs. Research by Leksono, Siagian, and Oei (2020) underscores the significance of this support in developing and implementing management policies, as well as in integrating various organisational functions. Furthermore, Mondal and Samaddar (2023) emphasise that backing from upper management cultivates a positive attitude among employees, resulting in higher levels of engagement and motivation. This supportive environment, as highlighted by Men et al. (2023), Basana et al. (2022) and Uddin and Akhter (2022), enables manufacturing SMEs to effectively tackle the challenges of global competition and continually improve management processes, ultimately promoting sustained business growth. Therefore, it can be hypothesised that:

H7: Top management support positively and significantly impacts SME business growth.

The moderating role of top management support

In addition to the relationships outlined in the conceptual model, there may be both direct and indirect relationships among the variables under investigation. Figure 1 incorporates top management support as a moderating variable to explore these potential relationships. While hypotheses (H1, H2, H3, H4, H5 and H6) establish primary associations between the research variables, further investigation into the complex connections could yield additional insights into this phenomenon. The role of top management support as a moderator in the manufacturing sector has been relatively under-researched (Hidayat et al. 2020), highlighting a gap in the literature regarding moderators of the relationship between 'firm innovative performance' and 'business growth'. This study aims to address this gap by investigating the impact of top management support on the relationship between a firm's innovation performance and its business growth. Top management support is widely acknowledged as an organisational factor impacting various aspects of business and management research. Dharmawati et al. (2023) proposed that top management support could be a positive intervening variable linked to organisational performance. Although there are few studies that focus on the moderating role of top management support, some research has investigated its impact in various contexts. For instance, Hidayat et al. (2020) explored the moderating effect of top management support on the relationship between auditor commitment and supply chain performance in Indonesia. Their findings revealed a positive moderation effect, indicating that top management support enhanced the relationship between supply chain performance and internal audit competency. The importance of leadership in the success of internal programmes and initiatives, such as supply chain management efforts, is highlighted in several studies (Alshourah et al. 2022; Hidayat et al. 2020; Tarigan and Ivandianto 2020; Leksono et al. 2020). Building on previous empirical evidence and existing literature, the following hypothesis is proposed:

H8: Top management support positively and significantly moderates the nexus between firm innovative performance and SME business growth

METHODS

This study was based on a positivist research philosophy, which asserts that research phenomena can be understood through systematic quantitative data collection and analysis, producing verifiable results (Dzomonda and Neneh, 2023; Saunders, Lewis, and Thornhill, 2019). Positivism fosters objectivity and improves the generalizability of findings (Bell, Bryman, and Harley 2022; Saunders et al. 2019). The choice of a quantitative research method was motivated by its emphasis on collecting and analysing numerical data to clarify the research issue (Bell et al. 2022). A causal research design was selected to investigate the connections between creative process engagement, firm innovative performance, green product innovation, green process innovation, green transformational leadership, and SME business growth. This design was preferred for its focus on objectivity and its ability to derive insights from a structured survey through rigorous statistical examination (Taherdoost 2022).

Sample and data collection

The study examined SMEs in the manufacturing industry. Specifically, during data collection in 2024, the target group included managers from manufacturing SMEs in the Gauteng province of South Africa. The sampling frame was based on 1,945 manufacturing SMEs in Gauteng sourced from the Small Enterprise Development Agency (SEDA). Respondents received questionnaires to fill out, using a simple random probability sampling method. The sample size of 321 manufacturing SMEs was calculated with the Raosoft sample size calculator, accounting for a 5% margin of error, 95% confidence interval, and 50% response distribution. After resolving missing values and inconsistencies, 304 out of the 321 questionnaires were filled out, yielding a 94.7% response rate. Seventeen questionnaires were unusable due to incomplete responses.

Measures

This study utilised items sourced from previous research to evaluate the hypotheses. Adjustments were made to the scale items to align with the study's context. Details about the measurement scales, the items employed, and their respective sources are presented in Appendix 1. The scale indicators were arranged on a Likert scale from strongly disagree (1) to strongly agree (5).

The demographic profile of the respondents

The demographic profile of respondents reveals a diverse sample, characterised by differences in gender, age, education, business characteristics, and location. Most respondents identified as male (61.5%), while a smaller percentage identified as female (32.6%), and a few opted not to disclose their gender (5.9%). The age distribution varied, with the largest group falling within the 31–39 years category (31.9%) and a close percentage in the 50–59 years category (31.6%). Education levels were diverse, with a notable proportion holding diplomas (39.1%) and degrees (30.3%). A significant number of respondents worked in family businesses (35.9%), which typically had between 10 and 100 full-time employees. The age of these businesses ranged from 4 to 20 years. Most businesses were located in industrial areas (74.0%), rather than in central business districts (26.0%). This varied demographic profile offers a thorough understanding of the sample population, laying the groundwork for further analysis and interpretation of study findings. The information is summarised in **Table 1.**

RESULTS AND DISCUSSION

Following the framework established by Hair et al. (2017), this research utilised a two-phase process to evaluate the results of Partial Least Squares Structural Equation Modeling (PLS-SEM). The initial phase focused on the measurement model, which involved assessing internal consistency (through Cronbach's alpha [α] and composite reliability), convergent validity (including indicator reliability and average variance extracted [AVE]), and discriminant validity (using the Fornell–Larcker

Table 1. Sample demographic characteristics

Characteristics	Frequency	%
Gender		
Male	187	61.5
Female	99	32.6
Prefer not to say	18	5.9
Total	**304**	**100.0**
Age distribution of the respondents (years)		
18–30	37	12.2
31–39	97	31.9
40–49	56	18.4
50–59	96	31.6
60 and above	18	5.9
Total	**304**	**100.0**
Level of education		
No formal education	57	18.8
Basic education	36	11.8
Diploma	119	39.1
Degree	92	30.3
Total	**304**	**100.0**

Characteristics	Frequency	%
Family business		
Yes	109	35.9
No	195	64.1
Total	**304**	**100.0**
Number of employees (full-time)		
Less than 10	7	2.3
Between 10 and 50	131	43.1
Between 50 and 100	76	25.0
Between 100 and 200	90	29.6
Total	**304**	**100.0**
Age of business (years)		
1–3	9	3.0
4–6	120	39.5
7–10	16	5.3
11–20	159	52.3
Total	304	100.0
The location of the business		
Central business district.	79	26.0
Industrial	225	74.0
Total	**304**	**100.0**

criterion and the heterotrait–monotrait [HTMT] ratio of correlations). The subsequent phase targeted the structural model, analysing the significance and magnitude of the path coefficients in the research model, alongside the coefficients of determination (R^2), effect size (f^2), and predictive relevance (Q^2) as outlined by Hair et al. (2017).

Measurement model validation

Table 2 presents the various methods employed to assess the reliability and validity of the constructs in this study. The evaluation of the outer model was conducted first, focusing on composite reliability (CR) to measure internal consistency, outer loadings to analyse indicator reliability, and average variance extracted (ave) to assess convergent validity. Composite reliability is deemed an appropriate metric for internal consistency as it accommodates the different outer loadings of the indicator variables. In contrast, Cronbach's alpha presumes that all indicators exhibit equal reliability (Hair et al. 2017). For all research constructs, the lowest item loading recorded was 0.710. It is crucial to highlight that items with a factor loading below 0.5 were excluded due to failing to meet the convergent validity criteria (Anderson and Gerbing 1988). All remaining individual item loadings exceeded the recommended minimum of 0.5 (Anderson and Gerbing 1988), indicating that all measurement tools are reliable and satisfactory. This outcome means that all items displayed convergent validity, possessing over 50% shared variance with their respective constructs (Fraering and Minor 2006). As shown in **Table 2**, Cronbach's alpha values ranged from 0.782 to 0.845, exceeding the acceptable internal consistency reliability threshold of 0.70 (Field 2013). According to Table 3, the lowest CR value of 0.863 is well above the minimum recommended value of 0.6 (Hulland 1999), and the lowest AVE value of 0.603 surpasses the recommended level of 0.4 (Anderson and Gerbing 1988). This verifies the establishment of convergent validity and strengthens the evidence for the internal consistency and reliability of the measurement instruments used. Consequently, all variables showed sufficient discriminant validity. Overall, these findings indicate acceptable reliability levels for the research scale (Chinomona and Chinomona 2013; Maziriri, Rukuni and Chuchu 2021).

Table 2. Accuracy analysis statistics

Code items	Cronbach's alpha value	CR	AVE	Factor loadings	VIF (outer) values
CPE4	0.83	0.88	0.60	0.79	2.11
CPE5				0.79	2.34
CPE6				0.83	2.02
CPE7				0.73	1.64
CPE9				0.74	1.64
FIP1	0.84	0.89	0.62	0.80	2.29
FIP2				0.80	2.61
FIP3				0.85	2.55
FIP4				0.71	1.40
FIP5				0.76	1.63
GPI2	0.81	0.87	0.64	0.81	1.79
GPI3				0.85	2.06
GPI4				0.77	1.66
GPI5				0.77	1.43
GPRI1	0.79	0.88	0.70	0.84	1.64
GPRI2				0.87	1.90
GPRI3				0.81	1.56
GTL3	0.79	0.86	0.61	0.82	1.78
GTL4				0.77	1.64
GTL5				0.80	2.03
GTL6				0.74	1.81
SBG1	0.78	0.87	0.70	0.81	1.55
SBG2				0.86	1.75
SBG3				0.84	1.62
TMS1	0.79	0.86	0.61	0.79	1.67
TMS2				0.74	1.52
TMS3				0.75	1.46
TMS4				0.84	1.70

Note: CR, composite reliability; AVE, average variance extracted; CPE, creative process engagement; FIP, firm innovative performance; GPI, green product innovation; GPRI, green process innovation; GTL, green transformational leadership; SBG, SME business growth; TMS, top management support; VIF, variance inflation factor.

Discriminant validity

Field (2013) states that discriminant validity refers to the measurement of separate concepts using distinct items. The results from the discriminant validity analysis can be found in Table 3 and Table 4. This validity was evaluated using the heterotrait–monotrait (HTMT) ratio (see Table 3) and the Fornell–Larcker criterion (see Table 4). A conservative standard suggests that discriminant validity is confirmed when the HTMT value is below 0.9 or 0.85 (Henseler, Ringle, and Sarstedt 2015; Maziriri, Nyagadza, and Maramura 2024; Maziriri et al. 2023). Table 4 shows that the highest HTMT value observed is 0.819, which is below the conservative cutoff of 0.85. Thus, all constructs meet the discriminant validity criteria. Furthermore, the Fornell and Larcker (1981) method was employed to further evaluate discriminant validity. According to this method, discriminant validity is confirmed when the square root of the AVE is greater than the inter-factor correlations among constructs. The results indicate that the highest inter-factor correlation, 0.783, occurs between creative process engagement and top management support. This

value is lower than the lowest square root AVE, which is 0.777 (for creative process engagement). This statistical evidence supports the discriminant validity of the measurement model, confirming that the measures are valid for structural model analysis.

The variance inflation factors, the coefficient of determination (R^2); the effect size (f^2) and the predictive relevance (Q^2)

In the context of PLS-SEM, the researchers employed a full collinearity assessment approach to identify common method bias (CMB) (Kock 2015). They utilised variance inflation factor (VIF) values to evaluate collinearity, setting a threshold of 3.3. Variance inflation factor values below 3.3 indicated that CMB was not an issue, while values above this threshold suggested its presence. Rather than reporting collinearity problems directly, the researchers calculated the VIF values in line with standard practices in business research.

The multicollinearity evaluation results, shown in **Table 2,** indicated that all constructs had VIF values under 3.3 (Kock and Lynn 2012), confirming that common method bias (CMB) was not an issue in this study. Additionally, the researchers evaluated the model fit using the standardised root mean square residual (SRMR), which assesses the average standardised residuals between the observed and hypothesised covariance matrices (Chen 2007; Islam 2023). A study model is considered to have a satisfactory fit when the SRMR value is below 0.08, with lower values indicating a better fit (Hu and Bentler 1998). In this instance, the theoretical model's SRMR was recorded at 0.06, indicating a good fit. Moreover, the reported Chi-Square value was 1919.037, and the normed fit index (NFI) was 0.901, satisfying the recommended threshold for NFI (Afthanorhan 2013). These findings further verify the model's adequacy. Furthermore, the researchers assessed the coefficient of determination (R^2)

Table 3. Heterotrait–monotrait ratio

Variables	CPE	FIP	GPI	GPRI	GTL	SBG	TMS	TMS × FIP
CPE	-	-	-	-	-	-	-	-
FIP	0.73	-	-	-	-	-	-	-
GPI	0.72	0.76	-	-	-	-	-	-
GPRI	0.74	0.80	0.75	-	-	-	-	-
GTL	0.78	0.69	0.73	0.74	-	-	-	-
SBG	0.79	0.82	0.76	0.81	0.72	-	-	-
TMS	0.66	0.67	0.65	0.63	0.80	0.81	-	-
TMS × FIP	0.29	0.59	0.30	0.39	0.19	0.31	0.55	-

Note: CPE, creative process engagement; FIP, firm innovative performance; GPI, green product innovation; GPRI, green process innovation; GTL, green transformational leadership; SBG, SME business growth; TMS, top management support

Table 4. Fornell–Larcker criterion

Variables	CPE	FIP	GPI	GPRI	GTL	SBG	TMS
CPE	*0.78*	-	-	-	-	-	-
FIP	0.71	*0.79*	-	-	-	-	-
GPI	0.68	0.74	*0.80*	-	-	-	-
GPRI	0.61	0.74	0.77	*0.84*	-	-	-
GTL	0.64	0.58	0.66	0.58	*0.78*	-	-
SBG	0.64	0.68	0.61	0.64	0.57	0.83	-
TMS	0.78	0.68	0.69	0.74	0.64	0.74	*0.78*

Note: Italic diagonal values are the square root of the average variance extracted.

CPE, creative process engagement; FIP, firm innovative performance; GPI, green product innovation; GPRI, green process innovation; GTL, green transformational leadership; SBG, SME business growth; TMS, top management support

Table 5. Coefficient of determination (R2), effect size (f 2) and predictive relevance (Q2)

Variables	*R* Square	Q^2	Effect size
Creative process engagement	0.40	0.45	3.42
Green product innovation	0.46	0.41	2.82
Green process innovation	0.37	0.37	2.47
Firm innovative performance	0.62	0.35	2.53
SME business growth	0.56	0.37	2.83

Note: SME, small and medium-sized enterprise

values for the endogenous constructs. According to Schumacher, Erol, and Sihn (2016), the R^2 value reflects the variance in a variable explained by sets of independent variables. Hair et al. (2019) propose that R^2 values of 0.75, 0.5, and 0.25 should be categorised as substantial, moderate, and weak, respectively. The study reported R^2 values for five constructs: creative process engagement, green product innovation, green process innovation, firm innovative performance, and SME business growth, with respective R^2 values of 0.405, 0.457, 0.369, 0.619, and 0.563.

The data suggest that the developed model has moderate to strong explanatory power, consistent with the findings of Hair et al. (2019). Beyond using R^2 to gauge predictive ability, Hair et al. (2019) also advise that researchers evaluate Q^2 to assess the predictive relevance of the structural model. For constructs to be deemed predictive, their Q^2 values need to be positive and above zero (Hair et al. 2019). As illustrated in **Table 5**, Q^2 quantifies the contribution of an exogenous construct towards an endogenous latent construct. The Q^2 values can be categorised as small (0.02), medium (0.15), or large (0.35) to assess the magnitude of the Q^2 effect. In this analysis, the computed Q^2 values were 0.446 for creative process engagement, 0.415 for green product innovation, 0.368 for green process innovation, 0.349 for firm innovative performance, and 0.373 for SME business growth. These values fall within the acceptable range, which suggests that the path model demonstrates sufficient predictive relevance for the endogenous constructs. Additionally, the effect size (f^2) evaluates the effect of omitting a particular exogenous construct from the model on the R^2 value (Hair et al. 2019). An effect size of $f^2 \geq 0.30$, $0.3 < f^2 \geq 0.50$, and $f^2 > 0.50$ are characterised as weak, moderate, and strong effects, respectively (Bliwise 2006).

Path Model

The PLS estimation path coefficient values and the item loadings for the research construct are presented in Figure 2. The results of hypothesis testing in **Table 6** demonstrate the proposed hypotheses, path coefficients, t-statistics, and whether each hypothesis is rejected or supported. Chin (1998) suggests that a t-statistic greater than 1.96 indicates significance in the relationship, with higher path coefficients signifying stronger relationships among latent variables. Based on the results in Table 6, H1 ($\beta = 0.636$; $t = 17.800$), H2 ($\beta = 0.676$; $t = 20.270$), H3 ($\beta = 0.608$; $t = 17.180$), H4 ($\beta = 0.403$; $t = 5.982$), H5 ($\beta = 0.434$; $t = 6.058$), H6 ($\beta = 0.215$; $t = 2.043$), H7 ($\beta = 0.622$; $t = 6.571$), and H8 ($\beta = 0.125$; $t = 2.992$) are significantly supported since their t-statistics exceed 1.96. Figure 2 illustrates the structural model, including the path coefficient values and factor loadings.

Discussion

Empirical studies have shown a strong positive link between green transformational leadership and creative process participation, supporting earlier findings. For instance, Begum et al. (2022) demonstrated that green transformational leadership significantly boosts engagement in creativity. This indicates that leaders who embrace green transformational practices like promoting environmental values, supporting sustainability, and inspiring eco-friendly initiatives can effectively

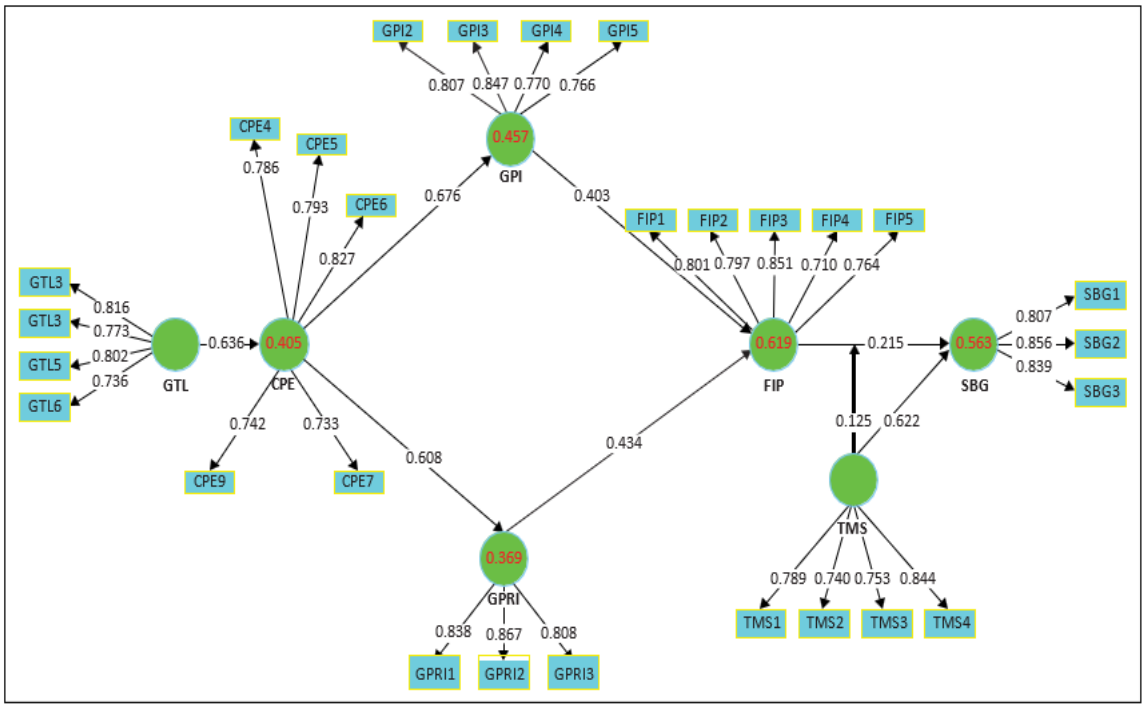


Figure 2. Structural model

Note: FIP, firm innovative performance; GPI, green product innovation; GPRI, green process innovation; GTL, green transformational leadership; SBG, SME business growth; TMS, top management support; CPE, creative process engagement

Table 6. Results of structural equation model analysis

Hypothesis	Hypothesised relationship	Path Coefficient values	*t*-statistics (|O/STDEV|)	p	Decision
H1	GTL-> CPE	0.64	17.80	0.000	Supported
H2	CPE -> GPI	0.68	20.27	0.000	Supported
H3	CPE -> GPRI	0.61	17.18	0.000	Supported
H4	GPI -> FIP	0.40	5.98	0.000	Supported
H5	GPRI -> FIP	0.43	6.06	0.000	Supported
H6	FIP -> SBG	0.21	2.04	0.041	Supported
H7	TMS-> SBG	0.62	6.57	0.000	Supported
H8	TMS x FIP -> SBG	0.12	2.99	0.003	Supported

Note: Italic diagonal values are the square root of the average variance extracted.

FIP, firm innovative performance; GPI, green product innovation; GPRI, green process innovation; GTL, green transformational leadership; SBG, SME business growth; TMS, top management support; CPE, creative process engagement; O, original sample; STDEV, standard deviation

increase their employees' involvement in creative work. Such heightened engagement enhances the chances of employees developing innovative, environmentally sustainable ideas and solutions. Essentially, green transformational leadership not only fosters a sustainable organisational culture but also drives the creative processes essential for advancing green innovations. This connection with previous studies further highlights the critical role leadership styles play in fostering a culture of creativity and sustainability in organisations.

Additionally, statistical analysis shows that active participation in creative activities significantly enhances both green product and process innovation. These findings align with previous studies stressing the importance of creative processes for fostering innovation. Cheng and Yang (2019) pointed out the essential role of creativity in creating innovative and practical eco-friendly solutions, a stance echoed by Shalley and Gilson (2004) and Zhang et al. (2020). This suggests that leaders advocating for environmental values can enhance employee creativity, ultimately driving innovation in green products and processes.

The research also indicated that green product innovation has a positive effect on a company's innovative performance. This finding aligns with the RBV theory, which emphasises the significance of a firm's resources and capabilities in achieving sustainable innovation advantages (Leskovar-Spacapan and Bastic 2007). Thus, companies looking to boost their economic returns can leverage green product innovation to enhance their overall innovative performance. This conclusion is in line with previous research, including Fatema and Islam (2023), which found a strong positive link between product innovation and the performance of manufacturing firms in India.

Moreover, the findings reveal that emphasising green product innovation allows companies to strengthen their innovative abilities and overall performance. This approach not only matches theoretical models but is also supported by empirical data, showcasing its practical advantages for businesses aiming for sustainable growth. Additionally, the research indicates that green process innovation positively influences a company's innovative performance. This aligns with the results from Fatema and Islam (2023), which showed a favourable relationship between process innovation and the performance of manufacturing firms in India, reinforcing the benefits of innovative approaches. These findings indicate that integrating green process innovations can further boost a company's innovative capabilities and overall success, underscoring the significance of adopting sustainability-focused innovative practices for long-term growth and achievement.

The study also revealed that a firm's innovative performance significantly boosts SME business growth. This aligns with recent research by Le et al. (2023), which shows that SMEs that prioritise innovation generally outperform those that don't, highlighting innovation's essential role in SME growth. This notion resonates with earlier studies, including Coad and Rao (2008), demonstrating that innovative endeavours greatly influence firm growth, especially among the fastest-growing companies. For SMEs, this implies that focusing on innovation is vital for meaningful business expansion. The positive link between innovation and growth emphasises the significant impact of innovative activities in fostering the success and development of SMEs.

Moreover, the research found that support from top management positively influences the growth of SMES. This aligns with the findings of Mondal and Samaddar (2023), who determined that senior management support fosters a positive employee attitude, which enhances engagement and motivation, which ultimately driving business growth. These outcomes suggest that robust backing from top management is crucial for the expansion of SMES, as it creates a supportive atmosphere that elevates employee morale and involvement, leading to enhanced overall business performance. In our analysis, we utilised a moderation analysis with the bootstrapping method. Specifically, we applied the product indicator approach, which investigates all possible pairwise combinations of the moderator and predictor indicators (Hair et al. 2022), to evaluate the moderating effects of top management support. This moderating function has received relatively limited attention in past research, and our findings provide new insights into the intricate relationship between firm innovative performance and SME growth. In conclusion, the study establishes that top management support

significantly moderates the link between innovative performance and SME growth, empirically validating the perspective that strong top management support strengthens this connection. This was evidenced by the significance of the interaction term TMS × FIP -> SBG ($\beta = 0.125$, $p < 0.01$), thereby confirming hypothesis H8. Figure 3 illustrates the nature of this interaction, showing that SME growth increases with firm innovative performance. Notably, this increase is more pronounced for individuals with a high level of top management support compared to those with a low level of support.

MANAGERIAL IMPLICATIONS

This research significantly advances the field of green transformational leadership, creativity, and innovation. It reveals a positive link between green transformational leadership and active participation in creative processes, thereby deepening our comprehension of how this leadership approach affects organisational creativity and green innovation. This outcome is consistent with prior studies, such as Begum et al. (2022), which highlight the crucial role of leadership in fostering a sustainable organisational culture. Additionally, the study supports Resource-Based View (RBV) theory by showing that innovations in green products and processes can boost a firm's innovative performance.

Practically, the study underscores the vital importance of green transformational leadership in cultivating organisational innovation and sustainability. Leaders who champion environmental values and promote eco-friendly initiatives significantly boost employee participation in creative endeavours, thus fostering the advancement of green innovations. Organisations that wish to enhance their innovative capabilities should integrate green leadership practices into their strategic planning and leadership development initiatives. Additionally, the research stresses the necessity of incorporating green product and process innovations to elevate a firm's innovative performance. Companies looking to improve their economic returns and competitive edge must focus on sustainability-

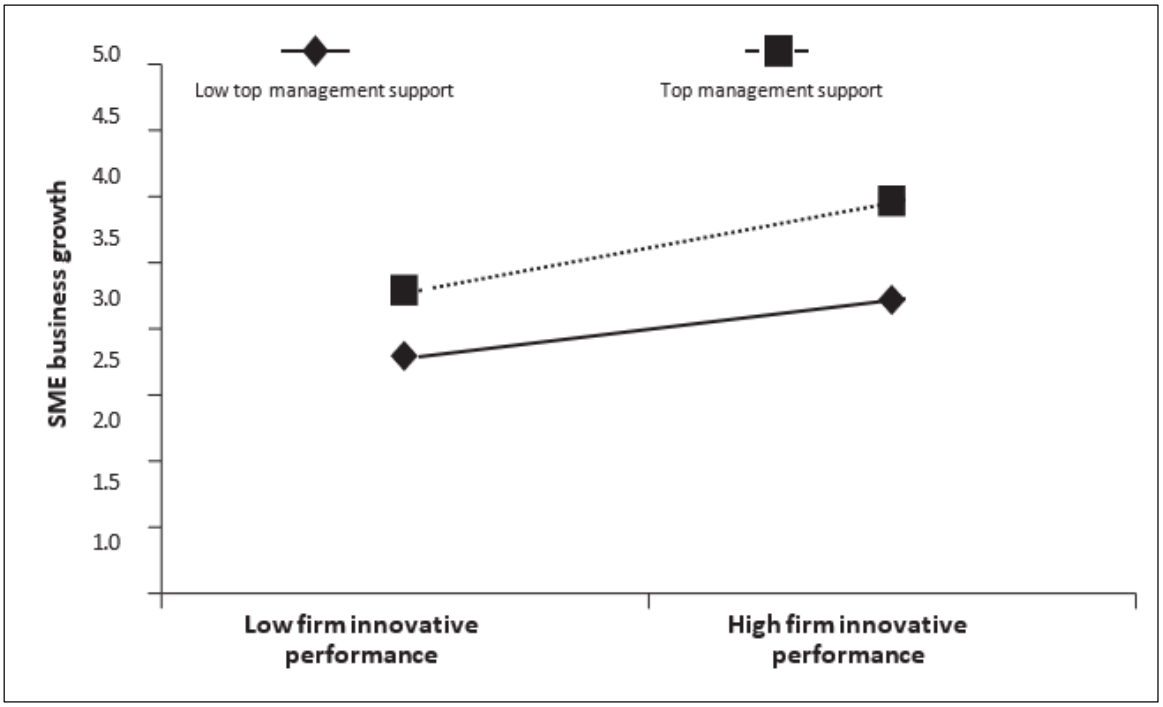


Figure 3. The interaction plot for the top management support moderating variable on the nexus between firm innovative performance and SME business growth

driven innovations. This strategic approach not only fulfils the growing market demand for eco-friendly products but also supports long-term business growth and sustainability.

From a policy perspective, the findings call for greater institutional support to mainstream green leadership and innovation within South Africa's manufacturing SME ecosystem. Policymakers could strengthen this agenda by introducing targeted financial incentives such as green tax credits, low-interest loans, or innovation grants to support SMEs investing in sustainable technologies and leadership development. Furthermore, government agencies, in collaboration with universities and industry associations, could establish structured capacity-building programs focused on green transformational leadership, creativity, and innovation management. These programs should aim to equip SME owners and managers with the skills needed to integrate environmental responsibility into strategic decision-making.

In addition, national and provincial authorities could develop 'Green Manufacturing Hubs' or incubators within industrial clusters such as Gauteng's Ekurhuleni and Tshwane corridors, providing technical assistance, mentorship, and shared infrastructure for SMEs pursuing eco-innovation. Strengthening public–private partnerships in this area would not only accelerate the diffusion of green technologies but also enhance the competitiveness and export potential of South African SMEs. Collectively, such policies would foster an enabling environment that aligns business incentives with national sustainability goals, helping SMEs transition toward low-carbon, innovation-driven growth.

In conclusion, the research offers essential insights for business leaders and policymakers focused on boosting organisational performance and growth through sustainability and innovation. In combining leadership development, supportive policies, and innovation-oriented incentives, both public and private actors can collaboratively drive the green transformation of South Africa's manufacturing sector. Through understanding the interconnected roles of green leadership, innovation, and proactive top management, organisations can craft more effective strategies for achieving sustainable growth and sustaining a competitive advantage.

CONCLUSION

When evaluating the findings, it's crucial to consider potential limitations, even with the study's theoretical and practical advancements. Its cross-sectional design does leave open the possibility of reverse causation or a bidirectional causal relationship (Churchill and Iacobucci, 2018; Hancock, Stapleton, and Mueller, 2019). This temporal limitation means that causal inferences between green transformational leadership, creative process engagement, and innovation outcomes should be interpreted with caution. Future studies could adopt longitudinal or experimental designs to more effectively capture causality and changes over time (Denzin & Lincoln, 2018; Saunders et al., 2019).

A second limitation involves the study's reliance on self-reported data from SME managers, which may introduce perceptual bias or social desirability effects. Respondents might have overstated their engagement in green practices or innovation to align with perceived positive organisational norms. To mitigate this, future research could combine subjective responses with objective performance indicators such as sustainability audits, innovation output metrics, or third-party environmental certifications to strengthen validity. Future studies should expand data collection to encompass SMEs in other provinces such as the Eastern Cape, KwaZulu-Natal, or Limpopo, capturing regional and sectoral diversity in leadership and innovation practices. Comparative analyses across provinces or industries could reveal contextual differences in the adoption of green leadership and innovative practices. Future studies could employ methodologies such as case studies or controlled experiments to explore how SME managers and

employees experience green transformational leadership and engage in creative processes in real settings. These approaches could reveal deeper behavioural and contextual dynamics, identifying potential mediators like sustainability commitment and moderators such as industry norms or firm size. Although these limitations are acknowledged, they do not detract from the study's contributions but instead point to meaningful directions for future research.

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APPENDIX 1: Measurement Scales

Creative processes engagement (Chen & Chang 2013)

CPE1 - I spend considerable time trying to understand the nature of the problem
CPE2 - I think about environmental problems from multiple perspectives
CPE3 - I decompose a difficult environmental problem or assignment into parts to obtain greater understanding
CPE4 - I consult a wide variety of information
CPE5 - I search for information from multiple sources (e.g. personal memories, others' experiences, documentation, and Internet)
CPE6 - I retain large amounts of detailed information in my area of expertise for future use
CPE7 - I consider diverse sources of information in generating new ideas
CPE8 - I look for connections with solutions used in seemingly diverse areas
CPE9 - I generate a significant number of alternatives to the same problem before I choose the final solution
CPE10 - I try to devise potential solutions that move away from established ways of doing things
CPE11 - I spend considerable time sifting through the information that helps to generate new ideas

Green transformational leadership (Zhang & Bartol 2010)

GTL1 - The leader encourages human resources to achieve environmental goals
GTL2 - The leader provides a clear environmental vision for the followers to follow
GTL3 - The leader inspires followers with environmental plans
GTL4 - The leader gets the employees to work together for the same environmental goals
GTL5 - The leader acts by considering the environmental beliefs of the individuals
GTL6 - The leader stimulates subordinates to think about green ideas

Green product innovation (Cheng, Yang & Sheu 2014)

GPI1 - Our firm often places emphasis on developing new green-products through new technologies to simplify their package.
GPI2 - Our firm often places emphasis on developing new green-products through new technologies to simplify their construction.
GPI3 - Our firm often places emphasis on developing new green-products through new technologies to easily recycle their components.
GPI4 - Our firm often places emphasis on developing new green-products through new technologies to easily decompose their materials.
GPI5 - Our firm often places emphasis on developing new green-products through new technologies to use natural materials.
GPI6 - Our firm often places emphasis on developing new green-products through new technologies to reduce damage from waste as much as possible.
GPI7 - Our firm often places emphasis on developing new green-products through new technologies to use as little energy as possible.

Green process innovation (Kawai, Strange & Zucchella 2018)

GPRI1 - The manufacturing process of the business effectively reduces the emission of hazardous substances or waste.
GPRI2 - The manufacturing process of the business recycles waste and emission that allow them to be treated and re-used.
GPRI3 - The manufacturing process of the business reduces the consumption of water, electricity, coal, or oil.
GPRI4 - The manufacturing process of the business reduces the use of raw materials.

SME Business growth (Lotz & Van der Merwe 2013)

SBG1 - Our business has experienced growth in profits over the past few years.
SBG2 - Our business has experienced growth in turnover over the past few years.
SBG3 - Our business has experienced growth in market share over the past few years.
SBG4 - The competitive position of our business has improved over the past few years.

Top management support (Noor Faezah et al. 2024)

TMS1 - Our top management recognises the importance of green practices.
TMS2 -Our top management proactively supports green practices implementation.
TMS3 - Our top management shows a positive attitude towards green practices.
TMS4 - Our top management is willing to invest the resources needed to implement green practices.
TMS5 - Our top management is likely to approve a special fund/research grant for investment in green practices.
TMS6 - Our top management has well-defined the organisation's environmental policy.