South African Journal of Information Management
ISSN: (Online) 1560-683X, (Print) 2078-1865

Innovation and knowledge management capabilities as determinants of financial performance in technology-based small businesses in South Africa

Check for updates

Authors:
Sakhumzi Stamper[1]
Willie T. Chinyamurindi[1]

Affiliations:
[1]University of Fort Hare, Department of Applied Management, Administration and Ethical Leadership, Faculty of Management and Commerce, East London, South Africa

Corresponding author:
Willie Chinyamurindi,
wchinyamurindi@ufh.ac.za

Dates:
Received: 06 Apr. 2025
Accepted: 23 June 2025
Published: 05 Sept. 2025

How to cite this article:
Stamper, S. & Chinyamurindi, W.T., 2025, 'Innovation and knowledge management capabilities as determinants of financial performance in technology-based small businesses in South Africa', *South African Journal of Information Management* 27(1), a2016. https://doi.org/10.4102/sajim.v27i1.2016

Copyright:
© 2025. The Authors. Licensee: AOSIS. This work is licensed under the Creative Commons Attribution License.

Read online:
Scan this QR code with your smart phone or mobile device to read online.

Background: Calls continue to grow for a deeper understanding of the capabilities that drive the performance of small businesses. This is especially important in emerging nations where the promotion of digitalisation is a key policy and developmental focus.

Objectives: This study investigates the determinants of small business performance by examining the role of innovation and knowledge management capabilities within the South African context. The focus is on technology-based small businesses.

Method: A structured questionnaire was administered to a sample of 261 respondents drawn from four key provinces in South Africa. All participating firms operated primarily as technology-based enterprises. Hypotheses were tested using inferential statistical techniques.

Results: The results reveal a significant and positive relationship between innovation capability and knowledge management capability. Additionally, knowledge management capability was found to mediate the relationship between innovation capability and financial performance.

Conclusion: These findings highlight the critical role of innovation and knowledge management capabilities in enhancing small business financial performance, particularly in digitally driven environments.

Contribution: The study offers insights for academics and practitioners seeking to leverage innovation and knowledge practices to improve competitiveness and support digital transformation in small firms.

Keywords: innovation management; knowledge management; financial performance; technology; small business.

Introduction

Knowledge and innovation management capabilities are increasingly recognised as vital for the success of firms. Knowledge management refers to how organisations leverage their knowledge resources to drive business success (Saratchandra & Shrestha 2022). These resources may encompass both intellectual and knowledge assets that add value to the firm (Wang 2024). In contrast, innovation management focuses on generating ideas that lead to the creation of new products and services, ultimately enhancing customer value (Hai et al. 2022; Taneo, Hadiwidjodo & Sudjatno 2020). Such efforts in innovation can also pave the way for firms to enter new markets (Boateng et al. 2020).

Both knowledge and innovation management capabilities are particularly crucial for businesses in the context of contemporary society (Cao et al. 2020; Wang, Chin & Lin 2020). These capabilities have the potential to benefit both businesses and society (Sytnik & Kravchenko 2021). Despite the complexity involved in managing these capabilities (Chaithanapat & Rakthin 2021), their value to firms is widely acknowledged (Pereira et al. 2019). It is imperative that organisations invest in firm-specific resources that support both knowledge management and innovation efforts (Aliu & Aigbavboa 2019; Gueler & Schneider 2021).

The relationship between knowledge and innovation capabilities and business performance remains a critical area of inquiry (Ochoa-Jiménez et al. 2021). These capabilities also play a pivotal role in driving the strategic foresight of the firm (Durst, Edvardsson & Foli 2023). However, leveraging these capabilities has not always been straightforward, often because of internal and

external challenges, including the alignment of knowledge and innovation capabilities with broader organisational objectives (Hai et al. 2022; Saratchandra & Shrestha 2022). This has spurred calls for further empirical research, particularly in the context of small businesses, on how knowledge and innovation management capabilities can be aligned with processes and performance outcomes (Ochoa-Jiménez et al. 2021). Furthermore, it is essential to understand how these capabilities manifest, given their potential to enhance firm competitiveness (Chigori, Chinyamurindi & Rungani 2024).

This study focusses on ascertaining the determinants of small business performance by examining the role of innovation and knowledge management capabilities within the South African context. The emphasis is on technology-based small businesses. In this context, the interplay between human and technological elements becomes critical (Leng et al. 2022). Establishing structures and processes to facilitate the management of knowledge and innovation capabilities is essential (Dos Santos, Chinkes & Carvalho 2023; Saratchandra & Shrestha 2022).

Moreover, it is vital to ensure that the management of knowledge and innovation capabilities is directly linked to the pursuit of superior performance, both in terms of tangible value (Pike-Bowles, Townes & Chinyamurindi 2024). Performance is often framed in terms of target-based outcomes (Govuzela & Mafini 2019) and is assessed through both financial and non-financial metrics (Sytnik & Kravchenko 2021; Taneo et al. 2020).

By fully leveraging their knowledge management and innovation capabilities, firms can achieve superior performance (Dos Santos et al. 2023). The goal should be to create synergies within the firm that serve as a coordinating mechanism, enhancing the utilisation of these capabilities for success (Ochoa-Jiménez et al. 2021). At the core of this effort is the development of capabilities specific to knowledge and innovation management (Gupta et al. 2023; Zhang et al. 2023). The management of such capabilities cannot be separated from the human resource component of the organisation (Chinyamurindi, Mathibe & Marange 2023; Ruzungunde, Chinyamurindi & Marange 2023).

The role of knowledge management and innovation capabilities is increasingly emphasised in the context of digital transformation. Digital transformation influences both societal and business performance aspects (Ivanov 2023). The emphasis is on balancing technological advancement with the creation of a human-centred society aimed at solving societal challenges (Carayannis & Morawska-Jancelewicz 2022). Digital transformation aims to foster the development of flexible industries (Xu et al. 2021), with the integration of human capabilities and machines being central to achieving organisational goals (Caggiano, Sameraro & Dassisti 2023).

Background of the study

The context of our work is situated within the South African small business context and seeks to understand issues related to innovation and knowledge management, including links to performance. Given the critical role that small businesses play in South Africa, we argue that the development of capabilities related to the management of knowledge and innovation should be prioritised (Radebe 2023). In small firms, innovation and knowledge management efforts are argued as key to realising economic returns (Cao et al. 2020; Hai et al. 2022). While small businesses are recognised for creating jobs (Sytnik & Kravchenko 2021), they also serve as a source of innovation (Mashavira 2020). The development of management capabilities within these businesses is crucial, given their potential to drive economic growth (Games & Rendi 2019) and enterprise development (Rasdien, Pooe & Munyanyi 2024).

At the small business level, managing knowledge and innovation capabilities is essential to support organisational activities (Henri & Wouters 2020). This, in turn, can inform superior performance, both financially and non-financially (Quan et al. 2021). To achieve these outcomes, small businesses must adopt a proactive approach, channelling their efforts through the management of knowledge and innovation capabilities (Sytnik & Kravchenko 2021). This responsibility lies with the management function of the firm (Papadopoulos, Baltas & Balta 2020). Effective management of these capabilities is critical for small businesses to remain competitive, especially in an evolving business environment (Cao et al. 2020). A balancing act between internal and external innovation and knowledge management efforts is necessary for success (Gupta et al. 2023).

We test our hypotheses with a sector-specific survey conducted in South Africa, focusing on small business firms with a technology emphasis. Notably, the participating small businesses utilise technology to support the digital transformation agenda, particularly in providing services for manufacturing design and operations (Papacharalampopoulos, Foteinopoulos & Stavropoulos 2023). In the South African context, there is a growing emphasis on research that focuses on small businesses as a unit of analysis (Mashavira 2020) while considering the broader goals of digital transformation. We also contribute and answer to the call to understand the capabilities needed for the superior performance of these small businesses (Byarugaba et al. 2022), particularly considering South Africa's digital transformation initiatives and agenda.

Literature review

Theoretical literature

Our theoretical grounding is premised on the knowledge-based theory, espoused through the works of Bertrand Russell, which positions knowledge as a strategic resource (Bratianu 2020). At the core, knowledge and innovation capabilities are regarded as important sources of competitive advantage (Durst et al. 2023). This highlights the need to improve organisational procedures and routines that enhance knowledge and innovation capabilities within the firm (Shuyang-Li et al. 2023). Such improvements can form the

basis for the firm's success (Anser et al. 2020) and provide a useful response to managing contemporary business challenges (Haq & Davies 2020). Furthermore, aligning with the digital transformation agenda, the success of firms depends on the synergistic link between human and machine capabilities (Chinyamurindi, Mathibe & Hove-Sibanda 2023).

Innovation capability and financial performance

The promotion of a firm's innovation capability can serve as a potential source of sustainable competitive advantage (Jarmooka et al. 2021). In essence, such a capability is a driver through which firm-specific innovations may arise (Chaithanapat & Rakthin 2021). Therefore, it is essential to ensure that resources and skills within the organisation are channelled towards promoting innovation capabilities (Boateng et al. 2020; Dileo & González-López 2019). Innovation capabilities can be enhanced by aligning the skill base within the firm with core activities that drive innovation (Taneo et al. 2020). The focus should be on ensuring a balance between what the firm excels at and what it aspires to achieve (Beynon et al. 2020). The link between human and machine capabilities, emphasised in the digital transformation context, becomes a crucial interface (Khan, Haleem & Javaid 2023).

For small businesses, the development of innovation capabilities is often tied to harnessing the intellectual capital of the firm. This activity has been shown to not only foster innovation but also lead to superior business performance (Jarmooka et al. 2021). For businesses in the technology sector, this includes ensuring sound investments in resources that support the firm's innovation capacity (Boateng et al. 2020). An investment in technology resources can also enhance innovation efforts (Papadopoulos et al. 2020). This argument aligns with the growing importance of digital transformation (Asif et al. 2023). Consequently, we argue that improving the management of innovation capabilities will lead to superior business performance. Based on the presented literature, we expect the following hypothesis:

H1: Innovation capability has a positive and statistically significant association with financial performance.

Knowledge management and financial performance

The management of knowledge within firms can be a responsive strategy to growing competition (Rehman & Iqbal 2020). Knowledge management can be considered a strategic resource for innovation (Anand et al. 2021). This involves managing both explicit and tacit knowledge resources (Mashavira, Chipunza & Dzansi 2021). The critical aspects, as argued by Bloem and Salimi (2022), are two fold: firstly, the presence of processes that encourage innovation, and secondly, the need for knowledge management efforts to support innovation. Enabling technologies within the digital transformation era need to be in place to support both innovation capability development and knowledge management efforts (Valette, Bril El-Haouzi & Demesure 2023).

In South African small businesses, knowledge management has been highlighted as a priority (Mashavira 2020). Knowledge management can assist in increasing profits, sales growth and market share (Audretsch & Belitski 2021; Sytnik & Kravchenko 2021). This positions knowledge management capabilities as potentially resulting in improved business performance (Anand et al. 2021). Knowledge management within a digital transformation context relies on resilient processes and organisational decision-making (Golovianko et al. 2023). Based on the presented literature, we expect the following hypothesis:

H2: Knowledge management capability has a significant direct and positive association with financial performance.

Mediating role of knowledge management capability

While knowledge management capabilities are essential for business performance, firms need to consider how value is linked to innovation (Teece 1986). This link is crucial, as it combines both capabilities to assist firms in performing better (Anser et al. 2020; Pike-Bowles et al. 2024). Moreover, the link between knowledge and innovation management capabilities enriches the firm's activities (Chaithanapat & Rakthin 2021; Saratchandra & Shrestha 2022). The argument here is for small businesses to focus on the novelty of their offerings through the management of both innovation and firm-specific knowledge (Jarmooka et al. 2021). Dynamic capabilities are vital processes and routines that precede superior business performance (Zahra 2021) and support the conditions necessary for digital transformation (Poláková et al. 2023).

The speed at which innovations are realised within firms depends on how knowledge is managed and applied towards achieving outcomes (Bloem & Salimi 2022). Firms that are more innovative may gain superior financial performance by adopting knowledge management practices (Yang, Guariglia & Guo 2019). This could potentially create smart industries (Selvarajan, Manoharan & Shankar 2024). This highlights the need to expand knowledge management efforts throughout the firm (Chaithanapat, Punnakitikashem & Rakthin 2022). Further, managing both knowledge and innovation capabilities presents a complex challenge that requires careful consideration (Byarugaba et al. 2022). Based on the presented literature, we expect the following hypothesis:

H3: Knowledge management capability mediates the relationship between innovation capability and financial performance.

We present the hypothesised model in Figure 1.

Figure 1 argues that both knowledge and innovation management capabilities to positively affect small business financial performance and have a mediating effect. These relationships and effects are predicted and informed by the literature review.

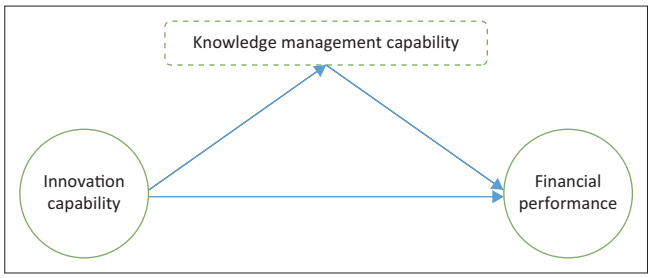

FIGURE 1: Research model.

Research methods and design

We employed a survey research strategy utilising structural equation modelling (SEM) techniques with the SmartPLS3 software. The sample consisted of technology-based small businesses from four provinces in South Africa (N = 261). The split was as follows as per province: Gauteng (n = 102), Eastern Cape (n = 35), Western Cape (n = 96) and Free State (n = 28). Key informants for the study were required to self-identify as either the owner or manager of a technology-based small business. Data collection occurred at major small business conventions in South Africa, which served as key meeting points for small businesses within the technology sector.

Three key measures were used in the study: (1) knowledge management capability, (2) innovation capability and (3) small business performance.

For the independent variable, innovation capability, we adopted a measure developed by Zhang and Hartley (2018), which consists of three items. Respondents were asked to evaluate the extent to which the statements related to their firm's response to innovation capability activities. One example item was: 'Our firm supports and encourages workers to participate in activities such as product development, innovation process improvement, and idea generation'.

The dependent variable, small business performance, was measured using financial performance indicators (Green & Medlin 2003; Spangenberg & Theron 2004), based on an eight-item scale. Respondents were asked to rate their technology-based small business against these financial performance measures.

The mediating variable, knowledge management capability, was measured using a seven-item scale (Gold, Malhotra & Segars 2001; Pérez-López & Alegre 2021). Respondents assessed the extent to which their small business demonstrated characteristics of knowledge management capabilities. An example item was: 'Our organisation has processes in place to distribute knowledge throughout the organisation'.

The study targeted small business owners or managers within the technology sector as respondents. These individuals were deemed to have relevant knowledge or experience in the technology business field. A convenience sampling technique was employed to achieve this demographic. The study adopted a quantitative approach, and data collection took place over 2 months (November to December 2021).

Data analysis was conducted using the Statistical Package for the Social Sciences (SPSS) version 27, AMOS version 22, and the PROCESS macro for SPSS (Hayes 2013). The analysis followed three steps. Firstly, a confirmatory factor analysis (CFA) was performed using AMOS to establish the validity and reliability of the measurement tools. This included a reliability analysis to ensure the robustness of the scales. Secondly, a process of scale validation, including a simple mediation analysis, was conducted using the Hayes PROCESS macro. For the mediation analysis to be valid, it was necessary to assess the data to ensure it met the assumptions of linearity, homoscedasticity, normality of estimation error and independence of observations (Hayes 2013). Thirdly, following the guidelines of MacKinnon, Fairchild and Fritz (2007), the strength of both the indirect and direct effects was evaluated to determine the results of the mediation analysis.

Ethical considerations

Ethical clearance was applied for and granted by the Institutional Faculty Research Ethics Committee at the University of Fort Hare. Ethical clearance to conduct this study was obtained from the University of Fort Hare Research Ethics Committee (No. CHI021SNGW01). As a research team, we ensured that all respondents' rights were respected during the data collection part of the research. Further, we ensured to attain clearance from the organisers of the small business conventions in South Africa, which served as key meeting points for small businesses within the technology sector and the respondents to the study.

Results

Demographic characteristics results

Regarding the demographic characteristics of the respondents, the majority were from the Western Cape province (n = 89, 43%), followed by Gauteng province (n = 67, 26%). Representation also came from the Eastern Cape province (n = 45, 17%) and KwaZulu-Natal province (n = 60, 23%). In terms of respondent roles, most identified themselves as owners of the technology-based business (n = 183, 70%), while 30% classified themselves as managers.

In terms of gender, most respondents were male (n = 177, 68%), and 32% were female. Regarding the age of the technology-based business firms, six firms were in operation for 1–3 years (2%), 47 firms had been in existence for 4–6 years (18%), while an even split existed between firms in operation for 7–9 years (40%) and those operating for 10 years or more (40%).

Results of the confirmatory factor analysis and tests for reliability

Table 1 presents the results of the confirmatory factor analysis (CFA) and tests for reliability.

Based on Table 1, the independent variable (innovation capability) consisted of three items with all factor loadings above 0.65. The average variance extracted for the construct was greater than the minimum required of 0.50. In terms of internal consistency, the innovation capability construct was above the recommended threshold of 0.70 (Nunnally 1967).

Table 2 presents the results of the CFA and tests for reliability for the dependent variable and financial performance.

Based on Table 2, the dependent variable (financial performance) consisted of eight items with all factor loadings ranging from 0.55 to above 0.66. The average variance extracted for the financial performance construct was generally found to be within the accepted minimum threshold of 0.50. Concerning the internal consistency, the financial performance construct was also above the recommended threshold of 0.70 (Nunnally 1967).

Table 3 shows the CFA and reliability tests conducted on the seven-item knowledge management capability scale.

TABLE 1: Innovation capability scale confirmatory factor analysis and internal consistency output.

Factor and respective items	CFA loadings	Alpha if item deleted
Innovation capability		
Our firm uses knowledge from different resources for product development activities efficiently and rapidly.	0.601	0.726
Our firm supports and encourages workers to participate in activities such as product development, innovation process improvement and data generation.	0.684	0.701
Our firm continuously evaluates new ideas that come from customers, suppliers and include them into product development activities.	0.694	0.693

Note: Cronbach's alpha = 0.740; Joreskog rho = 0.761; average variance extracted = 0.510.
CFA, confirmatory factor analysis.

TABLE 2: Financial performance scale confirmatory factor analysis and internal consistency output.

Relative to our competitors, rate how your organisation performance in comparison to the industry average on a 5-point Likert scale anchored between 'weaker' (1) and 'stronger' (5).	CFA loadings	Alpha if item deleted
Revenue – income generated from normal business operations.	0.568	0.726
Net income – profit that remains after all expenses and costs have been subtracted from revenue.	0.653	0.699
Cash flow – payments made into or out of a business, project or financial product.	0.661	0.682
Return on assets – a measure of the profitability of a business in relation to its equity.	0.583	0.834
Return on invested capital – a measure of the profitability and value-creating potential of the organisation relative to the amount of capital invested by shareholders and other debtholders.	0.554	0.783
Total debt to equity – shows how much debt a company has compared to its assets.	0.612	0.834
Long-term debt to equity – a comparison between an organisation's long-term debts and shareholders' equity.	0.583	0.763

Note: Cronbach's alpha = 0.861; Joreskog rho = 0.746; average variance extracted = 0.532.
CFA, confirmatory factor analysis.

Based on Tables 1–3, some conclusions can be drawn. Firstly, all the measurement models met the requirements for model fit. In essence, this meant there was a building linkage between factors and the determining contribution of constructs in measuring innovation capability, financial performance and knowledge management capability within the sampled organisations. Secondly, this allowed for further analysis to be conducted. Table 4 shows the fit indices of the constructs used.

Based on Table 4, the fit indices indicate a reasonably good model fit. For example, the knowledge management capability construct had a minimum discrepancy (CMIN)/degree of freedom (*df*) value of 2.363 (below the threshold of 3), a standardised root mean residual (SRMR) of 0.044 (below 0.05) and a comparative fit index (CFI) of 0.874. While the CFI is slightly below the ideal cutoff of 0.95, it is still within an acceptable range, suggesting an overall good fit. On the other hand, the Tucker–Lewis index (TLI) is 0.916, which is just below 0.95, and the root mean square error of approximation (RMSEA) is 0.071 with a 90% confidence interval (CI) [0.061–0.079], indicating an acceptable model fit for the knowledge management capability measurement model.

Results of the descriptive analysis

Table 5 shows a description of theoretical variables for the variables used in this study.

Based on Table 5, measured on a 5-point Likert scale, all variables and constructs reported adequate mean levels.

Simple mediation analysis

A simple mediation analysis was conducted, and the results of this are shown in Table 6. The test here was to investigate the hypothesis that knowledge management capability mediates the relationship between innovation capability and financial performance as shown in Table 6.

Based on Table 6 and through a simple mediation analysis, the following three conclusions are made.

TABLE 3: Knowledge management capability scale confirmatory factor analysis and internal consistency output.

Factor and respective items	CFA loadings	Alpha if item deleted
Knowledge management capability		
My organisation has processes to gain knowledge on our suppliers, customer and partners.	0.531	0.714
My organisation can generate new knowledge from existing new knowledge.	0.534	0.731
My organisation has processes in place to distribute knowledge throughout the organisation.	0.601	0.634
My organisation holds periodic meetings to inform employees about the latest innovations.	0.535	0.721
My organisation has formal processes to share the best practice among the different fields of activities.	0.522	0.796
In my organisation, knowledge is accessible to those who need it.	0.634	0.686
My organisation has processes for using knowledge to develop new products or services.	0.586	0.704

Note: Cronbach's alpha = 0.716; Joreskog rho = 0.702; average variance extracted = 0.565.
CFA, confirmatory factor analysis.

TABLE 4: Model fitness indices for the established measurement models.

Measurement model	CMIN/*df*	CFI	TLI	SRMR	RMSEA	90% CI
Innovation capability	2.435	0.853	0.745	0.045	0.067	0.062–0.081
Financial performance	2.231	0.834	0.933	0.012	0.057	0.000–0.134
Knowledge management capability	2.363	0.874	0.916	0.044	0.071	0.061–0.079

CMIN/*df*, discrepancy/Chi-square divided by degree of freedom; CFI, comparative fit index; TLI, Tucker–Lewis index; SRMR, standardised root mean square residual; RMSEA, root mean square error of approximation; CI, confidence interval.

TABLE 5: Descriptive summary of main theoretical variables (N = 261).

Variables	Mean	SD
Innovation capability	3.20	0.85
Knowledge management capability	4.80	1.18
Financial performance	3.30	0.81

Note: Innovation Capability and Knowledge Management Capability were measured on a 5-point Likert scale (1 – Strongly Disagree, 2 – Disagree, 3 – Neutral, 4 – Agree and 5 – Strongly Agree). Financial performance was measured on a 5-point Likert scale ranging from 1 – Weaker–5 – Stronger.

SD, standard deviation.

TABLE 6: Mediation analysis to determine the mediating effect of knowledge management capability on the relationship between innovation capability and financial performance.

Effects	Unstandardised beta coefficients		95% CI		Significance of beta coefficients	
	beta	SE	LLCI	ULCI	*t*-value	*p*
Direct effect(s)						
IC (X) → KMC (M)	0.2142*	0.0265	0.1746	0.1895	5.5435	< 0.0001
KMC (M) → FP (Y)	0.2135*	0.0454	0.0007	0.2342	1.8374	< 0.0001
IC (X) → FP (Y)	0.4114*	0.0412	0.3434	0.4323	8.3435	0.0475
Total effect of X on Y	0.4253*	0.0352	0.3144	0.5132	9.6747	< 0.0001
Indirect effect of X on Y	0.0424*	0.0134	0.0055	0.0515	-	-

Note: Number of bootstrap samples for percentile bootstrap confidence intervals = 10 000; predictor as the independent variable (X); outcome as the dependent variable (Y).

IC, innovation capability; FP, financial performance; KMC, knowledge management capability; M, mediator variable; SE, standard error; LLCI, lower-level confidence interval; ULCI, upper-level confidence interval; CI, confidence interval.

*, Significant effect at alpha = 0.05.

Firstly, concerning hypothesis 1, while controlling for knowledge management capability (mediator), the results of the regression path analysis indicated that innovation capability had a positive and statistically significant association with financial performance (β = 0.4114, t = 8.3435, p = 0.0475). In addition, the total effect of innovation capability on financial performance is statistically significant (β = 0.4253, t = 9.6747, p = < 0.0001). These results suggest that innovation capability has a direct and positive association with financial performance. As innovation capability is a significant predictor of financial performance after controlling for the mediator, knowledge management capability, this result is consistent with partial mediation.

Secondly, concerning hypothesis 2, the results reveal that knowledge management capability had a significant direct and positive association with financial performance (β = 0.2135, t = 1.8374, p = < 0.0001). Thus, there is sufficient statistical evidence to conclude that a firm's knowledge management capability to have a direct and positive association with financial performance.

Thirdly, concerning hypothesis 3, the mediation effect was examined using the indirect effect. A 95% bias-corrected CI based on 10 000 bootstrap samples indicated that the indirect effect (β = 0.0424) was entirely above zero (with 95% CI [0.0055–0.0515]). Thus, the technology firms surveyed performed better financially even after considering their innovation capability quest as an indirect effect through knowledge management capabilities. In conclusion, knowledge management capability partially mediates the relationship between innovation capability and financial performance.

Discussion

The study aimed to investigate the capabilities needed to inform the performance of small businesses in the context of South Africa, an emerging nation. The findings can be grouped into two main areas: tests for direct relationships and tests for mediation.

In terms of direct relationships, both small business innovation and knowledge management capabilities were found to have significant associations with firm performance. These results support previous research that attests to the role of capabilities, such as innovation and knowledge management, on organisational outcomes (Jarmooka et al. 2021). More specifically, the study highlights the role of these capabilities in influencing financial performance, particularly in the context of digital transformation with the technology sector in South Africa. As part of efforts to achieve superior performance, businesses should prioritise the development of capabilities related to innovation and knowledge management to realise success, especially financially.

Promoting innovation and knowledge management capabilities may serve as a distinguishing factor and a potential source of competitive advantage (Chaithanapat & Rakthin 2021). This can be achieved by ensuring that resources and organisational processes that foster innovation and knowledge management capabilities are promoted (Boateng et al. 2020; Dileo & González-López 2019). Moreover, it is essential that managers overseeing innovation and knowledge management capability development are adequately capacitated to meet the demands of digital transformation. Consideration should be given to providing appropriate skills training for these managers (Taneo et al. 2020), as they play a crucial role in implementing strategies for innovation and knowledge management (Rehman & Iqbal 2020). The capacity building of such managers is an important finding from the study, as it supports the role of innovation and knowledge management capabilities for business success.

In terms of the second set of findings, the study found partial mediation support for knowledge management capability in the relationship between small business innovation capability and financial performance. The findings underscore the importance of linking innovation and knowledge management capabilities in order to realise superior financial performance in the context of digital transformation.

Essentially, the link lies in balancing what the firm knows best through its knowledge management efforts and what it strives to achieve through innovation to stay ahead of competitors (Beynon et al. 2020).

Moreover, interventions aimed at promoting knowledge management and innovation capabilities should be encouraged, as they are linked to improved financial performance. Such efforts enable firms to gain experience in navigating context-specific challenges. These challenges require expertise in managing both innovation and knowledge (Jarmooka et al. 2021). Based on the partial mediation support, we argue that small businesses should fully utilise resources and processes that support knowledge management and innovation capabilities.

Implications

Some implications can be drawn from the study. Given the technology industry in which the sampled small businesses operate, there is a need to foster the development of resources that promote innovation and knowledge management capabilities (Papadopoulos et al. 2020). Managerial intervention is crucial for managing innovation and knowledge management effectively (Anand et al. 2021). An important implication from this study, considering the ideals of digital transformation, is the need to capacitate managers. This requires a two-fold approach, as proposed by Bloem and Salimi (2022). Firstly, the need for managers to fully exploit opportunities that encourage innovation. Secondly, mechanisms within the small business that assist in managing both innovation and knowledge capability development as informed by the first presented process. For South African technology-based small businesses striving to meet digital transformation goals, the prioritisation of innovation capabilities and knowledge management is key (Mashavira 2020). This study supports this by showing the role of firm-specific capabilities – such as innovation and knowledge management – in driving financial performance. The study also responds to calls for research exploring aspects related to digital transformation in emerging nations (Boateng et al. 2020).

Limitations and future research

Despite attempting to provide a national study of technology-based small business firms, the investigation has some limitations. Notably, the study employed a cross-sectional data collection design. Additionally, the focus was limited to small business firms that align with digital sector development. Therefore, caution should be exercised when generalising the findings. Future research could address these methodological limitations. Secondly, the respondents in this study were either owners or managers of the small technology businesses. Future studies could incorporate multiple respondents from different managerial units to assess the role of other organisational actors and units in view of innovation and knowledge management capabilities for financial success.

Conclusion

The study focused on innovation capability and knowledge management within small businesses. These concepts are dynamic and can be measured in various ways. Future research could focus on scales specific to innovation capability and knowledge management within small businesses. While this study lays the groundwork, future research should continue to explore the role of these capabilities in small business performance.

Acknowledgements

This article is initially based on the author, S.S.'s PhD thesis entitled, 'Intellectual capital, organisation capabilities and business performance among small businessess', towards the degree of Doctor of Philosophy in the Department of Business Management, Faculty of Management and Commerce, University of Fort Hare, South Africa, received in May 2022, with supervisor, Prof. W.T. Chinyamurindi. It is available here: core.ac.uk/download/618256684.pdf.

This article is based on research previously presented in abstract form at the MBALI Conference held in Richard's Bay on 29 July 2025 to 31 July 2025. The abstract has since been developed into a full manuscript, which has been expanded and revised for journal publication. This republication is done with permission from the conference organisers

Competing interests

The authors reported that they received funding from the Health and Welfare Sector Education Training Authority, which may be affected by the research reported in the enclosed publication. The authors have disclosed those interests fully and have implemented an approved plan for managing any potential conflicts arising from their involvement. The terms of these funding arrangements have been reviewed and approved by the affiliated university in accordance with its policy on objectivity in research.

Authors' contributions

S.S. and W.T.C. contributed equally to the conceptualisation, writing and editing of the manuscript and share first authorship. All authors contributed to the article, discussed the results and approved the final version for submission and publication.

Funding information

The authors disclosed receipt of the following financial support for the research, authorship and publication of this article. This work was supported by the Health and Welfare Sector Education Training Authority.

Data availability

The data that support the findings of this study are available from the corresponding author, W.T.C., upon reasonable request.

Disclaimer

The views and opinions expressed in this article are those of the authors and are the product of professional research. It does not necessarily reflect the official policy or position of any affiliated institution, funder, agency or that of the publisher. The authors are responsible for this article's results, findings and content.

References

Aliu, J. & Aigbavboa, C., 2019, 'Examining the roles of human capital theory. What next for the construction industry?', *Journal of Physics: Conference Series* 1378(2), 1–8. https://doi.org/10.1088/1742-6596/1378/2/022057

Anand, A., Muskat, B., Creed, A., Zutshi, A. & Csepregi, A., 2021, 'Knowledge sharing, knowledge transfer and SMEs: Evolution, antecedents, outcomes and directions', *Personnel Review* 50(9), 1873–1893. https://doi.org/10.1108/PR-05-2020-0372

Anser, M.K., Yousaf, Z., Yasir, M., Sharif, M., Nasir, M.H., Rasheed, M.I. et al., 2020, 'How to unleash innovative work behavior of SMEs' workers through knowledge sharing? Accessing functional flexibility as a mediator', *European Journal of Innovation Management* 25(1), 233–248. https://doi.org/10.1108/EJIM-11-2019-0332

Asif, M., Searcy, C. & Castka, P., 2023, 'ESG and Industry 5.0: The role of technologies in enhancing ESG disclosure', *Technological Forecasting & Social Change* 195, 1–12. https://doi.org/10.1016/j.techfore.2023.122806

Audretsch, D.B. & Belitski, M., 2021, 'Knowledge complexity and firm performance: Evidence from the European SMEs', *Journal of Knowledge Management* 25(4), 693–713. https://doi.org/10.1108/JKM-03-2020-0178

Beynon, M.J., Jones, P., Pickernell, D. & Huang, H., 2020, 'Growth and innovation of SMEs in local enterprise partnerships regions: A configurational analysis using fsQCA', *International Journal of Entrepreneurship and Innovation* 21(2), 83–100. https://doi.org/10.1177/1465750319846827

Bloem, V. & Salimi, N., 2022, 'Role of knowledge management processes within different stages of technological innovation: Evidence from biotechnology SMEs', *Knowledge Management Research & Practice* 21(4), 1–15. https://doi.org/10.1080/14778238.2022.2064352

Boateng, H., Visnupriyan, R., Ofori, K.S. & Hinson, C.R.E., 2020, 'Examining the link between social capital, knowledge quality, SMEs innovativeness and performance', *Business Information Review* 37(2), 1–9. https://doi.org/10.1177/0266382120970157

Bratianu, C., 2020, 'A knowledge management approach to complex crises', *Management Dynamics in the Knowledge Economy* 8(4), 345–356. https://doi.org/10.2478/mdke-2020-0022

Byarugaba, J.K., Mafabi, S., Dywili, M., Kyogabiirwe, B.J. & Chinyamurindi, W.T., 2022, 'Mediation of psychological capital on the relationship between human resource management practices and firm financial performance: South African findings', *International Journal of Business and Society* 23(2), 1066–1085. https://doi.org/10.33736/ijbs.4858.2022

Caggiano, M., Sameraro, C. & Dassisti, M., 2023, 'A metamodel for designing assessment models to support the transition of production systems towards Industry 5.0', *Computers in Industry* 152, 1–15. https://doi.org/10.1016/j.compind.2023.104008

Cao, S., Feng, F., Chen, W. & Zhou, C., 2020, 'Does market competition promote innovation efficiency in China's high-tech industries?', *Technology Analysis & Strategic Management* 32(4), 429–442. https://doi.org/10.1080/09537325.2019.1667971

Carayannis, E.G. & Morawska-Jancelewicz, J., 2022, 'The futures of Europe: Society 5.0 and industry 5.0 as driving forces of future universities', *Journal of Knowledge Economy* 13, 3445–3471. https://doi.org/10.1007/s13132-021-00854-2

Chaithanapat, P. & Rakthin, S., 2021, 'Customer knowledge management in SMEs: Review and research agenda', *Knowledge and Process Management* 28(1), 71–89. https://doi.org/10.1002/kpm.1653

Chaithanapat, P., Punnakitikashem, P., Oo, N. & Rakthin, S., 2022, 'Relationships among knowledge-oriented leadership, customer knowledge management, innovation quality, and firm performance in SMEs', *Journal of Innovation & Knowledge* 7(1), 1–10. https://doi.org/10.1016/j.jik.2022.100162

Chigori, D., Chinyamurindi, W.T. & Rungani, E., 2024, 'Development of a dynamic innovation management model for ambidextrous SMEs: Insights from a bibliometrics analysis', *South African Journal of Business Management* 55(1), 1–11. https://doi.org/10.4102/sajbm.v55i1.4282

Chinyamurindi, W., Mathibe, M. & Hove-Sibanda, P., 2023, 'Social enterprise performance in South Africa: The role of strategic planning and networking capability', *Journal of Social Entrepreneurship* 1–18. https://doi.org/10.1080/19420676.2023.2212672

Chinyamurindi, W., Mathibe, M. & Marange, C.S., 2023, 'Promoting talent through managing mental health: The role of decent work and organisational citizenship behaviour', *SA Journal of Industrial Psychology/SA Tydskrif vir Bedryfsielkunde* 49, a2057. https://doi.org/10.4102/sajip.v49i0.2057

Dileo, I. & González-López, M., 2019, 'Entrepreneurship, technological upgrading, and innovation policy', *Journal of Entrepreneurship, Management, and Innovation* 15(3), 7. https://doi.org/10.1111/ecot.12135

Dos Santos, I., Chinkes, A. & Carvalho, M.A.G., 2023, 'The digital competence of academics in higher education: Is the glass half empty or half full?', *International Journal of Education Technology in Higher Education* 20(9), 1–25. https://doi.org/10.1186/s41239-022-00376-0

Durst, S., Edvardsson, I.R. & Foli, S., 2023, 'Knowledge management in SMEs: A follow-up literature review', *Journal of Knowledge Management* 27(11), 25–58. https://doi.org/10.1108/JKM-04-2022-0325

Games, D. & Rendi, R.P., 2019, 'The effects of knowledge management and risk taking on SME financial performance in creative industries in an emerging market: The mediating effect of innovation outcomes', *Journal of Global Entrepreneurship Research* 9, 44. https://doi.org/10.1186/s40497-019-0167-1

Gold, A.H., Malhotra, A. & Segars, A.H., 2001, 'Knowledge management: An organizational capabilities perspective', *Journal of Management Information Systems* 18(1), 185–214. https://doi.org/10.1080/07421222.2001.11045669

Golovianko, M., Terziyan, V., Branytskyi, V. & Malyk, D., 2023, 'Industry 4.0 vs. Industry 5.0: Co-existence, transition, or a hybrid?', *Procedia Computer Science* 217(4), 102–113. https://doi.org/10.1016/j.procs.2022.12.206

Govuzela, S. & Mafini, C., 2019, 'Organisational agility, business best practices and the performance of small to medium enterprises in South Africa', *South African Journal of Business Management* 50(1), 1–13. https://doi.org/10.4102/sajbm.v50i1.1417

Green, K.W. & Medlin, B., 2003, 'The strategic planning process: The link between mission statement and organizational performance', *Academy of Strategic Management Journal* 2(4), 23–31.

Gueler, M.S. & Schneider, S., 2021, 'The resource-based view in business ecosystems: A perspective on the determinants of a valuable resource and capability', *Journal of Business Research* 133, 158–169. https://doi.org/10.1016/j.jbusres.2021.04.061

Gupta, S., Tuunanen, T., Kar, A.K. & Modgil, S., 2023, 'Managing digital knowledge for ensuring business efficiency and continuity', *Journal of Knowledge Management* 27(2), 245–263. https://doi.org/10.1108/JKM-09-2021-0703

Hai, B., Yin, X., Xiong, J. & Chen, J., 2022, 'Could more innovation output bring better financial performance? The role of financial constraints', *Journal of Financial Innovation* 8(1), 6. https://doi.org/10.1186/s40854-021-00309-2

Haq, M. & Davies, J., 2020, 'The person with maximum knowledge will win the race: Conceptualizing knowledge in microbusinesses', *Journal of Small Business Management* 61(2), 295–321. https://doi.org/10.1080/00472778.2020.1768799

Hayes, A.F., 2013, *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*, Guilford Press, New York, NY.

Henri, J.F. & Wouters, M., 2020, 'Interdependence of management control practices for product innovation: The influence of environmental unpredictability', *Accounting, Organizations and Society* 86, 1–14. https://doi.org/10.1016/j.aos.2019.101073

Ivanov, D., 2023, 'The Industry 5.0 framework: Viability-based integration of the resilience, sustainability, and human-centricity perspectives', *International Journal of Production Research* 61(5), 1683–1695. https://doi.org/10.1080/00207543.2022.2118892

Jarmooka, Q., Fulford, R.G., Morris, R. & Barratt-Pugh, L., 2021, 'The mapping of information and communication technologies, and knowledge management processes, with company innovation', *Journal of Knowledge Management* 25(2), 313–335. https://doi.org/10.1108/JKM-01-2020-0061

Khan, M., Haleem, A. & Javaid, M., 2023, 'Changes and improvements in Industry 5.0: A strategic approach to overcome the challenges of Industry 4.0', *Green Technologies and Sustainability* 1(1), 1–9. https://doi.org/10.1016/j.grets.2023.100020

Leng, J., Sha, W., Wang, B., Zheng, P., Zhuang, C. & Liu, Q., 2022, 'Industry 5.0: Prospect and retrospect', *Journal of Manufacturing Systems* 65, 279–295. https://doi.org/10.1016/j.jmsy.2022.09.017

MacKinnon, D.P., Fairchild, A.J. & Fritz, M.S., 2007, 'Mediation analysis', *Annual Review of Psychology* 58, 593–614. https://doi.org/10.1146/annurev.psych.58.110405.085542

Mashavira, N., 2020, 'The perceived impact of performance appraisal on the performance of small-to-medium-sized enterprises in Zimbabwe', *Acta Commercii* 20(1), 1–9. https://doi.org/10.4102/ac.v20i1.888

Mashavira, N., Chipunza, C. & Dzansi, D.Y., 2021, 'Managerial political competencies and the performance of small and medium-sized enterprises in South Africa', *Acta Commercii* 21(1), 1–13. https://actacommercii.co.za/index.php/acta/article/view/884

Nunnally, J.C., 1967, *Psychometric theory*, McGraw-Hill, New York, NY.

Ochoa-Jiménez, S., Leyva-Osuna, B.A., Jacobo-Hernández, C.A. & García-García, A.R., 2021, 'Knowledge management in relation to innovation and its effect on the sustainability of Mexican tourism companies', *Sustainability* 13(24), 13790. https://doi.org/10.3390/su132413790

Odor, H.O., 2018, 'Knowledge management', *Journal of Business Finance Affairs* 7(2), 335. https://doi.org/10.4172/2167-0234.1000335

Papacharalampopoulos, A., Foteinopoulos, P. & Stavropoulos, P., 2023, 'Integration of Industry 5.0 requirements in digital twin-supported manufacturing process selection: A framework', *Procedia CIRP* 119, 545–551. https://doi.org/10.1016/j.procir.2023.06.197

Papadopoulos, T., Baltas, K.N. & Balta, M.E., 2020, 'The use of digital technologies by small and medium enterprises during COVID-19: Implications for theory and practice', *International Journal of Information Management* 55, 102192. https://doi.org/10.1016/j.ijinfomgt.2020.102192

Pereira, V., Mellahi, K., Temouri, Y., Patnaik, S. & Roohanifar, M., 2019, 'Investigating dynamic capabilities, agility and knowledge management within EMNEs – Longitudinal evidence from Europe', *Journal of Knowledge Management* 23(9), 1708–1728. https://doi.org/10.1108/JKM-06-2018-0391

Pérez-López, S. & Alegre, J., 2021, 'Information technology competency, knowledge processes and firm performance', *Industrial Management & Data Systems* 112(4), 644–662. https://doi.org/10.1108/imds

Pike-Bowles, A., Townes, J. & Chinyamurindi, W.T., 2024, 'The role of strategic flexibility and dynamic capabilities on family business performance', *Southern African Journal of Entrepreneurship and Small Business Management* 16(1), 1–11. https://scielo.org.za/pdf/sajesbm/v16n1/06.pdf

Poláková, M., Suleimanová, J.H., Madzík, P., Copuš, L., Molnárová, I. & Polednová, J., 2023, 'Soft skills and their importance in the labour market under the conditions of Industry 5.0', *Heliyon* 27(9), 1–20. https://doi.org/10.1016/j.heliyon.2023.e18670

Quan, X., Xiao, H., Ji, Q. & Zhang, J., 2021, 'Can innovative knowledge management platforms lead to corporate innovation? Evidence from academician workstations in China', *Journal of Knowledge Management*, 25(1), 117–135. https://doi.org/10.1108/JKM-12-2019-0684

Radebe, N.T., 2023, 'Intrapreneurship and dynamic capabilities interplay: Insights of a diamond mine', *Acta Commercii*, 24(1), 1–8. https://doi.org/10.4102/ac.v24i1.1178

Rasdien, Z., Pooe, D. & Munyanyi, W., 2024, 'Supplier relationship management for enterprise development in the cement industry', *Southern African Journal of Entrepreneurship and Small Business Management*, 16(1), 1–9. https://doi.org/10.4102/sajesbm.v16i1.771

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

Ruzungunde, V., Chinyamurindi, W.T. & Marange, C.S., 2023, 'Determinants of mental health: Role of organisational climate and decent work amongst employees', *SA Journal of Human Resource Management/SA Tydskrif vir Menslikehulpbronbestuur*, 21, a2105. https://doi.org/10.4102/sajhrm.v21i0.2105

Saratchandra, M. & Shrestha, A., 2022, 'The role of cloud computing in knowledge management for small and medium enterprises: A systematic literature review', *Journal of Knowledge Management*, 26(10), 2668–2698. https://doi.org/10.1108/JKM-06-2021-0421

Selvarajan, S., Manoharan, H. & Shankar, A., 2024, 'SL-RI: Integration of supervised learning in robots for Industry 5.0 automated application monitoring', *Measurement: Sensors* 31, 1–13. https://doi.org/10.1016/j.measen.2023.100972

Shuyang Li, S., Martins, J.T., Vasconcelos, A.C. & Peng, G., 2023, 'Knowledge sharing in project work: The dynamic interplay of knowledge domains and skills', *Journal of Knowledge Management* 27(2), 328–355. https://doi.org/10.1108/JKM-06-2021-0455

Spangenberg, H.H. & Theron, C., 2004, 'Development of a questionnaire for assessing work unit performance', *South African Journal of Industrial Psycho*logy 30(1), 19–28. https://doi.org/10.4102/sajip.v30i1.134

Sytnik, N. & Kravchenko, M., 2021, 'Application of knowledge management tools: Comparative analysis of small, medium, and large enterprises', *Journal of Entrepreneurship, Management, and Innovation* 17(4), 121–156. https://doi.org/10.7341/20211745

Taneo, S., Hadiwidjodo, D. & Sudjatno, S., 2020, 'Creative destruction and knowledge creation as the mediation between innovation speed and competitiveness of food small and medium-sized enterprises in Malang, Indonesia', *Competitiveness Review: An International Business Journal* 30(2), 195–218. https://doi.org/10.1108/CR-12-2017-0090

Teece, D.J., 1986, 'Profiting from technological innovation: Implications for integration, collaboration, licensing and public policy', *Research Policy* 15, 285–305. https://doi.org/10.1016/0048-7333(86)90027-2

Valette, E., Bril El-Haouzi, H. & Demesure, G., 2023, 'Industry 5.0 and its technologies: A systematic literature review upon the human place into IoT- and CPS-based industrial systems', *Computers & Industrial Engineering* 184, 1–16. https://doi.org/10.1016/j.cie.2023.109426

Wang, C., Chin, T. & Lin, J.H., 2020, 'Openness and firm innovation performance: The moderating effect of ambidextrous knowledge search strategy', *Journal of Knowledge Management* 24(2), 301–323. https://doi.org/10.1108/JKM-04-2019-0198

Wang, Z., 2024, 'Linking innovative knowledge sharing and employees' innovative behaviour: The mediating role of thriving at work', *Knowledge Management Research & Practice* 1–11. https://doi.org/10.1080/14778238.2023.2261411

Xu, X., Lu, Y., Vogel-Heuser, B. & Wang, L., 2021, 'Industry 4.0 and Industry 5.0 – Inception, conception and perception', *Journal of Manufacturing Systems* 61(2), 530–535. https://doi.org/10.1016/j.jmsy.2021.10.006

Yang, J., Guariglia, A. & Guo, J., 2019, 'To what extent does corporate liquidity affect M&A decisions, method of payment and performance? Evidence from China', *Journal of Corporate Finance* 54, 128–152. https://doi.org/10.1016/j.jcorpfin.2017.09.012

Zahra, S.A., 2021, 'International entrepreneurship in the post COVID world', *Journal of World Business* 56(1), 1–8. https://doi.org/10.1016/j.jwb.2020.101143

Zhang, M. & Hartley, J.L., 2018, 'Guanxi, IT systems, and innovation capability: The moderating role of proactiveness', *Journal of Business Research* 90, 75–86. https://doi.org/10.1016/j.jbusres.2018.04.036

Zhang, W., Jiang, Y., Zhou, W. & Pan, W., 2023, 'Antecedents of knowledge-seeking intentions and efforts within new product development teams: Empirical evidence from knowledge-based Chinese companies', *Journal of Knowledge Management* 27(2), 356–382. https://doi.org/10.1108/JKM-08-2021-0617