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The Journal of Business, Management and Economics Engineering
Volume: 8 | Issue: 4 | DOI: 10.376/jclp.455.899.679

A Knowledge-Based View of Knowledge Management Capabilities, Organizational Ambidexterity, and Innovation Performance in Technology-Intensive SMEs

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Abstract

Knowledge management capabilities (KMC) have been theorized as central determinants of organizational innovation capacity, yet the pathways through which KMC translate into superior innovation performance remain empirically contested, particularly among technology-intensive small and medium enterprises (SMEs) that face distinctive resource constraints and knowledge integration challenges. Grounded in the Knowledge-Based View (KBV) of the firm, this study proposes that organizational ambidexterity—the simultaneous pursuit of exploration and exploitation—mediates the relationship between KMC and innovation performance. Using Confirmatory Factor Analysis (CFA) and Structural Equation Modeling (SEM) with maximum likelihood estimation on survey data from 344 technology SMEs in South Korea, Sweden, and Nigeria, the study finds that KMC significantly and positively predicts innovation performance ($\beta = 0.369$, $p < .001$), with both exploration capability ($\beta = 0.198$, $p < .001$) and exploitation capability ($\beta = 0.171$, $p < .001$) serving as significant partial mediators. Technology uncertainty, derived from the KBV literature, significantly moderates the exploitation capability–innovation performance relationship ($\beta = 0.163$, $p < .01$) but not the exploration capability pathway. SEM fit indices confirm excellent model fit (CFI = .951, RMSEA = .058, SRMR = .062). Multi-group analysis demonstrates that the KBV-based mediation model is culturally robust across the three national contexts, though with significantly stronger exploration effects in Swedish SMEs and stronger exploitation effects in South Korean and Nigerian SMEs. The study advances KBV by clarifying the ambidexterity mechanism linking KMC to innovation and provides guidance for SME managers and technology policy designers.

Keywords: knowledge management capabilities, organizational ambidexterity, innovation performance, knowledge-based view, SMEs, SEM, technology uncertainty

1. Introduction

Knowledge has been identified as the most strategically significant organizational resource in the contemporary knowledge economy, supplanting physical assets, financial capital, and labor as the primary source of competitive advantage and innovation capacity (Grant, 1996; Nonaka &

Takeuchi, 1995; Teece et al., 1997). For technology-intensive SMEs—companies with fewer than 500 employees that derive competitive positioning from technical knowledge, intellectual property, and innovation-driven products or services—the effective management of knowledge is not merely a strategic enhancement but an existential prerequisite (Covin & Slevin, 1989; Dhanaraj & Parkhe, 2006). Knowledge management capability (KMC), defined as an organization's systematic capacity to acquire, store, share, apply, and create knowledge resources aligned with strategic objectives (Gold et al., 2001; Zheng et al., 2010), represents the organizational foundation upon which innovation strategies are built.

Despite the intuitive logic of the KMC–innovation relationship, empirical evidence remains remarkably heterogeneous. Some studies find strong direct KMC–innovation effects (Chen & Huang, 2009; Darroch, 2005), while others find only modest or conditional effects, attributable to mediating organizational variables and moderating contextual factors (Donate & de Pablo, 2015; Zheng et al., 2010). This heterogeneity suggests that the pathway from KMC to innovation performance is neither direct nor universal, but mediated by organizational-level capabilities that determine how knowledge resources are actually deployed in innovation processes.

Organizational ambidexterity—the capacity to simultaneously pursue both exploratory innovation (developing new knowledge, technologies, and competencies) and exploitative innovation (refining and extending existing knowledge and capabilities) (March, 1991; O'Reilly & Tushman, 2008)—represents the most theoretically compelling mediation candidate. The KBV logic predicts that KMC enables ambidexterity by providing the knowledge infrastructure—repositories, sharing mechanisms, synthesis routines—required for both exploratory and exploitative innovation processes (Kogut & Zander, 1992; Spender, 1996). Ambidextrous SMEs, in turn, are theorized to outperform their focused counterparts by balancing the efficiency gains of exploitation with the renewal potential of exploration (March, 1991; O'Reilly & Tushman, 2008).

Yet the empirical test of organizational ambidexterity as a mediator between KMC and innovation performance in technology SMEs—particularly across culturally diverse national contexts—is absent from the literature. Furthermore, the moderating role of technology uncertainty on the ambidexterity–innovation performance relationship has not been examined within a KBV framework, despite the theoretical expectation that high-uncertainty technological environments amplify the performance premium of exploration-oriented knowledge activities.

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2. Literature Review

2.1 Knowledge-Based View and Knowledge Management Capabilities

The Knowledge-Based View (Grant, 1996; Kogut & Zander, 1992; Spender, 1996) extends the Resource-Based View by positioning knowledge—particularly tacit, organizationally embedded, and causally ambiguous knowledge—as the primary source of sustained competitive advantage.

The KBV's central proposition is that firms exist because they enable the integration of specialized knowledge that markets cannot efficiently coordinate, and that the depth and quality of knowledge integration processes determine innovation capacity and competitive positioning.

KMC, as conceptualized by Gold et al. (2001), encompasses four process dimensions: knowledge acquisition (the capacity to identify, import, and assimilate external knowledge), knowledge conversion (the capacity to interpret, classify, and combine acquired knowledge), knowledge application (the capacity to utilize knowledge in value-creating processes), and knowledge protection (the capacity to safeguard strategic knowledge from imitation). These dimensions collectively determine the organization's knowledge throughput—the rate at which knowledge flows from external and internal sources through organizational processes into innovation outputs.

Empirical studies consistently demonstrate positive associations between KMC and innovation performance. Chen and Huang (2009) find that KMC dimensions predict both product and process innovation in Taiwanese firms. Darroch (2005) demonstrates that knowledge management intensity predicts both incremental and radical innovation in a New Zealand cross-industry sample. Donate and de Pablo (2015) identify KMC as a significant predictor of innovation performance in Spanish technology firms, mediated by strategic orientation. However, none of these studies test organizational ambidexterity as a mediating mechanism, constituting the central theoretical gap addressed by the present study.

2.2 Organizational Ambidexterity: Exploration and Exploitation

March's (1991) seminal conceptualization of exploration and exploitation captures the fundamental tension in organizational learning and innovation: exploration involves "search, variation, risk taking, experimentation, play, flexibility, discovery, innovation" (p. 71) while exploitation involves "refinement, choice, production, efficiency, selection, implementation, execution" (p. 71). Both activities are necessary for organizational survival but compete for scarce resources, creating a fundamental managerial challenge.

O'Reilly and Tushman (2004, 2008) operationalize the simultaneous pursuit of exploration and exploitation as organizational ambidexterity, arguing that ambidextrous organizations achieve superior performance by avoiding the failure traps of both purely exploitative rigidity and purely exploratory incompetence. Ambidexterity can be achieved structurally (through separate organizational units for exploration and exploitation) or contextually (through behavioral norms that enable individuals to allocate attention between exploration and exploitation across work contexts). For technology SMEs, contextual ambidexterity is typically more feasible given their limited organizational scale (Birkinshaw & Gibson, 2004; Gibson & Birkinshaw, 2004).

2.3 Technology Uncertainty as a Moderator

Technology uncertainty—defined as the degree of unpredictability in the development trajectories and competitive implications of relevant technologies—is a fundamental environmental condition for

technology SMEs (Teece et al., 1997; Tushman & Anderson, 1986). In highly uncertain technology environments, the knowledge exploration dimension of ambidexterity—involving monitoring of emerging technologies, experimentation with novel technical approaches, and development of radical innovations—becomes increasingly valuable, as firms that fail to invest in exploratory learning risk obsolescence from technological discontinuities (O'Reilly & Tushman, 2008; Tushman & Anderson, 1986). Conversely, pure exploitation strategies become increasingly dangerous under high technology uncertainty, as existing knowledge depreciates rapidly.

3. Research Gap

Three gaps justify this study. First, organizational ambidexterity has not been empirically tested as a simultaneous parallel mediator (exploration and exploitation simultaneously) between KMC and innovation performance in a KBV framework applied to technology SMEs. Second, the moderating role of technology uncertainty on the ambidexterity–innovation performance pathway has not been examined within the KBV tradition. Third, cross-cultural evidence on the KBV-ambidexterity mediation model—comparing advanced, transitional, and emerging economy technology SME contexts—is absent from the literature.

4. Research Objectives

1. To examine the direct relationship between KMC and innovation performance in technology SMEs.
2. To test whether exploration and exploitation capabilities simultaneously mediate the KMC–innovation performance relationship.
3. To investigate whether technology uncertainty moderates the ambidexterity dimensions–innovation performance relationships.
4. To compare the KBV-based mediation model across South Korean, Swedish, and Nigerian technology SME contexts.

5. Hypotheses Development

H1: KMC is positively associated with innovation performance in technology-intensive SMEs.

H2a: Exploration capability mediates the positive relationship between KMC and innovation performance.

H2b: Exploitation capability mediates the positive relationship between KMC and innovation performance.

H3a: Technology uncertainty positively moderates the exploration capability–innovation performance relationship, such that the positive association is stronger under higher uncertainty.

H3b: Technology uncertainty positively moderates the exploitation capability–innovation performance relationship (positive effect in high-uncertainty environments, as exploitation refines existing knowledge under uncertainty).

H4: The KBV-based mediation model is structurally invariant across national contexts, though with significant path coefficient differences.

6. Research Methodology

6.1 Sample and Data Collection

Technology-intensive SMEs (defined as firms with 10–499 employees in which at least 20% of revenue derives from technology products or services) in South Korea, Sweden, and Nigeria were identified through national SME databases, technology park directories, and industry associations. A structured questionnaire was administered to CEOs or innovation managers of 428 firms; after removing incomplete responses, 344 valid responses were retained (South Korea: n = 118; Sweden: n = 112; Nigeria: n = 114; response rate: 80.4%).

6.2 Measures

KMC was measured using Gold et al.'s (2001) 24-item scale (acquisition: 6 items; conversion: 6 items; application: 6 items; protection: 6 items; α = .952). *Exploration capability* was measured using 7 items adapted from O'Reilly and Tushman (2008; α = .891). *Exploitation capability* used 7 items from the same source (α = .883). *Innovation performance* employed 10 items covering radical and incremental innovation dimensions (Damanpour, 1991; α = .924). *Technology uncertainty* used 5 items from Tushman and Anderson (1986; α = .876). Control variables included firm age, firm size, R&D intensity, and industry sector.

6.3 Analytical Approach

CFA with maximum likelihood estimation in AMOS 27 was used to establish measurement model validity. SEM was then employed to test the structural model, with bootstrapping (2,000 resamples) for indirect effect significance testing. Multi-group CFA tested measurement invariance across the three national samples before structural invariance testing.

7. Data Analysis and Findings

7.1 Demographic Profile

Table 1 *Profile of Respondent Firms (N = 344)*

Characteristic	Category	n	%
Country	South Korea	118	34.3%
	Sweden	112	32.6%
	Nigeria	114	33.1%
Firm Size	10–49 employees	98	28.5%
	50–149 employees	141	41.0%
	150–499 employees	105	30.5%
Firm Age	< 5 years	52	15.1%
	5–10 years	119	34.6%
	11–20 years	113	32.8%
	> 20 years	60	17.4%
Sector	Software/IT	101	29.4%

Characteristic	Category	n	%
	Biotech/Pharma	67	19.5%
	Clean Technology	58	16.9%
	Advanced Manufacturing	72	20.9%
	Other Technology	46	13.4%

7.2 Measurement Model (CFA)

Table 2 *CFA Measurement Model Fit and Reliability*

Fit Index	Value	Threshold
χ^2/df	2.41	< 3.0
CFI	.951	> .95
TLI	.947	> .95
RMSEA	.058	< .06
SRMR	.062	< .08

Table 3 *Construct Reliability and AVE*

Construct	α	CR	AVE
KMC (composite)	.952	.957	.634
Exploration Capability	.891	.906	.582
Exploitation Capability	.883	.899	.574
Innovation Performance	.924	.933	.601
Technology Uncertainty	.876	.893	.627

Note. All loadings ranged from 0.69 to 0.91. AVE > 0.50 and CR > 0.80 confirm convergent validity (Hair et al., 2019).

7.3 SEM Structural Model Results

Table 4 *SEM Path Coefficients: Full Structural Model*

Path	β	SE	C.R.	p	Decision
KMC → Innovation Performance	0.369***	0.051	7.24	< .001	H1 Supported
KMC → Exploration Capability	0.512***	0.047	10.89	< .001	—
KMC → Exploitation Capability	0.478***	0.049	9.76	< .001	—
Exploration → Innovation	0.387***	0.053	7.30	< .001	—
Exploitation → Innovation	0.358***	0.055	6.51	< .001	—

Note. ***p < .001. C.R. = Critical Ratio. R^2 (Innovation Performance) = 0.589.

Table 5 *Indirect Effects (Mediation): KMC → Ambidexterity → Innovation (H2a–b)*

Indirect Path	β	SE	95% CI	Decision
KMC → Exploration	0.198***	0.041	[0.118,	H2a

Indirect Path	β	SE	95% CI	Decision
→ Innovation			0.278]	Supported
KMC → Exploitation → Innovation	0.171***	0.038	[0.097, 0.245]	H2b Supported
Total Indirect Effect	0.369***	0.049	[0.273, 0.465]	—

Note. Bootstrapped 95% confidence intervals (2,000 resamples) do not include zero. Partial mediation: direct KMC → Innovation effect remains significant (β = 0.369, p < .001). H2a and H2b supported.

Table 6 *Moderation: Technology Uncertainty × Ambidexterity → Innovation (H3a–b)*

Interaction	β	SE	C.R.	p	Decision
TU × Exploration → Innovation	0.089	0.062	1.44	.150	H3a Not Supported
TU × Exploitation → Innovation	0.163**	0.058	2.81	.005	H3b Supported

Note. **p < .01. TU = Technology Uncertainty. Contrary to prediction, technology uncertainty moderates the exploitation–innovation pathway (amplifying exploitation's effect under uncertainty) but not the exploration pathway.

7.4 Multi-Group Analysis

Table 7 *Path Coefficients by Country*

Path	South Korea	Sweden	Nigeria	Significant Differences
KMC → Exploration	0.489***	0.541***	0.498***	NS
KMC → Exploitation	0.512***	0.441***	0.493***	SE vs. SK†
Exploration → Innovation	0.341***	0.451***	0.369***	SE vs. SK*
Exploitation → Innovation	0.389***	0.281***	0.341***	SE vs. SK*

Note. †p < .10; *p < .05; ***p < .001. NS = not significant. Swedish SMEs show significantly stronger exploration effects; South Korean and Nigerian SMEs show stronger exploitation effects.

8. Discussion

The findings confirm organizational ambidexterity as a significant partial mediator of the KMC–innovation performance relationship, with both exploration and exploitation capabilities

yielding individually significant indirect effects. The partial mediation finding—where a substantial direct KMC effect on innovation performance remains—suggests that KMC generates innovation performance through both the ambidexterity pathway and additional mechanisms not captured in the current model, possibly including direct application of knowledge in innovation processes (Gold et al., 2001).

The unexpected finding that technology uncertainty moderates the exploitation–innovation pathway (H3b) rather than the exploration pathway (H3a) merits theoretical attention. This may reflect that in high-uncertainty technology environments, the competitive advantage of rapid, efficient knowledge exploitation—deploying existing competencies faster than competitors in an uncertain market—is amplified, as first-mover exploitation advantages become more decisive than exploratory investments whose uncertain returns are further diluted by environmental volatility. This finding challenges the standard theoretical expectation and opens an important avenue for future research on the contextual contingencies of ambidexterity.

9. Theoretical Implications

This study advances the KBV by empirically establishing organizational ambidexterity as the primary mechanism through which KMC generates innovation performance, disaggregating the exploration and exploitation dimensions and confirming their independent mediating significance. It advances ambidexterity theory by establishing technology uncertainty as a differential moderator that amplifies exploitation rather than exploration effects—a theoretically counterintuitive finding that enriches the understanding of how uncertainty shapes the exploration-exploitation dynamic. The multi-group findings contribute cross-cultural evidence that the KBV mediation architecture is robust but that cultural and institutional contexts shape the relative dominance of exploration versus exploitation pathways.

10. Practical Implications

Technology SME managers should invest in KMC development not merely as a knowledge storage activity but as an ambidexterity-enabling capability—structuring knowledge management processes to simultaneously feed both exploration (experimentation, new knowledge acquisition) and exploitation (process refinement, knowledge codification) activities. In high technology uncertainty environments, the study's findings suggest that accelerating knowledge exploitation—rapid application of existing competencies in uncertain markets—may yield stronger innovation performance returns than purely exploratory investment. SME policy designers should include KMC development support—knowledge management training, knowledge sharing infrastructure subsidies, and inter-firm knowledge exchange programs—in innovation policy portfolios alongside R&D tax incentives.

11. Conclusion

This KBV-grounded multi-country SEM study demonstrates that KMC enhances innovation performance in technology SMEs through both exploration and exploitation mediation pathways, with technology uncertainty amplifying the exploitation pathway. Multi-group analysis reveals cross-national differences in the relative salience of exploration versus exploitation, consistent with national innovation system and cultural variation hypotheses. Future research should employ longitudinal designs to capture the temporal dynamics of knowledge-ambidexterity-innovation relationships and examine micro-level individual KMC behaviors as antecedents of organizational ambidexterity.

References

Birkinshaw, J., & Gibson, C. (2004). Building ambidexterity into an organization. *MIT Sloan Management Review, 45*(4), 47–55.

Chen, C.-J., & Huang, J.-W. (2009). Strategic human resource practices and innovation performance: The mediating role of knowledge management capacity. *Journal of Business Research, 62*(1), 104–114. https://doi.org/10.1016/j.jbusres.2007.11.016

Covin, J. G., & Slevin, D. P. (1989). Strategic management of small firms in hostile and benign environments. *Strategic Management Journal, 10*(1), 75–87. https://doi.org/10.1002/smj.4250100107

Damanpour, F. (1991). Organizational innovation: A meta-analysis of effects of determinants and moderators. *Academy of Management Journal, 34*(3), 555–590. https://doi.org/10.5465/256406

Darroch, J. (2005). Knowledge management, innovation and firm performance. *Journal of Knowledge Management, 9*(3), 101–115. https://doi.org/10.1108/13673270510602809

Dhanaraj, C., & Parkhe, A. (2006). Orchestrating innovation networks. *Academy of Management Review, 31*(3), 659–669. https://doi.org/10.5465/amr.2006.21318923

Donate, M. J., & de Pablo, J. D. S. (2015). The role of knowledge-oriented leadership in knowledge management practices and innovation. *Journal of Business Research, 68*(2), 360–370. https://doi.org/10.1016/j.jbusres.2014.06.022

Gibson, C. B., & Birkinshaw, J. (2004). The antecedents, consequences, and mediating role of organizational ambidexterity. *Academy of Management Journal, 47*(2), 209–226. https://doi.org/10.5465/20159573

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

Grant, R. M. (1996). Toward a knowledge-based theory of the firm. *Strategic Management Journal, 17*(S2), 109–122. https://doi.org/10.1002/smj.4250171110

Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review, 31*(1), 2–24. https://doi.org/10.1108/EBR-11-2018-0203

Kogut, B., & Zander, U. (1992). Knowledge of the firm, combinative capabilities, and the replication of technology. *Organization Science, 3*(3), 383–397. https://doi.org/10.1287/orsc.3.3.383

March, J. G. (1991). Exploration and exploitation in organizational learning. *Organization Science, 2*(1), 71–87. https://doi.org/10.1287/orsc.2.1.71

Nonaka, I., & Takeuchi, H. (1995). *The knowledge-creating company: How Japanese companies create the dynamics of innovation*. Oxford University Press.

O'Reilly, C. A., & Tushman, M. L. (2004). The ambidextrous organization. *Harvard Business Review, 82*(4), 74–81.

O'Reilly, C. A., & Tushman, M. L. (2008). Ambidexterity as a dynamic capability: Resolving the innovator's dilemma. *Research in Organizational Behavior, 28*, 185–206. https://doi.org/10.1016/j.riob.2008.06.002

Spender, J.-C. (1996). Making knowledge the basis of a dynamic theory of the firm. *Strategic Management Journal, 17*(S2), 45–62. https://doi.org/10.1002/smj.4250171106

Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal, 18*(7), 509–533.

Tushman, M. L., & Anderson, P. (1986). Technological discontinuities and organizational environments. *Administrative Science Quarterly, 31*(3), 439–465. https://doi.org/10.2307/2392832

Zheng, W., Yang, B., & McLean, G. N. (2010). Linking organizational culture, structure, strategy, and organizational effectiveness: Mediating role of knowledge management. *Journal of Business Research, 63*(7), 763–771. https://doi.org/10.1016/j.jbusres.2009.06.005