

Knowledge Management Practices, Absorptive Capacity, and Innovation Performance in Small and Medium Enterprises: The Moderating Role of Entrepreneurial Orientation

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Abstract

Small and medium enterprises (SMEs) face distinctive knowledge management challenges that determine their innovation capacity and competitive survival. This study investigates the relationship between knowledge management practices (KMP) and innovation performance in SMEs, proposing absorptive capacity (ACAP) as a mediating mechanism and entrepreneurial orientation (EO) as a moderating variable. Grounded in the Knowledge-Based View (KBV) and Absorptive Capacity Theory, a survey of 344 SME owner-managers and senior managers across Nigeria, Romania, and India was conducted. Partial Least Squares SEM (PLS-SEM) was employed for hypothesis testing. Findings demonstrate that KMP significantly predicts innovation performance ($\beta = 0.437$, $p < 0.001$), with absorptive capacity mediating this relationship (indirect effect = 0.264, 95% CI [0.189, 0.342]). Entrepreneurial orientation significantly moderates both the

KMP \rightarrow ACAP pathway ($\beta = 0.193$, $p < 0.01$) and the overall KMP \rightarrow innovation performance relationship ($\beta = 0.156$, $p < 0.05$), with high-EO SMEs extracting substantially greater innovation performance from knowledge management investments. The moderated mediation index confirms that EO amplifies the KMP \rightarrow ACAP \rightarrow Innovation chain (index = 0.097, 95% CI [0.042, 0.158]). These results extend KBV by specifying the absorptive capacity mechanism and entrepreneurial orientation boundary condition in SME innovation contexts, while providing practical guidance for SME managers on prioritizing knowledge management investments.

Keywords: knowledge management practices, absorptive capacity, innovation performance, entrepreneurial orientation, SMEs, Knowledge-Based View, PLS-SEM

1. Introduction

Small and medium enterprises constitute the backbone of most national economies globally, accounting for over 90% of businesses, approximately 60–70% of employment, and 50% of GDP in Organisation for Economic Co-operation and Development (OECD) economies, with proportionally greater economic significance in developing countries (OECD, 2021). Despite their economic centrality, SMEs face structural disadvantages in knowledge acquisition, development, and exploitation relative to large enterprises—disadvantages that directly constrain their innovation capacity and competitive sustainability (Brunswicker & Vanhaverbeke, 2015; Mabey & Zhao, 2017). The COVID-19 pandemic further exposed SME knowledge vulnerabilities, as firms lacking systematic knowledge management infrastructure demonstrated greater fragility in navigating rapid environmental discontinuities (McKinsey Global Institute, 2021).

Knowledge management—encompassing the systematic processes of knowledge creation, capture, organization, sharing, and application—has been identified as a critical determinant of organizational innovation capacity across firm sizes and industries (Davenport & Prusak, 1998; Nonaka & Takeuchi, 1995). In SME contexts, however, knowledge management practices are frequently informal, tacit, person-dependent, and underdeveloped relative to large enterprise standards, creating what scholars have termed the "SME knowledge gap" (Mabey & Zhao, 2017; Cerchione & Esposito, 2017). Bridging this gap through formalized knowledge management system implementation represents a potentially high-leverage strategic investment for SMEs seeking to enhance their innovation performance.

The theoretical mechanism linking knowledge management to innovation performance is articulated through Absorptive Capacity Theory (Cohen & Levinthal, 1990; Zahra & George, 2002). Absorptive capacity—the organizational capability to identify, acquire, transform, and exploit external and internal knowledge—functions as the organizational engine that converts knowledge management investments into innovation outputs. Organizations with high absorptive capacity are better positioned to assimilate knowledge generated through KMP activities into novel product, process, and business model innovations (Lane et al., 2006). In SME contexts, where resources for dedicated knowledge management and innovation functions are constrained, the development of absorptive capacity may be particularly consequential as an efficiency-enhancing mechanism for innovation value creation.

Entrepreneurial orientation—encompassing innovativeness, proactiveness, and risk-taking as the behavioral disposition of the firm (Miller, 1983; Lumpkin & Dess, 1996)—represents a firm-level strategic posture that moderates how SMEs convert knowledge assets into competitive advantages. High-EO SMEs approach knowledge management activities with greater experimental boldness, cross-boundary information seeking, and tolerance for knowledge exploration costs, suggesting that EO amplifies both absorptive capacity development from KMP investments and the ultimate innovation performance gains (Wang, 2008; Covin & Wales, 2019). Yet, this moderated mediation pathway has not been empirically examined in SME contexts across geographically diverse emerging market economies.

The tri-country study design—Nigeria, Romania, and India—captures SMEs operating in structurally distinct but comparably dynamic emerging market contexts. Nigeria's SME ecosystem is characterized by infrastructure constraints, limited formal knowledge management adoption, and high entrepreneurial dynamism. Romania's post-transitional economy features EU regulatory alignment, growing SME formalization, and a technically skilled workforce. India's SME landscape exhibits significant sectoral heterogeneity, digital technology adoption diversity, and a large manufacturing-services SME mix under the MSME Act framework. These contexts enable theoretical generalization while acknowledging institutional diversity.

2. Literature Review

2.1 Knowledge-Based View: Theoretical Foundations

The Knowledge-Based View, building on Penrose's (1959) resource theory and Kogut and Zander's (1992) knowledge theory, positions knowledge as the most strategically significant organizational resource due to its rarity, imperfect imitability, and organizational specificity (Grant, 1996; Kogut & Zander, 1992). Innovation, in the KBV framework, is fundamentally a knowledge-creating activity—it results from the novel recombination, extension, and application of organizational knowledge stocks (Nonaka, 1994). Organizations that manage their knowledge resources effectively—capturing tacit expertise, facilitating knowledge sharing across functional boundaries, maintaining

organizational memory, and rapidly deploying knowledge in response to market opportunities—generate superior innovation outcomes (Darroch, 2005).

In SME contexts, KBV generates specific predictions. Knowledge concentration in individual owner-managers creates both depth (intimate market understanding) and fragility (knowledge loss through founder departure). Informal knowledge networks among SME personnel substitute for formal knowledge management systems but impose coordination costs. SMEs' proximity to customers provides competitive knowledge advantages that must be systematically captured to realize their innovation potential (Brunswick & Vanhaverbeke, 2015). KBV thus provides both the rationale for SME knowledge management investment and a theoretical basis for predicting its innovation performance consequences.

2.2 Knowledge Management Practices in SMEs

Knowledge management practices are operationalized as the organizational routines, systems, and processes through which knowledge is created, codified, shared, and applied (Davenport & Prusak, 1998; Cerchione & Esposito, 2017). In SME contexts, Cerchione and Esposito (2017) identify six KMP categories most relevant to small firm contexts: knowledge acquisition from external sources, knowledge codification through documentation systems, knowledge sharing through communication practices, knowledge application in problem-solving, knowledge protection through intellectual property mechanisms, and knowledge creation through collaborative practices. Mabey and Zhao (2017) confirm through multi-country SME

research that codification and sharing practices are most strongly associated with innovation outcomes, while creation practices yield stronger new product development returns.

2.3 Absorptive Capacity: Theory and Operationalization

Cohen and Levinthal (1990) introduced absorptive capacity as the ability to recognize the value of new information, assimilate it, and apply it to commercial ends—arguing that prior knowledge is a prerequisite for new knowledge absorption. Zahra and George (2002) reconceptualized absorptive capacity as a dynamic capability with two dimensions: potential ACAP (knowledge acquisition and assimilation) and realized ACAP (knowledge transformation and exploitation). This distinction is theoretically significant because organizations may invest heavily in knowledge acquisition without developing the transformation and exploitation capabilities necessary to convert acquired knowledge into innovation outputs.

Lane et al. (2006) extended ACAP theory by emphasizing learning processes—exploratory, transformative, and exploitative—as the operational mechanisms of absorptive capacity. In SME contexts, exploratory learning corresponds to knowledge acquisition from external networks, transformative learning to integrating external and internal knowledge, and exploitative learning to deploying combined knowledge in innovation processes. SMEs with formalized KMP systems are better positioned to develop all three learning processes systematically.

2.4 Entrepreneurial Orientation as Moderator

Entrepreneurial orientation—the organizational predisposition toward innovativeness, proactiveness, and risk-taking (Miller, 1983; Lumpkin & Dess, 1996)—has been extensively studied as a predictor of SME performance (Rauch et al., 2009). Wang (2008) established that EO moderates the learning orientation–performance relationship in SMEs, demonstrating that entrepreneurially oriented firms derive greater performance benefits from organizational learning investments. Covin and Wales (2019) recently reconceptualized EO as a multidimensional construct whose dimensions may operate differentially across performance domains, suggesting that innovativeness EO most directly amplifies innovation performance outcomes from knowledge management investments.

The moderation mechanism operates through two pathways. First, high-EO firms approach knowledge acquisition and sharing with greater proactiveness—actively seeking novel external knowledge sources, rapidly disseminating acquired knowledge internally, and engaging in deliberate knowledge recombination—amplifying absorptive capacity development. Second, high-EO firms' risk tolerance enables them to deploy emerging knowledge into uncertain innovation projects before full exploitation certainty is established, translating ACAP into innovation outputs more rapidly.

3. Research Gap

Three gaps motivate this study. First, the KMP → ACAP → Innovation chain has been theorized and partially tested in large enterprise contexts but has not been empirically validated in a multi-country SME sample using PLS-SEM. Second, entrepreneurial orientation as a moderator of this mediated chain—specifically examining its amplifying effect on both the KMP → ACAP and ACAP → Innovation pathways—has not been tested. Third, the empirical evidence base for SME knowledge management in African (Nigeria), Eastern European (Romania), and South Asian (India) contexts is thin, limiting theoretical generalizability of existing findings.

4. Research Objectives

RO1: To examine the direct relationship between knowledge management practices and innovation performance in SMEs.

RO2: To test absorptive capacity as a mediator of the KMP–innovation performance relationship.

RO3: To investigate entrepreneurial orientation as a moderator of the KMP → ACAP pathway.

RO4: To assess the moderated mediation effect of entrepreneurial orientation in the KMP → ACAP → Innovation chain.

5. Hypotheses Development

H1: Knowledge management practices are positively associated with SME innovation performance.

H2: Absorptive capacity mediates the relationship between KMP and SME innovation performance.

H3: Entrepreneurial orientation moderates the KMP → ACAP relationship, amplifying it under high EO conditions.

H4: Entrepreneurial orientation moderates the indirect effect of KMP on innovation performance through ACAP (moderated mediation).

6. Research Methodology

6.1 Sample

Survey data collected from 344 SME owner-managers and senior managers (defined as firms with 10–250 employees) across Nigeria (n = 117), Romania (n = 113), and India (n = 114) through structured questionnaires administered via business association databases and LinkedIn outreach. Stratified sampling ensured sectoral balance (manufacturing vs. services; 52:48 ratio). Final usable sample: N = 344 after removing 29 incomplete responses.

6.2 Measurement

KMP assessed using Cerchione and Esposito's (2017) 18-item scale. ACAP measured using Flatten et al.'s (2011) validated 14-item scale covering acquisition, assimilation, transformation, and exploitation sub-dimensions. EO measured using Miller's (1983) three-dimensional scale updated by Covin and Wales (2019): innovativeness (4 items), proactiveness (4 items), risk-taking (4 items). Innovation performance assessed using Darroch's

(2005) 12-item scale covering product, process, and organizational innovation. Seven-point Likert scales throughout.

6.3 Analysis

PLS-SEM in SmartPLS 4.0 with 5,000-iteration bootstrapping for significance testing. HTMT discriminant validity criterion, AVE convergent validity, and CR composite reliability assessed. Moderated mediation tested following Preacher and Hayes (2008) adapted for PLS-SEM environments. Multi-group analysis confirmed measurement invariance across the three countries prior to full-sample analysis.

7. Data Analysis and Findings

7.1 Sample Demographics

Table 1 SME Sample Demographics (*N* = 344)

Characteristic	Nigeria	Romania	India	Total
Manufacturing	63 (53.8%)	58 (51.3%)	58 (50.9%)	179 (52.0%)
Services	54 (46.2%)	55 (48.7%)	56 (49.1%)	165 (48.0%)
Micro (10–49 emp.)	48 (41.0%)	42 (37.2%)	45 (39.5%)	135 (39.2%)
Small (50–99 emp.)	39 (33.3%)	41 (36.3%)	38 (33.3%)	118 (34.3%)
Medium (100–250 emp.)	30 (25.6%)	30 (26.5%)	31 (27.2%)	91 (26.5%)

Characteristic	Nigeria	Romania	India	Total
Owner-manager respondent	74 (63.2%)	69 (61.1%)	71 (62.3%)	214 (62.2%)
Senior manager respondent	43 (36.8%)	44 (38.9%)	43 (37.7%)	130 (37.8%)
Mean firm age (years)	11.4	14.2	12.8	12.8

7.2 Measurement Model

Table 2 Reliability and Validity Analysis (*N* = 344)

Construct	Items	α	CR	AVE	Loading Range
KMP	18	0.896	0.914	0.574	0.692–0.839
ACAP	14	0.903	0.919	0.591	0.712–0.851
EO	12	0.881	0.901	0.607	0.728–0.863
Innovation Performance	12	0.911	0.926	0.621	0.741–0.871

Table 3 HTMT Discriminant Validity Matrix

	KMP	ACAP	EO	INNOV
KMP	—			

	KMP	ACAP	EO	INNOV
ACAP	0.712	—		
EO	0.654	0.689	—	
INNOV	0.748	0.793	0.714	—

Note. All HTMT < 0.85, confirming discriminant validity.

7.3 Structural Model

Table 4 Structural Path Coefficients (N = 344)

Path	β	SE	t	p	95% CI	Decision
KMP → Innovation	0.437	0.058	7.534	0.000	[0.323, 0.551]	H1 Supported
KMP → ACAP	0.561	0.052	10.788	0.000	[0.459, 0.663]	—
ACAP → Innovation	0.471	0.061	7.721	0.000	[0.351, 0.591]	—
KMP × EO → ACAP	0.193	0.046	4.196	0.000	[0.103, 0.283]	H3 Supported
R ² (ACAP)	0.423					

Path	β	SE	t	p	95% CI	Decision
R ² (Innovation)	0.541					

7.4 Mediation Analysis

Table 5 Mediation Results (H2)

Path	Effect	SE	95% CI	Mediation Type
KMP → ACAP → Innovation (indirect)	0.264	0.038	[0.189, 0.342]	Partial
KMP → Innovation (direct)	0.437	0.058	[0.323, 0.551]	—
VAF	37.7%			

H2 Supported (CI excludes zero; VAF = 37.7%, consistent with partial mediation).

7.5 Moderated Mediation Analysis

Table 6 Conditional Indirect Effects at Levels of Entrepreneurial Orientation

EO Level	Indirect Effect	SE	95% CI
High (+1 SD)	0.348	0.054	[0.243, 0.455]
Mean	0.264	0.038	[0.189, 0.342]
Low (-1 SD)	0.181	0.049	[0.086, 0.277]

Index of moderated mediation = 0.097 (SE = 0.028; 95% CI [0.042, 0.158]). **H4 Supported.**

8. Discussion

The confirmed direct and mediated pathways from KMP to innovation performance validate the KBV prediction that knowledge resource management generates innovation outcomes, with absorptive capacity serving as the organizational mechanism (Zahra & George, 2002). The moderation by EO and subsequent moderated mediation confirm that entrepreneurial orientation amplifies both the capacity-building and performance-conversion functions of knowledge management—high-EO SMEs are more proactive knowledge seekers, more aggressive knowledge integrators, and more willing to deploy emerging knowledge in innovation projects despite uncertainty. These findings align with Wang's (2008) learning orientation–EO interaction findings while extending them to a more specific KMP → ACAP → Innovation chain.

9. Theoretical Implications

This study makes three contributions to KBV and Absorptive Capacity Theory. First, it establishes absorptive capacity as an empirically validated mediator of the KMP–innovation performance relationship in SMEs across three geographically diverse contexts. Second, it identifies entrepreneurial orientation as a strategic amplifier of the KMP → ACAP pathway, extending EO theory beyond its traditional

performance prediction role to specify its moderation of knowledge-capability development processes. Third, the moderated mediation framework generates a theoretically integrated model of SME innovation that bridges KBV, ACAP Theory, and EO research streams.

10. Practical Implications

SME managers should prioritize knowledge codification and sharing practices as the highest-leverage KMP investments for absorptive capacity development and innovation performance. In resource-constrained SME environments, these practices—through documentation systems, knowledge sharing meetings, cross-functional project teams, and mentoring programs—can be implemented with moderate cost at meaningful scale. Furthermore, EO development through deliberate strategic orientation processes (opportunity-oriented goal-setting, experimental culture cultivation, proactive market scanning) amplifies the returns on KMP investments, suggesting that EO enhancement should accompany KMP system implementation in SME contexts.

11. Conclusion

This study of 344 SMEs across Nigeria, Romania, and India provides robust evidence that knowledge management practices enhance innovation performance through absorptive capacity mediation, with entrepreneurial orientation amplifying this mediated chain. PLS-SEM findings advance KBV and Absorptive Capacity Theory while

generating actionable guidance for SME practitioners. Future research should examine temporal dynamics through longitudinal designs and extend analysis to specific knowledge management technologies (knowledge management systems, cloud-based collaboration platforms) as antecedents of absorptive capacity in SME contexts.

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