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Exploring the Impact of Dynamic Capabilities: Organizational Learning Mediation between Technical and Administrative Innovation

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Abstract

The manufacturing sector encompasses a diverse array of outputs, including computers, automobiles, medical equipment, electronic devices, chemical tools, and telecommunications systems. This study investigates how pioneering orientation influences both administrative and technical innovation, with organizational learning serving as a mediating variable and dynamic capabilities operating as a moderator. Grounded in the Resource-Based View (RBV) and Social Exchange Theory (SET), data were collected from 344 middle managers employed in manufacturing firms in Saudi Arabia. The results demonstrate that organizational learning significantly mediates the relationship between pioneering orientation and both forms of innovation. Moreover, dynamic capabilities moderate the link between pioneering orientation and organizational learning. These findings offer theoretical contributions to innovation literature and provide actionable insights for manufacturing firms, organizational leaders, and policymakers aiming to enhance innovation through strategic learning processes and capability development.

Keywords

Pioneering Orientation; Administrative Innovation; Technical Innovation; Dynamic Capabilities; Organizational Learning; Resource-Based View (RBV); Social Exchange Theory (SET)

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1. Introduction

Manufacturing industries of furniture, beverages, plastics, and construction materials, remain foundational to national economies but often operate on a limited scale (AbdulSattar, 2021; AlAzzawi, 2021; Tortorella et al., 2020). Innovation has become a critical strategic imperative, serving as a determinant of firm sustainability and competitiveness (Alabdullah & Kanaan-Jebna, 2023). As organizations confront rapidly evolving markets, their ability to innovate both technically and administratively plays a decisive role in long-term performance and survival (Azeem et al., 2021). Innovation is broadly understood in the literature as both a process and an outcome (Kaewsaeng-on et al., 2022; Le & Lei, 2019). Technical innovation refers to the development of new processes, products, or services, whereas administrative innovation relates to changes in policies, procedures, and organizational structures (Singh et al., 2021; Zhang et al., 2019). The consistent adoption of these innovations is critical to maintaining operational effectiveness (Patwary et al., 2024; Siddiqui et al., 2019). In contrast to material innovations that solve technological challenges, administrative innovations reflect strategic adjustments within organizational frameworks. Pioneering orientation reflects a firm's strategic posture in introducing novel products or services to the market before competitors (Gala-Velásquez et al., 2024; García-Villaverde et al., 2020). This orientation extends beyond early market entry; it encompasses a firm's willingness to undertake risk and lead innovation initiatives, shaping its strategic behavior (García-Villaverde et al., 2017). Some firms consistently seek first-mover advantage by launching differentiated offerings, while others

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follow with incremental improvements (Gupta & Bose, 2019; Levi-Bliech & Dahan, 2024; Wurzel et al., 2020). Despite the acknowledged strategic benefits, the mechanisms linking pioneering orientation to innovation outcomes remain insufficiently explored.

Organizational learning plays a central role in enhancing knowledge acquisition and application capabilities essential for innovation (Argote et al., 2020). It involves continuous reflection and adaptation, enabling employees to share expertise, experiment, and improve performance (Patwary et al., 2024). Scholars have identified several ongoing challenges: diverse conceptualizations of learning, evolving modalities, and a growing reliance on learning for organizational resilience and effectiveness (Siddiqui et al., 2019; Tortorella et al., 2020). Firms with high learning orientation are more adept at recognizing market shifts and aligning their strategic actions accordingly (Hendri, 2019; Ivaldi et al., 2022). Recent research has underscored the strategic importance of dynamic capabilities the organization's ability to reconfigure resources in response to environmental changes (Chatterjee et al., 2023). These capabilities are central to sustaining innovation and remain a focal point in strategic management literature (Herold et al., 2023; Ruiz-Ortega et al., 2024). Although often viewed as reactive mechanisms, emerging perspectives suggest that dynamic capabilities may also evolve internally through innovation practices (Soluk et al., 2021; Weaven et al., 2021; Wu et al., 2023). Despite growing interest, the interplay between pioneering orientation, organizational learning, and innovation especially technical and administrative forms remains under-theorized. Existing literature has yet to fully explain how pioneering orientation influences innovation through learning, or how dynamic capabilities condition this relationship. These gaps limit our understanding of the antecedents and mechanisms driving innovation outcomes. To address these gaps, the present study investigates how organizational learning mediates the relationship between pioneering orientation and both technical and administrative innovation. Drawing upon the Resource-Based View (RBV) and Social Exchange Theory (SET), this study integrates internal capabilities and relational dynamics to provide a comprehensive model. RBV emphasizes the strategic value of intangible resources particularly knowledge as key to competitive advantage (Barney et al., 2021; Freeman et al., 2021). SET, meanwhile, provides a relational framework, suggesting that interpersonal exchanges rooted in trust and reciprocity influence knowledge-sharing behaviors essential to learning and innovation (Cook et al., 2013; Cook & Hahn, 2021). When knowledge hiding occurs, it can disrupt collaboration and lead to silence, impeding organizational learning (Thomas & Gupta, 2021).

In light of these theoretical foundations, this study examines the direct and indirect effects of pioneering orientation on innovation outcomes and the moderating role of dynamic capabilities. The findings are expected to contribute to a deeper understanding of how internal learning processes and strategic orientations interact to drive innovation in contemporary organizations.

2. Conceptual Background

2.1. Technical Innovation

Technological innovation has long been recognized as a key factor driving productivity growth. While early growth theories considered technology as an exogenous factor (Gala-Velásquez et al., 2024), endogenous growth models have positioned it as a fundamental internal mechanism for long-term development (Kaewsaeng-on et al., 2022). The advent of the Fourth Industrial Revolution, characterized by advanced digital technologies, has intensified the strategic relevance of technological innovation. Despite the substantial productivity gains, such progress has also accelerated environmental degradation, notably through increased fossil fuel consumption (Hao et al., 2020). From a competitive standpoint, technological innovation enables market expansion and new business opportunities, contributing to sustained advantage (Chatterjee et al., 2023).

2.2. Administrative Innovation

Administrative innovation focuses on internal organizational structures and procedures rather than products or services. Levi-Bliech and Dahan (2024) define administrative innovation as substantial changes in organizational routines that address both internal coordination and external alignment. These include modifications in decision rights, task structures, and resource allocations. While traditionally overlooked in favour of manufacturing-led innovations, administrative improvements in sectors such as finance have proven critical for strategic development (Azeem et al., 2021; Cho et al., 2019). The unique traits of administrative innovation such as intangibility, durability, and variability require different innovation approaches than those applied to technical processes (Patwary et al., 2024).

2.3. Resource Based Theory

The Resource-Based Theory (RBT) asserts that firms achieve competitive advantage through the strategic use of valuable, rare, and inimitable resources. These include not only tangible assets but also knowledge-based capabilities that drive learning and innovation (Barney et al., 2021). Knowledge-based resources enhance the firm's ability to reconfigure and apply capabilities in ways that contribute to innovation performance. RBT, along with its extension into the Knowledge-Based View (KBV), emphasizes the significance of intangible assets in shaping organizational outcomes (Freeman et al., 2021; Taher, 2012).

2.4. Social Exchange Theory

Social Exchange Theory offers a lens for understanding employee behaviors such as silence and knowledge hiding, often triggered by perceived unfairness in the workplace (Cook & Hahn, 2021; Thomas & Gupta, 2021). This theory posits that reciprocal exchanges underpin workplace interactions, encompassing both material and psychological rewards such as trust and mutual respect. In this context, shared goals and ethical values encourage knowledge sharing, which is vital for organizational learning and innovation (Cook et al., 2013).

3. Research Model and Hypothesis

Figure 1 presents the research model based on a value-oriented framework, linking pioneering orientation, organizational learning, and innovation performance. Pioneering orientation is widely associated with early adoption of new technologies, often leading to both administrative and technical innovation (Gala-Velásquez et al., 2024). When pioneering firms introduce innovative products, competitors may replicate the underlying technology without incurring development costs. However, firms with a pioneering mindset are better positioned to navigate such challenges, as advanced technologies enable entry into untapped markets and alignment with shifting consumer needs (Gala-Velásquez et al., 2024).

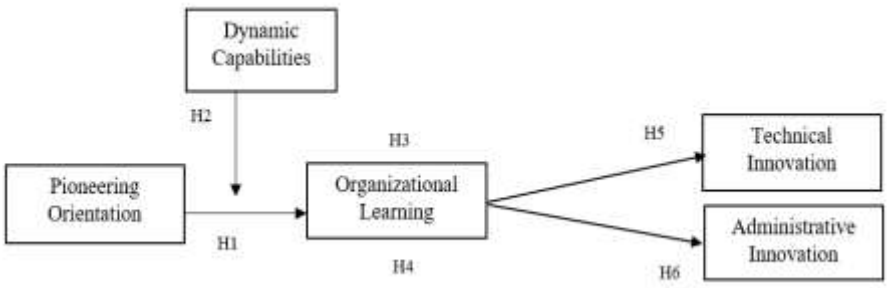

Figure 1. Research Model

Organizational learning plays a critical role by transforming pioneering initiatives into actionable knowledge. Rather than being the sum of individual employee experiences, it involves structured processes of knowledge acquisition, distribution, interpretation, and retention (Argote et al., 2020; Asif, 2019; Ivaldi et al., 2022; North & Kumta, 2018; Siddiqui et al., 2019; Tortorella et al., 2020). This capability enhances decision-making, operational planning, and innovation through the development of collective insights. Learning curves support performance monitoring, cost estimation, and market-entry strategies by enabling firms to track efficiency improvements over time (Kim & Park, 2020; Malik & Danish, 2010). As Antunes and Pinheiro (2020) note, increased output typically reduces unit costs, which strengthens innovation outcomes. Organizational learning, as a strategic resource, is essential in linking pioneering orientation with sustained innovation performance across both administrative and technical dimensions.

H1: Pioneering orientation has a significant impact on organizational learning.

Recent research has focused on dynamic capabilities as internal mechanisms enabling firms to respond to evolving environments and sustain competitive advantage (Herold et al., 2023; Soluk et al., 2021). These capabilities encompass deliberate practices and configurations that allow organizations to reconfigure resources, integrate knowledge, and adapt strategically (Apascaritei & Elvira, 2022). Studies such as Wu et al. (2023) identify specific components such as cooperation, experiential learning, strategic planning, and restructuring as instrumental dimensions of dynamic capabilities. Ruiz-Ortega et al. (2024) further highlight how change agents and adaptive practices influence innovation outcomes and overcome resistance to transformation. Pioneering orientation, viewed as a strategic rather than a purely cognitive construct, reflects an organization's disposition toward creating and launching novel products in unexplored markets (Gala-Velásquez et al., 2024; Wu et al., 2023). It characterizes firms that proactively develop new combinations of resources and seek first-mover advantages (García-Villaverde et al., 2020). This orientation contributes to resource accessibility, customer positioning, and early market dominance conditions that foster unique learning and capability development (Gupta & Bose, 2019; Levi-Bliech & Dahan, 2024). Firms exhibiting a pioneering orientation often require dynamic capabilities to translate innovative intent into actionable knowledge and learning structures. These capabilities serve as enablers by moderating the relationship between strategic orientation and organizational learning. By leveraging their ability to sense, adapt, and transform, firms can enhance knowledge assimilation and integration within the organization (Wurzel et al., 2020).

H2: Dynamic capabilities moderate the relationship between pioneering orientation and organizational learning.

Organizational learning is a structured process through which firms develop knowledge and capabilities based on shared experiences and interactions within the organization (Argote et al., 2020; Ghasemzadeh et al., 2019). This process shapes decision-making and influences long-term firm performance. The learning cycle comprises four interrelated sub processes: search, knowledge generation, retention, and transfer (Antunes & Pinheiro, 2020; Hendri, 2019). These stages facilitate the transformation of task-based experience into applicable knowledge, enabling firms to improve operational and strategic outcomes. Knowledge generation and interpretation involve contextualizing new information to form shared understanding, while distribution and organizational memory ensure knowledge is transferred and retained across functional units (Basten & Haamann, 2018; Gupta & Bose, 2019; Malik & Danish, 2010). A strong learning orientation strengthens organizational capacity to anticipate market shifts and respond to emerging opportunities (Cho et al., 2019; Hao et al., 2020). Firms that institutionalize learning are better positioned to exploit first-mover advantages through continuous innovation and strategic renewal (Azeem et al., 2021; Le & Lei, 2019). Technical innovation, in this context, reflects the development of new products, processes, or technologies that redefine competitiveness. Organizational learning acts as a bridge between a firm's pioneering orientation and its ability to execute innovation by internalizing external knowledge and translating it into practical applications (Kaewsaeng-on et al., 2022; Patwary et al., 2024). Marketing research

further underscores how early entrants use accumulated knowledge to shape customer preferences and reinforce their innovative lead (Siddiqui et al., 2019).

H3: Organizational learning mediates the relationship between pioneering orientation and technical innovation.

In highly competitive markets, firms are compelled to explore strategic methods to maintain superiority, including introducing original products and redesigning internal processes. While pioneering new offerings can present risks such as imitation by competitors once innovations are launched the strategic posture of a pioneering orientation remains central to sustaining a competitive edge (Antunes & Pinheiro, 2020; Castaneda & Cuellar, 2020; Hao et al., 2020). Pioneering orientation reflects a firm's repeated inclination to initiate new product introductions early, across its various lines of business (Mueller et al., 2010). It signals a strategic commitment to being among the first movers in untapped markets, where few rivals have ventured. Organizational learning plays a crucial intermediary role in this context. It enables firms to internalize prior experiences, absorb new knowledge, and apply it to decision-making and operational improvements (Argote et al., 2020; North & Kumta, 2018). This learning capacity becomes particularly significant when overcoming cognitive and structural barriers that hinder innovation, such as rigid routines or an overreliance on existing products and solutions (Hendri, 2019). Firms with a strong marketing-oriented pioneering mindset are better equipped to identify and capitalize on opportunities for innovation, not only technologically but also administratively. Administrative innovation involves changes to organizational structures, managerial processes, and systems that support improved performance (Azeem et al., 2021; Levi-Bliech & Dahan, 2024). By facilitating adaptive behaviors, knowledge integration, and process renewal, organizational learning mediates the translation of pioneering orientation into administrative innovations.

H4: organizational learning mediates the relationship between pioneering orientation and administrative innovation.

Organizational learning enhances a firm's ability to absorb, internalize, and apply knowledge across individual, team, and organizational levels, ultimately contributing to its innovative capabilities (Argote et al., 2020; Ghasemzadeh et al., 2019). When firms effectively manage internal and external knowledge flows, they improve their capacity for technical innovation often reflected in new product development and process improvement (North & Kumta, 2018; Tortorella et al., 2020). Learning-oriented organizations proactively seek knowledge beyond their boundaries, identifying emerging technological trends that can catalyze creative solutions (Ivaldi et al., 2022). Internally, such firms emphasize employee-driven learning behaviors, which enhance knowledge absorption and promote continuous innovation in technical functions (Basten & Haamann, 2018; Kim & Park, 2020). Moreover, the act of problem-solving within organization's facilitates knowledge recombination and creates a basis for further innovation (Antunes & Pinheiro, 2020). Both deliberate and incidental learning processes contribute to a firm's innovation outcomes, as employees build on shared expertise or generate ideas through market feedback and experimentation (Asif, 2019; Ganguly et al., 2019). Organizational learning also increases the speed and quality of integrating customer information into product development, improving alignment between innovation and market needs (Kaewsaeng-on et al., 2022; Zhang et al., 2019). From a strategic perspective, technical innovation includes the development of products, services, and production technologies, which improve the firm's ability to enter or redefine markets (Le & Lei, 2019; Liu et al., 2020). This capacity for renewal is significantly influenced by the firm's learning processes, which strengthen its knowledge base and adaptive innovation practices.

H5: Organizational learning has a significant impact on technical innovation.

Organizational learning is a critical enabler of both technical and administrative innovation. As highlighted by Argote et al. (2020) and Ghasemzadeh et al. (2019), learning processes enhance an

organization's innovation capabilities by facilitating knowledge acquisition and application. The development of administrative innovation is closely linked to learning mechanisms that encourage internal adaptation and process refinement (Tortorella et al., 2020; Wurzel et al., 2020). These mechanisms support structured efforts, including strategy development and employee engagement in both formal and informal learning activities. Knowledge practices are shown to directly influence innovation outcomes, encompassing both administrative and technical innovation (Argote et al., 2020). Furthermore, organizational knowledge sharing significantly improves employee learning and performance (Anand et al., 2022; Offergelt et al., 2019). Within the knowledge-based view (KBV), learning behaviors rooted in knowledge integration are fundamental to achieving innovation-driven performance (Castaneda & Cuellar, 2020). Technological trajectories offer a platform for innovation by guiding the evolution of products and systems. In turbulent markets, firms that integrate advanced technologies into their operations outperform competitors (Zhang et al., 2019). From the resource-based view (RBV), distinct competencies such as IT capabilities enhance innovation and provide sustained competitive advantage (Ganguly et al., 2019; Liu et al., 2020). Technical innovation facilitates product diversification and revenue growth, particularly in emerging economies (García-Villaverde et al., 2020; Siddiqui et al., 2019), while administrative innovation supports structural adaptability and market responsiveness. Weak technical innovation capabilities, on the other hand, may restrict market expansion. Thus, organizational learning contributes substantively to innovation performance across sectors (Argote et al., 2020; Ghasemzadeh et al., 2019).

H6: Organizational learning has a significant impact on administrative innovation.

4. Research Methodology

4.1. Research Context

This study employed an online survey to collect data from middle management employees working in large manufacturing organization's in Saudi Arabia. Due to confidentiality and accessibility limitations, the specific identities of the respondents were unknown. A snowball sampling technique was adopted to reach a broad network of relevant professionals through referral-based participation. The survey was distributed electronically using Google Forms, a practical approach given the respondents' digital accessibility. Saudi Arabia's manufacturing sector was selected as the study context due to its significant contribution to national GDP and its integration into international supply chains. The country's industrial base encompasses sectors such as metal processing, plastics, textiles, chemicals, food and beverage, and construction materials. With its strategic location, political stability, and supportive industrial policies, Saudi Arabia remains attractive for both domestic growth and foreign direct investment (AbdulSattar, 2021). The presence of a skilled workforce and modern infrastructure further underlines its industrial competitiveness.

4.2. Instrument Development

Established scales from prior studies were adopted and adapted to fit the current research scope, which focuses on the relationships among pioneering orientation, organizational learning, and innovation types. Items were reviewed to ensure their relevance and clarity within the Saudi Arabian manufacturing context. Several subject matter experts from academia and industry evaluated the instrument to detect potential ambiguities in phrasing or format. The survey instrument was originally prepared in English. A pilot test was conducted to refine the instrument, with minor revisions made following feedback. The final instrument employed a five-point Likert scale (1 = strongly disagree to 5 = strongly agree) to assess the variables of interest. Details of the measurement items and their sources are provided in Appendix A.

4.3. Data Collection

A total of 450 survey invitations were disseminated through email and social media channels, including a direct link to the online questionnaire. Participation was voluntary, and responses were collected over a two-week period. From the distributed invitations, 344 valid and complete responses were obtained, yielding a response rate of approximately 76%. The respondents formed the final sample for the empirical analysis. To evaluate potential non-response bias, early and late respondents defined as those who completed the survey in the first and final three days of data collection were compared. Independent samples t-tests revealed no statistically significant differences in age ($p > 0.01$), indicating minimal non-response bias.

Table 1. Descriptive Statistics of Respondents Profile

Category	Items	Frequencies	Percentage
Gender	Male	215	62.5
	Female	129	37.5
Qualification	Primary/Secondary Schools	90	26.1
	Colleges	110	31.9
	Universities	80	23.2
	Others	64	18.6
Age	< 20 Years	96	27.9
	20-30 Years	108	31.3
	30-40 Years	68	19.7
	> 40 Years	72	20.9
Experience	Less than 2 Years	174	50.5
	2-6 Years	99	28.7
	More than 6 Years	71	20.6
Total		344	100.0

5. Data Analysis and Results

5.1. Instrument Validation

SmartPLS 3.0 was employed to conduct the measurement model assessment. To ensure each item loaded onto a single construct, unidimensionality was first examined, and all items were retained for further analysis. The reliability and validity of the measurement model were evaluated using standard criteria, including factor loadings, Cronbach's alpha, composite reliability (CR), and average variance extracted (AVE), following established guidelines (Hair et al., 2024). As presented in Table 2, all standardized loadings exceeded the recommended threshold of 0.70 and were statistically significant (t-values > 1.96). The CR values ranged from 0.855 to 0.958, and Cronbach's alpha values ranged from 0.781 to 0.945, surpassing the minimum acceptable level of 0.70, indicating strong internal consistency. In addition, the AVE values for all constructs were above the minimum criterion of 0.50, confirming convergent validity. Discriminant validity was assessed by comparing the square root of each construct's AVE with the inter-construct correlations. As shown in Table 2, all constructs satisfied the Fornell-Larcker criterion, where the AVE square roots exceeded corresponding inter-construct correlations, supporting discriminant validity.

Table 2. Results of Convergent Validity Test

Item	Std. Loadings	VIF	CR	AVE	Alpha
AI1	0.851	2.450	0.949	0.788	0.932
AI2	0.909	3.958			
AI3	0.925	4.429			
AI4	0.906	3.786			
AI5	0.843	2.566			
DC1	0.853	3.067	0.926	0.714	0.899
DC2	0.833	2.943			
DC3	0.876	3.263			
DC4	0.886	3.547			
DC5	0.772	1.727			
OL1	0.785	1.081	0.855	0.549	0.781
OL2	0.794	1.743			
OL3	0.756	1.653			
OL4	0.800	1.802			
OL5	0.821	2.004			
PO1	0.873	2.111	0.878	0.644	0.815
PO2	0.722	1.501			
PO3	0.756	1.670			
PO4	0.848	1.835			
TI1	0.907	3.878	0.958	0.820	0.945
TI2	0.900	3.563			
TI3	0.911	3.862			
TI4	0.913	3.804			
TI5	0.897	3.414			

5.2. Discriminant Validity

The discriminant validity was further supported by the Fornell-Larcker criterion. As shown in Table 3, the square roots of the AVE values (on the diagonal) were greater than the corresponding inter-construct correlations, indicating satisfactory discriminant validity among the study constructs.

Table 3. Discriminant Validity, Mean and Standard Deviation

	Mean	SD	AI	DC	OL	PO	TI
AI	4.45	1.48	0.888				
DC	3.20	1.28	0.730	0.845			
OL	3.18	1.10	0.542	0.481	0.741		
PO	3.78	1.31	0.433	0.604	0.410	0.802	
TI	1.89	1.39	0.774	0.690	0.728	0.387	0.906

5.3. Hypothesis Testing

The structural model was evaluated using path coefficients (β), t-values, and p-values to test the proposed hypotheses. A bootstrapping procedure with 5,000 resamples was employed to assess the significance of both direct and indirect effects. All hypothesized paths were found to be statistically significant ($p < 0.001$), confirming the model's robustness (Hair et al., 2024). Moderation and mediation effects were tested using interaction terms and indirect path coefficients, respectively. As illustrated in Figure 2, pinioning orientation (H1), dynamic capabilities (H2), and organizational

learning (H3) significantly influenced both technical innovation (H6) and administrative innovation (H7). In addition, the mediating role of organizational learning in the relationship between dynamic capabilities and both types of innovation (H4 and H5) was supported.

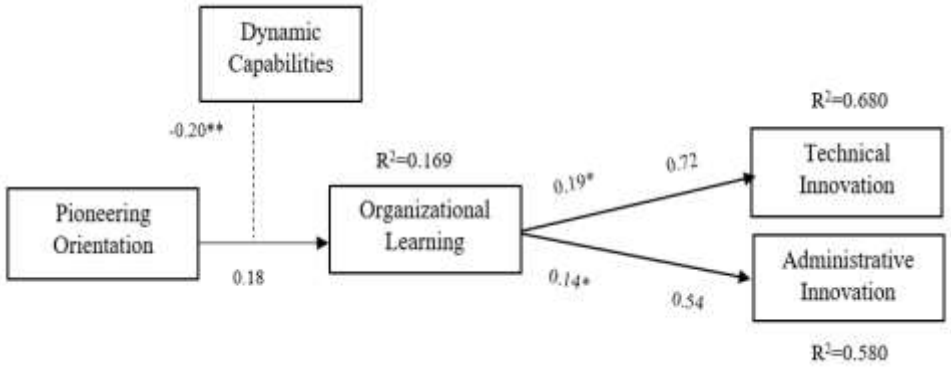

Figure 2. Testing Results. (** for moderation and * for mediation coefficient path results).

6. Discussion and Implications

6.1. Discussion of Findings

This study examined how organizational learning mediates the relationship between pioneering orientation and both administrative and technical innovation. The findings reveal that pioneering orientation significantly influences organizational learning, which in turn positively impacts both forms of innovation. First, the positive link between pioneering orientation and organizational learning confirms that firms oriented toward proactively exploring new markets and opportunities tend to engage more intensively in organizational learning activities. These organization's seek novel insights and experiences that enhance internal knowledge flows, facilitating administrative adjustments and technological advancement (Levi-Bliech & Dahan, 2024). As a result, managerial emphasis on exploratory and proactive strategic behavior can strengthen organizational learning, enabling a firm to adapt in volatile environments. Firms exhibiting such orientation are more likely to acquire experiential knowledge that supports innovative thinking and problem-solving capabilities. Furthermore, pioneering orientation is found to indirectly influence innovation through its effect on organizational learning. The findings highlight that organization's utilizing pioneering strategies such as developing low-cost alternatives or differentiation-based competitive approaches gain more from shared knowledge practices. This reinforces prior arguments that learning orientation acts as a conduit through which strategic orientation translates into innovation outcomes (Wurzel et al., 2020). Specifically, the indirect pathways from pioneering orientation to both administrative and technical innovation, mediated by organizational learning, confirm the critical role of knowledge exploration and integration processes.

The study also investigated two moderators: knowledge sharing and knowledge hiding. Results indicate that knowledge sharing significantly moderates the relationship between pioneering orientation and organizational learning. This aligns with prior work suggesting that effective knowledge sharing supported by technologies, feedback mechanisms, and HR practices enhances collective learning processes (Le & Lei, 2019). Firms that cultivate environments where employees engage in open knowledge exchange demonstrate improved absorptive capacity and adaptability. Reward systems, supportive leadership, and training programs that reinforce such behaviors are critical for amplifying the learning derived from pioneering behaviors. In contrast, knowledge hiding was found to negatively moderate the link between pioneering orientation and organizational learning. Concealing knowledge inhibits collaborative efforts and disrupts communication flows that are vital for organizational learning (Antunes & Pinheiro, 2020). This barrier to knowledge diffusion may lead employees to suppress engagement in innovation-related processes. Empirical evidence suggests that

unethical workplace behaviors, such as knowledge hiding, not only deteriorate team dynamics but also hinder innovation performance by obstructing learning capabilities (Bari et al., 2020; Nguyen et al., 2022). Hence, promoting a psychologically safe environment is essential to reduce knowledge concealment and foster open learning. The mediation analysis confirmed that organizational learning serves as a significant mechanism through which pioneering orientation influences both technical and administrative innovation. These findings extend the literature by clarifying how organizational learning facilitates innovation at different levels. For technical innovation, organizational learning supports the acquisition and application of external and internal knowledge that accelerates the development of novel products and processes (Argote et al., 2020; Hao et al., 2020). Similarly, administrative innovation benefits from shared learning practices that allow the organization to restructure policies, improve management procedures, and develop new governance models (Kim & Park, 2020). Our findings are consistent with prior research suggesting that learning capabilities enhance innovation across various organizational domains (Azeem et al., 2021; Singh et al., 2021). However, the impact of organizational learning on objectively measured innovation outcomes (e.g., new product launches) was not statistically significant. A plausible explanation may lie in the temporal misalignment between learning processes and the materialization of innovation outcomes, particularly in knowledge-intensive sectors. Innovation often emerges after prolonged cycles of experimentation, learning, and development, suggesting that the full effect of learning on innovation may unfold over time. Overall, the results highlight the critical role of organizational learning in shaping innovation outcomes. Firms with robust learning capabilities characterized by effective knowledge acquisition, sharing, and utilization are better positioned to drive both administrative and technical innovation. These capabilities enable firms to adapt to evolving market demands, optimize internal operations, and sustain competitive advantage (Tortorella et al., 2020). Technical innovation benefits from continuous learning about new technologies and production techniques, while administrative innovation is enhanced through learning-driven changes to organizational structures and processes.

6.2. Implications for Research and Practice

This study contributes to the literature on innovation by empirically examining how organizational learning mediates the relationship between pioneering orientation and both technical and administrative innovation. By drawing from the Resource-Based View (RBV) and Social Exchange Theory (Barney et al., 2021; Thomas & Gupta, 2021), the research provides an integrated perspective on how internal capabilities and social mechanisms support innovation in knowledge-intensive environments. From a theoretical standpoint, this study extends prior research by conceptualizing knowledge sharing and knowledge hiding not only as social behaviors but as mechanisms that shape the effectiveness of pioneering orientation in stimulating innovation. It further advances understanding of how dynamic capabilities, embedded in organizational learning, serve as critical pathways for converting strategic orientations into tangible innovation outcomes. The findings offer valuable practical insights for managers in large manufacturing organizations. Encouraging a pioneering orientation alone may not suffice; rather, it should be supported by an organizational culture that prioritizes structured learning and openness to knowledge exchange. In environments characterized by rapid technological change and heightened global competition, firms that systematically acquire, interpret, and integrate new knowledge are more likely to achieve breakthrough innovation in both technical and administrative domains. Furthermore, the results suggest that managers in pioneering firms should carefully align innovation strategies with knowledge management practices. Companies entering markets as early movers should strengthen their competitive advantage through a dual emphasis on cost leadership and product differentiation, ensuring the distinctiveness of their innovations is recognized by consumers and competitors alike. However, as marketing differentiation may benefit follower firms more than pioneers, managers should critically assess the timing and positioning of their innovation strategies to avoid misalignment with market expectations. In practice, organizations should invest in institutional mechanisms that reduce knowledge hiding and incentivize collaborative behaviors, such as gain-sharing programs, recognition systems, and knowledge platforms. These practices reinforce the social infrastructure necessary to convert pioneering

orientations into sustained innovation performance.

6.3. Conclusion

This study examined the role of pioneering orientation as a catalyst for technical and administrative innovation, with organizational learning acting as a mediating mechanism. Despite the acknowledged importance of dynamic capabilities, limited empirical research has explored how middle managers utilize organizational learning to translate strategic orientation into innovation outcomes. Our findings reveal that pioneering orientation significantly influences organizational learning, which in turn positively impacts both technical and administrative innovation. These results underscore the mediating role of organizational learning as a dynamic capability that enables firms to adapt, innovate, and compete effectively. By focusing on large manufacturing firms, the study offers a nuanced understanding of how innovation unfolds in resource-rich yet competitive settings. The research also highlights the importance of managing knowledge flows both in terms of promoting sharing and addressing the risks associated with knowledge hiding as these social factors shape how learning processes translate into innovation. In summary, the study provides a theoretically grounded and empirically supported framework that elucidates how pioneering orientation, when channeled through organizational learning, enhances innovation capabilities. These insights offer both scholarly and managerial value in designing more adaptive, learning-oriented, and innovation-driven organizations.

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6 Appendix

Variable	Item	Wording	Source
Pioneering Orientation	PO1	We compete heavily on the basis of being first-to-market with new products.	(Mueller et al., 2012)
	PO2	We typically precede our major competitors in bringing new products to the market.	
	PO3	We offer products that are very different to those of our major competitors.	
	PO4	We offer products that are unique and distinctly different from those of our major competitors	
Dynamic Capability	DC1	Our employees can develop alternative ways of doing their tasks	
	DC2	We can develop flexible process to allow us to respond quickly to changes and opportunities in our markets	
	DC3	We can quickly adopt strategy changes in response to shifts in our business priorities	
	DC4	Our firm has an organizational culture that supports and encourages innovation	
	DC5	At our firm, knowledge from different resources is used for product development activities efficiently and rapidly	
Organizational Learning	OL1	The employees attend fairs and exhibitions regularly	(Jiménez-Jiménez & Sanz-Valle, 2011)
	OL2	There is a consolidated and resourceful R&D policy	
	OL3	New ideas and approaches on work performance are experimented continuously	
	OL4	The company has formal mechanisms to guarantee the sharing of the best practices among the different fields of the activity	
	OL5	There are individuals within the organization who take part in several teams or divisions and who also act as links between them	
Technical Innovation	TI1	Micro-marketing joint venture	(Ibarra, 1993)
	TI2	New client compensation scheme	
	TI3	Data base on newspaper circulation	
	TI4	New strategy for generating clients	
	TI5	New process for generating clients	
Administrative Innovation	AI1	Introduction of company news	(Ibarra, 1993)
	AI2	Creation of personnel department	
	AI3	New performance appraisal system	
	AI4	Job posting penetration	
	AI5	Employee survey	