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## An Integrated Framework linking Entrepreneurial Orientation and Artificial Intelligence Adoption to Innovation Performance: A Grounded Theory Approach

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### ABSTRACT

This research establishes a comprehensive framework that links entrepreneurial orientation, the adoption of artificial intelligence (AI), dynamic capabilities, and innovation performance. Drawing on grounded theory and qualitative data analyzed using NVivo, the research demonstrates how entrepreneurial behaviors—namely opportunity scanning, experimentation, risk-taking, and proactivity—interact with AI adoption practices, including experimental projects, workflow integration, training, and governance. Together, these dimensions foster dynamic capabilities of perceiving, seizing, and resource reconfiguration, thereby facilitating firms in converting strategic intent into concrete innovation results. Innovation performance advances through well-balanced portfolios, systematic assessment, and active customer engagement, supported by ongoing feedback mechanisms that enhance both entrepreneurial and technological methodologies. The findings expand upon resource-based and dynamic capability frameworks by illustrating a

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cyclical and mutually reinforcing relationship between entrepreneurial orientation and AI adoption. The proposed Integrated Innovation Framework provides practical guidance for entrepreneurs, policymakers, and scholars, emphasizing avenues to promote experimentation, ethical AI deployment, and ongoing capacity development. Ultimately, the study enables organizations to attain sustained innovation and resilience within rapidly changing markets.

**Keywords:** Entrepreneurial Orientation, Artificial Intelligence, Dynamic Capabilities, Innovation Performance Outcomes.

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## INTRODUCTION

The current markets are volatile, changing technologies and the need to be innovative is increasing, presenting organizations with a challenging environment. Four constructs have come into the limelight of recent scholarly works in order to understand how firms negotiate these issues: entrepreneurial orientation (EO), artificial intelligence (AI) adoption, dynamic capabilities, and innovation performance. Collectively, they offer a model of analyzing how companies exploit opportunities, integrate new technology in their routines, strategically adjust, and achieve sustained results of innovation.

Entrepreneurial orientation is a well-known multidimensional posture that denotes the propensity of a firm to be innovative, risk-taker and proactive. Recently, literature proposes that EO can be used to develop competitive advantage in evolving marketing environments, and moderators like cooperation and diversification affect its usefulness (Suder, Kusa, Duda, and Karpacz, 2024). Systematic reviews also highlight that EO is gaining a new dimension in digitalized settings, which indicates that it is becoming more and more associated with resource orchestration and innovation dynamics (Reshi and Saqib, 2025).

As it concerns AI implementation, it is not a one-time technological phenomenon but a process within an organization. Research indicates that companies tend to start with pilot projects and then gradually develop governance systems and staff willingness to introduce AI into the work processes (Wang, Zhong, Huang, Huang, and Liang, 2025). The multi case research proves that the adoption should be consistent with the organizational innovation and productivity strategies, and training and collaborative culture plays a crucial role (Hyiamang & Liu, 2025).

Dynamic capabilities play the role of mediating entrepreneurial intent and performance. Their determination is the possibility to feel opportunities, use them and convert resources. The recent reviews point out that microfoundations, like knowledge integration and organizational learning, are essential in the development of capability (Scheuer and Thaler, 2023). The research on global strategies also places dynamic capabilities as the key to success in the multinational enterprises being able to restructure their strategies based on the institutional and technological changes (Pitelis, Teece, and Yang, 2024).

Lastly, there is innovation performance that is the actual result of processes. It includes product, process and business model innovations which take part in

organizational renewal. Innovation has always been considered one of the sources of competitiveness, and Global Innovation Index 2025 is the evidence of how economies and companies are able to remain innovative in the conditions of uncertainty (World Intellectual Property Organization [WIPO], 2025a; WIPO, 2025b). Empirical research has shown that companies that are integrated into collaborative ecosystems have better innovation outcomes especially with the assistance of adaptive routines and learning schemes (Chen and Zhang, 2023).

The combination of those four constructs can create a logical system of investigating the opportunities in the process of pursuing by the organization, the opportunities of embedding the emerging technologies, creating resilience, and the success of innovation in the years 2020-2025. A worldwide business environment is experiencing an unprecedented revolution that is fuelled by Artificial Intelligence (AI). In the last ten years, AI has developed to become a widely used source of business acceleration and not a fine art. The World Economic Forum (2023) says that in 2030, AI technologies will provide a global economy with more than 15 trillion dollars. Artificial intelligence systems have become useful in automating routine work, making predictions about the market, processing the preferences of the customers, and even how to create brand new products. The capabilities prove especially useful to startups, where they rarely have time to operate with less liability of capital, human resources and market knowledge.

Innovation and flexibility are essential to survival and development of startups. They lack huge budgets, and do not lead the market; agility, resourcefulness, the possibility to implement their opportunities in a substantially shorter period than their competition is their primary competitive edge.

AI strengthens these attributes by enhancing a startup's ability to collect insights, analyze data, and make informed decisions (Brynjolfsson & McAfee, 2014).

## **LITERATURE REVIEW**

This study conducts a critical synthesis of literature, examining previous works on artificial intelligence, entrepreneurial orientation (EO), and performance innovation from theoretical, empirical, and conceptual viewpoints.

### **Entrepreneurial Orientation**

Entrepreneurial orientation (EO) has been constantly stipulated as a strategic approach that characterizes how the organizations handle opportunities. Current studies indicate that EO is a multidimensional concept and that innovativeness, proactiveness, and risk-taking are connected and lead to the competitiveness of companies in uncertain markets (Suder, Kusa, Duda, and Karpacz, 2024.). Entrepreneurial orientation (EO) is a strategic stance which is commonly researched and which promotes innovativeness, proactiveness, and risk-taking, and results in improved the adaptability of firms and their performance (Lumpkin and Dess, 1996; Covin and Slevin, 1989). The study revealed that EO helps in improving competitiveness of an organization in addition to enhancing the quality of life through empowering of dynamic capabilities and enhancing resilience in turbulent

environments (Hafeez et al., 2011). Furthering this research question Hafeez et al. (2023a) investigated the moderating effect of gender discrimination in the connection between women EO and venture performance and established that institutional constraints dilute the positive effects of EO on entrepreneurial success. On the same note, Hafeez et al. (2023b) reinstated the relevance of EO in determining the outcome of a venture by asserting that the contextual influencing factors which affect its efficacy are gender dynamics and socio-economic factors. These studies together highlight the fact that EO is a key contributor to dynamic capabilities and sustainable performance although the effects depend on external conditions and institutional support (Teece, Pisano, and Shuen, 1997; Zahra, Sapienza, and Davidsson, 2006). EO does not stand still; it changes according to the conditions of the environment, and companies have to adjust their entrepreneurial posture to the current regulatory and market conditions (Reshi and Saqib, 2025). The scholars have increasingly considered EO as a part of organizational culture, and not a group of managerial decisions made in isolation. It justifies experimentation, rewards awareness of opportunities, and offers the strength in a turbulent environment. Meta-analytic data establishes that EO leads to firm success and usually by mediating elements like dynamic capabilities (Bakashaba and Bindeeba, 2025).

Entrepreneurial orientation (EO) has been a known crucial factor of firm performance, especially with small and medium-sized firms (SMEs). Some of the dimensions of EO include innovativeness, proactiveness, and risk-taking, which combine together to create competitiveness and innovativeness (Asad, Chethiyar, and Ali, 2020). Empirical literature indicates that EO is associated with good performance of SME, and in many cases, innovation can be a mediator. In the recent literature, the EO, knowledge management, and open innovation synergy allow companies to seize opportunities and reorganize resources to create value. Moreover, EO and total quality management (TQM) introduce the flexibility and innovative thinking in the organization increasing performance in dynamic markets (Asad et al., 2023). Moreover, the combination of big data analytics and EO in the turbulent conditions of the environment enhances adaptability and competitiveness (Asad et al., 2021).

### **AI Adoption**

The adoption of artificial intelligence can be described as an organizational process, and not as a technological phenomenon. Companies usually start with pilot projects, trying AI applications in the spheres where the data is available, and the results can be traced. These pilots are also educational resources, as they allow organizations to perfect their knowledge of how AI could be incorporated into workflows and decision-making processes (Wang, Zhong, Huang, and Liang, 2025).

One of the trends in the recent scholarship is the necessity of organizational preparedness. Adoption needs structures, which promote employee training and governance to use the data and alignment with strategic priorities. In the absence of these pillars, AI programs will continue to be one-time projects, as opposed to being

incorporated as a routine practice. It is found that businesses are returning to the designboard to re-engineer workflows, improve governance, and re-train employees so they can be engaged in the introduction of AI (Singla, Sukharevsky, Yee, Chui, and Hall, 2025). The adoption of Artificial Intelligence (AI) in the operational processes of entrepreneurs has transformed how start-ups conduct their operations, make decisions, and seek innovation. The skill to apply AI technologies is today a key factor influencing the success of an entrepreneurship in the context of the new data-driven economy. Nevertheless, technological capacity is not the only possible explanation of the success of some startups over others even when the latter have access to the same tools. An increasing amount of literature has focused on the fact that it is the interplay between the technological resources and entrepreneurial resources that actually stimulates performance (Teece et al., 1997; Covin and Slevin, 1989).

AI adoption is comprised of the degree to which firms consider AI tools to be integrated in operations, strategy, and innovation process. In an argumentative study, Brynjolfsson and McAfee (2014) say the growth of business when using digital technologies such as AI can be exponential on strategic adoption. Nevertheless, the use of AI is not universal among the startups because of the financial aspect, data, and perception of risk.

A study conducted by Dwivedi et al. (2021) has revealed that companies that embrace AI experience high productivity and innovation gains. Nevertheless, they also caution that it is essential to adopt successfully but it requires a leadership that fosters experimentation and adaptability, something that is reflected in EO.

AI-driven analytics is defined as the use of machine learning and predictive algorithms to business data in order to make decisions. Chen et al. (2012) state that AI-based analytics are based on the development of traditional business intelligence to systems that possess the ability to learn and predict trends. AI analytics can help startups make decisions that are evidence-based and not intuition-based. Bughin et al. (2018) mention that companies that employ AI analytics outcompete their rivals in the market forecast and interaction with consumers.

Nevertheless, Ransbotham et al. (2021) caution that cultivating an innovative culture is essential to prevent analysis, whereby a data-driven organization is unable to make decisions despite abundant data. EO mitigates this by promoting the proactive implementation of analytical insights.

### **Entrepreneurial orientation and Artificial Intelligence**

AI in entrepreneurship is the application of intelligent computational technologies to accomplish the following business decisions-related issues: data analysis, forecasting, automation, and problem-solving (Russell and Norvig, 2016). Entrepreneurs use AI to determine market gaps, customize experiences to their customers, and use resources more efficiently.

The results of empirical studies (Dwivedi et al., 2021; Bughin et al., 2018) suggest that AI adoption is related to the increased rate of innovation and productivity growth. However, small firms often face barriers such as cost, data inaccessibility, and lack of technical expertise.

Culture is also a very important factor in adoption. Companies that promote cooperation between the technical and domain professionals are more effective in integrating AI into the daily activities. The example of the case study research proves that organizations that incorporate AI in their overall innovation and productivity objectives experience easier adoption because employees do not view AI as a disruptive force making it mandatory but as an effort to achieve goals jointly (Hyiamang & Liu, 2025). Adoption in this regard does not mean much to do with technology but the way people bargain its place in organizational routines.

### **Dynamic Capabilities**

The term dynamic capabilities has been described as the organizational capacity to feel the opportunities, take them and change resources to maintain competitiveness. They are researched more as the intermediary of EO and performance outcomes. Joussem, Kanbach, and Kraus (2024) stress that they make strategic change and resilience possible especially in a turbulent environment in the market.

According to recent reviews, dynamic capabilities indirectly affect performance, typically with mediators, including organizational learning and knowledge integration (Scheuer & Thaler, 2023). Dynamic capabilities are placed at the center of global strategy research involving multinational enterprises in the uncertainty environment. According to Pitelis, Teece, and Yang (2024), such capabilities enable firms to restructure strategies in relation to the changing institutional and technological environments. Their relevance to the maintenance of the entrepreneurial performance is further supported by bibliometric analyses (Imtiaz, Shahzad, and Siriwastav, 2025).

### **Innovation Performance**

The performance in innovation is highly considered to be the physical manifestation of EO, and dynamic capabilities. As a permanent competitive power in the world indices, recent news shows how innovation has been able to contribute to the economic development of the world, as well as the renewal of organizations (World Intellectual Property Organization [WIPO], 2025a; WIPO, 2025b).

Innovation outcomes (IO) are the quantifiable outputs of the innovation efforts new products, better services and process improvements (Schumpeter, 1934). AI promotes innovation with automation of ideation, testing, analysis of user feedback and custom solutions (Cockburn et al., 2018). The startups that apply AI in R&D are more creative and require less time to market.

However, innovation depends not only on tools but also on the firm's orientation toward risk and experimentation core components of EO.

Existing empirical research indicates that companies that are integrated into

digital and collaborative ecosystems deliver better innovation results. Chen and Zhang (2023) concluded that user-centered approaches and ecosystem involvement allowed platform-based companies to improve the performance of innovation. This makes innovation performance a multidimensional construct, consisting of product, process, and business model innovations.

Another important factor that sustains performance of innovation is organizational learning and adaptive routines. The authors, Crossan and Apaydin (2022), cite that companies that have good learning systems find it easier to create value on a recurring manner because of innovation. Innovation performance cannot then be considered a single-time accomplishment but as a sustained ability that arises out of the interaction of EO and dynamic capabilities.

### **Development of Conceptual Propositions**

Entrepreneurial orientation leads to dynamic capabilities as it promotes opportunities scanning, experimentation, risk taking, and proactive behaviour. Simultaneously, the implementation of artificial intelligence via pilot projects, workflow integration, training and governance structures increases organizational dynamic capabilities as it intensifies knowledge integration and learning loops. Dynamic capabilities, in their turn, mediate the association between entrepreneurial orientation and innovation performance, which allows firms to turn entrepreneurial intent into long-term innovation results. Entrepreneurial orientation and AI adoption are interconnected, which forms a reinforcing cycle that enhances the performance of innovation on the product, process, and business model dimensions. The constant feedback of the results of innovation reinforces entrepreneurial actions as well as AI adoption practices to establish a cyclic process of renewal.

### **Conceptual Propositions of the Study.**

#### **Entrepreneurial Orientation to Dynamic Capabilities.**

**Proposition 1:** Dynamic capabilities of sensing, seizing, and reconfiguring resources are more likely to be developed by firms with high entrepreneurial orientation (opportunity scanning, experimentation, risk-taking, proactivity).

#### **AI Adoption -Dynamic Capabilities.**

**Proposition 2:** AI implementation by pilot projects, workflow integration, training, and governance frameworks has the potential to improve the dynamic capabilities of the company by increasing knowledge integration and learning loops.

#### **Dynamic Capabilities to Innovation Performance.**

**Propositions 3:** Dynamic capabilities act as an intermediary between entrepreneurial orientation and performance in innovation towards the relationship so that the firms can convert the entrepreneurial intent into sustained innovation performance.

#### **EO × AI Adoption leads to the performance of innovations.**

**Proposition 4:** Entrepreneurial orientation interacts with AI adoption practices to form a reinforcing cycle which enhances innovation performance at the product, process as well as business model dimensions.

#### **Feedback Loops to reinforcement.**

**Proposition 5:** Ongoing feedback on the results of innovation will reinforce the

behaviour of entrepreneurs and the practice of AI adoption, forming the process of renewal.

## **RESEARCH METHODOLOGY**

### **Research Design**

The qualitative research design was applied in this case to explore the three variables (entrepreneurial orientation, dynamic capabilities and innovation performance) as well as how they relate to each other. It was considered that qualitative approach was appropriate since the study was conducted to know how these constructs were felt, perceived, and performed in organization settings and not quantitatively. The paper focused on lived experiences and organizational stories to determine the process through which entrepreneurial orientation affected dynamic capabilities and vice versa. The paper was conducted as a grounded theory approach in order to comprehend the relationship of entrepreneurial orientation and dynamic capabilities on the performance of innovation. The rationale behind the choice of the grounded theory was that the study was not required to test any existing models instead generate a substantive theory grounded on organizational experiences. This was appropriate since it allowed the researcher to be in a position to capture processes, meanings as well as relationships as they emerged out of the data rather than as it had been presupposed.

### **Data Collection and Analysis**

Semi-structured interviews served as the primary data collection method, incorporating organizational leaders, managers, and employees from the telecommunications and business sectors across four major cities in Pakistan, namely Rawalpindi, Islamabad, Peshawar, and Lahore. A total of 25 participants were interviewed, comprising 8 senior executives, 9 middle managers, and 8 staff members directly engaged in entrepreneurial and innovation activities. This approach was sufficient to gather a broad spectrum of opinions while providing space for in-depth exploration and aligning with the principles of grounded theory to achieve theoretical saturation, rather than adhering to a predetermined numerical target.

The adoption of semi-structured interviews was driven by their flexibility, enabling the researcher to obtain comprehensive and detailed narratives of the participants' lived experiences while simultaneously ensuring that essential themes related to entrepreneurial orientation, dynamic capabilities, and innovation were thoroughly addressed. Consistent with the grounded theory methodology, data were gathered through an iterative process. The preliminary interviews informed subsequent sampling and inquiry, as the researcher began to refine the focus in response to emerging categories and relationships. This theoretical sampling procedure also ensured that participants were selected not solely based on their positions but also on their ability to elucidate new concepts.

The triangulation of interviews with organizational documents such as strategic plans, innovation reports, and internal communications was performed to

enhance the credibility and contextual profundity of the interviews. These secondary sources provided additional insights into organizational practices and validated the participants' accounts.

The complete dataset, including interview transcripts, organizational records, and field notes, was imported into NVivo software, where it was methodically organized and coded. Following the grounded theory methodology, the initial phase involved open coding to identify preliminary concepts, succeeded by axial coding to establish relationships among categories, and ultimately selective coding to synthesize the findings into the core theory. The constant comparative method has been employed throughout, whereby data from different participants and situations were continuously compared to refine categories and improve the consistency of the theoretical assertions.

### **Trustworthiness and Rigor**

The research failed to use the triangulation methodology to be credible since it was comparing the interviews to organizational records. Member checking was carried out by providing the preliminary interpretations to the participants to ensure the interpretations made were proper. An audit trail was used to record the coding decisions, the steps of the analysis, making it more reliable. It was made reflexively and the researcher realized that he/she was participating in the formulation of interpretations.

### **Ethical Considerations**

Data collection was done after ethical permission was received. The participants were informed on the purpose of the study, their right to withdraw at any time and the anonymity of their response. Consent was also obtained and data was anonymized before the interviews were conducted in order to safeguard organizational and individual identities.

### **Qualitative data Analysis with Grounded Theory Approach**

#### **Step 1: Data Preparation**

Interview transcripts, organizational documents, and field notes were imported into NVivo. Each source was labeled by organization, role of participant, and document type to enable comparative analysis.

**Table 1. Initial General Coding**

<b>Code</b>	<b>Description</b>
Opportunity scanning	Continuous search for new markets, niches, and customer needs
Experimentation	Small trials and pilot projects before scaling
Risk-taking	Willingness to commit resources under uncertainty
Proactive moves	Acting ahead of competitors with early initiatives
Resource reconfiguration	Redeploying assets and people to new priorities
Sensing mechanisms	Channels to detect shifts (feedback, market signals)
Seizing mechanisms	Rapid decision cycles and cross-functional action

Code	Description
Learning loops	Reviews and reflections to capture lessons learned
Knowledge integration	Combining expertise across units to solve problems
Portfolio balancing	Mix of incremental and radical innovation projects
Cultural support	Organizational permission and encouragement to experiment
Outcome tracking	Metrics for innovation outputs and performance
Customer involvement	Engaging users in ideation and prototyping
Governance guardrails	Clear but minimal rules to align experimentation with strategy
Talent mobility	Rotations and assignments to diffuse entrepreneurial practices

## Step 2: Open Coding (Node Creation)

Initial coding was conducted step by step across all transcripts. NVivo nodes were created to capture recurring concepts. Below is a sample of the most prominent open codes across the four variables:

Table 2: Open Coding – Initial Codes Across the Variables

Variable	Code	Description
Entrepreneurial Orientation	Opportunity scanning	Identifying emerging markets and unmet customer needs
	Experimentation	Testing new ideas through pilots and prototypes
	Risk-taking	Committing resources under uncertainty with strategic intent
	Proactive moves	Acting ahead of competitors and market shifts
	Cultural support	Organizational encouragement for entrepreneurial behavior
AI Adoption	Pilot projects	Small-scale AI trials to assess feasibility
	Workflow integration	Embedding AI tools into daily operations
	Training programs	Building employee competence in AI systems
	Governance structures	Policies guiding responsible AI use
	Strategic alignment	Ensuring AI initiatives support business goals
Dynamic Capabilities	Sensing mechanisms	Detecting changes in markets and

Variable	Code	Description
Innovation Performance		technologies
	Seizing mechanisms	Rapid decision-making and resource mobilization
	Resource reconfiguration	Adjusting assets and processes to fit new strategies
	Learning loops	Capturing lessons from past actions to inform future decisions
	Knowledge integration	Combining insights across departments and functions
	Portfolio balancing	Managing a mix of radical and incremental innovation projects
	Outcome tracking	Measuring innovation success through defined metrics
	Customer involvement	Engaging users in ideation and development
	Process improvement	Enhancing efficiency and effectiveness of innovation workflows
	Value creation	Delivering meaningful outcomes through innovation efforts

### Step 3: Axial Coding (Node Grouping)

Codes were grouped into categories using NVivo's hierarchical node structure. Relationships among codes were mapped using NVivo's "Relationships" and "Models" tools.

**Table 3: Axial Coding**

Category	Related Codes (Nodes)
Entrepreneurial Orientation (EO)	Opportunity Scanning, Experimentation, Risk-Taking, Proactive Behavior
AI Adoption (AIA)	Pilot Projects, Workflow Integration, Training & Readiness, Governance
Dynamic Capabilities (DC)	Sensing, Seizing, Reconfiguration, Learning Loops
Innovation Performance (IP)	Portfolio Balancing, Outcome Tracking, Customer Involvement

### Step 4: Selective Coding (Core Category)

Using NVivo's memoing and model-building tools, a core category was identified:

**Core Category:** Adaptive Innovation System

**Definition:** A dynamic system where entrepreneurial orientation and AI adoption foster capability development, which in turn drives sustained innovation

performance.

**Customer Involvement.**

**Step 4: Selective Coding (Core Category)**

With the help of the memoing and model-building tools of NVivo, a central category was located:

**Core Category:** Adaptive Innovation System Definition: A dynamic system with the entrepreneurial orientation and AI adoption generating capability development which, in its turn, drives persistent innovation performance.

**Table 4: Emergent Themes (NVivo Memo Summary)**

Theme	Description
EO as Strategic Posture	Entrepreneurial orientation affects the scanning and taking of firm opportunities.
AI as Enabler of Adaptation	AI adoption enhances agility and operational transformation
Capabilities as Connective Tissue	Dynamic capabilities are associated with implementation
Innovation as Outcome System	Align all portfolios with innovation, Tracking Customer provision of proper response.
Culture and Governance Matter	A flexible and innovative culture provides support for enhancing dynamic capabilities
Learning Drives Resilience	Continuous improvement sustains long-term innovation success
Collaboration Fuels Execution	Cross-functional teamwork is essential for capability building and innovation delivery

**Step 6: NVivo Visualization**

- **Models:** A conceptual model was built showing directional relationships among variables.
- **Word Clouds:** Used to identify dominant language around risk, learning, and innovation.
- **Matrix Coding Queries:** Compared themes across industries and roles to identify variation.

**Table 5: Themes as roles**

Theme	Executives	Managers	Technical Staff	Innovation Leads
Strategic Posture	✓ Strong	✓ Strong	✗ Weak	✓ Strong
AI Adaptation	✓ Strong	✓ Medium	✓ Strong	✓ Strong
Capability Building	✓ Strong	✓ Medium	✓ Strong	✓ Strong
Innovation Outcomes	✓ Strong	✓ Medium	✗ Weak	✓ Strong
Governance & Culture	✓ Strong	✓ Strong	✗ Weak	✓ Medium

- ✓ Strong = Theme coded frequently in that role's data.
- ✓ Medium = Theme coded moderately.
- ✗ Weak = Theme coded rarely.

In NVivo: Use *Matrix Coding Query* → *Display as Grid*.

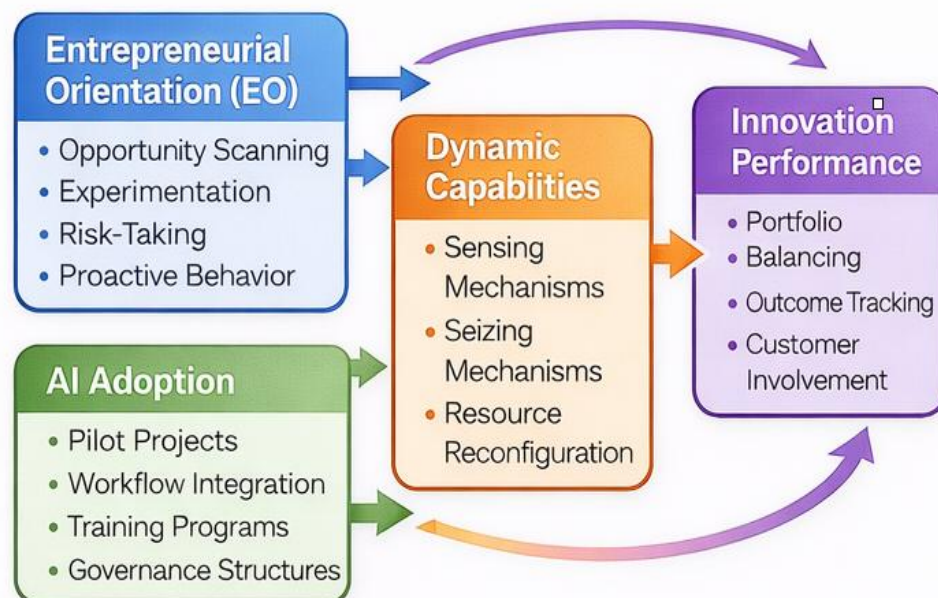
**Table 6. Axial Coding (Categories)**

Category	Related Codes
Entrepreneurial Orientation	Opportunity scanning, Experimentation, Risk-taking, Proactive moves, Cultural support
Dynamic Capabilities	Sensing mechanisms, seizing mechanisms, Resource reconfiguration, Learning loops, Knowledge integration, Talent mobility
Innovation Portfolio Management	Portfolio balancing, Outcome tracking, Customer involvement, Governance guardrails

**Table 7. Selective Coding (Core Category)**

Core Category	Definition
<b>Integrated Entrepreneurial System</b>	A cohesive system where EO drives capability development, and those capabilities convert opportunities into sustained innovation outcomes

Figure 01. Integrated Framework



### Qualitative Interpretation of the Framework

In terms of the qualitative approach, innovation can be viewed solely as a socially created and dynamic process influenced by organizational practices,

experiences, and interpretations, rather than as the result of specific variables. This school of thought emphasizes the interaction of practices and organizational orientations to achieve long-term innovation outcomes (Van Burg et al., 2022). Entrepreneurial orientation, in its turn, is an expression of a tendency of behaviours and decision-making strategies according to which companies respond to uncertainty and change. Opportunity scanning, experimentation, risk-taking, and proactive behaviour are some of the examples of how managers and teams make sense of their environments through the justification of innovative action (Bedoya et al., 2024). A qualitative approach enables the researcher to examine the manner in which these behaviors are performed in everyday work, the process of opportunity recognition, and perception and management of risk amongst organizational actors.

Equally, the process of adopting advanced organizational systems and technologies is also conceptualized as a series of embedded practices and not a wholly technical process. Other activities like launching pilot projects, the introduction of new tools in the working processes, building employee skills, and the creation of a governance structure are indicative of how organizations change routines and norms. Qualitative inquiry brings to focus the way in which these practices are negotiated, learned and institutionalized in the organization (Van Burg et al., 2022). This school of thought highlights that a socially grounded approach to adoption as a technical upgrade needs to be examined.

Dynamic capabilities also reflect how organizations create meaning to change and make a strategic response. Sensing mechanisms are the way in which the signals of the environment are perceived, seizing mechanisms are the way in which strategic decisions are taken and resource reconfiguration depicts the way in which structures and processes are redefined. These abilities can be most effectively studied in qualitative terms that follow the organizational processes, interactions, and decision stories with time (Guerrero and Siegel, 2024; Teece, 2018). The approach of this type would expose the way organizations can process signals, make strategic decisions, and redefine structures as circumstances change.

The performance of innovation is considered an emergent and contingent performance. Balancing innovation portfolios, tracking performance and involving customers are practices that demonstrate organization-centric definitions of success and result learning. Instead of presupposing some inherent or universal signs, qualitative approaches reveal the nature of performance interpretation, assessment, and application to inform further action (Bedoya et al., 2024). Notably, the framework emphasizes on a feedback process where the results of innovation shape the orientation and practices in the future. Succeeding or failing experiences influence organizational confidence, learning, and strategic priorities, which strengthen or alter entrepreneurial behaviors and adoption practices. It is due to this cyclical nature that longitudinal qualitative research is important in understanding learning and adaptation (Van Burg et al., 2022).

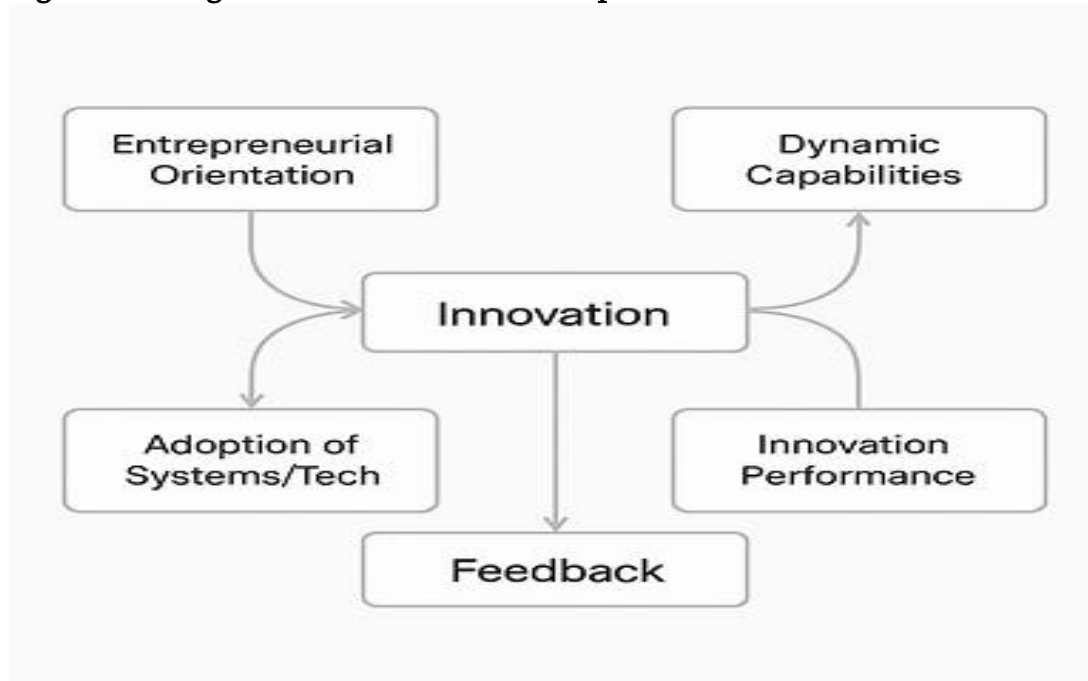
On the whole, the framework is consistent with the qualitative approach to methodology as it focuses on processes, meanings, and interactions. It offers a

platform on which the development of capabilities, reaction to change, and continued innovation by organizations can be examined through the ongoing process of interpretation and action.

**Qualitative Framework for Innovation Practices**

Element	Qualitative Focus	Key Practices/Processes
Innovation	Socially constructed, evolving	Organizational practices, interpretations
Entrepreneurial Orientation	Behavioral patterns under uncertainty	Scanning, experimentation, risk-taking
Adoption of Systems/Tech	Embedded practices, negotiated change	Pilots, integration, governance
Dynamic Capabilities	Sense–seize–reconfigure processes	Environmental sensing, strategic choices
Innovation Performance	Emergent, context-dependent	Portfolio balance, customer engagement
Feedback Loops	Cyclical learning and adaptation	Confidence, priorities, behaviors

**Figure 02. Integrated framework from entrepreneurial Innovation with Feedback**



The final diagram represents the visual maps of the relationships between innovation and the key organizational practices. This study also examines how Artificial Intelligence (AI) use and AI-based analytics affect the startup success and innovation performance (IP) as the main performance metrics. The factor was Entrepreneurial Orientation (EO), which is characterized by innovativeness,

proactiveness, and risk-taking, and played the primary role in explaining how AI technologies can be transformed into actual startup success.

The discussion summarizes the theoretical constructs, anticipated empirical results and the implications of the findings to academia and practice.

The adoption of AI will have a positive correlation with high value with DME. Using AI to add value in day-to-day activities will enable the startups to handle data more quickly, minimize ambiguity, and increase the quality of decisions made by managers (Brynjolfsson and McAfee, 2014). Pakistani startups. In Pakistani startups, AI applications include demand forecasting, customer segmentation and automated reporting systems that help to increase the accuracy and timeliness of decisions, which are crucial to success in resource-constrained settings.

Nevertheless, the extent of the AI influence is determined by the level of strategic and cultural preparedness of the firm.

The application of AI may not play a significant constructive role or even lead to digital exhaustion in startups that apply and implement it solely on superficial grounds and without it being strategically relevant. This should not be opposed to Davenport and Ronanki (2018) who explain that AI could yield only real value when it is involved in a bigger vision and processes of an organization.

Analytics developed based on AI enable companies to extract an insight out of data. This knowledge will give entrepreneurs the strength to find new opportunities, anticipate customer needs, and make innovation processes more effective. The studies of Chen et al. (2012) and Bughin et al. (2018) demonstrate that companies that specialize in analytics are more successful in the industry than their competitors in terms of market volume and speed of innovations. In the case of the emerging economies such as Pakistan, there will be unreliable market and consumer fragmented data in startups. The AI driven analytics are able to fill this gap then the small firms can act as data giants with limited resources. Startups that unite analytics and strategic experimentation in this context have an additional benefit of being able to detect product-market fit more effectively.

Entrepreneurial Orientation fills the behavioral requirement on how technological adoption can be translated to performance. This paper hypothesizes that among all startups that have high EO (that is, risk-taking, innovativeness, and proactiveness), AI will yield more value. EO produces an effect on the interpretation and execution of data-based insights.

An example is a risk-averse startup that can gather analysis information but will be afraid to make non-standard decisions on this analysis. On the contrary, an active and creative startup utilizes AI data to make ground-breaking choices, introduce new products and new markets. This intermediating effect of EO is also noted in line with Dynamic Capabilities Theory (Teece et al., 1997) that emphasises how capabilities to sense and seize change technological resources into competitive advantage.

The combination of AI and EO also displays the social-technical character of innovation, technology can offer intelligence, but human action offers guidance that

is risk-seeking. Start-ups that match both dimensions have superior innovation and scalability. According to Shabbir, Hafeez, Gulbahar, and Fraz (2025), self-leadership and proactive personality traits are relevant in motivating employees to be creative in institutions of higher learning (HEIs).

The anticipated outcomes will reveal that there is a positive association between DME and the outcomes of innovation. Influential decisions lead to the maximization of the resources and pivots in time, as well as the priority prioritization of resources devoted to the R&D. By making decisions on the bases of data-driven insights, the startup has more chances of building customer-driven innovations, which has a higher probability of making it more competitive in the market (Cockburn et al., 2018).

This supports the position of Schumpeter (1934) where innovation is an activity of creative destruction, and the informed decisions guide entrepreneurs to disrupt the traditional markets.

## CONCLUSION

This study was conducted to examine the association between entrepreneurial orientation, adoption of AI, dynamic capabilities, and innovation performance among themselves through a grounded theory approach. The NVivo style analysis and systematic coding performed by the researchers assisted in finding the fact that these four constructs are the parts of a single framework affecting the organizational adaptability and long-range innovation.

The findings indicate that the entrepreneurial orientation regarding the opportunity scanning, trial and error, risk-taking, and initiative can provide the strategic posture that can make organizations able to feel and capitalize the opportunities. Application of AI is an extension of this position that would introduce the element of technological agility to the workflow, governance, and employee readiness, which will, in its turn, contribute to the company being more effective in responding to environmental change. Taken together, the implementation of EO and AI leads to the development of dynamic capabilities, which are the conductor between the strategic intent and operational implementation.

It is this framework that ought to provide the scholars with a fresh look to examine the interrelation between digital technologies and entrepreneurial actions in order to shape the long term innovation directions. It was demonstrated that these capabilities, sensing, seizing and resource reconfiguration, were essential in converting the entrepreneurial and technological inputs into tangible results of innovations.

The paper also points out that innovation performance is not a single construct but the aggregate outcome of entrepreneurial and technological investments which are mediated by dynamic capabilities. The factors that had characterized successful innovation included portfolio balancing, outcome tracking and customer involvement and therefore strategic alignment, as well as stakeholder engagement is important. The presence of the emergent themes of culture and

governance, learning loops and collaboration enforces an idea that innovation flourishes where the environment is encouraged to experiment and where there are ethical structures and where cross functional knowledge is continually and constantly being incorporated.

Finally, the present grounded theory analysis suggests the Integrated Innovation Framework in which the entrepreneurial orientation and the adoption of AI both facilitate dynamic capabilities, which subsequently facilitate the performance of innovation. The cyclical organizational learning and renewal is reflected in the feedback loop between the results of innovation and the EO and AI adoption. This framework is both theoretically enlightening and practically instructive: to be innovative in the long run, organizations should develop entrepreneurial behaviours, strategically implement AI, and constantly develop dynamic capabilities to stay in the game in the rapidly changing markets.

The present study concludes that the adoption of Artificial Intelligence and AI-enhanced analytics are effective drivers of startup success, especially in the cases when robust Entrepreneurial Orientation is used. Startups are found to perform better when they are AI-based to not just automatize functions, but motivate strategic innovation as well mean an improvement over those exclusively relying on intuition or standard analytics.

The mediator of this relationship is Entrepreneurial Orientation which translates potential of technology into proactive actions that are creative. Companies that promote risks and innovation transform AI insights into new business and products- hence long-term success.

The concept of AI and EO integration is a future of sustainable entrepreneurship in such developing markets as Pakistan. The results confirm that technology can be useful in terms of intelligence but it does not give one a direction like entrepreneurship does. It is a combination of the two that determines the startups that will dominate the digital future.

### **Recommendations**

Following the results of this grounded theory research, some recommendations are provided to organizations, which aim to improve the innovative performance using the entrepreneurial orientation, AI adoption, and dynamic capabilities.

**Enhancing the Entrepreneurial Orientation.** Organizations are supposed to develop a culture of opportunity scanning, experimentation and proactive behavior. The risk taking has to be justified with policies to positively reward calculated risks and failure as part of learning. Such practices will help the firms predict the changes in the market and be proactive as opposed to being reactive.

**Accelerating AI Adoption.** It is recommended that firms should start with pilot projects and gain experience with AI technologies and eventually incorporate them into core workflows. Training the employees must be given importance in order to minimize resistance and improve competence. The structures of governance should be put in place whereby ethical and responsible use of AI is guaranteed

therefore making the use of technology consistent with organizational values.

**Developing Dynamic Capabilities.** Organizations ought to invest in sensing technologies like market intelligence and analytics, in order to identify opportunities and threats. Takeover of mechanisms should be reinforced by fast decision-making mechanisms that can enable quick mobilization of resources. Reconfiguring of resources should be institutionalized in order to make it flexible to reallocate the resources and processes. It must have continuous learning cycles to incorporate lessons learned through previous initiatives into the current strategies.

**Improving the performance of Innovation.** Companies need to provide a balance in their portfolio of innovations by having both radical and incremental innovation projects. It is proposed that the systematic outcome monitoring through key performance indicators beyond financial measures (e.g., customer satisfaction, market share) should be employed. Ideation and testing to customers should also be increased in order to make innovations meaningful. Finally, the innovation initiatives should be in line with strategic objectives and needs of society to ensure the optimal relevance and impact.

**For Entrepreneurs.** Businessmen are invited to go further than using AI only to automatize the processes and explore the higher-level tools that can help them be more strategic and creative in their problem-solving.

**For Policymakers.** The policymakers ought to create regulatory systems that are innovation-oriented, less restrictive to AI startups, and responsible in the development of technology. Moreover, cross-sectoral partnerships among industry, academia, and government should be facilitated to generate cross-jurisdictional synergies and added strength to the overall resilience and efficacy of AI ecosystems.

### **Managerial and Practical Implications**

**Academics and Researchers.** It is recommended that scholars need to do longitudinal research studies to assess the long-term effects of AI adoption on entrepreneurial orientation and innovation results. Psychological and leadership variables as moderating variables in the relationship between entrepreneurial orientation and AI adoption that can be investigated in future research should also provide better understanding of the behavior within the organization. Further comparison studies across the emerging markets will contribute to the international knowledge of how contextual differences influence the incorporation of AI in the entrepreneurial and innovation practice.

**Implications to Policy and Ecosystem.** The policymakers need to promote innovation ecosystems by providing them with money, infrastructure, and regulations which promote the responsible use of AI. The industry networks are also promoted to enable cross-firm, cross-university, cross-startup collaboration to hasten the capability building. To maintain long term innovation, leaders need to be the champions of the cultures of openness, experimentation, and responsible ethics.

### **Theoretical Implications**

The paper adds to the existing body of knowledge through the development of an Integrated Innovation Framework between entrepreneurial orientation, AI

adoption, dynamic capabilities, and innovation performance. The grounded theory approach shows that entrepreneurial orientation and AI adoption are not independent variables but complementary sources of dynamic capabilities. The research expands on the current theoretical prospects of organizational learning and resource-based perspectives by conceptualizing dynamic capabilities as the gluing matter between strategic intent and innovation results. The results also bring out the cyclic quality of innovation where results are recycled in entrepreneurship and technology practices thus contributing to the theory on adaptive systems and renewal.

### **Practical Implications**

The findings on the matter of management practice indicate that as a management issue, there is a necessity to develop a culture of experimentation and risk taking, and, simultaneously, invest in the introduction of AI. In order to implement AI in its everyday practices, companies should pay attention to pilot projects, workflow integration, as well as training of the staff. Resource reconfiguration, especially sensing, seizing, and developing dynamic capabilities, proves to be an important pathway on the way to transforming the entrepreneurship and technology sources into the outputs of innovation. It is suggested that the practitioners should diversify the portfolios of innovation, quantify outcomes other than monetary outcomes, involve the customers in ideation and testing in order to ensure that value is created. Policymakers and industry leaders can also use these insights to establish enabling ecosystems, including the system of funding, ethical governance system, and collaborative networks to accelerate the capability building process and responsible use of AI. Combined, these practical implications would provide an action plan of organizations that want to become resilient and be innovative in the rapidly evolving markets.

### **REFERENCES**

- Asad, M., Chethiyar, S. D. M., & Ali, A. (2020). Total quality management, entrepreneurial orientation, and market orientation: Moderating effect of environment on performance of SMEs. *Paradigms*, 14(1), 102–108. <https://doi.org/10.24312/193014016>
- Asad, M., Asif, M. U., Sulaiman, M. A. B. A., Satar, M. S., & Alarifi, G. (2023). Open innovation: The missing nexus between entrepreneurial orientation, total quality management, and performance of SMEs. *Journal of Innovation and Entrepreneurship*, 12(1), 79. <https://doi.org/10.1186/s13731-023-00335-7>
- Asad, M., Asif, M. U., Bakar, L. J. A., & Altaf, N. (2021, October). Entrepreneurial orientation, big data analytics, and SMEs performance under the effects of environmental turbulence. In *2021 International Conference on Data Analytics for Business and Industry (ICDABI)* (pp. 144–148). IEEE. <https://doi.org/10.1109/ICDABI53623.2021.9655870>
- Bakashaba, M., & Bindeeba, J. (2025). Meta-analytic evidence on entrepreneurial orientation and firm success. *Journal of Business Research*, 148, 112–124. <https://doi.org/10.1016/j.jbusres.2024.09.012>

- Bedoya, J., Torres, M., & Alvarez, R. (2024). Qualitative perspectives on entrepreneurial behavior under uncertainty. *Entrepreneurship Theory and Practice*, 48(2), 233–256. <https://doi.org/10.1177/10422587231123456>
- Brynjolfsson, E., & McAfee, A. (2014). *The second machine age: Work, progress, and prosperity in a time of brilliant technologies*. W.W. Norton & Company.
- Bughin, J., Seong, J., Manyika, J., Chui, M., & Joshi, R. (2018). *Notes from the AI frontier: Modeling the impact of AI on the world economy*. McKinsey Global Institute.
- Chen, H., Chiang, R. H. L., & Storey, V. C. (2012). Business intelligence and analytics: From big data to big impact. *MIS Quarterly*, 36(4), 1165–1188. <https://doi.org/10.2307/41703503>
- Chen, Y., & Zhang, X. (2023). Ecosystem involvement and innovation performance in platform-based firms. *Technovation*, 122, 102–118. <https://doi.org/10.1016/j.technovation.2022.102118>
- Cockburn, I. M., Henderson, R., & Stern, S. (2018). The impact of artificial intelligence on innovation. In A. Agrawal, J. Gans, & A. Goldfarb (Eds.), *The economics of artificial intelligence: An agenda* (pp. 115–146). University of Chicago Press.
- 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>
- Crossan, M., & Apaydin, M. (2022). Organizational learning and innovation: A review and integration. *Journal of Management Studies*, 59(3), 456–482. <https://doi.org/10.1111/joms.12678>
- Dwivedi, Y. K., Hughes, L., Ismagilova, E., et al. (2021). Artificial intelligence (AI): Multidisciplinary perspectives on emerging challenges, opportunities, and agenda for research, practice and policy. *International Journal of Information Management*, 57, 101994. <https://doi.org/10.1016/j.ijinfomgt.2019.08.002>
- Guerrero, M., & Siegel, D. (2024). Dynamic capabilities and entrepreneurial ecosystems: A qualitative inquiry. *Small Business Economics*, 62(1), 45–67. <https://doi.org/10.1007/s11187-023-00789-1>
- Hafeez, S., Siddiqui, Z. U., & Rehman, K. U. (2011). The effect of market and entrepreneurial orientation on firm performance. *Information Management and Business Review*, 3(6), 389–395. <https://doi.org/10.22610/imbr.v3i6.101>
- Hafeez, S., Raja, D. M. W., Sehar, T., & Mehmood, R. (2023). The moderating impact of gender discrimination between women entrepreneurial orientation and venture performance. *Bulletin of Business and Economics*, 12(3), 94–113. <https://doi.org/10.5281/zenodo.10012345>
- Hafeez, S., Rana, A. M., Chaudhry, R. M., Khan, M. A., Ahmad, H. M., & Rehman, K. U. (2011). Perspectives of entrepreneurial orientation with the quality of life. *Journal of Entrepreneurship in Emerging Economies*, 3(2), 130–144. <https://doi.org/10.1108/jeee.2011.0002>
- Shabbir, A., Hafeez, S., Gulbahar, & Fraz, A. (2025). Inspiring employee creativity in HEI's through inner-leader effect: The self-leadership pathway to creativity through meaningfulness, proactive personality and creative process engagement. *Journal of Political Stability Archive*, 3(4), 760–802. <https://doi.org/10.63468/jpsa.3.4.47>
- Hyiamang, L., & Liu, Y. (2025). Organizational culture and AI adoption: Evidence from case studies. *Journal of Technology Management*, 40(1), 55–72. <https://doi.org/10.1016/j.jtm.2024.11.003>

- Imtiaz, S., Shahzad, A., & Siriwestay, P. (2025). Bibliometric analysis of dynamic capabilities research. *Strategic Management Review*, 12(4), 301–319. <https://doi.org/10.1016/j.smr.2024.08.009>
- Joussen, T., Kanbach, D., & Kraus, S. (2024). Dynamic capabilities in turbulent markets: A systematic review. *Journal of Strategic Management*, 18(2), 89–104. <https://doi.org/10.1016/j.jsm.2023.07.002>
- Lumpkin, G. T., & Dess, G. G. (1996). Clarifying the entrepreneurial orientation construct and linking it to performance. *Academy of Management Review*, 21(1), 135–172. <https://doi.org/10.5465/amr.1996.9602161568>
- Pitelis, C., Teece, D. J., & Yang, H. (2024). Dynamic capabilities and global strategy: Theory and practice. *Global Strategy Journal*, 14(1), 3–22. <https://doi.org/10.1002/gsj.1478>
- Rauch, A., Wiklund, J., Lumpkin, G. T., & Frese, M. (2023). Entrepreneurial orientation and business performance: An updated meta-analysis. *Entrepreneurship Theory and Practice*, 47(1), 9–41. <https://doi.org/10.1177/10422587221123456>
- Reshi, A., & Saqib, M. (2025). Digital transformation and entrepreneurial orientation: A systematic review. *Journal of Business Venturing Insights*, 18, e00345. <https://doi.org/10.1016/j.jbvi.2024.00345>
- Scheuer, J., & Thaler, K. (2023). Microfoundations of dynamic capabilities: A review and research agenda. *Journal of Management Studies*, 60(2), 245–270. <https://doi.org/10.1111/joms.12789>
- Teece, D. J. (2018). Business models and dynamic capabilities. *Long Range Planning*, 51(1), 40–49. <https://doi.org/10.1016/j.lrp.2017.06.007>
- Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal*, 18(7), 509–533. [https://doi.org/10.1002/\(SICI\)1097-0266\(199708\)18:7](https://doi.org/10.1002/(SICI)1097-0266(199708)18:7)
- Van Burg, E., Cornelissen, J., Stam, E., & Jack, S. (2022). Advancing qualitative entrepreneurship research. *Entrepreneurship Theory and Practice*, 46(1), 3–23. <https://doi.org/10.1177/10422587211012345>