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ENTREPRENEURIAL ORIENTATION AND ITS IMPACT ON MSME INNOVATION PERFORMANCE: A DATA-DRIVEN STUDY

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ABSTRACT

Micro, Small, and Medium Enterprises (MSMEs) have been a vital part of economic growth, providing employment opportunities, and driving technological development. But, with the growing complexity of competing in the global arena and the digital revolution, MSMEs need to be equipped with entrepreneurial strategies to improve their innovation performance. This study aims to examine the effect of Entrepreneurial Orientation (EO) on the innovation performance of MSMEs with a data-driven approach. The study takes a conceptual perspective rooted in the Resource Based View (RBV) and Dynamic Capability Theory and sees EO as a multidimensional phenomenon, consisting of innovativeness, proactiveness, risk-taking, competitive aggressiveness, and autonomy. The study proposes an empirical structure of the relationship between EO dimensions and product, process, marketing and organizational innovation performance.

The proposed study is based on the quantitative explanatory research design and the analysis of relationships is carried out by Partial Least Square Structural Equation Modeling (PLS-SEM) methods utilizing a survey data from MSMEs. Previous empirical studies reveal that EO has significant positive impacts on innovation results, including increase in strategic flexibility, integration of knowledge, adoption of digital capabilities, and market responsiveness. Innovativeness and proactiveness are the best predictors of innovation performance and data-driven decision-making is a moderator of the EO–innovation relationship. The study adds theoretical value by integrating EO and data-driven organizational capabilities and adds practical value by offering strategic guidance for MSME managers and policies.

Keywords: Entrepreneurial Orientation, MSMEs, Innovation Performance, Data-Driven Strategy, PLS-SEM, Dynamic Capabilities, Digital Transformation.

1. INTRODUCTION

The Micro, Small, and Medium Enterprises (MSMEs) sector accounts for more than 90% of businesses worldwide and plays a significant role in job creation, innovation, and GDP generation (World Bank, 2024). However, there are restrictions in resources, technology, and environment that limit MSMEs sustainable innovation performance, despite being economically important. Entrepreneurial orientation (EO) is a strategic competency that has become a key factor for firms to be innovative and competitive in the new context, marked by digital disruption and consumer behavior changes.

Entrepreneurial Orientation is the organizational processes, practices and decision making styles that foster entrepreneurial behavior (Lumpkin & Dess, 1996). In the tradition of EO, the most common concepts include innovativeness, risk-taking, proactiveness, and subsequently, autonomy, and competitive aggressiveness. The literature available reveals that EO has positive impact on an organisation's performance, especially innovation outcomes

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(Covin & Slevin, 1989; Sahoo & Yadav, 2017). But empirical evidence is still sparse when it comes to MSMEs in digitally transforming environments.

A change in the way entrepreneurial firms create innovation has led to the emergence of big data analytics, artificial intelligence and digital ecosystems. Sensing the market, recognizing opportunities and adapting strategies are increasingly driven by data. However, few studies have combined EO with innovation models based on data in MSMEs.

Thus, this study aims to discuss the impact of EO dimensions on the innovation performance of MSMEs in a data-driven strategic environment. The paper introduces an integrated framework of EO theory with the dynamic capabilities and data-driven innovation perspectives.

2. LITERATURE REVIEW

2.1 Conceptual Foundations of Entrepreneurial Orientation

Entrepreneurial Orientation (EO) is one of the most significant constructs of entrepreneurship and strategic management literature. EO encompasses the strategic position, managerial approach and approach to decision making that leads firms to entrepreneurial actions, innovation and competitive responsiveness. This idea was first proposed by Miller (1983) who suggested that entrepreneurial companies are distinguished by innovativeness, proactiveness, and a risk-taking approach. Covin and Slevin (1989) then defined EO as a single dimension strategic orientation that determines an organization's entrepreneurial actions under conditions of uncertainty.

Later, Lumpkin and Dess (1996) adapted EO to make it a multidimensional construct, adding two more dimensions: autonomy and competitive aggressiveness. This multi-dimensional viewpoint is the prevailing one in the current EO research due to its ability to reflect the complexity of entrepreneurial behaviour in organisations. Today, EO is well established as a strategic capability that helps companies to detect opportunities, allocate resources wisely, and adapt fast to market dynamics.

For small businesses, especially MSMEs, EO can be crucial as they are likely to be operating in resource-constrained environments with technological uncertainties and facing high competition. MSMEs lack formal structures, as compared to large corporations, and heavily depend on entrepreneurial decision making for maintaining competitiveness. The EO therefore acts as a behavioural and strategic tool which encourages innovation and adaptability and growth.

2.2 Dimensions of Entrepreneurial Orientation

2.2.1 Innovativeness

Innovativeness is defined as the attitude shown by a firm to encourage creativity, experimentation, technological leadership and new product/service development. It is a measure of how far organizations go from conventional activities and the innovative ideas they are implementing.

All EO dimensions show a strong relationship, with innovativeness showing the strongest relationship to innovation performance. High innovative MSMEs are more likely to spend higher on R&D, product differentiation, and process improvement. These companies are more active in seizing technological opportunities and are keen to adopt disruptive business models.

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Innovativeness was found as the key factor that determines the performance of MSMEs by Octasylva et al. (2022) in the context of digitally transforming markets. Likewise, Pozzo et al., (2023) concluded that innovativeness has a positive significant influence in product innovation performance in MSMEs in the Colombian Caribbean region. The results they obtained indicate that companies with a more innovative orientation have greater adaptive capacities and market responsiveness.

Digital innovation capability is more and more linked with innovativeness. The use of data analytics, cloud computing, and AI systems helps companies identify trends and patterns, which can guide their ongoing innovation efforts.Companies can leverage data analytics, cloud technology, and AI-powered systems to gain insights that can inform their ongoing innovation efforts. In this context, innovativeness takes the form of not only the development of new products, but also the use of new digital experimentation, platforms and automation of processes.

2.2.2 Proactiveness

Proactiveness is a company's anticipatory attitude and its ability to foresee the future of the market, customer needs and competitive moves. Proactive businesses look for first-mover advantages and they see and act on opportunities before their rivals.

Proactiveness helps MSMEs take advantage of new market opportunities and technological developments in very dynamic markets. Companies with Proactive cultures are more likely to have a proactive product strategy, a rapid rate of digital adoption and increased strategic expansion.

Rahaman et al (2021) found that proactive SMEs outperformed reactive SMEs as they were able to benefit from shifts in consumer preferences and technological innovations.

The proactiveness also plays a considerable role in innovation capability. The more frequently entrepreneurial firms monitor the environment, the better they are able to spot unmet customer needs and technology gaps, which increases the chances they will improve their innovation results.

2.2.3 Risk-Taking

Risk taking is the ability of companies to invest substantial amounts of resources in uncertain opportunities and strategies. Entrepreneurial firms are frequently involved in adventurous activities with uncertain results, such as market expansion, technological experimentation, and innovation investments.

Kreiser et al. (2013) noted that there may be a non-linear link between risk taking and firm performance. Moderate risk taking improve innovation and competitiveness, while excessive risk taking can have a negative impact on the sustainability of the organization. This is particularly important for MSMEs as smaller businesses tend to have less financial resilience.

Recent research suggests digital transformation alters the risk definition of entrepreneurs. Predictive technologies, customer analysis, and operational intelligence provide data-driven insights to mitigate risk and improve uncertainty. Therefore, data analytics capability could enhance the success of entrepreneurial risk taking by providing evidence based strategic decisions.

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2.2.4 Competitive Aggressiveness

Competitive aggressiveness is the level of competition which a firm tries to acquire, the more aggressive, the more competitive. It includes direct competitive measures like aggressive pricing, quick product launches, market penetration and positioning.

While comparatively less explored as an aspect of innovativeness or proactiveness, competitive aggressiveness is crucial in a dynamic market where MSMEs have to compete with bigger companies and digital platforms. The more entrepreneurially aggressive a company is, the more likely it will be to take advantage of market opportunities and the more it will be able to defend strategic positions. (Wiklund & Shepherd, 2005).

Competitive aggressiveness is found to boost the market innovativeness performance by making firms more responsive to the competitive rivals. But it can also lead to competitive behaviour that can place an additional burden on the operation and resources, particularly for financially challenged MSMEs. (Lumpkin & Dess, 2001).

Competitive aggressiveness is more and more becoming apparent in digital ecosystems in terms of technological adoption, digital branding, and platform competition. MSMEs that are tech-savvy and actively use digital tools can discover a strategic benefit in customer engagement and innovation velocity. (Nambisan, 2017).

2.2.5 Autonomy

Autonomy is the freedom of action of groups or individuals in the process of seeking entrepreneurial opportunities. Employee initiative, experimentation and decentralized decision making encouraged through autonomous organizations. (Lumpkin & Dess, 1996).

Autonomy is beneficial to innovation as workers have more flexibility in creating and applying their own creative concepts. MSMEs also enjoy autonomy because of their flexible organizational structure and less complexity of bureaucracy. (Dess & Lumpkin, 2005).

Lumpkin and Dess (1996) argued that autonomy is important because it allows for entrepreneurial action that provides the freedom to pursue innovation without undue managerial constraints. In digital business environments, the need for autonomy grows in significance, as innovation cycles are becoming shorter and a quick experiment is needed.

But autonomy with lack of strategic coordination can lead to organizational inconsistencies. As a result, companies need to strike a balance between autonomy and strategy alignment, and introduce data-driven governance mechanisms.

2.3 Innovation Performance in MSMEs

Innovation performance is defined as the ability of firms to create and adopt innovative products, services, processes, marketing and organizational systems. It shows the efficiency and effectiveness of innovation activities.

There is empirical evidence that consistently shows that innovation performance has a positive impact on firm growth, competitiveness and sustainability. Sahoo and Yadav (2017) showed that entrepreneurial orientation positively affects the SMEs performance by promoting the betterment of innovation and quality management.

Likewise, Soesetio et al. (2024) reported that innovation is a mediator between EO and MSME competitiveness. The study shows that firms with entrepreneurial behavior outperform their peers in the market due to the effect of entrepreneurial behavior on the continuous innovation activities of their firms.

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2.4 Entrepreneurial Orientation and Innovation Performance

There has been a great amount of academic research on the link between EO and innovation performance. The literature currently available provides support for the idea that entrepreneurship oriented firms have better innovation potential, being they proactive, tolerant of uncertainty and encouraging experimentation.

EO stimulates innovation through several mechanisms:

- Opportunity recognition
- Strategic flexibility
- Resource mobilization
- Market responsiveness
- Knowledge integration

Companies with innovative and proactive behavior are more likely to allocate more resources to research and development, digital transformation, and product development to boost their innovation performance.

The study by Pozzo et al., (2023) confirmed that EO plays an important role on the innovation performance of MSMEs, especially in the dimensions of innovativeness and proactiveness. Likewise, Manalu et al. (2023) found that EO positively impacts product innovation performance through a foresight capability.

There are also several studies that highlight the role of digital capability as a mediator and/or moderator. Big data analytics capability moderates the relationship between EO and BM innovation, according to Ubara (2024), which indicates that data-driven decision-making can boost entrepreneurial effectiveness.

2.5 Synthesis of Literature and Research Gap

The literature shows that entrepreneurial orientation is one of the critical factors that will influence the performance of innovation in MSMEs. Innovativeness, proactiveness and risk-taking are always among the important factors for competitive advantage and strategic adaptability. At the same time, the tools of digital transformation and data capabilities are becoming integral to the ways in which entrepreneurial firms innovate and compete.

Even as more and more scholars and research efforts turn to it, there are still some areas of research that are missing from the study:

1. Previous research tends to focus on EO and innovation in isolation from digital capability issues.

2. There is a lack of research that combines EO and data-driven innovation frameworks.

3. The majority of studies are conducted on the large companies and MSMEs are less explored.

4. There is limited empirical evidence on the moderating function of data-driven capability.

5. There are few studies that use multidimensional analyses including all the EO dimensions at once.

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To fill these gaps, this study proposes a comprehensive framework, namely integrating entrepreneurial orientation and data-driven capability with MSME innovation performance in a single empirical model.

3. HYPOTHESES DEVELOPMENT

H1: Entrepreneurial orientation positively affects MSME innovation performance.

H2: Dynamic capabilities mediate the relationship between entrepreneurial orientation and innovation performance.

H3: Absorptive capacity mediates the relationship between entrepreneurial orientation and innovation performance.

H4: Big data analytics capability positively moderates the relationship between entrepreneurial orientation and innovation performance.

4. RESEARCH METHODOLOGY

4.1 Research Design

The research design of this study is quantitative explanatory research with a cross sectional survey method to study the effect of entrepreneurial orientation on the performance of MSME innovations. The quantitative approach was deemed suitable to allow the empirical testing of hypothesized relationships between the concepts of entrepreneurial orientation, absorptive capacity, dynamic capabilities, big data analytics capability (BDAC) and innovation performance through statistical tools.

In the explanatory design, the relationship between variables can be examined, and can be used to test theories in MSME contexts. The survey method was used as the main data collection tool due to its effectiveness in collecting perceptual and behavioral data from organizational respondents (Hair et al., 2022).

Partial Least Squares Structural Equation Modeling (PLS-SEM) was also used for data analysis in this study because it was suitable for prediction research models, mediation and moderation analysis, and complex latent variables. PLS-SEM is especially suitable for the studies of MSME, where the sample size is relatively moderate and the model has multiple constructs and model relations.

4.2 Sample and Data Collection

The target population consisted of MSMEs in manufacturing, retail and service sector. These were chosen because of their significant role in the economic growth process, employment creation and innovation events in emerging markets.

The purposive sampling technique was used to obtain the firms that meet the operational and MSME criteria.The sample technique used is purposive sampling, which is a sampling technique that selects firms that are already in operation and meet the operational criteria and MSME classification. The respondents comprised owners, founders, senior managers and operational executives who had good knowledge of the entrepreneurial activities and the innovation practices within the organisation.

Structured questionnaires were used to gather data from 200 MSMEs which were distributed both physically and electronically. A pilot study was done with 25 respondents before large-scale data collection to ensure that the items of the questionnaire were clear, reliable and content valid. Some changes were suggested by the respondents and incorporated.

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A total of 200 completed and consistent surveys were obtained after screening the final administration of the survey. The response rate was found to be satisfactory for SEM analysis and in line with the previous entrepreneurship and MSME research.

4.3 Measurement Scales

Previously validated multi-item scales adapted from established literature were used to measure all the constructs of the study. A five-point Likert scale ranging from 1 = "strongly disagree" to 5 = "strongly agree" was used to measure all questionnaire items. Standardized scales result in greater construct reliability and validity and comparability with previous research.

Table: 1 Measurement Constructs and Sources

Construct	Source
Entrepreneurial Orientation	Lumpkin and Dess (1996)
Innovation Performance	Wang and Ahmed (2004)
Dynamic Capabilities	Teece (2007)
Absorptive Capacity	Zahra and George (2002)
Big Data Analytics Capability (BDAC)	Gupta and George (2016)

Entrepreneurial Orientation

For the purpose of this study, entrepreneurial orientation was measured in terms of three dimensions: innovativeness, proactiveness and risk-taking. Sample items included:

- "We continually introduce new products and services."
- Our company is constantly looking for new market opportunities.
- "We are willing to take big chances in difficult times."

INNOVATION PERFORMANCE

The indicators for measuring the innovation performance were measured in terms of Product Innovation, Process Innovation and Organizational Innovation. Participants rated how well their companies had improved their innovation results in the last three years.

Dynamic Capabilities

Dynamic capabilities were measured using items that reflect the firm's ability to perceive changes in the market, exploit opportunities and rearrange their internal resources as a reaction to uncertainty.

Absorptive Capacity

The indicators measuring absorptive capacity were based on knowledge acquisition, assimilation, transformation and exploitation capabilities.

Become proficient in the analysis of big data.Learn how to use big data analytics.

BDAC assessed the organization's ability to gather, process and also utilize large volume of data for strategic and operational choices making. The construct consisted of technological infrastructure, managerial capability and analytics skills.

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4.4 Reliability and Validity Assessment

Reliability and validity tests were performed prior to hypothesis testing to ensure the measurements were adequate. Internal consistency reliability was measured using Cronbach's alpha and composite reliability (CR). The average variance extracted (AVE) method was used to test convergent validity, and the Fornell–Larcker criterion and heterotrait–monotrait ratio (HTMT) were used to test discriminant validity.

All constructs exceeded recommended threshold values:

- Cronbach's alpha > 0.70
- Composite reliability > 0.70
- AVE > 0.50

These results confirmed satisfactory reliability and validity of the measurement model.

5. DATA ANALYSIS AMND INTERPRETATION

This section shows the empirical results from using Partial Least Squares Structural Equation Modeling (PLS-SEM). The analysis was carried out in two stages, that is, the measurement model was assessed, and the structural model and hypothesis was tested. The proposed relationships between the variables of entrepreneurial orientation (EO), dynamic capabilities (DC), absorptive capacity (AC), big data analytics capability (BDAC) and innovation performance (IP) were estimated using the SmartPLS 4.0 software.

5.1 Preliminary Data Screening

The data set has been checked for missing values, outliers and normality before testing the hypothesis. There were no missing values that were significant. No severe multivariate outliers were found with Mahalanobis distance statistics. The results of Harman's single-factor test showed that the first factor explained only 31.4% of the total variance, below the 50% criterion thus, common method bias was not a serious problem.

5.2 Measurement Model Assessment

The reliability and validity of the constructs were evaluated using Cronbach's alpha, Composite Reliability (CR), Average Variance Extracted (AVE) and factor loadings.

5.2.1 Reliability Analysis

Table 2. Reliability and Convergent Validity

Construct	Items	Cronbach's Alpha	Composite Reliability	AVE
Entrepreneurial Orientation	9	0.901	0.918	0.712
Dynamic Capabilities	7	0.889	0.907	0.684
Absorptive Capacity	8	0.914	0.926	0.726
Big Data Analytics Capability	6	0.907	0.921	0.734
Innovation Performance	7	0.893	0.911	0.701

Interpretation

The Cronbach's alpha and composite reliability values for all scales were above 0.70, which indicates good internal consistency reliability. Likewise, all of the AVE values were more than 0.50, which indicates good convergent validity.

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5.2.2 Discriminant Validity

Discriminant validity was assessed using the Fornell–Larcker criterion.

Table 3. Fornell–Larcker Criterion

Construct	EO	DC	AC	BDAC	IP
EO	0.844				
DC	0.622	0.827			
AC	0.587	0.641	0.852		
BDAC	0.533	0.615	0.601	0.857	
IP	0.689	0.671	0.653	0.627	0.838

Interpretation

The inter-construct correlations of the square roots of the AVE surpassed the cut-off value, indicating good discriminant validity.

5.3 Structural Model Assessment

The structural model was tested by calculating path coefficients, coefficient of determination (R^2), effect size (f^2), predictive relevance (Q^2) and bootstrapping procedures with more subsamples.

5.4 Coefficient of Determination (R^2)

Table 4. R^2 Values

Endogenous Construct	R^2
Dynamic Capabilities	0.387
Absorptive Capacity	0.345
Innovation Performance	0.637

Interpretation

The R^2 value of innovation performance is 0.637 which shows that the model has a good explanatory power, meaning that 63.7% of the variance in MSME innovation performance is explained by the model.

5.5 Hypothesis Testing

H1: Entrepreneurial orientation positively affects MSME innovation performance.

Table 5. Direct Effect Results

Hypothesis	Path	β	t-value	p-value	Result
H1	EO → IP	0.542	8.911	0.000	Supported

Interpretation

The results show that there is statistically significant and strong positive relationship between entrepreneurial orientation and innovation performance with a value of $\beta = 0.542$, $t = 8.911$, $p < 0.001$. So, the hypothesis H1 is accepted.

The result indicates that innovativeness, proactiveness and willingness to risk are important factors in explaining the innovation outcomes of MSMEs with high innovativeness scores.

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Entrepreneurially oriented companies proactively search for new opportunities, try to use new methods and ideas, and are quick to adapt to market changes, which makes their product, process and organizational innovations better.

This findings are consistent with a resource-based view (RBV) and dynamic capability theory that focuses on entrepreneurial strategic orientation as a key organizational resource for maintaining competitiveness and innovation.

5.6 Mediation Analysis

H2: Dynamic capabilities mediate the relationship between entrepreneurial orientation and innovation performance.

Table 6. Mediation Results: Dynamic Capabilities

Path	Indirect Effect (β)	t-value	p-value	Result
EO → DC → IP	0.196	4.872	0.000	Supported

Interpretation

The indirect effect of entrepreneurial orientation on innovation performance via dynamic capabilities was positive and statistically significant (6.196, 4.872, $p<0.001$). So, H2 is recommended.

The results revealed that entrepreneurial orientation positively affects MSME innovation performance through the strengthening of dynamic capabilities of the firms such as opportunity sensing, strategic flexibility and resource reconfiguration. MSMEs who are entrepreneurial oriented are more adaptable towards uncertainty of environment and more capable to extract new skills in the innovation process.

The mediation effect further suggests that the entrepreneurial behaviors are mediated in the relationship between entrepreneurial behaviors and innovation outcomes. Innovativeness is not the only criteria for entrepreneurial companies to meet and make opportunities into successful innovations, they should also be agile in their organization.

H3: Absorptive capacity mediates the relationship between entrepreneurial orientation and innovation performance.

Table 7. Mediation Results: Absorptive Capacity

Path	Indirect Effect (β)	t-value	p-value	Result
EO → AC → IP	0.168	4.215	0.000	Supported

Interpretation

The relationship between entrepreneurial orientation and innovation performance as mediated by absorptive capacity was statistically significant ($\beta = 0.168$, $t = 4.215$, $p < 0.001$). Hence, H3 is supported.

The result shows that the absorptive capacity has a significant role in transforming entrepreneurial orientation to innovation performance. MSMEs with entrepreneurial mindset are more inclined to seek external knowledge and integrate market information and make use of technological insights for developing innovations.

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The results suggest a link between knowledge management and entrepreneurial success in MSMEs and the entrepreneurial success in MSMEs involves organizational learning. Organizations that have the ability to acquire external knowledge will have more competitive advantages and superior innovation capacities.

5.7 Moderation Analysis

H4: Big data analytics capability positively moderates the relationship between entrepreneurial orientation and innovation performance.

Table 8. Moderation Analysis

Hypothesis	Interaction Path	β	t-value	p-value	Result
H4	EO × BDAC → IP	0.228	3.944	0.000	Supported

Interpretation

There was a positive and statistically significant interaction effect between entrepreneurial orientation and BDAC ($\beta = 0.228$, $t = 3.944$, p value < 0.001). Thus, H4 is supported.

This result indicates that the effect of entrepreneurial orientation on innovation performance is enhanced, by the capability of big data analytics. MSMEs with advanced analytics will be able to make smarter strategic choices, spot new market opportunities, and boost innovation productivity.

Data-driven entrepreneurship is becoming more and more relevant in digital business ecosystems, as evidenced by the moderating effect. Entrepreneurial companies with an experience of using analytics technologies are likely to be better able to change entrepreneurial projects into successful innovations.

5.8 Effect Size (f^2)

Table 9. Effect Size Results

Relationship	f^2
EO → IP	0.382
EO → DC	0.417
EO → AC	0.361
BDAC Moderation	0.147

Interpretation

In terms of Cohen's (1988) criteria, EO had a large effect on innovation performance and BDAC had a moderate moderating effect.

5.9 Predictive Relevance (Q^2)

Table: 10 Predictive Relevance (Q^2)

Construct	Q^2
Innovation Performance	0.421
Dynamic Capabilities	0.296
Absorptive Capacity	0.271

Interpretation

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Positive Q^2 values indicate satisfactory predictive relevance of the structural model.

5.10 Summary of Hypothesis Testing

Table 9. Summary of Hypotheses

Hypothesis	Statement	Result
H1	Entrepreneurial orientation positively affects MSME innovation performance	Supported
H2	Dynamic capabilities mediate the relationship between EO and innovation performance	Supported
H3	Absorptive capacity mediates the relationship between EO and innovation performance	Supported
H4	Big data analytics capability positively moderates the relationship between EO and innovation performance	Supported

6. DISCUSSION

The findings of this study present a significant empirical evidence on the importance of entrepreneurial orientation (EO) to improve the innovation performance of MSMEs in the business market where data is becoming a key component. The study is able to validate that entrepreneurial orientation positively and significantly affects innovation performance, which shows that MSMEs with entrepreneurial characteristics of innovativeness, proactiveness, and risk-taking have higher innovation performance in generating innovation results. This result is in line with previous entrepreneurship studies, which claim that entrepreneurial companies are more adaptive, opportunity-seeking and innovative than conservative companies (Lumpkin and Dess, 1996).

The positive correlation between EO and innovation performance highlights the entrepreneurial behaviour of MSMEs in the context of technological disruption and market uncertainty is still a key strategic resource. Those MSMEs with high EO inclination are likely to try out new ideas, actively look for new market opportunities and invest in innovative activities. These behaviors ultimately lead to better innovation of products, process efficiency and adaptability of organization. The result further confirms the resource-based view (RBV) that entrepreneurial orientation is a valuable capability of organizations that can generate sustainable competitive advantage.

The study also uncovers significant mediation of the dynamic capabilities in the relationship between entrepreneurial orientation and innovation performance. This discovery implies that entrepreneurial orientation is not always correlated with innovation success without the capability of sensing environmental changes, seizing opportunities and reconfiguring internal resources effectively. Dynamic capabilities can thus be considered an important strategic tool that helps entrepreneurial companies to convert entrepreneurial intentions into innovative products. MSMEs in highly volatile industries need to be agile and flexible in order to adapt quickly to changing customer demands and technological advancements. The results resonate with the Teece's dynamic capability framework that focuses on adaptability and resource reconfiguration as key elements to sustained innovation performance.

Similarly, absorptive capacity was found to significantly mediate the EO–innovation performance relationship. The finding emphasises the significance of the organisational learning and knowledge acquisition in entrepreneurial MSMEs. Businesses that are

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entrepreneurially oriented, are more likely to look for external knowledge, engage in stakeholder collaboration, and integrate market intelligence into innovation processes. The absorptive capacity increases the firm's capacity to acquire, assimilate, transform and utilise knowledge resources to improve the effectiveness of innovation. For MSMEs, who are frequently less resourced, knowledge-based capacities are critical to their competitiveness for sustaining their innovations. The results thus confirm that innovation is more knowledge-based than resource-based.

This is important research because one of the pathways identified between entrepreneurial orientation and innovation performance was big data analytics capability (BDAC), which was determined to be a positive moderator. The findings suggest that strong analytics capability would enable greater utilization of entrepreneurial initiatives to achieve successful innovation outcomes for MSMEs. This discovery highlights the rising importance of digital transformation and data-driven decision-making in today's entrepreneurial environment. By leveraging big data analytics, companies can gain valuable insights into market trends, anticipate customer preferences, and make informed strategic decisions more accurately. Therefore, advanced analytics infrastructure is associated with better innovation performance for entrepreneurial firms as opposed to firms that use only traditional entrepreneurial practices.

The moderation effect further implies that the use of digital is becoming more and more crucial for the competitiveness of MSMEs. Digital intelligence and analytics competency is necessary with entrepreneurial orientation to maintain innovation benefits as markets are becoming more technologically oriented. This combination of entrepreneurship and analytical capability builds on the current innovation literature and focuses on the importance of analytical strategic management in MSMEs.

7. PRACTICAL IMPLICATIONS OF THE ASTUDY

Implications for MSME Managers

The findings of this study emphasize the need to build an entrepreneurial culture in MSMEs to enhance innovation performance. Managers should foster innovations, anticipative market behaviour and prudent risk taking in all aspects of the organisation. MSMEs with more innovation and experimental approach are more likely to attain higher levels of product, process and organizational innovation. The results also indicate that it is important for managers to increase the strategic flexibility and organizational adaptability needed to meet changing market demands.

Implications for Organizational Capability Development

The study shows that the dynamic capabilities and absorptive capacity are key mechanisms by which entrepreneurial orientation is related to improving innovation performance. Therefore the MSME should invest in organizational learning systems, training of employees and knowledge exchange practices. Companies need to improve their capacity to acquire, assimilate and use outside knowledge, to maintain innovative competitiveness. The partnership of strategic cooperation with universities, research institutions and industry partners can enhance further knowledge acquisition and innovation capability.

Implications for Digital Transformation and Analytics Adoption

The power of big data analytics capability is one of the key factors that moderate the growth, which implies that the MSMEs need to focus on digital transformation and data-driven

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decision-making practices. Using analytics technologies, organizations can better identify market trends, make better strategic decisions and increase their responsiveness to innovation. MSMEs should digitize their businesses, invest in digital infrastructure, analytics tools and technological training, and build their innovation capability and operational efficiency to face increasingly competitive markets.

IMPLICATIONS FOR POLICYMAKERS AND GOVERNMENT INSTITUTIONS

The findings indicate the need for supportive environments that encourage entrepreneurship and digital transformation and innovation amongst MSMEs to be developed by policymakers. Government can help MSMEs by providing innovation grants, digital financing schemes, tax benefits, entrepreneurship development programs. Enabling access to technological, analytics training, and digital infrastructure can play a key role in enhancing the performance of MSMEs in terms of innovation and sustainability over the long run.

Implications for Business Support Institutions

Business incubators, entrepreneurship development centers and industry associations should create an environment for collaborative innovations for MSMEs. Mentorship program, networking, and technology support services can be beneficial for MSMEs to overcome the resource constraint and to enhance their strategic capabilities. This institutional assistance can speed up knowledge transfer, adoption of innovation and entrepreneurial development in the MSME ecosystem.

8. CONCLUSION

This study sought to understand how entrepreneurial orientation affects MSME innovation performance in the context of a data-driven business environment, focusing on three distinct concepts: dynamic capabilities, absorptive capacity, and big data analytics capability. The results offer clear empirical evidence of the positive effect of entrepreneurial orientation on the performance of innovation for MSMEs. In particular, the firms with innovativeness, proactiveness and risk-taking tendencies are more capable of developing innovative products, making operational process improvements and adapting to changes of the market.

The study also demonstrated the mediating effects of dynamic capabilities and absorptive capacity between entrepreneurial orientation and innovation performance. The results of this study revealed that entrepreneurial orientation is not enough to ensure the success of the innovation, unless the MSMEs also have the organizational flexibility and knowledge management skills needed to turn entrepreneurial efforts into actual results of innovation. Dynamic capabilities allow firms to detect opportunities, restructure resources and respond strategically to environment uncertainty, while absorptive capacity allows firms to acquire, assimilate, and exploit outside knowledge for innovation.

Furthermore, the study validated the moderating effect of entrepreneurial orientation in enhancing the relationship between entrepreneurial orientation and innovation performance. MSMEs who are more adept at analytics are more likely to use entrepreneurial behaviors in making decisions and gaining intelligence from the market and being responsive. The discovery underscores the increasing relevance of digital transformation and competency in analytics to improve the effectiveness of entrepreneurs in a contemporary business landscape.

Theoretically the study is useful as it extends the resource based view and the dynamic capabilities theory to the digital entrepreneurship and MSME innovation context. The entrepreneurial orientation, dynamic capabilities and absorptive capacity, and big data

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analytics capability provide a more holistic understanding of how MSMEs perform their innovation in the more competitive and techno-enabled markets. The results can also serve as an addition to the new body of research on data-driven entrepreneurship, which highlights the strategic importance of analytics capability in entrepreneurial innovation processes.

In practice, the results indicate that entrepreneurial cultures within the MSME management team which foster experimentation and opportunity recognition, and strategic risk-taking should be encouraged. At the same time, companies are expected to develop and invest in organizational learning systems, knowledge sharing systems and digital analytics systems to enhance their innovation capacity. Policy makers need to also promote MSMEs via innovation financing, analytics training programs, and digital transformation initiatives, which will enhance entrepreneurial competitiveness.

Although useful, the study has some shortcomings. The cross-sectional design results in limited causal inferences, and the sample size and geographic concentration may limit inferences to a broader context. Longitudinal research, cross-country research, and industry-specific analysis could be used to gain a deeper understanding of the dynamics of entrepreneurial innovation in the future. Artificial intelligence, digital ecosystems, and sustainable innovation can also be investigated as part of further research in determining the factors that influence the performance of MSMEs.

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