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Business model innovation: The role of big data analytics capability and entrepreneurial orientation as mediation

Heru Tri Setiono[1*], Hai Dung Do[2], Titik Kusmantini[3], Hendri Gusaptono[4], Yi Chin Hsieh[5], Sinta Putri Anggraini[6], Ashila Metta Rahmadanti[7]
[1,3,4,6] Universitas Pembangunan Nasional Veteran, Yogyakarta, Indonesia
[2] Ming Chi University of Technology, New Taipei, Taiwan
[5] National Yang Ming Chiao Tung University, Hsinchu, Taiwan
[7] Universitas Gajdah Mada, Yogyakarta, Indonesia
heruts@upnyk.ac.id
*Correspondent Author

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ABSTRACT

Big data analytics capabilities are an important tool to business competitiveness high dynamic market conditions. Big data will lead companies to focus more on managing internal and external data with the aim of capturing suitable new opportunities to maintain competitive advantage. Entrepreneurial orientation shows a company's strategic mindset characterized the willingness take risks, innovate and act proactively in seizing market opportunities for strategic growth. Meanwhile, business model innovation involves deep and last transformations the essential elements firm's business model. Business model innovation often organizational transformation aimed at ensuring the achievement of expected performance. This study aims to analyze It works closely with the effect big data analytics on business model innovation, acting as a mediating factor in that relationship. This research quantitative method approach. The research population is oyster mushroom micro small medium entreprises in Sleman, Bantul, and Kulon Progo Regencies and the number of 100 respontents. Study used purposive sampling to select participants. The data was analyzed using structural equation modeling with the partial least squares method. Findings show having strong big data analytics capabilities helps drive business model innovation, and entrepreneurial orientation role process as a mediating variable. Furthermore, entrepreneurial orientation positively affects business model innovation and serves as a mediating variable relationship between big data analytics capability and business model innovation.

1. Introduction

Existence micro small and medium entreprises (MSMEs) needed to mobilize the creative and innovative potential of the village, so that it can create new jobs and can absorb

labor in the countryside. The role of MSMEs in Indonesia's national economy is capable of creating jobs and improving income distribution. According to Dahri et al. (2025), micro-enterprises not only create jobs but also increase purchasing power and community welfare. One business opportunity growing in several areas in Sleman, Bantul, and Kulonprogo is mushroom cultivation. According to Gelmez et al. (2024), oyster mushroom cultivation offers economic, social, and environmental benefits. The economic potential is substantial, as demand for oyster mushrooms in both national and international markets is increasing. The selling price is relatively stable, and the cultivation period is relatively short. Its development needs to be done so that it can function in accordance with its role. Small and medium-sized businesses can reach their goals and objectives if they are managed in a clear and professional way (Agunggunanto & Kushartono, 2016).

Big data analytics capability in oyster mushroom MSMEs in Sleman, Bantul, and Kulon Progo role managing market information, sales trends and consumer preferences in real time. This capability encourages business actors to be more innovative and entrepreneurial because they can make data-driven decisions to identify new opportunities, reduce uncertainty, and increase business competitiveness (Ciampi et al., 2020; Cui et al., 2022). Furthermore, entrepreneurial orientation encourages business model innovation through the courage to take risks and create new value according to market needs (Makhloufi et al., 2021; Daradkeh, 2023). Thus, big data analytics capability directly influences business model innovation, and indirectly through entrepreneurial orientation, which mediates analytical capabilities into concrete innovative strategies (Makhloufi, 2023).

But in the 4.0 era, business development is increasingly dynamic, in addition to managing the business professionally, big data analytics capability are needed to support future business development. Business professionals need more than just conventional business management, namely the ability to manage big data analytics capability and translate it into meaningful information to support business processes and achieve competitive advantage. Big data analytics capability knowledge and skills are important in driving sustainable performance improvement of MSMEs as well as generating new ideas that can be realized in the form of concrete actions. One functions big data analytics capability to business development role management decisions (Ajah & Nweke, 2019).

Big data analytics capability here acts as a strategic planning “advisor” for Mushroom MSMEs. Big data analytics capability will help management and staff to improve their analytical abilities and decision-making skills. In addition to helping make decisions, big data analytics capability can also identify market trends (Ajah & Nweke, 2019). Entrepreneurial orientation represents a company’s strategic posture To be risk-taking, innovative, and proactive (Genc et al., 2019) means a company focuses on finding and using new market opportunities when creating its business plans (Escobar et al., 2022). This is known as business model innovation, on the other hand, is closely linked to organizational transformation aimed at ensuring that expected performance outcomes are achieved (Latif et al., 2021). Consequently, a fundamental shift in organizational culture becomes a prerequisite for successful transformation, requiring diversified strategies to address evolving customer needs and expand the customer base.

The contribution of this study lies in demonstrating influence big data analytics capability identifying new and effective paradigms of value creation, proposition, and acquisition within business model innovation. The findings enrich the managerial literature on big data analytics capability the MSMEs and empirically confirm that such capabilities can effectively facilitate the business models are changing quickly, becoming more profitable and creative, especially in fast-moving environments. This research adds strategic management by showing that the ability to big data analytics can improve business model innovation

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indirectly by encouraging firms to make proactive, innovative, and risk-oriented decisions (entrepreneurial orientation).

The findings of this study confirm that integrating big data analytics capability and entrepreneurial orientation can enhance business model innovation in small enterprises. This aligns with previous findings that big data analytics capability acts strategic resource drives innovation through entrepreneurial behavior (Ciampi et al., 2020; Makhloufi, 2023). Furthermore, Daradkeh (2023) highlighted that analytics and knowledge-oriented leadership are essential to enable dynamic business model transformation, particularly in technology-constrained MSMEs such as those in rural agribusiness sectors. Hence, this study helps add more real-world examples about how big data analytics, entrepreneurial mindset and business model innovation work together linkage within developing economies, emphasizing data-driven entrepreneurship as a key enabler of sustainable innovation (Makhloufi et al., 2021; Cui et al., 2022).

Previous studies, Ciampi et al. (2020) and Cui et al. (2022), focused on large companies in the technology and service sectors, while Makhloufi, (2023) study emphasized the green entrepreneurial orientation aspect environmental sustainability. However, there is limited research examining the relationship between big data capability analysis, entrepreneurial orientation and business model innovation in the context of food-based agribusiness MSMEs, particularly in the oyster mushroom sector, which has different supply chain dynamics than the manufacturing sector. This study fills this gap by examining how big data capability analysis is applied by food MSMEs in rural areas and how entrepreneurial orientation mediates this relationship, thus generating new, adaptive, data-driven business models. The innovation research integration big data capability analysis and entrepreneurial orientation in the context of local agripreneurial MSMEs, a topic rarely discussed in the international literature.

2. Literature Review and Hypothesis Development

2.1. Literature Review

2.1.1. Resource-Based View Theory

Resource-based view (RBV) theory is used this research because it is the main basis for understanding how big data analytics capability to provide competitive advantage and drive business model innovation (Barney, 1991). RBV states that unique and hard-to-imitate resources such as big data analytics capability, role sustainable competitive advantage firms (Wamba et al., 2017). In addition, RBV theory is relevant because it links the importance of technology and information resources to the success of a firm's business strategy of dynamic business environment changes (Grant, 1996).

2.1.2. Big Data Analytics Capability

Big data analytics capability is a set of data in very large quantities, has a diversity of types is produced at high speed, so it requires special technology to collect, store, process, and analyze it effectively (Manyika et al., 2011). The three main characteristics of big data analytics capability (volume, variety, velocity) (Laney, 2001). Big data analytics capability becomes a strategic asset for companies because it is able to identify patterns, trends and insights that cannot obtained through traditional data analysis (Wamba et al., 2017).

2.1.3. Business Model Innovation

Business model innovation is the process of redesigning or creating a new business model by changing the value offered to customers, how that value is

delivered, and how the company generates revenue from that value (Zott & Amit, 2010). It involves changes in three key components of the business model: value proposition, revenue structure and operational processes (Teece, 2010). Business model innovation helps competitive amidst dynamic changes in the business environment (Gambardella & McGahan, 2010).

2.1.4. Entrepreneurial Orientation

Entrepreneurial orientation is a conceptual framework that describes a firm's strategic attitude towards new business opportunities with key characteristics of innovation, proactivity, and risk-taking (Lumpkin & Dess, 1996). Entrepreneurial orientation reflects extent to firms actively seek and take advantage of new opportunities in market, develop innovative products or services, and dare to make risky strategic decisions for business growth (Covin & Slevin, 1989). Entrepreneurial orientation an important innovation and organizational performance (Rauch et al., 2009).

2.2. Hypothesis Development

2.2.1. Positive Effect Big Data Analytics Capability on Business Innovation

Big data analytics capability encompasses tools and techniques for data analysis and result visualization to support managerial decision-making; however, these tools alone are insufficient to transform an organization truly data-driven enterprise capable of converting data into actionable knowledge (Kwon et al., 2014). It refers firm's ability to leverage technology and human expertise to utilize big data analytics for generating insights that provide a competitive advantage (Mikalef et al., 2017). As an operational capability, big data analytics capability involves organizational routines related to identifying, collecting, storing and analyzing large volumes data through interaction of resources, assets, skills and competencies (Lin & Kunnathur, 2019). Essentially, it represents a firm's ability to employ big data analytics in making strategic and operational decisions. This capability reflects an organization proficiency managing data, infrastructure, and talent to generate new insights and transform such knowledge into sustainable competitive advantage (Xing et al., 2022). **H_1: Big Data Analytics Capability Positive Effect on Business Model Innovation.**

2.2.2. Positive Effect Big Data Analytics Capability on Entrepreneurial Orientation

Previous studies confirmed relationship between big data analytics capability and entrepreneurship orientation. Makhloufi (2023) found big data analytics capability strengthens entrepreneurship orientation by increasing absorptive capacity, enabling companies to better utilize external information to support innovation and proactivity. El-Kassar and Singh (2019) demonstrated big data capabilities role increase organizational agility and strengthen strategic decision-making processes, ultimately fostering entrepreneurial orientation. Furthermore, Mikalef et al. (2019) also emphasized that big data analytics capability is closely related to a company ability to proactively respond to opportunities, a key dimension of entrepreneurship orientation. Research by Rialti et al. (2019) supports these findings by demonstrating that integrating big data analytics capability into business processes enables companies to be more innovative. **H_2: Big Data Analytics Capability Positive Effect on Entrepreneurial Orientation.**

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2.2.3. Positive Effect Entrepreneurial Orientation and Business Model Innovation

Many researchers have different ways of defining entrepreneurial orientation, but most look at it from the company's point of view. They usually break it down into three main parts: being innovative, taking risks, and being proactive. Being innovative means the company is open to new ideas, likes to experiment, and uses creativity to get ahead. Taking risks means the company is willing to invest a lot in projects that might not have certain results. Being proactive means the company tries to stay ahead by predicting market changes and acting quickly against competitors. This entrepreneurial orientation helps the company put action within the organization. It embodies the company's strategic posture to be the first in introducing innovations to the market, to take calculated risks and to proactively respond to environmental dynamics (Arabeche et al., 2022). Furthermore, entrepreneurial orientation enables firms to generate and realize new ideas in the form of products or services, engage in high-risk projects, anticipate future market needs and identify emerging business opportunities (Al-Shami et al., 2022). **H_3: Entrepreneurial Orientation Has a Positive Effect Business Model Innovation**.

2.2.4. Effect Big Data Analytic Capability on Business Model Innovation through Entrepreneurial Orientation

Business model innovation brings about fundamental and irreversible changes core components the company business model, often accompanied ambiguity and uncertainty (Ferreras-Méndez et al., 2021). Such innovation can serve as source of competitive advantage and enhance organizational performance (Wahyuni & Sara, 2020). However, the definition of business model innovation remains inconsistent due to differing perspectives among scholars, some view it as a process, while others regard it as an outcome. This conceptual diversity makes it challenging for researchers to adopt a single, unified definition. Fauzan et al. (2021) propose three approaches to operationalize business model innovation in research: Describing it through comparisons between the current and previous business conditions, employing a predefined framework that specifies the components of the business model, and analyzing whether business activities represent new developments or modifications of existing ones. The innovation capability demonstrated by Mushroom MSMEs reflects their high level of productivity and competitiveness, which strengthens their entrepreneurial capacity and overall business performance. Therefore, business model innovation remains a crucial factor in building competitive advantage and improving firm outcomes. **H_4: Entrepreneurial Orientation Mediates Effect Big Data Analytic Capability on Business Model Innovation.**

2.3. Research Framework

Big data analytics capability refers company ability technology and talent utilize big data analytics capability idea for innovation, and a number of previous studies have proven that big data capabilities have a positive impact on business model innovation (Mikalef et al., 2017; Lin & Kunnathur, 2019; Xing et al., 2022). According to Escobar et al. (2022), big data analytics capability alone are not enough to create innovation capabilities. The existence of innovation capabilities in Mushroom MSMEs is one proof that Mushroom MSMEs have high productivity and competitiveness so as to improve entrepreneurial capabilities and business activities. Business model innovation help

company gain its competitors and boost performance. Figure 1 shows how strong big data analysis skills directly affect business model innovation and also have an indirect impact, namely through entrepreneurial orientation as a mediating variable.

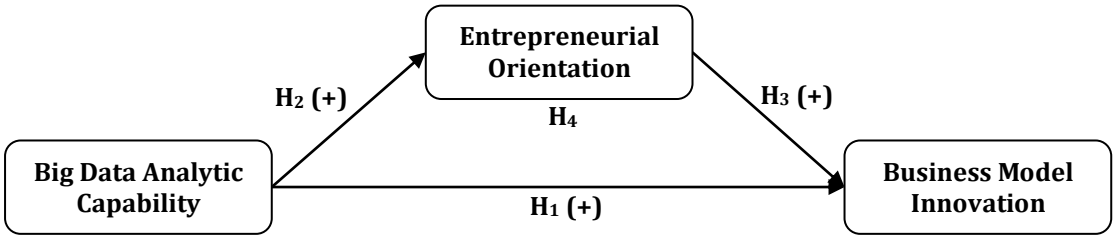

Figure 1. Research Framework

3. Research Methods

3.1. Population and Sampling

Research method by researchers quantitative method (Sugiyono, 2017). Sample oyster Mushroom MSMEs in Sleman, Bantul, Kulon Progo Regencies who have started cultivating oyster mushrooms for more than 3 years, conducting oyster mushroom processing businesses such as mushroom chips, and other mushroom culinary preparations. Samples study were 100 respondents. Number Oyster Mushroom MSMEs in the three districts was recorded at 305. The target sample size for each district was 50 MSMEs, but only 100 questionnaires were returned and processed. The data collection method in questionnaire. Data analysis using partial least squares method.

3.2. Data Colleting Method

The analytical variables of big data analytics capability (BDAC) was taken Ciampi et al. (2020) and Ciampi et al. (2021). It has three main areas with a total of 20 questions: tangible resources (10 questions), human skills (6 questions), intangible resources (4 questions). The tangible resources part has 3 smaller groups: data (3 questions), technology (5 questions), and basic resources (2 questions). The human skills part has two smaller groups: technical skills (3 questions) and managerial skills (3 questions). The intangible resources part also has two smaller groups: data-driven culture (2 questions) and organizational learning intensity (2 questions).

The business model innovation (BMI) variable adopted from Ciampi et al. (2021) consists of five indicators with 5 items, namely internal reconfiguration to increase the proportion of overall value, reconfiguration of operating process system opportunities, reconfiguration between customer partners, analysis of new opportunities to improve services, utilizing innovative opportunities through price model adjustments. The entrepreneurial orientation (EO) variable is adopted from Rank and Strenge, (2018); Ciampi et al. (2020) with its development consisting of 9 indicators with 9 items namely research and development, new product lines, new product or service changes, competitor responses, main drivers of operational technology, competitive attitudes towards competitors, risk analysis, actions from environmental adaptation, decisions in exploiting opportunities.

3.3. Data Analysis Method

3.3.1. Validity Reliability

Validity reliability were conducted to ensure that the research instrument used had internal consistency and was able accurately measure construct. Construct validity was evaluated through the average variance extracted (AVE) value minimum

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threshold of 0.5, while reliability was measured taken Cronbach's alpha, composite reliability with cut-off value of ≥ 0.7 as an indicator of acceptability (Hair et al., 2021). If AVE, Cronbach's alpha, and composite reliability values meet these criteria, instrument can be declared valid and reliable for use in further analysis.

3.3.2. Hypothesis Test

Hypothesis test conducted to examine relationships between research variables according the conceptual model formulated using structural equation modeling with the partial least squares (SEM-PLS). This method is suitable for testing models with complex latent variables and relatively limited sample sizes (Hair et al., 2021). The path coefficient and t-statistic were used as the basis for testing, with hypothesis accepted if p-value was < 0.05 and t-statistic ≥ 1.96 while also considering the magnitude of the path coefficient, which indicates strength of relationship between variables (Chin, 1998; Hair et al., 2021).

4. Results

4.1. Measurement Model

Study used SEM-PLS, which is a variant-based analysis method used to test the relationship latent variables research model. Following are the result analysis using Smart PLS version 4 (Ghozali, 2021). Figure 2 shows the measurement model.

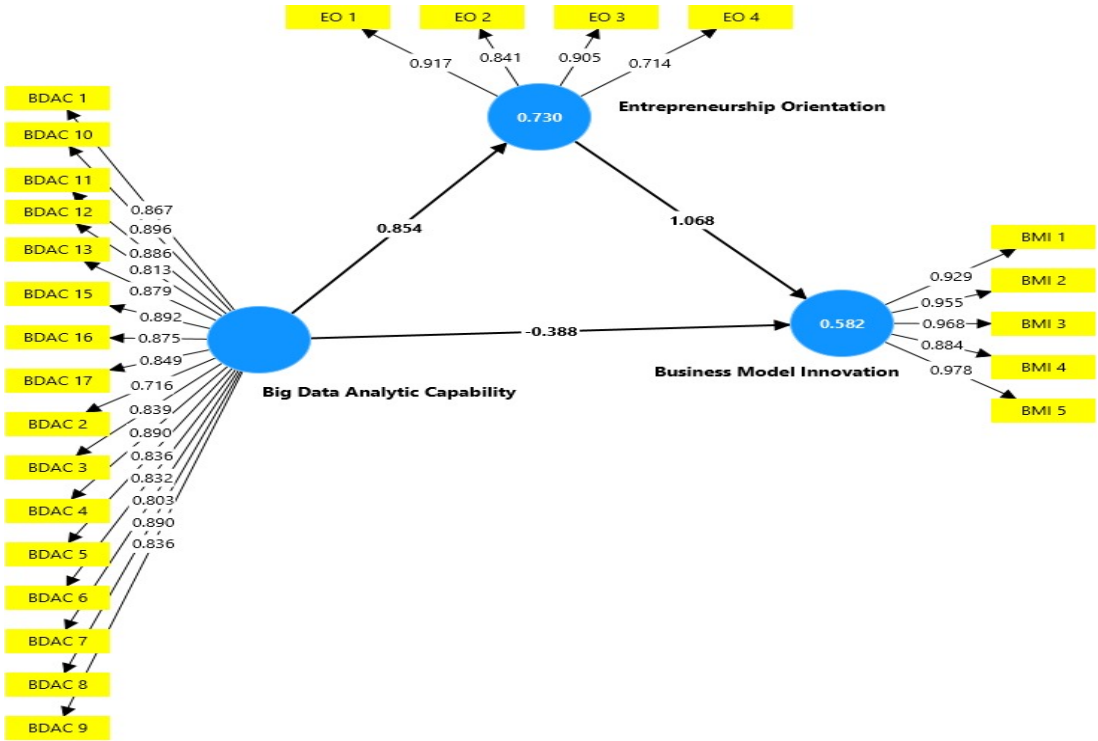

Figure 2. Measurement Model

4.2. Validity Test

The indicators on each variable have a high loading factor value, with an average value above 0.7, indicating that all indicators have significant contribution construct. In the big data analytic capability variable, indicators BDAC1 to BDAC17 have a loading factor between 0.803 to 0.896, indicating high measurement reliability. The entrepreneurship orientation variable consists of four indicators (EO1 to EO4) with

loading factors ranging from 0.714 to 0.917, indicating that entrepreneurship orientation is well measured by these four indicators. The business model innovation variable consists of five indicators (BMI1 to BMI5) with loading factors ranging from 0.884 to 0.978, indicating that all of these indicators are highly representative in measuring business model innovation. The number of valid indicators differs from the initial explanation in the methodology section, where the big data analytic capability variable was described as having 20 items and entrepreneurship orientation as having 9 items. This difference arises because several items were removed during the evaluation of the measurement model. Indicators low factor loading values removed ensure construct validity and reliability (Hair et al., 2021). After this refinement process, 17 big data analytic capability items and 4 entrepreneurship orientation items remained, all of which demonstrated strong contributions to their respective constructs. This adjustment is consistent with standard practice in SEM-PLS, where only indicators meeting the factor loading threshold are retained in the final model. Table 1 shows the validity test result.

Table 1. Validity Test Result

Item Indicator	Big Data Analytic Capability	Business Model Innovation	Entrepreneurship Orientation
BDAC1	0.867		
BDAC2	0.716		
BDAC3	0.839		
BDAC4	0.890		
BDAC5	0.836		
BDAC6	0.832		
BDAC7	0.803		
BDAC8	0.890		
BDAC9	0.836		
BDAC10	0.896		
BDAC11	0.886		
BDAC12	0.813		
BDAC13	0.879		
BDAC15	0.892		
BDAC16	0.875		
BDAC17	0.849		
BMI1		0.929	
BMI2		0.955	
BMI3		0.968	
BMI4		0.884	
BMI5		0.978	
EO1			0.917
EO2			0.841
EO3			0.905
EO4			0.714

4.3. Reliability Test

Based on Table 2, all research variables have Cronbach's alpha and composite reliability values above 0.7. This indicates instruments used study have excellent internal consistency. The big data analytic capability variable obtained Cronbach's alpha value of 0.975 and composite reliability of 0.977 with an AVE of 0.724. The business model innovation variable also showed very strong reliability with Cronbach's alpha value of 0.969, composite reliability of 0.976, and an AVE value of 0.890, and the entrepreneurship orientation variable had Cronbach's alpha value of 0.866, composite reliability of 0.910, and AVE of 0.719.

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Table 2. Reliability Test Result

Variable	Cronbach's Alpha	Composite Reliability	Average Variance Extracted
Big Data Analytic Capability	0.975	0.977	0.724
Business Model Innovation	0.969	0.976	0.890
Entrepreneurship Orientation	0.866	0.910	0.719

4.4. R-Square Test

Based on Table 3, business model innovation variable has R-square 0.582 R-square adjusted 0.574. This means the model using this variable explains about 58.2% of the changes in the dependent variable, while the other 41.8% is affected by things not included in the model. The entrepreneurship orientation variable has R-square 0.730 R-square adjusted 0.727. This shows the model with this variable explains 73% of the changes in the dependent variable, with the rest, about 27%, explained by other factors. The fact that R-square adjusted shows model strong and reliable explaining the link between entrepreneurship orientation dependent variable.

Table 3. R-Square

Variable	R-Square	R-Square Adjusted
Business Model Innovation	0.582	0.574
Entrepreneurship Orientation	0.730	0.727

4.5. Fornell-Larcker

Table 4 shows Fornell-Larcker Criterion be concluded each construct in model good discriminant validity. Square root value of AVE shown by the diagonal numbers in the table, which are 0.851 for big data analytic capability, 0.944 for business model innovation, and 0.848 for entrepreneurship orientation. These three values are higher than the correlation values between the constructs below them. These results indicate that each construct has the ability to distinguish itself from other constructs model, so that discriminant validity has been met according to the Fornell-Larcker criteria (Fornell & Larcker, 1981).

Table 4. Fornell-Larcker

Variable	Big Data Analytic Capability	Business Model Innovation	Entrepreneurship Orientation
Big Data Analytic Capability	0.851		
Business Model Innovation	0.524	0.944	
Entrepreneurship Orientation	0.854	0.736	0.848

4.6. Hypothesis Test

Table 5 show that big data analytics capability has positive on business model innovation. The path coefficient is 0.388, t-statistic is 2.135, p-value is 0.033 this means big data analytics capability directly helps improve business model innovation. Second test big data analytics capability also positive on entrepreneurial orientation. The coefficient is 0.854, t-statistic 27.472, p-value 0.000. This suggests that as a firm's data analytics ability increases, its entrepreneurial orientation also gets stronger, which is shown through behaviors like being innovative, proactive, willing to take risks.

Third test entrepreneurial orientation has positive on business model innovation. The coefficient is 1.068, the t-statistic is 6.418, and p-value 0.000. This means entrepreneurial orientation plays big role in driving business model innovation. Finally, the fourth test confirms entrepreneurial orientation mediator between big data analytics capability on business model innovation. Mediating effect coefficient is 0.912, the t-statistic is 5.460, p-value 0.000. While big data analytics capability directly influences business model innovation, its effect stronger and important when goes through firm's entrepreneurial orientation.

Table 5. Hypothesis Test Result

Hypothesis	Original Sample	Sample Mean	Standard Deviation	T Statistics	P Values
Big Data Analytic Capability → Business Model Innovation	-0.388	-0.417	0.182	2.135	0.033
Big Data Analytic Capability → Entrepreneurship Orientation	0.854	0.859	0.031	2.472	0.000
Entrepreneurship Orientation → Business Model Innovation	1.068	1.095	0.166	6.418	0.000
Big Data Analytic Capability → Entrepreneurship Orientation → Business Model Innovation	0.912	0.944	0.167	5.460	0.000

4.7. Discussion

4.7.1. Effect Big Data Analytic Capability on Business Model Innovation

These findings can be explained through the RBV theory (Barney, 1991), Sustainable competitive advantage comes from resources that valuable, rare, hard to copy and cannot replaced. Big data analytic capability is considered a strategic resource because it helps turn data information supports better decision making and development of new business models. Idea aligns with Wamba et al. (2017), which big data can key resource for boosting innovation and gaining a competitive edge. Mikalef et al. (2017) also describe big data analytic capability as company's ability use technology, processes and skilled people extract insights from large data sets, helping them beat competitors. Ciampi et al. (2020) further support this by showing that big data analytic capability affects business model innovation both directly and indirectly, with entrepreneurship orientation as a mediator. Furthermore, Cui et al. (2022) found that investment in developing big data capabilities increases employee technology orientation and creativity, which in turn drives business model innovation. Daradkeh (2023) also emphasized that the combination of knowledge orientation and analytics capabilities a significant role business model innovation across various industries. In oyster mushroom MSMEs, big data analytic capability can be implemented through the use of digital recording applications, online sales data integration, and analytical dashboards to monitor production, distribution, and market demand trends. With this data support, MSMEs can design new business models such as fresh mushroom subscription services, developing value-added processed products (mushroom chips, mushroom nuggets, or premium organic mushrooms) and diversifying digital distribution channels to reach a wider market.

4.7.2. The Effect Big Data Analytic Capability on Entrepreneurship Orientation

This finding reinforces the RBV theory (Barney, 1991), which emphasizes that sustainable competitive advantage can achieved through ownership orchestration of valuable, rare, difficult-to-imitate and nonsubstitutable resources.

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Big data analytic capability meets these criteria because it is a knowledge-based strategic asset that can enhance a company's entrepreneurial behavior. Also consistent Makhloufi (2023) asserted big data analytic capability strengthens Entrepreneurship Orientation by increasing knowledge absorptive capacity, which enables companies to transform external information into innovative opportunities. El-Kassar and Singh (2019) emphasized big data capabilities enhance organizational agility, crucial factor in fostering entrepreneurship orientation. Furthermore, Mikalef et al. (2019) found big data analytic capability is closely related to company's ability proactively respond market opportunities, which one of key dimensions entrepreneurship orientation. Thus, this results confirm big data analytic capability is not only crucial for operational efficiency but also a role in fostering an adaptive and innovative entrepreneurial mindset. The implementation of big data analytic capability in oyster mushroom MSMEs involves utilizing online sales data, social media, and marketplace platforms to understand consumer trends. For example, increasing interest in organic mushroom products or healthy processed products can serve as a basis for product differentiation, creating new opportunities, and strengthening the competitiveness of MSMEs in a dynamic market.

4.7.3. The Effect Entrepreneurship Orientation on Business Model Innovation

Strong entrepreneurship orientation is reflected in innovative, proactive behavior, and the courage to take risks, all of which are fundamental to transforming business models in a dynamic environment. In the RBV theory, entrepreneurship orientation is viewed as a strategic asset because it reflects combination resources difficult to imitate substitute, such as creativity, innovative capabilities, and the courage to face market risks. This aligns with research by Makhloufi et al. (2021), which found entrepreneurship orientation enhances innovation capabilities through absorptive capacity and organizational learning mechanisms. Abdelkareem et al. (2022) confirmed that Entrepreneurship Orientation role the business model transformation of MSMEs in developing countries, where flexibility and the courage to try new strategies are key to survival and growth. For oyster mushroom MSMEs, implementing entrepreneurship orientation can be realized through various innovative business strategies. For example, the courage to try new distribution patterns, such as direct sales through e-commerce and marketplace platforms, to expand consumer reach.

4.7.4 Role Mediated Entrepreneurship Orientation of Big Data Analytic Capability on Business Model Innovation

New data analytics capabilities will generate optimal business model innovation if coupled with an entrepreneurship orientation of innovation, proactivity, and risk-taking (Akter & Wamba, 2019). From the RBV theory, big data analytics capability viewed valuable strategic resource but the transformation of information from big data into business innovation strategies can only be realized through entrepreneurship orientation, a high-level capability. Entrepreneurship orientation serves as a connecting mechanism that enables companies to translate data insights into significant changes business models. Ciampi et al. (2020) emphasize that entrepreneurship orientation is a crucial mediator that strengthens effect big data analytics capability on business model innovation. Recent research by Makhloufi (2023) also supports entrepreneurship orientation link between data analytics capabilities and sustainable innovation. Furthermore, Rialti et al. (2019) assert companies that are able to combine big data analytics capability with

entrepreneurship orientation are more adaptive in responding to market dynamics by creating new, competitive business models. For oyster mushroom MSMEs, this means that production, sales, and market trend data will only be beneficial if the business owner possesses a strong entrepreneurship orientation. MSMEs with a strong entrepreneurship orientation will be bold enough to develop organic mushroom product lines, use sustainable packaging, and market their products through digital channels, which can increase their competitiveness in an increasingly competitive market.

5. Conclusion

Findings on study demonstrate big data analytics capability has positive business model innovation and entrepreneurship orientation, while entrepreneurship orientation also has a positive influence on business model innovation. Furthermore, the results confirm entrepreneurship orientation mediates between big data analytics capability and business model innovation, indicating data-driven capabilities alone are not sufficient, but require an entrepreneurial mindset to transform analytical insights into business model innovation. These findings highlight the importance of integrating technology and entrepreneurship to foster innovation in MSMEs. Despite these valuable insights, the study has several limitations. The research was conducted only on Oyster Mushroom MSMEs, which means the findings cannot generalized other types MSMEs. Future studies are encouraged to expand the scope by involving MSMEs from various industries to provide more representative results. Moreover, further research could explore the role of other mediating variables such as organizational culture, digital transformation or stakeholder collaboration, which may enrich the understanding of the mechanisms that strengthen impact big data analytic capability on business model innovation (Ciampi et al., 2021).

From a theoretical perspective, knowledge by reinforcing literature on the big data analytic capability and entrepreneurship orientation in driving business model innovation. Results align with the RBV theory, which posits that strategic resources, when effectively utilized, can lead to competitive advantage through innovation (Barney, 1991). In this context, big data analytic capability represents a unique organizational resource that, when complemented with entrepreneurial orientation, enhances the firm's ability to innovate. This finding also supports Lumpkin and Dess (1996), who emphasized the importance of entrepreneurial orientation in fostering innovation and sustaining competitiveness. In practical terms, research provide important implications for MSMEs managers, particularly in the Oyster Mushroom sector. MSMEs are encouraged to invest in big data analytic capability technology and provide employee training programs so that data can be effectively transformed into actionable business strategies. At the same time, managers need to strengthen entrepreneurial orientation by promoting an organizational climate that supports creativity, risk-taking, and proactivity. By combining analytical capabilities with entrepreneurial behavior, MSMEs will be better equipped to adapt to dynamic market conditions and achieve sustainable business model innovation.

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