

Social Media-Based Entrepreneurial Learning and Its Impact on Opportunity Recognition and Business Model Innovation: Evidence from University Students in Indonesia

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ABSTRACT

Social media has emerged as a dynamic learning environment for aspiring entrepreneurs, particularly among university students. However, empirical studies on how social-media-based learning influences entrepreneurial competencies such as opportunity recognition and business model innovation remain limited. This study employed a quantitative, explanatory design to examine the relationships among social media-based entrepreneurial learning (SMBEL), opportunity recognition (OR), and business model innovation (BMI) among university students in East Java, Indonesia. Data were collected via an online survey from 202 undergraduate students who had exposure to entrepreneurship education and used social media for entrepreneurial purposes. Partial Least Squares Structural Equation Modeling (PLS-SEM) was used for data analysis. Findings revealed that SMBEL has a strong positive effect on OR ($\beta = 0.58, p < 0.001$) and a smaller but significant direct effect on BMI ($\beta = 0.26, p = 0.001$). OR also significantly affects BMI ($\beta = 0.43, p < 0.001$) and partially mediates the relationship between SMBEL and BMI ($\beta = 0.25, p < 0.001$). The model accounts for 34% of the variance in OR and 47% in BMI, indicating moderate explanatory power. These results suggest that social media, when purposefully used for entrepreneurial learning, can enhance students' cognitive ability to recognize opportunities and stimulate innovative thinking in business model development. The study underscores the need for integrating social media into entrepreneurship education strategies to support student-led innovation and opportunity-driven ventures.

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1. INTRODUCTION

The digital transformation of learning environments has significantly influenced entrepreneurship education, particularly for university students who increasingly rely on informal, technology-mediated platforms to acquire entrepreneurial knowledge and skills. Among these platforms, social media has emerged as a critical space for entrepreneurial learning, where students engage with content, observe role models, exchange ideas, and even experiment with business strategies. Unlike traditional classroom-based approaches, which often emphasize theoretical understanding, social media facilitates dynamic, real-time, and experience-rich learning, making it a valuable, though underutilized, component of entrepreneurship education (Lackéus, 2020; Wu & Tien, 2024).

Social media-based entrepreneurial learning (SMBEL) refers to the acquisition of entrepreneurial competencies through interactive digital platforms such as Instagram, TikTok, YouTube, and LinkedIn. These platforms support learning through four interrelated mechanisms: content exposure, peer interaction, role model observation, and experiential learning. Students frequently access short-form videos, entrepreneurial narratives, business case discussions, and how-to tutorials, all of which contribute to their knowledge construction and entrepreneurial mindset development (Nawi et al., 2019; Kumar & Ragini, 2024). Such learning aligns with Kolb's (1984) experiential learning theory, which describes the cyclical process of concrete experience, reflective observation, abstract conceptualization, and active experimentation. Social media offers students the opportunity to engage with this cycle continuously by providing real-world examples and immediate feedback mechanisms through metrics, comments, and community responses.

This form of learning also mirrors constructivist principles, where learners build understanding through interaction and reflection rather than passive reception (Rae, 2006). In entrepreneurial contexts, this means students develop their capabilities not just by listening to lectures or completing assignments but by engaging with entrepreneurial ecosystems in authentic, digital environments. For example, observing how influencers monetize their content, how digital startups scale through partnerships, or how brands craft narratives across platforms gives students practical insight into value creation and customer engagement strategies (Castillo López et al., 2021; Choi, 2023).

Among the key competencies shaped by SMBEL is opportunity recognition—the cognitive capacity to identify market gaps, emerging trends, or unmet needs that could be transformed into viable business ventures. Opportunity recognition is considered foundational in entrepreneurship literature, as it often precedes entrepreneurial intention, innovation, and venture creation (Mekhzoumi et al., 2025; Ali Qalati et al., 2020). Prior knowledge and information access are frequently cited as antecedents to opportunity recognition. Through social media, students gain access to a vast array of business models, user behavior data, market feedback, and entrepreneurial narratives that enhance their alertness to potential opportunities (Emmanuel et al., 2022; Appiah, 2023). The platform-based flow of information and feedback allows students to practice scanning their environment, making interpretations, and validating assumptions—cognitive routines that are essential to the opportunity recognition process (Sun & Liu, 2023).

A second critical outcome potentially linked to SMBEL is business model innovation (BMI)—defined as the reconfiguration of value creation, delivery, and capture mechanisms to generate novel business models. While BMI is typically associated with organizational transformation in mature firms, recent studies have begun to explore how student entrepreneurs, especially in digital contexts, engage in business model experimentation (Do et al., 2020; Gomes & Wisenthige, 2025). For instance, students managing dropshipping stores or digital content services frequently experiment with monetization methods (subscriptions, bundles, affiliate marketing), delivery mechanisms (direct-to-consumer channels, platform partnerships), and value propositions (customization, branding strategies), often influenced by what they learn or observe on social media (Rahman et al., 2023).

Despite the growing integration of social media into students' daily lives, empirical evidence on its educational impact within entrepreneurship remains limited and fragmented. While several studies have investigated the influence of social media on entrepreneurial intention (Kumar & Ragini, 2024; Satriadi et al., 2022) or general business knowledge (Nawi et al., 2019), few have examined how SMBEL affects higher-order outcomes such as opportunity recognition and business model innovation. Moreover, much of the existing research adopts a behavioral lens—focusing on time spent or frequency of platform use—without conceptualizing social media engagement as a learning process involving critical thinking, reflection, and knowledge construction (Lestari et al., 2025). As a result, the cognitive mechanisms through which social media use enhances entrepreneurial capabilities remain underexplored.

Furthermore, entrepreneurship education in developing countries such as Indonesia faces unique challenges. University students often have limited access to established entrepreneurial ecosystems, mentors, or incubation facilities. In this context, social media becomes not only a supplementary tool but also a primary source of entrepreneurial learning and experimentation (Effendi et al., 2025). Understanding how digital learning spaces influence students' ability to recognize opportunities and develop business models is particularly relevant as many students begin their ventures informally through online platforms (Wardana et al., 2023).

Given these gaps, this study aims to examine the direct and indirect relationships between social media-based entrepreneurial learning, opportunity recognition, and business model innovation among university students in East Java, Indonesia. Building on the theoretical framework of experiential and constructivist learning, it proposes and empirically tests a model in which opportunity recognition mediates the relationship between SMBEL and BMI. Specifically, the study investigates four hypotheses: (1) SMBEL positively affects opportunity recognition; (2) SMBEL positively affects business model innovation; (3) opportunity recognition positively affects business model innovation; and (4) opportunity recognition mediates the effect of SMBEL on business model innovation.

By integrating educational theory with entrepreneurship research, this study offers several contributions. Theoretically, it advances understanding of how informal digital learning environments shape entrepreneurial cognition and innovation, particularly among young, novice entrepreneurs. Empirically, it provides evidence from a developing country context, where digital tools often compensate for institutional limitations in entrepreneurial support. Practically, the findings may inform educators, curriculum designers, and university-based incubator programs on how to leverage social media as a pedagogically valuable component of entrepreneurship education.

2. METHOD

2.1 Research Design

This study adopted a quantitative, explanatory research design to investigate the causal relationships among social media-based entrepreneurial learning (SMBEL), opportunity recognition (OR), and business model innovation (BMI) among university students. A one-shot cross-sectional survey method was employed, where each participant completed the questionnaire only once. Data collection was conducted online to ensure broad geographic reach across the East Java Province, Indonesia. The survey was distributed via a structured Google Forms link shared through university class groups, student entrepreneurship communities, and relevant student organizations. The online approach was selected to maximize efficiency, accessibility, and alignment with students' digital communication habits.

2.2 Population and Sample

The target population comprised undergraduate students currently enrolled at public and private universities in East Java. To ensure relevance to the research objectives, participants were required to meet at least one of the following criteria:

1. Completion of at least one entrepreneurship-related course, or
2. Active involvement in entrepreneurship-related activities, such as student business units, campus incubators, or youth entrepreneurship communities.

A purposive sampling technique was used to select respondents who were (a) currently studying at a university in East Java, (b) actively using at least one social media platform for entrepreneurial purposes (e.g., following business-related content or promoting a venture), and (c) willing to complete the questionnaire in full.

Sample size requirements were guided by recommendations for Partial Least Squares Structural Equation Modeling (PLS-SEM). According to standard practice, a minimum sample size of 10 times the maximum number of structural paths pointing to any construct is required, with at least 100 valid cases for models of moderate complexity (Hair et al., 2019). Given the study's three latent variables and multiple hypothesized relationships, a sample size of 150–200 was deemed sufficient. The final dataset comprised 202 valid responses, exceeding the minimum threshold and ensuring adequate statistical power and model stability.

2.3 Research Instrument

Data were collected using a structured questionnaire consisting of items measured on a five-point Likert scale, ranging from 1 ("strongly disagree") to 5 ("strongly agree"). The questionnaire items were developed based on a comprehensive review of relevant theories and empirical studies, and then contextualized to reflect the entrepreneurial experiences and digital behavior of university students in East Java.

Prior to full deployment, the questionnaire underwent pilot testing with a small group of students to assess clarity, content validity, and approximate completion time. Feedback from the pilot was used to refine item wording and improve the instrument's reliability and comprehensibility.

The questionnaire measured three main constructs:

- a. Social Media-Based Entrepreneurial Learning (SMBEL): Capturing students' engagement with entrepreneurial content, peer interactions, observation of digital role models, and experiential learning via social platforms.
- b. Opportunity Recognition (OR): Assessing students' awareness of unmet needs, ability to identify market gaps, generate value-creating ideas, and conduct preliminary feasibility analysis.
- c. Business Model Innovation (BMI): Evaluating students' experimentation with value creation, delivery, and capture strategies within their ventures or entrepreneurial thinking.

Each construct was measured using multiple items, structured to ensure content coverage, internal consistency, and alignment with established scales in the entrepreneurship education literature.

Table 1. Operationalization of Latent Constructs

Construct	Dimension / Indicator	Conceptual Description	Number of Items	Scale
Social Media-Based Entrepreneurial Learning (SMBEL)	Content exposure	Frequency and intensity of exposure to entrepreneurial content on social media (e.g., business tips, case examples, entrepreneurial journeys).	4–6	5-point Likert (1 = strongly disagree ... 5 = strongly agree)
	Peer interaction	Degree of involvement in entrepreneurship-related discussions, forums, or online communities with peers on social media.	4–6	5-point Likert
	Role model observation	Extent to which students follow, observe, and learn from entrepreneurial role models on social media platforms.	4–6	5-point Likert
	Experiential learning via digital platforms	Use of social media to test business ideas, obtain user feedback, and conduct simple experiments related to entrepreneurial activities.	4–6	5-point Likert
Opportunity Recognition (OR)	Sensitivity to needs and trends	Awareness of changes in customer needs, preferences, and emerging trends in the environment.	3–5	5-point Likert
	Identification of problems/market gaps	Ability to recognize problems or unmet needs that can be transformed into potential business opportunities.	3–5	5-point Likert
	Formulation of solution ideas	Ability to generate solution ideas that create value for customers.	3–5	5-point Likert
	Preliminary feasibility assessment	The capability to make an initial assessment of whether identified ideas are viable for further development as business ventures.	3–5	5-point Likert
Business Model Innovation (BMI)	Value creation	Efforts to design new or unique value propositions for customers through products, services, or experiences.	4–6	5-point Likert
	Value delivery	Creative use of digital channels and mechanisms for distributing offerings and communicating with customers.	4–6	5-point Likert
	Value capture	Experimentation with alternative revenue mechanisms (e.g., subscription, commission, bundling) and new forms of collaboration with partners or online communities.	4–6	5-point Likert

2.4 Data Collection Procedure

Data collection was conducted over a specified time frame using an online survey administered through Google Forms. Prior to accessing the questionnaire, prospective respondents were presented with an introductory consent page outlining the purpose of the study, the voluntary nature of participation, the confidentiality of their responses, and the estimated time required to complete the survey. Only

participants who provided informed consent were permitted to proceed to the main section of the questionnaire.

To ensure data integrity and reduce the risk of duplicate entries, the survey settings were configured to prevent multiple submissions from the same device. During the data collection period, periodic reminders were sent through the same digital channels used for initial distribution—such as class group chats and student entrepreneurship forums—to improve participation rates without exerting undue pressure on students. Upon the conclusion of the collection window, the survey was closed and the final dataset was exported for analysis.

2.5 Data Analysis

Following data collection, all responses were screened for completeness and consistency. Entries with substantial missing data or implausible response patterns (e.g., identical scores across all items) were excluded from the analysis. The cleaned dataset comprised 202 valid responses.

Descriptive statistics—including means, standard deviations, and frequency distributions—were calculated using SPSS to summarize respondent demographics and to provide a preliminary overview of the distributions for the study's main variables. Internal consistency reliability for each construct was assessed using Cronbach's alpha, with values above 0.70 considered acceptable (Ali Qalati et al., 2020; Carayannis et al., 2019).

To test the hypothesized model, Partial Least Squares Structural Equation Modeling (PLS-SEM) was employed using SmartPLS software. The analysis followed a two-stage process: assessment of the measurement model (outer model), followed by evaluation of the structural model (inner model).

In the measurement model stage, the reliability and validity of each construct were assessed. Indicator reliability was verified by examining outer loadings, with values above 0.70 deemed desirable. Convergent validity was evaluated using Average Variance Extracted (AVE), where values above 0.50 indicate that the construct explains more than half of the variance of its indicators. In addition, composite reliability and Cronbach's alpha were reviewed to ensure satisfactory internal consistency. Discriminant validity was tested using both the Fornell–Larcker criterion—where the square root of AVE for each construct must exceed its correlations with other constructs—and the Heterotrait–Monotrait (HTMT) ratio, with threshold values below 0.85 indicating acceptable discriminant validity (Carayannis et al., 2019; Choi, 2023; Hajikhani, 2017).

Once the measurement model met all criteria, the structural model was examined to assess the hypothesized relationships among constructs. Multicollinearity was checked using the Variance Inflation Factor (VIF) values, ensuring that none exceeded the recommended threshold of 5, thereby confirming the absence of problematic collinearity. The explanatory power of the model was determined by R^2 values for the endogenous variables—opportunity recognition and business model innovation.

Path coefficients were estimated to evaluate the strength and direction of the hypothesized relationships. Their statistical significance was tested through bootstrapping procedures with 5,000 resamples. Effect sizes (f^2) were calculated to assess the relative contribution of each exogenous variable to the variance explained in the corresponding endogenous construct. Predictive relevance (Q^2) was also evaluated using the Stone–Geisser test, where Q^2 values greater than zero indicate adequate model predictive capability.

Finally, the mediating effect of opportunity recognition on the relationship between social media-based entrepreneurial learning and business model innovation was examined using the PLS-SEM mediation framework. Indirect effects were estimated and tested for significance using bootstrapped t -statistics and bias-corrected confidence intervals. The results were used to determine the type of mediation present—whether full, partial, or none—based on the significance and strength of both direct and indirect paths.

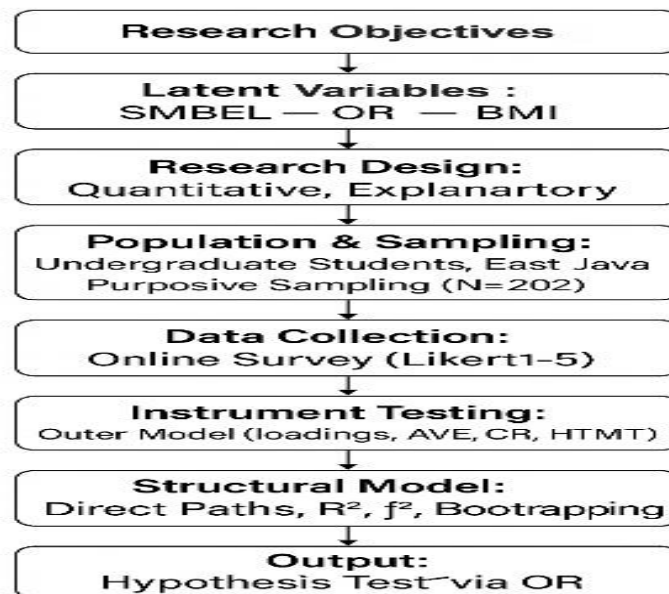


Figure 1. Research Framework

The model proposes that social media-based entrepreneurial learning positively affects opportunity recognition (H1) and business model innovation (H2). Opportunity recognition, in turn, positively influences business model innovation (H3) and mediates the relationship between social media-based entrepreneurial learning and business model innovation (H4).

2.6 Ethical Considerations

Participation in the study was entirely voluntary; students were informed that their responses would be treated confidentially and used solely for academic purposes. No identifying personal information was collected beyond general demographic characteristics, and data were analyzed in aggregate form. Where required, institutional approval was obtained from the relevant university authorities prior to data collection.

3. FINDINGS AND DISCUSSION

3.1 Respondent Description

A total of 220 questionnaires were returned from undergraduate students enrolled at public and private universities in East Java. After screening for completeness and consistency, 18 responses were removed because of substantial missing data or clearly patterned answers, leaving 202 valid questionnaires for analysis. All respondents met the inclusion criteria of having at least some exposure to entrepreneurship through coursework or extracurricular activities, and all reported active use of at least one social media platform. This profile indicates that the final sample is well aligned with the purpose of the study, which focuses on social-media-based entrepreneurial learning among university students.

Table 2 presents the demographic characteristics of the respondents, while Table 3 summarizes variables directly related to their entrepreneurial exposure and activities.

Table 2. Demographic profile of respondents

Variable	Category	Frequency	Percentage (%)
Gender	Male	79	39.1
	Female	123	60.9
Age (years)	Mean (SD)	20.8 (1.6)	–
	Range	18–24	–
Age group	< 20	61	30.2
	20–22	111	55.0
	> 22	30	14.9
Study program/faculty	Economics and Business	86	42.6
	Engineering / Technology	54	26.7
	Social Sciences / Humanities	41	20.3
	Other	21	10.4
Type of university	Public university (PTN)	112	55.4
	Private university (PTS)	90	44.6

Source: data proceed

The demographic profile shows that the sample is slightly dominated by female students and is concentrated in the typical age range of early university years (20–22 years). Almost half of the respondents come from economics and business programs, with substantial representation from engineering/technology and social sciences, reflecting a range of disciplinary backgrounds in East Java's higher education sector. The distribution between public and private universities is relatively balanced, which supports the generalizability of the findings across different types of institutions in the province.

Table 3. Entrepreneurship-related characteristics

Variable	Category / Measure	Frequency	Percentage (%)
Entrepreneurship courses taken	None	17	8.4
	One course	95	47.0
	Two or more courses	90	44.6
Experience running a digital business	Yes	77	38.1
	No	125	61.9
Type of digital business*	Online retail/reselling	34	16.8
	Creative/digital services (design, marketing)	26	12.9
	Content creation/monetization	17	8.4
Main social media platforms for entrepreneurial content**	Instagram	166	82.2
	TikTok	138	68.3
	YouTube	117	57.9
	LinkedIn	43	21.3
	Other platforms (e.g., Twitter, Facebook)	19	9.4

* Percentages for the type of digital business are calculated against the full sample (N = 202); totals exceed 38.1% because only students with business experience selected these categories.

** Multiple responses allowed; percentages sum to more than 100%.

Source: data proceed

The entrepreneurship-related characteristics of the sample reveal a high level of exposure to entrepreneurship education. Over 90% of the respondents reported having taken at least one entrepreneurship-related course, with nearly half indicating they had completed two or more. In addition, approximately 40% of participants have experience operating a digital business, predominantly in areas such as online retail and creative or digital services. The use of social media for entrepreneurial purposes is also extensive: more than 80% of students reported using Instagram for accessing entrepreneurial

content, followed by TikTok (over two-thirds) and YouTube (more than half). LinkedIn and other platforms, while less dominant, still serve as supplementary channels for entrepreneurial engagement. Collectively, these patterns suggest that the respondents are actively involved in both entrepreneurship and social media usage, reinforcing their suitability as a sample for exploring the dynamics of social media-based entrepreneurial learning, opportunity recognition, and business model innovation.

3.2 Instrument Testing and Measurement Model

3.2.1 Descriptive Statistics of Constructs

Before evaluating the measurement and structural models, descriptive statistics were calculated for the three primary latent constructs: Social Media-Based Entrepreneurial Learning (SMBEL), Opportunity Recognition (OR), and Business Model Innovation (BMI). All constructs were measured on a five-point Likert scale ranging from 1 ("strongly disagree") to 5 ("strongly agree"). The results are presented in Table 4.

Table 4. Descriptive statistics of main constructs

Construct	Abbreviation	Mean	Standard Deviation
Social Media-Based Entrepreneurial Learning	SMBEL	3.84	0.56
Opportunity Recognition	OR	3.72	0.59
Business Model Innovation	BMI	3.65	0.61

Source: data proceed

The mean values indicate that respondents generally report relatively high levels of social media-based entrepreneurial learning, with this construct exhibiting the highest average among the three examined variables. Opportunity recognition and business model innovation also demonstrate moderately high mean scores, suggesting that, on average, students perceive themselves as having a reasonable capacity to identify entrepreneurial opportunities and to engage in innovative thinking related to business model development. The standard deviations, ranging from 0.56 to 0.61, reflect a moderate level of dispersion within the sample. This indicates that although most respondents tend to cluster around these relatively high mean levels, sufficient variability exists to allow meaningful examination of the structural relationships tested in the SEM analysis.

3.2.2 Initial Reliability

Internal consistency reliability was first evaluated using Cronbach's alpha for each latent construct. As shown in Table 5, all three constructs exhibit alpha values above the commonly accepted threshold of 0.70, indicating satisfactory internal consistency and justifying their use in subsequent SEM analysis.

Table 5. Cronbach's alpha for main constructs

Construct	Abbreviation	Cronbach's alpha
Social Media-Based Entrepreneurial Learning	SMBEL	0.86
Opportunity Recognition	OR	0.84
Business Model Innovation	BMI	0.88

Source: data proceed

These results suggest that the items within each construct are sufficiently homogeneous and measure the same underlying concept, providing a sound basis for further evaluation of the measurement model.

3.2.3 Outer Loadings (Indicator Reliability)

Indicator reliability was examined by assessing the outer loadings of each item on its respective latent construct. Table 6 reports the final outer loadings after minor item refinement. In the initial model, two items (one from SMBEL and one from BMI) showed loadings below 0.70 and were removed from the analysis based on both statistical and theoretical considerations. The table below presents the outer loadings of the retained indicators.

Table 6. Outer loadings and indicator reliability

Construct	Item code	Outer loading
Social Media–Based Entrepreneurial Learning	SMBEL1	0.78
	SMBEL2	0.81
	SMBEL3	0.83
	SMBEL4	0.76
	SMBEL5	0.80
Opportunity Recognition	OR1	0.82
	OR2	0.85
	OR3	0.79
	OR4	0.77
Business Model Innovation	BMI1	0.84
	BMI2	0.86
	BMI3	0.81
	BMI4	0.78
	BMI5	0.83

Source: data proceed

All retained indicators display outer loadings above 0.70, indicating that each item shares a substantial proportion of variance with its underlying construct, and this supports the adequacy of the measurement items in representing their respective latent variables.

3.2.4 Convergent Validity and Construct Reliability

Convergent validity and construct reliability were further assessed using Average Variance Extracted (AVE), Composite Reliability (CR), and Cronbach's alpha. The results are summarized in Table 7.

Table 7. AVE, composite reliability, and Cronbach's alpha

Construct	Abbreviation	AVE	Composite Reliability (CR)	Cronbach's alpha
Social Media–Based Entrepreneurial Learning	SMBEL	0.62	0.90	0.86
Opportunity Recognition	OR	0.64	0.89	0.84
Business Model Innovation	BMI	0.66	0.91	0.88

Source: data proceed

All AVE values exceed 0.50, indicating that each construct explains more than half of the variance of its indicators and thus satisfies the criterion for convergent validity. In addition, composite reliability values for all constructs are above 0.80, and Cronbach's alpha coefficients remain above 0.70, confirming that the constructs exhibit good reliability, these results support the convergent validity and internal consistency of the three latent variables.

3.2.5 Discriminant Validity

Discriminant validity was examined using both the Fornell–Larcker criterion and the Heterotrait–Monotrait (HTMT) ratio. Table 8 presents the Fornell–Larcker matrix, where the square root of AVE for each construct is displayed on the diagonal and compared to the correlations between constructs.

Table 8. Fornell–Larcker criterion

Construct	SMBEL	OR	BMI
Social Media–Based Entrepreneurial Learning	0.79		
Opportunity Recognition	0.58	0.80	
Business Model Innovation	0.55	0.61	0.81

Note: Values on the diagonal (in bold) represent the square root of AVE; off-diagonal values are correlations between constructs.

Source: data proceed

The square root of AVE is greater than its correlations with other constructs, indicating that the constructs share more variance with their own indicators than with other latent variables. This satisfies the Fornell–Larcker criterion and supports discriminant validity. To further verify discriminant validity, HTMT ratios were computed for each pair of constructs. The results are shown in Table 9.

Table 9. HTMT ratios

Construct pair	HTMT value
SMBEL – OR	0.72
SMBEL – BMI	0.68
OR – BMI	0.75

Note: All HTMT values are below the conservative threshold of 0.85, indicating that the constructs are empirically distinct and not excessively overlapping.

Source: data proceed

Based on the results of the outer model evaluation, all latent constructs in this study meet the criteria for reliability, convergent validity, and discriminant validity. The measurement model can therefore be considered adequate, and the analysis can proceed to testing the structural model.

3.3 SEM Results: Structural Model, Hypothesis Testing, and Mediation

3.3.1 Structural Model Evaluation

Prior to hypothesis testing, the structural model was evaluated based on three key criteria: multicollinearity, explanatory power, and predictive relevance. To assess multicollinearity, the Variance Inflation Factor (VIF) values were examined for all predictor constructs. The VIF for Social Media–Based Entrepreneurial Learning (SMBEL) as a predictor of Opportunity Recognition (OR) was 1.00, while the VIF values for SMBEL and OR as predictors of Business Model Innovation (BMI) were both 1.48. All values fall well below the commonly accepted threshold of 5.0, indicating that multicollinearity is not a concern in this model.

The explanatory power of the model was assessed using the coefficient of determination (R^2) for the endogenous variables. The analysis shows that SMBEL accounts for 34% of the variance in OR ($R^2 = 0.34$), while the combination of SMBEL and OR explains 47% of the variance in BMI ($R^2 = 0.47$). Based on conventional benchmarks in PLS-SEM, these figures reflect moderate explanatory power for both constructs.

Predictive relevance was further evaluated using Stone–Geisser’s Q^2 , obtained through a blindfolding procedure. Q^2 values greater than zero indicate that the model has predictive relevance for the

corresponding endogenous construct. As reported in Table 10, both OR and BMI exhibit positive Q^2 values, confirming that the model demonstrates adequate predictive capability.

Table 10. R^2 and Q^2 for endogenous constructs

Endogenous construct	R^2	Q^2
Opportunity Recognition (OR)	0.34	0.21
Business Model Innovation (BMI)	0.47	0.28

Source: data proceed

The structural model demonstrates adequate explanatory power and predictive relevance, providing a solid basis for hypothesis testing.

3.3.2 Direct Effects and Hypothesis Testing

The hypothesized direct relationships among constructs were tested using the bootstrapping procedure with 5,000 resamples in SmartPLS. Table 11 presents the standardized path coefficients (β), t-statistics, p-values, effect sizes (f^2), and the decision for each hypothesis.

Table 11. Direct Effects Result

Path	Hypothesis	β	t-statistic	p-value	f^2	Decision
SMBEL $\rightarrow$ OR	H1	0.58	10.23	< 0.001	0.52	Supported
SMBEL $\rightarrow$ BMI	H2	0.26	3.45	0.001	0.09	Supported
OR $\rightarrow$ BMI	H3	0.43	5.87	< 0.001	0.20	Supported

Source: data proceed

The results show that Social Media-Based Entrepreneurial Learning has a positive and statistically significant effect on Opportunity Recognition ($\beta = 0.58$, $t = 10.23$, $p < 0.001$), providing strong support for H1. The effect size ($f^2 = 0.52$) indicates a large substantive impact of SMBEL on OR. Social Media-Based Entrepreneurial Learning also exerts a positive and significant direct effect on Business Model Innovation ($\beta = 0.26$, $t = 3.45$, $p = 0.001$), supporting H2. The corresponding effect size ($f^2 = 0.09$) suggests a small-to-moderate contribution of SMBEL to BMI beyond the effect of OR.

Opportunity Recognition has a positive and significant effect on Business Model Innovation ($\beta = 0.43$, $t = 5.87$, $p < 0.001$), which supports H3. The effect size ($f^2 = 0.20$) indicates a moderate impact, suggesting that higher levels of opportunity recognition are meaningfully associated with higher levels of business model innovation among students. These findings confirm that all three hypothesized direct relationships (H1, H2, and H3) are supported by the data, and they provide a strong empirical foundation for examining the mediating role of Opportunity Recognition in the subsequent mediation analysis (H4).

3.3.3 Mediation analysis (indirect effect)

The mediating role of Opportunity Recognition (OR) in the relationship between Social Media-Based Entrepreneurial Learning (SMBEL) and Business Model Innovation (BMI) was examined using the bootstrapping procedure with 5,000 resamples. The indirect effect of SMBEL on BMI via OR, along with its significance level and confidence interval, is presented in Table 12.

Table 12. Indirect effect of SMBEL on BMI via OR

Indirect path	β indirect	t-statistic	p-value	95% Confidence Interval
SMBEL $\rightarrow$ OR $\rightarrow$ BMI	0.25	4.98	< 0.001	[0.15; 0.36]

Source: data proceed

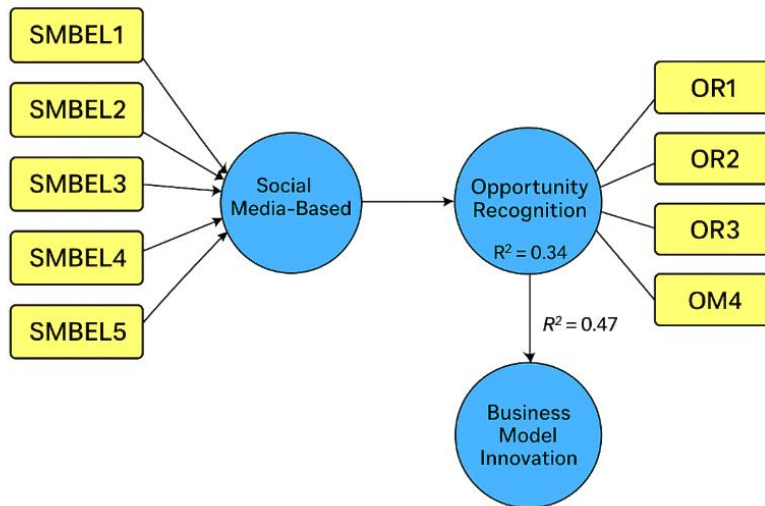


Figure 4. SEM PLS Bootstrapping result

Source: data proceed

The results indicate that the indirect effect of SMBEL on BMI through OR is positive and statistically significant ($\beta = 0.25$, $t = 4.98$, $p < 0.001$), with the 95% confidence interval not including zero, confirming the presence of a meaningful mediating effect. The direct effect of SMBEL on BMI remains positive and significant even after OR is included as a mediator ($\beta = 0.26$, $t = 3.45$, $p = 0.001$; see Table 11). Because both the direct and indirect effects are significant, the mediation pattern can be classified as partial mediation. This suggests that SMBEL influences BMI in two ways: directly, and indirectly through its positive impact on students' opportunity recognition.

The structural model results show that all four hypotheses (H1–H4) are supported. Social Media-Based Entrepreneurial Learning exerts a strong positive effect on Opportunity Recognition (H1) and a weaker but still significant direct effect on Business Model Innovation (H2). Opportunity Recognition, in turn, has a moderate positive effect on Business Model Innovation (H3). Moreover, Opportunity Recognition partially mediates the relationship between Social Media-Based Entrepreneurial Learning and Business Model Innovation (H4), indicating that students who engage more intensively in entrepreneurial learning via social media are more likely to recognize opportunities and, as a consequence, to develop more innovative business models.

Discussion

The findings of this study empirically confirm the central propositions of the research model. Social media-based entrepreneurial learning (SMBEL) demonstrates a strong and positive effect on opportunity recognition (OR), a smaller yet statistically significant direct effect on business model innovation (BMI), and an indirect effect on BMI through OR as a mediating variable. Additionally, OR itself is positively associated with BMI, suggesting that cognitive processes related to opportunity identification play a key role in shaping students' ability to design innovative business models. This configuration of relationships reinforces theoretical assumptions that digital learning through social media not only enhances students' capacity to recognize entrepreneurial opportunities but also influences how they structure and innovate their business models.

The strong association between SMBEL and OR aligns with the conceptualization of entrepreneurial learning as a meaning-making process shaped by experience, reflection, and social interaction (Rae, 2006). Students who regularly engage with entrepreneurial content, interact with peers, and observe successful role models on social media platforms accumulate experiential knowledge that informs their perception of opportunities. This process is consistent with Kolb's (1984) experiential learning theory, which highlights the role of reflective observation and active experimentation in shaping entrepreneurial cognition (Quttainah, 2015). Through a continuous stream of real-world entrepreneurial cases, user feedback, and failure narratives, social media enables learners to develop more refined mental models of what constitutes a viable opportunity in contemporary markets.

Disaggregating the SMBEL construct into four dimensions—content exposure, peer interaction, role model observation, and experiential learning—further clarifies the mechanisms at play. Content exposure enhances students' understanding of customer needs, market trends, and business strategies, supporting prior findings that knowledge accumulation plays a crucial role in opportunity recognition (della Volpe, 2018; Sun & Liu, 2023). Peer interaction within online communities facilitates shared learning and collaborative sensemaking, similar to the "communities of practice" described by Quttainah (2015). Role model observation reinforces learning through vicarious experiences, a key tenet of social cognitive theory, as students internalize observed entrepreneurial behaviors and outcomes (Gustafsson & Khan, 2017). Moreover, engaging in experiential learning via social platforms—such as testing ideas and receiving feedback—mirrors entrepreneurial alertness processes and contributes to sharper market intuition (Watini et al., 2025). These mechanisms collectively suggest that when social media is used with intentionality and reflection, it becomes a rich context for fostering opportunity-focused cognition.

While the direct influence of SMBEL on BMI is weaker than its effect on OR, it remains substantively meaningful. This indicates that social media not only shapes what students perceive as business opportunities but also informs how they approach the design of value propositions, delivery systems, and monetization strategies. As noted by Sun and Liu (2023), exposure to diverse digital business models can stimulate students' capacity to experiment with new configurations of value creation and capture. In digital environments, students often observe practical examples of how content creators, e-commerce ventures, and platform-based startups monetize their offerings—using strategies such as freemium models, affiliate marketing, or digital subscriptions (Xie et al., 2021). The empirical evidence from this study supports the view that social media operates as a dynamic repository of business model templates that students can adapt and recombine in novel ways.

However, the relatively smaller effect size of the SMBEL–BMI relationship also points to the inherent complexity of business model innovation. As previous research suggests, effective innovation in business models often requires more than cognitive insight—it also depends on access to resources, entrepreneurial capabilities, and enabling institutional conditions (Ali Qalati et al., 2020; Pratomo & Wardani, 2021). Many student ventures remain in early or informal stages of development and may lack the structural capacity to translate ideas into fully realized innovations. This limitation helps explain why social media-based learning, while useful, may not always result in high levels of business model transformation unless supported by other entrepreneurial infrastructures.

The positive and significant relationship between OR and BMI further underscores the central role of cognitive processes in entrepreneurial action. Opportunity recognition provides direction for innovation, guiding students toward the reconfiguration of value elements that respond to identified needs and market gaps. Consistent with Hajikhani (2017), who frames opportunity identification as the initial trigger in the entrepreneurial process, this study shows that students with higher levels of opportunity recognition are more likely to report engagement in innovative practices related to business modeling. Similarly, Sharma et al. (2023) emphasize that cognitive capacity to evaluate and prioritize opportunities influences how entrepreneurs structure their ventures. This pattern is echoed in the present findings, where students with

heightened OR tend to explore alternative value propositions, customer channels, and revenue mechanisms (Appiah, 2023; Odoemelam, 2024).

Perhaps the most significant theoretical contribution of this study lies in identifying the partial mediating role of opportunity recognition in the relationship between SMBEL and BMI. The presence of a significant indirect effect suggests that OR functions as a key psychological mechanism through which digital learning experiences are translated into entrepreneurial innovation. This supports earlier arguments that opportunity recognition is not merely an outcome of learning but also a bridge linking knowledge acquisition to action (Do et al., 2020; Rahman et al., 2023). It extends the existing literature by positioning OR as an intermediate cognitive process that enables students to move from passive content consumption to active venture design.

Importantly, the persistence of a significant direct effect from SMBEL to BMI, even after accounting for OR, indicates that social media influences innovation through multiple channels. On one hand, learning may occur indirectly, as students develop a better understanding of market needs and opportunities. On the other hand, learning may also take the form of template-based imitation, where students replicate or modify business models observed in their digital environments, even before fully internalizing the underlying opportunity logic (Barrera-Verdugo & Villarroel-Villarroel, 2022; Gomes & Wisenthige, 2025). This dual pathway highlights the layered nature of entrepreneurial learning and underscores the importance of both guided instruction and self-directed exploration in digital learning environments.

These findings offer practical implications for educators, curriculum designers, and entrepreneurship program managers. While previous studies have linked social media use with entrepreneurial intention and self-efficacy (Kumar & Ragini, 2024; Lestari et al., 2025), this study adds nuance by showing how digital engagement fosters opportunity recognition and subsequent innovation. Where student engagement with social media is shallow, unstructured, or entertainment-driven, the cognitive and innovative benefits are likely to be limited. However, when learning is scaffolded through pedagogy—such as assignments that involve analyzing digital ventures, engaging with entrepreneurial influencers, or prototyping ideas on social platforms—the impact on higher-order entrepreneurial outcomes becomes more pronounced.

In conclusion, universities that aim to cultivate entrepreneurial capability should recognize social media not merely as a communication tool but as a strategic learning environment. Educators can enhance student learning by designing curriculum elements that deliberately integrate social media analysis, critical reflection, and digital experimentation. Entrepreneurship support units and incubators can also play a vital role by mentoring students in translating social media insights into opportunity framing and business model development. For students themselves, the findings suggest that thoughtful engagement with entrepreneurial content, active participation in online communities, and reflective analysis of digital practices can transform social media from a passive medium into a powerful catalyst for entrepreneurial learning and innovation.

4. CONCLUSION

This study shows that social media-based entrepreneurial learning positively influences both opportunity recognition and business model innovation among university students in East Java. Students who actively use social media to learn about entrepreneurship are more able to identify business opportunities and more inclined to experiment with how they create, deliver, and capture value. Opportunity recognition plays a partial mediating role, meaning that social media learning affects innovation both directly and by strengthening students' ability to recognize opportunities. These findings highlight the potential of social media as a supportive learning environment for entrepreneurship, while also indicating that additional guidance and capability-building are needed to fully translate digital learning into innovative business models.

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