








# “A framework to nurturing digital entrepreneurs: Demystifying critical factors that influence tech-driven business behavior”

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# A FRAMEWORK TO NURTURING DIGITAL ENTREPRENEURS: DEMYSTIFYING CRITICAL FACTORS THAT INFLUENCE TECH-DRIVEN BUSINESS BEHAVIOR

## Abstract

Technology and the internet have altered business activities by enabling organizations to reach customers, develop markets, enhance profitability, and raise brand awareness. With 167 million social media users, Indonesia's internet economy provides numerous entrepreneurial possibilities; however, just 0.43% of entrepreneurs are technology-based. This demonstrates the need for digital entrepreneurship education and effective social media use, particularly among tech-savvy college students. The present study aims to examine the effects of social media utilization, digital entrepreneurship education, and attitude toward digital business on the technology-based entrepreneurial behavior of Indonesian university students, using the frameworks of the unified theory of acceptance and use of technology and the theory of planned behavior. This study employs quantitative research using a non-probability sampling method with a judgmental technique, focusing on 391 university students engaged in entrepreneurial activities using social media. The study employed SmartPLS to analyze the research data. The results indicate that social influence, work and performance expectations, and attitude toward digital entrepreneurship positively influence the use of social media for technology-based entrepreneurial activities. Moreover, the paper unveiled that the provision of digital entrepreneurship education and the utilization of social media for commercial purposes had a beneficial influence on behavior that is predisposed toward technology. The present study demonstrates that the adoption of social media functions as a mediator in the association between digital entrepreneurship education and the adoption of social media, therefore exerting an impact on technology-based entrepreneurial behavior.

## Keywords

social media adoption, attitude toward digital business, digital entrepreneurship education, technopreneurship, Indonesia

## JEL Classification

M13, O14

## INTRODUCTION

Technology and the internet have permeated many aspects of everyday life, including business. Businesses need internet-based platforms and tools to access new markets, directly engage with customers, expand their market coverage (Eggers et al., 2017), and increase revenue (Patma et al., 2021) and brand awareness (Mitsa & Lyakh, 2023). Internet users in Indonesia exceeded 224 million in 2022 (Kurniasari et al., 2023). This number is expected to reach 270 million by 2028 (Statista, 2022). Indonesia's digital population ranked third in Asia and fourth internationally in 2023, distinguishing it from other nations (Statista, 2023). Google et al. (2023) predict that Indonesia's digital economy will reach \$110 billion by 2025 after recovering from the COVID-19 pandemic. Indonesia's large market and entrepreneurial potential make it a tempting alternative for firms and entrepreneurs.

Digital technologies have changed everything, including entrepreneurship. They have encouraged entrepreneurs to develop and manage businesses. One of the most common uses of ICT is social media. Social media is a major ICT component that affects business (Patma et al., 2021). Businesses use social media platforms to establish and advertise their brand, as well as analyze client patterns, particularly browsing and buying habits (Hossain et al., 2022). Social media may also help SMEs communicate with customers better. They can also reach more people with lower marketing costs (Novandari et al., 2023).

Students are major social media users. Students' extensive social media use promotes digital business potential (Wibowo, Narmaditya, Suparno, et al., 2023). Education and technology integration have helped students start and build their businesses in response to social media's emergence. The concept of digital entrepreneurship education has emerged (Sitaridis & Kitsios, 2024). The benefits of social media for business (Abbas & Sabri, 2022; Barrera-Verdugo & Villarroel-Villarroel, 2022) and universities that teach students how to maximize technology for business have also led to a positive attitude toward digital business.

With a large population of young people with advanced information technology capabilities, the Indonesian government encourages college students to become entrepreneurs to address entrepreneurial gaps (Lestari et al., 2024). Unfortunately, the number of young entrepreneurs remains low (Santika, 2023), with only 0.43% running technology-based businesses (Alamsyahrir & Ie, 2022).

Digital technology, particularly social media, has become a pillar of modern entrepreneurship, allowing firms to communicate with customers, analyze market trends, and save marketing expenses. University students, as avid social media users, have enormous potential for digital entrepreneurship; nevertheless, organized digital entrepreneurship education is required to channel this potential. Although the Indonesian government encourages young entrepreneurship, the number of technology-based enterprises remains low.

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## 1. LITERATURE REVIEW AND HYPOTHESES

The present study defines technology-based entrepreneurial activity following Giones and Brem's (2017) concept of digital entrepreneurship, which refers to the intentional transformation of corporate concepts into tangible products or services by the use of technology. Digital transformation refers to the development of operational processes and the use of technology to transform assets, services, or components of a firm into a digital format (Kraus et al., 2019). Technology-based entrepreneurial behavior refers to the strategic use and use of technology in many aspects of company operations, such as opportunity identification, innovative idea generation, supply chain management, marketing, and customer interactions, to enhance business performance. Technology-based behavior necessitates effective planning for success, making it most suitable for analysis within the framework of Ajzen's (1991) theory of planned behavior (TPB) to assess entrepreneurial behavior (Farooq, 2018).

The theory of planned behavior (TPB) (Ajzen, 1991) is an expansion of the theory of reasoned action (TRA). In contrast to TRA, TPB incorporates both perceived and actual effects on the behavior under study (Ajzen, 1985). This study utilizes TPB to analyze technology-driven entrepreneurial conduct, as TPB has demonstrated efficacy in forecasting numerous human behaviors, including entrepreneurship (Cui & Bell, 2022). According to the theory of planned behavior, three fundamental factors – attitude, perceived behavioral control, and subjective norms – jointly influence an individual's intention to act and forecast subsequent behavior.

This study specifically examines attitudes toward technology-driven entrepreneurial endeavors, encompassing favorable perspectives and perceptions of digital enterprises, which substantially enhance the probability of entrepreneurial activity. Attitude, a cognitive assessment of an activity, indicates one's positive or negative disposition toward that activity; perceived behavioral control denotes the individual's perceived ability to execute the activ-

ity, and subjective norms encompass societal influences on the individual's decisions (Ajzen, 1991). Ajzen (1991) postulates that attitudes toward an activity are a manifestation of cognitive evaluations. Maintaining a good attitude increases the probability of engaging in a certain activity. This phenomenon is referred to as an entrepreneurial mentality within entrepreneurship. This study investigates the range of attitudes expressed by individuals toward technology-based enterprises, particularly their positive views and perceptions of digital business. Vasileva et al. (2022) revealed that more than 60% of the 308 Russian students evaluated displayed a favorable attitude toward digital commerce. Agarwal et al. (2020) indicated that those in India who are younger than 30 years old are more likely to establish their own firms.

According to German Ruiz-Herrera et al. (2023), the primary determinant of e-commerce adoption among young individuals is their attitude toward digital business. Barrera-Verdugo and Villarroel-Villarroel's (2022) analysis of Chilean business management and engineering students reveals a significant correlation between the students' attitudes toward entrepreneurship and their use of social media in entrepreneurship. Furthermore, Abbas and Sabri (2022) highlight the significant influence of attitudes in shaping students' use of social media for commercial purposes, especially in digital entrepreneurship, with a specific focus on female students.

The TPB believes behavior belief generates behavior attitude. It shows that when a person thinks the projected outcomes of an action are favorable, they are more likely to do it (Ajzen, 1991). Robinson et al. (1991) assert that personal attitude is the determining factor in individuals' preferring or disliking, which in turn increases the probability of engaging in a specific behavior. The attitude of an individual toward an action is a direct manifestation of his/her assessment of it. Evaluators can place their assessments on a continuum that spans from positive to negative. The TPB asserts that planned attitudes are causally linked to intentions, which then drive behavioral results (Farooq, 2018).

In the context of entrepreneurship, the attitude toward entrepreneurship can be described as "the difference between perceptions of personal desir-

ability in becoming self-employed and organizationally employed" (Vamvaka et al., 2020). Liñán and Chen (2009) state that "attitude toward start-up is the degree to which the individual holds a positive or negative personal valuation about being an entrepreneur." Moreover, Abbas and Sabri's (2022) study of 331 final-year students in Malaysia found that students have a positive attitude and motivation for digital entrepreneurship. It indicates a positive attitude toward engaging in digital business endeavors.

Nevertheless, the use of the TPB framework alone is insufficient to elucidate the factors that drive an individual to pursue entrepreneurship (Lestari et al., 2024). Longitudinal research using the TPB framework shows that attitudes and behavioral intentions account for only 30-40% of behavior variability (Loan et al., 2021). This study focuses on technology-based entrepreneurial behavior and utilizes the unified theory of acceptance and use of technology (UTAUT) (Venkatesh et al., 2003) to elucidate how the process of adopting social media for business affects technology-based entrepreneurship behavior among Indonesian students, which has not been widely researched.

Venkatesh et al. (2003) introduced the unified theory of acceptance and use of technology (UTAUT) framework. The UTAUT concept posited four fundamental components: effort expectation, performance expectancy, social influence, and facilitating condition. The UTAUT model is more suitable for the current research project after comparing it with earlier models of technological acceptance, such as TRA, TAM, TPB, or the diffusion of innovation framework. This is due to its comprehensive nature, as it integrates all previous acceptance models (Venkatesh et al., 2003).

The first core element is social influence. Social influence refers to the impact of friends, family, colleagues, and peers on an individual's choice to adopt new technology. This is similar to subjective norms, which evaluate how significant others affect technology use (Venkatesh et al., 2003). Those considered influential in business decision-making, such as business experts, customers, and competitors, will directly influence the entrepreneur's choice to utilize social media for business marketing (Pentina et al., 2012). Puriwat and Tripopsakul

(2021) demonstrate that social influence exerts a favorable effect and significantly influences the behavioral intentions of Thai individuals to utilize social media for business-related goals. Young et al. (2023) revealed that social influence has a substantial impact on enabling Indonesian MSMEs to use social media. Small and medium-sized enterprises (MSMEs) will use social media platforms for promotional purposes, depending on the opinions of their peers who are active on social media.

The second core element of UTAUT is effort expectancy. The concept of effort expectation in UTAUT refers to the subjective perception of the ease of using a technology. Users often aim to reduce their effort while increasing the benefits that they obtain (Venkatesh et al., 2003). Salloum et al. (2018) and Awotunde et al. (2020) reveal that effort expectation positively affects university students' social media use. Social media usage rises due to its convenience. Additionally, effort expectancy can boost Facebook and Twitter adoption (Williams et al., 2021).

Puriwat and Tripopsakul (2021) demonstrate that social media, due to its performance and efficacy, is the most convenient medium for entrepreneurs to acquire knowledge and apply it to company objectives. This study suggests that social media platforms like Facebook and Line have the potential to serve as conduits for company promotion, in addition to facilitating communication with friends and family. Nawi et al. (2019) conducted research among business college students in Malaysia, revealing a statistically significant correlation between effort expectation and social media usage.

The last core element of UTAUT is performance expectancy. Users of any technology invariably anticipate a predetermined degree of performance that will adequately fulfill their requirements; alternatively, they will be dissuaded from utilizing it (Alshebami, 2022). According to Puriwat and Tripopsakul (2021), performance expectancy is the strongest factor influencing the adoption of social media for businesses in Thailand. This phenomenon occurs due to the previous awareness among business owners regarding the benefits and advantages of social media in enhancing business performance. Nawi et al. (2017) suggest that the use of social media as a commercial platform by

student entrepreneurs in Malaysia is significantly impacted by their performance expectancy. As per student entrepreneurs, the incorporation of social media platforms would augment the effectiveness of their digital businesses.

Social media adoption enhances technology-based entrepreneurship behavior by providing opportunities (Salamzadeh et al., 2020). The utilization of social media with a focus on business results gives a rise in the visibility and brand recognition of the company, the creation and maintenance of relationships with customers, and an increased amount of revenue and sales (Gavino et al., 2019). The adoption of social media for commercial purposes has had an advantageous effect on technology-based entrepreneurship behavior by improving business development. When businesses incorporate social media into their business processes, it can lead to improved business performance and sustainability (Novandari et al., 2023). Social media helps businesses communicate, collaborate, innovate, and improve performance by encouraging technology-driven entrepreneurship. Multiple studies suggest that social media use can motivate students to become entrepreneurs by allowing them to sell items, build stakeholder connections, and get input for company improvements (Hossain et al., 2022).

The availability of advanced digitalization and technological advances provides students with expanded possibilities to establish digital enterprises while pursuing their studies at higher learning institutions (W. F. Crittenden et al., 2019). Education on technological entrepreneurship is indispensable for equipping individuals with the required abilities and expertise to effectively navigate the contemporary business environment, particularly in the context of the growing prevalence of technologies such as social media (Keller et al., 2022). In addition, it is imperative to underscore the importance of social media in modern marketing education, as it is anticipated that it will serve as the primary platform for marketing communications in numerous organizations. Digital entrepreneurship education teaches students the craft of social media advertising and marketing. This discipline allows students to effectively leverage their abilities in parallel processing, graphical awareness, and random access, transforming their social me-

dia skills into online marketing (V. Crittenden & W. Crittenden, 2015).

According to Liñán (2008), entrepreneurship education can boost students' behavioral intentions and encourage entrepreneurial behavior. In addition, Rauch et al. (2015) indicate that entrepreneurship education significantly improves students' perspectives on entrepreneurship, thereby increasing their propensity to engage in entrepreneurial activities. Scholars acknowledge entrepreneurship education as a means of fostering entrepreneurial activities and behavior (Rambe, 2023) because exposure to entrepreneurial education programs may have a major impact on students' perceptions of new business formation (Phuong Dung et al., 2023). Entrepreneurship education must incorporate technology to provide students with the requisite skills to adapt to the rapid pace of technological change due to the proliferation of digital technologies. Therefore, digital entrepreneurship education involves the modification of the curriculum to instruct students on establishing a business, identifying entrepreneurial opportunities, and establishing a digital enterprise (Wibowo, Narmaditya, Saptono, et al., 2023).

Digital entrepreneurship education is affordable to set up and administer. As a result, the instruction of digital entrepreneurship is not only pertinent and contemporary but also practicable in numerous educational institutions, as it directly addresses the real-world concerns of students (Kraus et al., 2019). Starting and growing digital enterprise is taught in digital entrepreneurship education. Because it improves cognitive understanding, it can help create startups and new firms, including digital entrepreneurship at universities (Wibowo, Narmaditya, Suparno, et al., 2023). Students are equipped with the necessary skills to segment consumers, create a business model canvas, manage resources, utilize a variety of digital marketing elements, and assess the long-term viability of a firm by acquiring sufficient digital entrepreneurial knowledge (Sufyan et al., 2023).

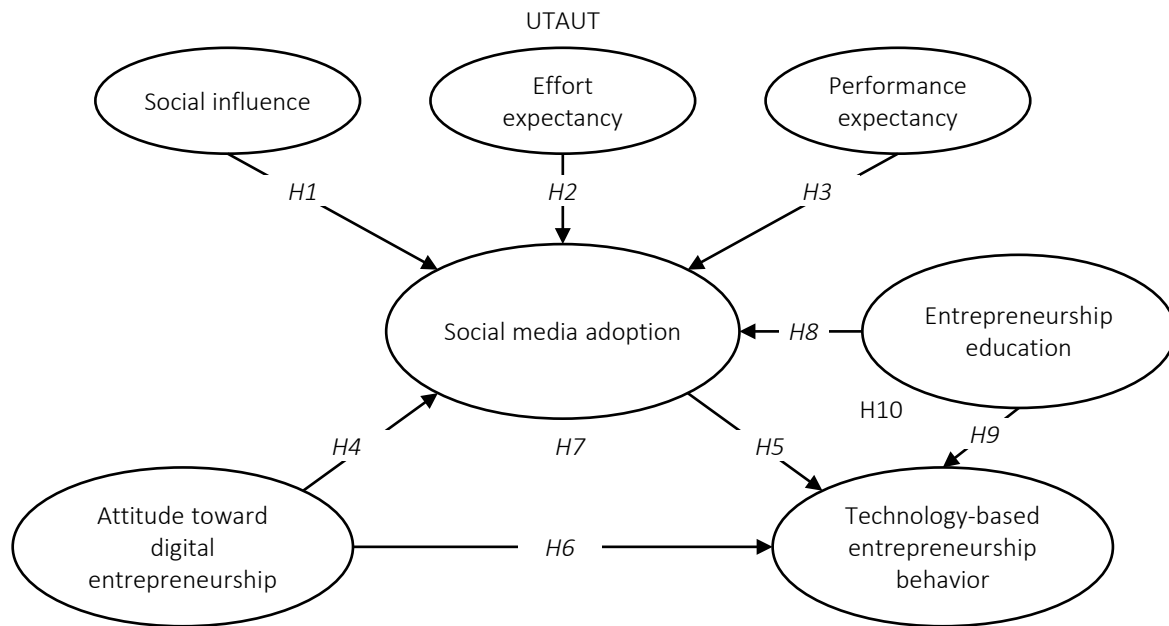
Additionally, despite the substantial influence of entrepreneurship education on entrepreneurial intention and behavior (Setiawan & Lestari, 2021), there is a scarcity of research on digital entrepreneurship education (Kraus et al., 2019). This ren-

ders the mere acquisition of formal education insufficient. Additionally, the phase of cultivating entrepreneurial intention is the primary focus of research on the impact of digital entrepreneurship education on the entrepreneurial process (Wibowo, Narmaditya, Saptono, et al., 2023). Most studies focus on cultivating entrepreneurial intention rather than the tangible effects of digital entrepreneurship education on technology-driven activities, especially in emerging economies such as Indonesia. This study aims to address this gap by investigating the impact of digital entrepreneurship education on technology-driven entrepreneurial behavior, therefore providing significant insights into a relatively underexplored domain within the digital entrepreneurship field.

The present study also investigates the effect of social media adoption as a mediator in the relationship between technology-based entrepreneurial behavior and digital entrepreneurship education and attitude toward digital entrepreneurship. Carr and Hayes (2015) highlight the quick evolution of social media and the major changes in its applications over the previous decade. As Guíñez-Cabrera and Aqueveque (2022) mentioned, social media can serve as both a learning instrument and a marketing tool.

There are numerous studies that support the notion that social media can be employed as a learning medium, as literature offers an abundance of information in addition to its use as a marketing instrument (Al-Marroof et al., 2021). The presence of social media also gives birth to role models for businesses in the form of KOLs (key opinion leaders), who are referred to as influential entrepreneurs (Rudeloff & Damms, 2023). Social media, through the presence of KOLs, has become a medium for entrepreneurship education because of the amount of content about business inspiration, knowledge, and experience to become a businessperson that students can use to carry out technology-based entrepreneurial practices (Guíñez-Cabrera & Aqueveque, 2022).

Moreover, with the rise of influential entrepreneurs, students can easily find business role models on social media (Rudeloff & Damms, 2023). Through entrepreneurial role models, students can cultivate an entrepreneurial attitude. Their suc-



**Figure 1.** Research model

cess tales encourage and empower young people to pursue business opportunities. By seeing and emulating the actions of successful entrepreneurs, students learn the skills and confidence needed to start their own firms, eventually leading to venture development (Muofhe & Du Toit, 2011).

The purpose of this investigation is to examine the effects of social media utilization, digital entrepreneurship education, and attitudes toward digital business on the technology-based entrepreneurial behavior of Indonesian university students, utilizing both the unified theory of acceptance and use of technology (UTAUT) and the theory of planned behavior (TPB). Specifically, this study seeks to understand how social influence, effort expectation, and performance expectancy impact students' use of social media for business purposes (Figure 1). Furthermore, the study explores how attitudes toward digital entrepreneurship and the role of digital entrepreneurship education shape technology-based entrepreneurial behavior among students. Additionally, it checks how social media usage mediates the relationships between attitudes toward digital entrepreneurship, entrepreneurship education, and technology-based entrepreneurship activity, highlighting social media's role as an influential factor in this context. According to the literature review, the hypotheses are as follows:

**H1:** *Social influence positively affects social media adoption.*

**H2:** *Effort expectancy positively affects social media adoption.*

**H3:** *Performance expectancy positively affects social media adoption.*

**H4:** *Attitude toward digital entrepreneurship positively affects social media adoption.*

**H5:** *Social media adoption positively affects technology-based entrepreneurship behavior.*

**H6:** *Attitude toward digital entrepreneurship positively affects technology-based entrepreneurship behavior.*

**H8:** *Digital entrepreneurship education positively affects social media adoption.*

**H9:** *Entrepreneurship education positively affects technology-based entrepreneurship behavior.*

This study also postulates mediation hypotheses as follows:

**H7:** *Social media adoption mediates the relationship between attitude toward digital entre-*

*preneurship and technology-based entrepreneurship behavior.*

*H10: Social media adoption mediates the relationship between entrepreneurship education and technology-based entrepreneurship behavior.*

## 2. METHODOLOGY

This study employs a deductive technique commonly utilized in social science research. It entails building a concept on a theoretical basis derived from previous research and then examining it against several assumptions (Goaill & Al-Hakimi, 2021). The data collection from university students was conducted using a quantitative electronic self-administered survey questionnaire, which was in line with the study design and concept. The study used online-based surveys to increase convenience and efficiency while reducing costs and effort.

The Indonesian government has enforced a policy that requires the inclusion of entrepreneurship instruction in university curricula. Hence, the population under investigation in this study comprises all presently registered university students. A non-probability sampling method, namely the judgmental sampling methodology, is used to examine the elements that impact technology-based entrepreneurial behavior. The selection of samples is based on specific criteria, namely, students who have developed a business plan and currently run a technology-driven business.

The sample calculation was carried out using G-Power software version 3.1. To calculate the number of samples in the linear multiple regression study with the effect size criterion of 0.15, the significance level of 95% was chosen with three variable predictors; the minimum sample number was 119 respondents. Of the total 658 questionnaires distributed digitally through social media and WhatsApp, only 391, or 59.4%, were processed and further analyzed in the study. The respondents' profiles in this investigation are summarized in Table 1.

**Table 1.** Demographic profile

Variable	Item	Quantity	%
Gender	Male	208	53.20%
	Female	183	46.80%
Age	20-21 years old	195	49.87%
	22-23 years old	102	26.09%
	17-19 years old	94	24.04%
Study program	Management/ Business/ Accounting	261	66.75%
	Engineering	40	10.23%
	Visual Communication Design	28	7.16%
	Information Systems	17	4.35%
	Education	11	2.81%
	Communication Science	9	2.3%
	Administration Science	8	2.05%
	Other	6	1.53%
	Economics	6	1.53%
	Agribusiness	5	1.28%
Domicile	Banten Region	215	54.99%
	West Java Region	87	22.25%
	Jakarta	38	9.72%
	Sumatera Region	24	6.14%
	East Java Region	14	3.58%
	Central Java and Yogyakarta	5	1.28%
	Others	5	1.28%
Social media owned (multiple responses)	Instagram	352	
	WhatsApp	335	
	TikTok	269	
	YouTube	230	
	Facebook	193	
	Line	70	
Most used social media (multiple responses)	WhatsApp	309	
	Instagram	294	
	TikTok	229	
	YouTube	147	
	Facebook	100	
	Line	21	

According to Table 1, most respondents are male, between 20 and 21 years old, pursuing studies in the fields of management, business, and accounting, and residing in Banten Province. Most respondents actively use multiple social media platforms. Instagram, WhatsApp, and TikTok are the social media that most respondents have. WhatsApp, Instagram, and TikTok are the most frequently used social media in terms of frequency.

The item indicators of the constructs were evaluated using a five-point Likert scale, where an-



swer modes ranged from ‘strongly disagree’ (1) to ‘strongly agree’ (5). Most of these questions were acquired from prior research. The variables of social media adoption and digital entrepreneurship education are adapted from Wibowo, Narmaditya, Suparno, et al. (2023). The measurements of social influence, effort expectancy, performance expectancy, and social media adoption were modified following the outcomes of Rizkalla et al. (2023). Finally, technology-based entrepreneurship behavior is taken from Rauch and Hulsink (2015).

The present study employed the partial least squares (PLS) structural equation modeling (SEM) approach to perform path analysis and evaluate the associations between latent variables within the research framework. Structural equation modeling (SEM) is a superior method for assessing mediation analysis compared to hierarchical regression tests (Zaman et al., 2019). Moreover, SEM-PLS path analysis is well-suited for practical scenarios and provides benefits in intricate research models in entrepreneurship study.

### 3. RESULTS

#### 3.1. Outer model

Within SEM-PLS, the assessment of the prediction framework is further segmented into two sequential stages. Initial examination of the measurement model (outer model assessment) and subsequent evaluation of the structural model (inner model assessment) are the two steps involved (Hair et al., 2016). A measurement model evaluates the internal consistency, convergent validity, discriminant validity, and reliability of each indicator that constitutes a latent variable in a research model (Hair et al., 2017). The evaluation of convergent validity involves the analysis of the outer loadings and average variance extracted (AVE) as described by Hair et al. (2016, 2017). An assessment of the indicator’s reliability is conducted by examining the loading of each specific indicator to check if the constructs meet the criterion of 0.708 (Hair et al., 2017). Furthermore, to possess a strong convergent validity, the average variance

**Table 2.** Reliability and convergent validity

Construct	Indicator	Outer Loadings	Cronbach’s Alpha	CR	AVE
ATTD	ATTD_1	0.808	0.822	0.833	0.652
	ATTD_2	0.754			
	ATTD_4	0.789			
	ATTD_5	0.875			
EB	EB_1	0.779	0.863	0.868	0.593
	EB_2	0.801			
	EB_3	0.8			
	EB_4	0.756			
	EB_5	0.725			
	EB_6	0.754			
EDU	EDU_1	0.816	0.850	0.850	0.624
	EDU_2	0.788			
	EDU_3	0.783			
	EDU_5	0.788			
	EDU_6	0.775			
EE	EE_1	0.794	0.765	0.768	0.680
	EE_2	0.851			
	EE_3	0.829			
PE	PE_1	0.875	0.792	0.808	0.706
	PE_2	0.822			
	PE_3	0.822			
SI	SI_1	0.873	0.807	0.811	0.722
	SI_2	0.834			
	SI_3	0.841			
SMA	SMA_1	0.759	0.729	0.731	0.552
	SMA_2	0.708			
	SMA_3	0.757			
	SMA_4	0.747			

Note: ATTD = Attitude toward digital entrepreneurship, EE = Effort Expectancy, EDU = Entrepreneurship Education, PE = Performance Expectancy, SMA = Social Media Adoption, SI = Social Influence, EB = Technology-Based Entrepreneurship Behavior.

**Table 3.** Discriminant validity – Fornell-Larcker criterion

Construct	ATTD	EE	EDU	PE	SMA	SI	EB
ATTD	0.808						
EE	0.434	0.825					
EDU	0.556	0.486	0.790				
PE	0.466	0.629	0.580	0.840			
SMA	0.633	0.527	0.602	0.594	0.743		
SI	0.502	0.565	0.559	0.633	0.556	0.850	
EB	0.634	0.593	0.524	0.517	0.650	0.556	0.770

Note: ATTD = Attitude toward digital entrepreneurship, EE = Effort Expectancy, EDU = Entrepreneurship Education, PE = Performance Expectancy, SMA = Social Media Adoption, SI = Social Influence, EB = Technology-Based Entrepreneurship Behavior.

**Table 4.** Discriminant validity – HTMT ratio

Construct	ATTD	EE	EDU	PE	SMA	SI	EB
ATTD							
EE	0.540						
EDU	0.658	0.603					
PE	0.566	0.805	0.704				
SMA	0.814	0.701	0.757	0.769			
SI	0.610	0.718	0.674	0.785	0.722		
EB	0.735	0.728	0.606	0.613	0.813	0.660	

Note: ATTD = Attitude toward digital entrepreneurship, EE = Effort Expectancy, EDU = Entrepreneurship Education, PE = Performance Expectancy, SMA = Social Media Adoption, SI = Social Influence, EB = Technology-Based Entrepreneurship Behavior.

extracted (AVE) value for all research constructs must exceed 0.5 (Hair et al., 2017). As shown in Table 2, all the indicators had an outer loading value over 0.708. Equally, the average variance extracted (AVE) value of all hidden variables surpasses 0.5. Thus, it may be deduced that this research paradigm possesses robust convergent validity. Cronbach's alpha and composite reliability (CR) are statistical measures employed to evaluate the dependability of a concept, as seen in Table 2. The study's composite reliability and Cronbach's alpha values were both above 0.708, indicating that all constructs satisfied the required requirements (Hair et al., 2016, 2017).

The present study employed the criteria proposed by Fornell and Larcker (1981) and the heterotrait-monotrait ratio (HTMT) (Hair et al., 2017) in order to establish discriminant validity. The Fornell-Larcker criteria, as presented in Table 3, predicts that the square root of the average variance extracted (AVE) should be greater than the correlations between latent variables. Therefore, this indicates that the desired level of discriminant validity has been attained. Furthermore, this work assesses the discriminant validity by employing the heterotrait-monotrait ratio (HTMT), also known as the multitrait-multimethod matrix (Table 4). All

data in the current investigation demonstrated an HTMT ratio below the threshold of 0.90, suggesting a substantial degree of discriminant validity (Henseler et al., 2015).

### 3.2. Inner model

The first step was conducting a lateral collinearity test to analyze the structural model. When two variables are used to assess the same underlying concept, this test becomes relevant. The test utilizes variance inflation factors (VIFs) to assess the data, expecting outcomes that are less than 5. The most effective criterion for preventing collinearity is around 3 or below (Hair et al., 2016, 2017). Table 5 shows that the regression model employed in this study did not display multicollinearity, as evidenced by all the variance inflation factor (VIF) values for each construct falling below the threshold of 5 (Hair et al., 2016, 2017).

Unlike CB-SEM, PLS-SEM does not require goodness-of-fit measures. Basic statistical analysis and  $R^2$ -based data normality tests are needed to evaluate the model's fitness. Table 6 shows that the three core components of UTAUT – social influence, effort expectancy, and performance expectancy – explain 55.2% of the variations in social

**Table 5.** VIF analysis

Construct	ATTD	EE	EDU	PE	SMA	SI	EB
ATTD					1.600		1.815
EE					1.835		
EDU					1.884		1.706
PE					2.215		
SMA							1.967
SI					2.011		
EB							

Note: ATTD = Attitude toward digital entrepreneurship, EE = Effort Expectancy, EDU = Entrepreneurship Education, PE = Performance Expectancy, SMA = Social Media Adoption, SI = Social Influence, EB = Technology-Based Entrepreneurship Behavior.

media adoption for business purposes, indicating a moderate relationship (Chin, 1998). Social media adoption for business, attitude toward digital entrepreneurship, and entrepreneurship education explain 50.9% of technology-based entrepreneurship behavior variations with moderate effect (Chin, 1998).

Utilizing the  $R^2$  value alone to support a model is unreliable (Hair et al., 2017). Stone-Geisser created the  $Q^2$  test (Geisser, 1974) to evaluate the structural model's predictive power. A  $Q^2$  score over zero means the structural model's exogenous variables may predict endogenous latent variables (Chin, 2010; Hair et al., 2017). Considering that all endogenous variable  $Q^2$  values are above zero, Table 6 demonstrates that the research model has significant predictive significance.

The evaluation of a structural model involves determining its ability to make accurate predictions and the importance of evaluating the relationship (path coefficients) among its components. This study utilizes the bootstrapping method for hypothesis testing, as specified by Blais and Weber (2009) also Purwanto and Sudargini (2021). Moreover, the examination of the structural model, as outlined by Hair et al. (2017), begins with path coefficients. Accordingly, the study employed 5000 subsamples to assess the statistical significance of path coefficients at a significance level of 5% (or less than 0.05). This study likewise used the beta coefficient and the  $T$  statistic to analyze the hypotheses proposed by Hair et al. (2017). Beta coefficients quantify the magnitude of the impact of each independent variable in the structural (inner) model of partial least squares (PLS) (Henseler et al., 2016). As the influence of endogenous latent construction increases, so does the magnitude of

the  $\beta$  estimate. Furthermore, a  $T$  statistic test is conducted to assess the level of significance (Hair et al., 2017).

Table 6 shows that all direct hypotheses have been supported. Path analysis shows a positive relationship between social influence ( $\beta$  value = 0.090,  $T$  value = 1.741, and  $P$  value = 0.041), effort expectancy ( $\beta$  value = 0.110,  $T$  value = 2.105, and  $P$  value = 0.018), performance expectancy ( $\beta$  value = 0.196,  $T$  value = 3.176, and  $P$  value = 0.001), and attitude toward digital entrepreneurship ( $\beta$  value = 0.340,  $T$  value = 7.208, and  $P$  value = 0.000) on social media adoption. Thus, H1-H4 are supported. The hypotheses testing shows that social media adoption ( $\beta$  value = 0.367,  $T$  value = 6.633, and  $P$  value = 0.000), attitude toward digital entrepreneurship ( $\beta$  value = 0.337,  $T$  value = 6.238, and  $P$  value = 0.000), and entrepreneurship education ( $\beta$  value = 0.116,  $T$  value = 2.058, and  $P$  value = 0.020) significantly affect technology-based entrepreneurship behavior, indicating that H5-H6 and H9 are supported.

Hair et al. (2014) encourage considering the effect size ( $f^2$ ) for considerable significance. The  $P$  value simply indicates impact presence, not magnitude. Therefore, this study uses  $P$  and  $f^2$  values for more accurate data interpretation (Hair et al., 2017). Chin (1998) defines  $f^2$ 's impact size as 0.02, 0.15, and 0.35, corresponding to modest, moderate, and significant impacts. Statistical analysis in Table 6 indicates that social influence does not have any impact, effort expectation, performance expectancy, and entrepreneurship education have minimal impacts, and attitude toward digital business has a moderate effect ( $f^2$  value = 0.164). Social media adoption ( $f^2$  value = 0.141) and attitude toward digital entrepreneurship ( $f^2$  value = 0.128) moderately affect technology-based entrepreneurship

**Table 6.** Path analysis

	Hypothesis	Beta ( $\beta$ )	T Statistic	P value	Result	R2 Adjusted	f <sup>2</sup>	Q2
H1	SI to SMA	0.090	1.742	0.041	Supported		0.009	
H2	EE to SMA	0.110	2.105	0.018	Supported		0.015	
H3	PE to SMA	0.196	3.176	0.001	Supported	0.552	0.039	0.541
H4	ATTD to SMA	0.340	7.208	0.000	Supported		0.164	
H8	EDU to SMA	0.196	3432	0.000	Supported		0.046	
H5	SMA to EB	0.367	6.633	0.000	Supported		0.141	
H6	ATTD to EB	0.337	6.238	0.000	Supported	0.509	0.128	0.477
H9	EDU to EB	0.116	2.058	0.020	Supported		0.016	

Note: ATTD = Attitude toward digital entrepreneurship, EE = Effort Expectancy, EDU = Entrepreneurship Education, PE = Performance Expectancy, SMA = Social Media Adoption, SI = Social Influence, EB = Technology-Based Entrepreneurship Behavior.

behavior, while entrepreneurship education has a small effect ( $f^2$  value = 0.016).

The present study investigated the indirect influence of social media adoption as a mediating factor on the association between attitude toward digital entrepreneurship and entrepreneurship education on technology-based entrepreneurial behavioral outcomes. The mediation connection was evaluated in this study by implementing the methodology proposed by Baron and Kenny (1986). Table 7 indicates that the integration of social media has a significant positive impact on the relationship between attitude toward digital entrepreneurship ( $\beta$  value = 0.125,  $T$  value = 5.394, and  $P$  value = 0.000) and entrepreneurship education ( $\beta$  value = 0.072,  $T$  value = 3.190, and  $P$  value = 0.001) on technology-based entrepreneurship behavior. The study conducted by Hair et al. (2014) demonstrates that incorporating the variable “social media adoption” as a mediator in the model leads to a partial mediating effect. This is due to the significant correlation observed between attitudes toward digital entrepreneurship, entrepreneurship education, and technology-based entrepreneurial behavior.

In order to quantify the magnitude of the indirect impact, the study measured the variance accounted for (VAF). VAF, as defined by Hair et al. (2014), is the ratio of indirect effect to overall impact. The

partial mediation role of attitudes toward digital business in technology-based entrepreneurial activity through social media adoption was shown to explain 27% of the variance (Hair et al., 2014). Furthermore, entrepreneurial education explained 38% of the variance. The VAF values fall between the 20-80% range, suggesting partial mediation.

## 4. DISCUSSION

The results indicate that the adoption of social media for business purposes among students in Indonesia is positively influenced by technology acceptance, which includes social influence, effort expectation, and performance expectancy. The findings of this study validate previous research, indicating that students employ social media for business-related objectives due to the impact of influential persons, the ease of using business functions, and the advantages of social media features such as social media marketing, customer engagement, market expansion, and competitor analysis (Nawi et al., 2019; Puriwat & Tripopsakul, 2021). In relation to social impact, social media serves as a social network platform that students utilize not only for personal and social communication and interaction with their digital networks but also for initiating and advancing their entrepreneurial ventures (Gutiérrez-Cabrera & Aqueveque, 2022).

**Table 7.** Mediation analysis

	Hypothesis	Beta ( $\beta$ )	T Statistic	P value	VAF	Result
H7	ATTD $\rightarrow$ SMA $\rightarrow$ EB	0.125	5.394	0.000	0.27	Partial Mediation
H10	EDU $\rightarrow$ SMA $\rightarrow$ EB	0.072	3.190	0.001	0.38	Partial Mediation

Note: ATTD = Attitude toward digital entrepreneurship, EE = Effort Expectancy, EDU = Entrepreneurship Education, PE = Performance Expectancy, SMA = Social Media Adoption, SI = Social Influence, EB = Technology-Based Entrepreneurship Behavior.

This study also confirms previous findings that convenience and usefulness increase social media usage (Nawi et al., 2017, 2019; Puriwat & Tripopsakul, 2021). Higher adoption rates for social media are associated with ease of use. In addition to simplicity of use, business adoption of social media is affected by perceived utility or performance expectancy. Facebook is strong in community-based marketing, WhatsApp in interpersonal communication, TikTok in short videos, and Instagram in visuals. Each social media has its advantages.

Furthermore, the study findings demonstrate the impact of digital entrepreneurship education on the use of social media. Higher education institutions have been prompted by technological advancements to modify their educational curriculum to incorporate technology or digitalization (V. Crittenden & W. Crittenden, 2015; W. F. Crittenden et al., 2019). The incorporation of social media as a digital marketing tool and digital media for customer connections and customer loyalty is a fundamental component of the entrepreneurship education curriculum in Indonesia.

Furthermore, social media adoption, attitude toward digital entrepreneurship, and digital entrepreneurship education have a substantial favorable impact on technology-based entrepreneurial activity among Indonesian students. Positive attitudes toward digital business are positively correlated with students' views on the advantages derived from business digitalization (Abbas & Sabri, 2022), which in turn increases their motivation to persist in doing business utilizing technology.

Furthermore, utilizing social media for commercial purposes presents several prospects

for digital enterprises to further expand their market presence and attract a larger consumer base. Social media platforms enable students to use their networks for selling items, facilitating communication, and gathering client feedback (Hossain et al., 2022) to enhance product development and foster creativity. Utilizing social media for commercial purposes enables students to save promotional expenses by offering cost-effective advertising within a specific target market that aligns with company requirements. This will enable students to engage in technology-driven company management.

Moreover, providing digital entrepreneurship education to university students has a highly beneficial impact on their behavior toward technology-based entrepreneurship. Educational programs focused on digital entrepreneurship provide students with the necessary skills and knowledge to effectively employ technology in their company operations (Wibowo, Narmaditya, Suparno, et al., 2023). In addition, teaching digital entrepreneurship education not only caters to marketing requirements but also enables students to enhance the utilization of technology in order to optimize the business supply chain. This includes activities such as exploring business concepts, identifying several supplier alternatives, and studying the market and consumers to improve business performance.

At last, the mediation test revealed that social media adoption partially mediated the relationship between attitude toward digital entrepreneurship and technology-based entrepreneurship behavior, as well as the relationship between entrepreneurship education and technology-based entrepreneurship behavior.

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## CONCLUSION

The present study aims to examine the effects of social media utilization, digital entrepreneurship education, and attitudes toward digital business on the technology-based entrepreneurial behavior of Indonesian university students, using the unified theory of acceptance and use of technology and the theory of planned behavior. The broad availability and quick progress of technology and internet access have had a huge impact on the entrepreneurial environment, changing how students view and seek entrepreneurial opportunities. This study emphasizes the importance of digital entrepreneurship education and the strategic use of social media in encouraging technology-based entrepreneurial behaviors among Indonesian university students. By analyzing these aspects, the study sheds light on how digital tools and education might help students engage more successfully in technology-driven business activities.

The primary findings indicate that the utilization of social media for entrepreneurial behavior is substantially influenced by characteristics such as a positive attitude toward digital entrepreneurship, effort expectancy, performance expectancy, and social influence. Furthermore, the curriculum of digital entrepreneurship education has a beneficial effect on the adoption of social media for business purposes and the concurrent digital entrepreneurial behavior of students. Finally, the study emphasizes the mediation function of social media adoption in the relationship between entrepreneurial activity and digital entrepreneurship education.

The potential for technology-based entrepreneurship in Indonesia remains unexplored, despite the country's substantial number of digital technology consumers. This underscores the importance of ongoing initiatives in digital entrepreneurship education to address this disparity. The development of a new generation of entrepreneurs may be significantly influenced by universities.

An individual should possess a high level of technological proficiency and be capable of leveraging digital technologies to achieve success in entrepreneurship. The results of this study offer a practical framework for policymakers, educators, and entrepreneurs to capitalize on the benefits of digital technology, thereby fostering a dynamic and vibrant entrepreneurial atmosphere in Indonesia.

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