



SCIENTIFIC OASIS

Decision Making: Applications in  
Management and EngineeringJournal homepage: [www.dmame-journal.org](http://www.dmame-journal.org)  
ISSN: 2560-6018, eISSN: 2620-0104Artificial Intelligence-Enabled Decision Making in Social Media Adoption  
for Sustainable Digital Business in Thai SMEsSaranee Visuthiphol<sup>1</sup>, Sumaman Pankham<sup>1,\*</sup><sup>1</sup> College of Digital Innovation Technology, Rangsit University, Thailand.

## ARTICLE INFO

**Article history:**

Received 5 July 2024

Received in revised form 19 Nov 2024

Accepted 28 February 2025

Available online 30 March 2025

**Keywords:**Social Media, Artificial Intelligence,  
Entrepreneurial Orientation,  
Sustainability, Competitive  
Advantage, SMEs, Rough Set e-  
Delphi, SEM

## ABSTRACT

This study develops and validates a structural equation modeling (SEM) to examine social media adoption by SMEs and its impact on sustainability. It aims to identify key factors influencing SMEs sustainability in the digital context and explore their interrelationships. This study employed a mixed-methods approach. In the qualitative phase, the Rough Set e-Delphi technique was utilised to collect insights from experts and refine the research constructs through three rounds of online questionnaires, involving 20 experts. The quantitative phase involved a survey of 776 executives from Thai SMEs, which served as the primary data collection method. The study results indicate that social media adoption is positively influenced by four factors: perceived usefulness, perceived ease of use, compatibility, and business orientation. The implementation of social media networks has a positive impact, enhancing both performance metrics and competitive advantages for SMEs. This research confirms that the sustainable performance of SMEs significantly contributes to sustainability across their business processes. The findings demonstrate that social media serves as a powerful tool for improving SMEs operations, while fostering competitive advantages that support sustainability. This study demonstrates that entrepreneurial orientation, in conjunction with technology acceptance, facilitates social media adoption. It offers practical implications for artificial intelligence engineering by exploring how AI systems, with digital analytical capabilities, automated functions, and predictive modelling, can improve operational decision-making, supply chain management, and overall performance in SMEs. The insights gained can be utilised by SMEs owners, policymakers, and researchers to enhance the use of social media through AI-driven strategies, promoting sustainable SME growth in emerging economies.

## 1. Introduction

Digital transformation is reshaping industries worldwide, presenting both new opportunities and challenges for Small and Medium Enterprises (SMEs). To remain competitive in the market, businesses must adopt digital technologies, with post-COVID-19 growth accelerating this transition. Social media platforms are instrumental for SMEs globally, offering efficient means to engage with clients, promote brands, and access new markets [1; 2]. However, the adoption of digital technologies among SMEs varies widely across regions and economies, influenced by factors such as resource

\* Corresponding author.

E-mail address: [sumaman.p@rsu.ac.th](mailto:sumaman.p@rsu.ac.th)<https://doi.org/10.31181/dmame8120251366>

availability, digital literacy, and supportive policies [3].

In Thailand, SMEs have played a critical role in the economy, with 3,178,000 SMEs contributing significantly to employment, income, and poverty reduction as of 2023 [4; 5]. SMEs make up nearly 99% of businesses and account for over 71.9% of total employment, generating approximately 35% of the GDP and contributing over 20% of exports. Despite their importance, these enterprises face challenges in the digital age, including shifting consumer behaviour, technological adaptation, and sustainability concerns [6]. Recognising this, the Thai government has incorporated SMEs into the national strategy, particularly in the "Modern SMEs and Entrepreneurs" master plan under the 20-Year National Strategy (2018-2037), which focuses on leveraging technology and innovation to enhance the competitiveness of SMEs both domestically and internationally.

Social media has become a crucial tool for SMEs in Thailand to improve customer interaction, increase accessibility, and boost competitiveness. With over 56.85 million social media users and an online trade value of 11 billion US dollars, SMEs have significant opportunities for growth through these platforms. Social media's cost-effective nature allows small businesses to connect with broader audiences, facilitating interaction with consumers and large corporations. For example, in countries like Hungary and Slovakia, over 76% of businesses actively use social media, while 24% face challenges such as platform complexity and uncertainty about results. Consequently, SMEs are advised to focus on audience-specific platforms, prioritise brand awareness, and invest in employee training or skilled social media managers to maintain a strong presence. Effective social media strategies can enhance market competition, increase revenue, and stabilise market reach [7; 8].

There is no uniform pattern in how SMEs adopt digital technologies, as adoption varies across businesses. The success and extent of digital technology adoption depend on four key factors: the perceived usefulness and ease of use of the technology, its compatibility with existing business processes, and the level of innovation in management approaches by entrepreneurs [9; 10]. Further research is needed on the role of social media in digital technology adoption for SMEs and its impact on sustainability, particularly in emerging economies such as Thailand.

There is no uniform pattern in how SMEs adopt digital technologies, as adoption varies across businesses. The success and extent of digital technology adoption depend on four key factors: the perceived usefulness and ease of use of the technology, its compatibility with existing business processes, and the level of innovation in management approaches by entrepreneurs [9; 10]. Further research is needed on the role of social media in digital technology adoption for SMEs and its impact on sustainability, particularly in emerging economies such as Thailand.

This study uses SEM to assess the digital sustainability of Thai SMEs, exploring factors like perceived usefulness, entrepreneurial orientation, and social media usage, aiming to identify key drivers of sustainable development in the sector. This study has several key contributions. First, it expands academic literature on digital business sustainability by integrating various theoretical frameworks, including the Technology Acceptance Model [11], Diffusion of Innovation theory, and entrepreneurship and strategic management concepts. Second, it offers empirical insights from an emerging economy context, enriching digital business research with diverse perspectives. Third, the study's findings have practical implications for SME owners and managers, providing guidance on effectively leveraging digital technologies for sustainable business growth [12; 13]. Additionally, this study aims to improve and validate an SEM of sustainability for SMEs using social media in Thailand. It seeks to identify key factors influencing SME sustainability in the digital context and explore the relationships between these factors [14].

## **2. Literature Review**

This study examines factors driving social media adoption in SMEs, focusing on Perceived

Usefulness, Ease of Use, Compatibility, Entrepreneurial Orientation, and Competitive Advantage. It explores their impact on SME performance and sustainability, proposing eight hypotheses on social media's role in enhancing competitive advantage and long-term sustainability.

### *2.1 Perceived Usefulness (PU)*

SMEs owner-managers assess digital technologies based on their perceived impact on performance [15]. Research shows SMEs adopt and sustain these technologies when they enhance performance [16; 17]. The causal model reveals that perceived usefulness, along with ease of use, significantly influences system adoption, varying by usage context [18; 19].

H1: PU has a positive effect on SM.

### *2.2 Perceived Ease of Use (PEOU)*

PEOU refers to the extent to which an individual believes that using a particular system or model requires minimal effort. For SMEs, the PEOU of digital technologies and social media platforms plays a crucial role in their adoption and effective utilisation. Technologies that are considered user-friendly are more likely to be adopted and integrated into business operations. Furthermore, small businesses are more inclined to adopt information systems based on leadership and innovation characteristics, although the degree of adoption is largely influenced by organisational factors. Competition does not have a direct impact; instead, shared reliance on organisational learning and business processes fosters optimised learning plans, enhances business process performance, and facilitates the integration of individual and organisational learning to achieve improved business outcomes [20; 21].

H2: PEOU positively influences SM.

### *2.3 Compatibility (COM)*

Users perceive an innovation as compatible when it aligns with their established values, prior experiences, and addresses future audience needs. In the context of digital SMEs, COM refers to how well digital technologies and social media integrate with a business's existing operations, culture, and goals [22; 23]. Interrelated IT investments further enhance acceptance and performance, while the adoption of effective management software relies on its perceived usefulness and ease of application [22-25].

H3: COM has a direct and a positive effect on SM.

### *2.4 Entrepreneurial Orientation (EO)*

EO reflects an organisation's approach to decision-making, management style, and practices, encompassing five key aspects: innovativeness, proactiveness, risk-taking, autonomy, and competitive aggressiveness [26]. For SMEs, a strong EO can enhance performance and sustainability within the digital business environment [27]. For instance, in Spanish SMEs within the service industry, entrepreneurial characteristics, firm attributes, managerial traits, and EO significantly impact performance and competitive success, with macroeconomic, social, and business environment factors serving as controlling influences [28].

H4: EO has a positive effect on SM.

### *2.5 Competitive Advantage (CA)*

Competitive advantage refers to a firm's superior ability to implement value-creating strategies compared to its rivals. In the digital context, SMEs can attain competitive advantage through cost leadership, differentiation, focus strategies, or rapid responses to market changes [29]. For smaller businesses, profits derived from market connections and supply chain relationships are more significant than traditional efficiency improvements. The use of IT applications within firms and their

external networks fosters greater social complexity. Relational capital facilitates mutual business benefits through enhanced supplier governance structures and capability development. The interplay between cognitive and structural social capital fosters the creation of relational social capital, which strengthens joint sense-making activities, thereby promoting information sharing and knowledge integration that contribute to improved relationship performance [30].

H5: EO has a positive effect on CA.

## 2.6 Social Media Usage (SM)

Social media usage in SMEs involves leveraging platforms for marketing, customer engagement, and information sharing, significantly influencing performance and sustainability [31]. EO positively affects social network use, mediating the link between EO and SMEs growth, unlike large businesses [32; 33]. Positive attitudes and increased social media use are linked to improved firm performance [34].

H6: SM has a positive effect on CA.

## 2.7 SMEs' Performance (SF)

Small business performance encompasses three key areas: financial outcomes, operational productivity, and marketplace outcomes. In the current digital context, performance assessment includes factors such as online presence metrics, customer engagement indicators, and digital sales metrics [35; 36]. Improved digital marketing practices enhance SMEs' customer interactions, operational efficiency, and organisational adaptability, while also providing reliable data to stakeholders regarding the transformative impact of crises.

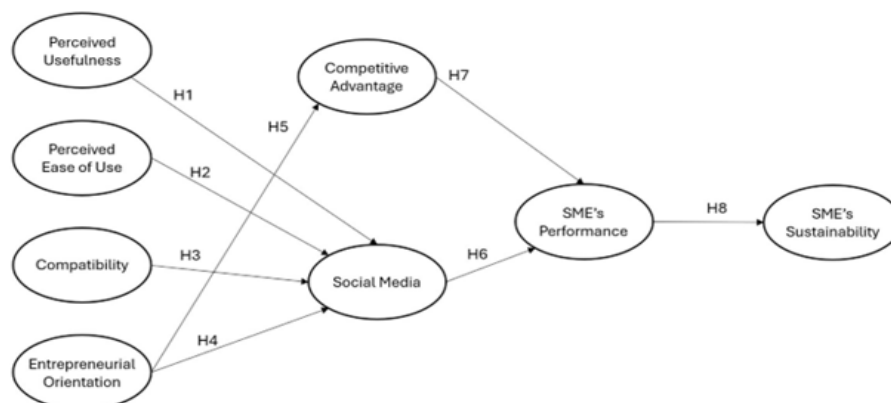
H7: CA has a positive effect on SF.

## 2.8 SMEs' Sustainability (ST)

Sustainability for SMEs refers to their ability to achieve and sustain long-term objectives while balancing social, economic, and environmental considerations [37]. In the digital business context, sustainability also entails adapting to technological advancements and maintaining a competitive advantage over time. Sustainable competitive advantages emerge from factors such as flexibility, dynamic adjustment, and resource integration, while unsustainable outcomes result from organisational inflexibility, informal entrepreneurship, information blocking, and technological deficiencies. Furthermore, digital sustainability can lead to advancements in entrepreneurship, innovation, and strategy, with the potential for positive societal impact. Sustainability for SMEs has become increasingly critical in this era [38-41].

H8: SM has a positive effect on ST.

Based on the hypotheses outlined above, the proposed study adopts a conceptual model, as illustrated in Figure 1.



**Fig.1.** Hypothesised Research Framework

### 3. Methods

A mixed-method approach was adopted for this study, combining both qualitative and quantitative analyses to ensure robustness and validity. The study has received approval from the Office of Research Ethics at Rangsit University, with the approval number RSUERB2024-017. The research team has thoroughly reviewed and authorised the study. The methods employed for the study are depicted in Figure 2.



**Fig.2.** Mixed-Method approach [14].

#### 3.1 Qualitative Phase's Sample and Data Collection

The qualitative phase employed the Rough Set e-Delphi Technique to collect expert opinions and refine the research constructs. Data was purposively sampled from January to March 2024. This process helped establish content validity and refine the measurement items for each construct.

##### 3.1.1 Literature Review:

The study conducted a thorough review of existing literature to synthesise key issues related to the use of social media, SME performance, and SME sustainability.

##### 3.1.2 Expert Selection:

A total of 20 experts with over three years of experience in social media and online marketing were selected. These experts were chosen based on their industry expertise, successful past campaigns, and their capacity to provide valuable insights into digital strategies and market trends. The experts were from three distinct groups: SME owners, government sector representatives, and university professors.

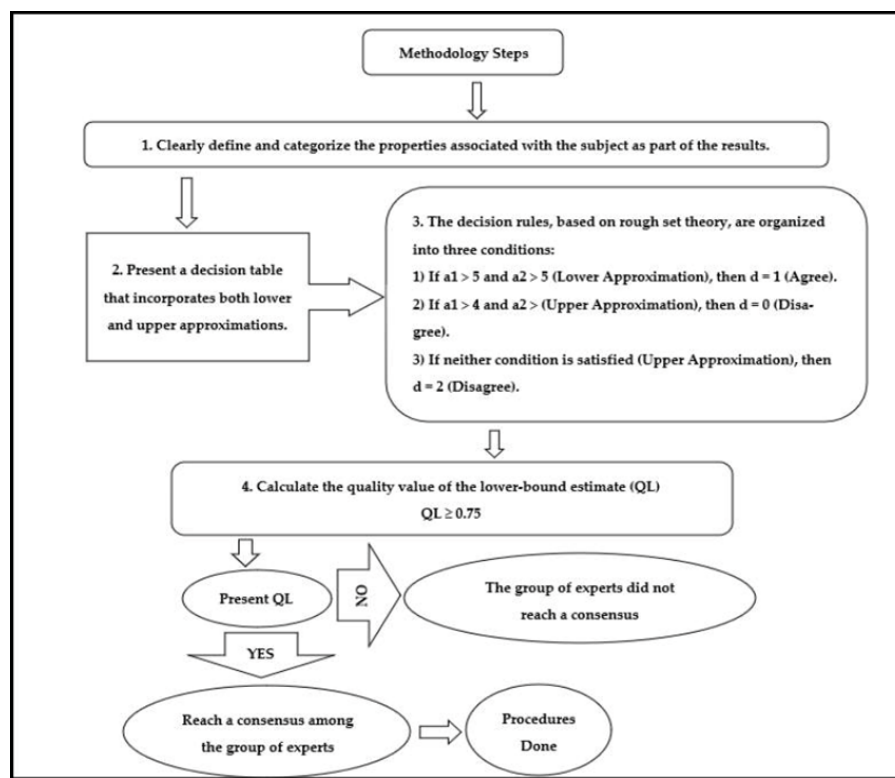
##### 3.1.3 Collect Expert's Opinion:

The e-Delphi technique was used across three iterative rounds to gather expert opinions. The method started with open-ended surveys, followed by a closed-ended questionnaire using a 7-point Likert scale, and concluded with a final questionnaire for validating expert responses and measuring consensus.

- Round One: An open-ended survey was distributed to gather expert insights.
- Round Two: A closed-ended online questionnaire, using a 7-point Likert scale, was developed and distributed based on the insights collected in the first round.
- Round Three: A final closed-ended questionnaire was distributed to verify expert responses and measure consensus on key factors.

##### 3.1.4 Conclusion Synthesis:

The conclusions were formulated based on qualitative analysis of expert consensus obtained through the Rough Set Delphi process. This synthesis was conducted in four steps, as illustrated in Figure 3.



**Fig.3.** Rough Set Delphi Technique [14].

### 3.2 Quantitative Phase's Sample and Data Collection

Quantitative research was conducted through online questionnaires to examine broader trends by collecting data. Online questionnaires were distributed using convenient sampling technique from April to June 2024. Data was collected from 800 SME owners, partners, and managers who have run their businesses for more than five years in Thailand; however, only 776 responses were deemed appropriate for data processing and analysis, as presented in Table 1.

#### 3.2.1 Questionnaire Development:

An online questionnaire was designed targeting 776 SMEs owners, partners, and managers in Thailand. The questionnaire was carefully structured with clear, concise questions tailored to the research objectives. It included both open-ended and closed-ended questions, and a 7-point Likert scale was used to ensure reliable and valid data collection.

#### 3.2.1 Validation and Refinement:

A closed-end questionnaire using a 7-point Likert scale was created based on expert insights gathered in phase one. The information, themes, and key factors identified from expert opinions were used to formulate structured questions, integrating the expert insights from the previous phase into the design and content of the closed-ended questionnaire.

#### 3.2.3 Collect Questionnaires:

The online questionnaires were distributed to 776 SMEs owners, partners, and managers in Thailand. After distribution, the responses were collected for further processing.

#### 3.2.4 Conclusion Formulation:

The data was analysed, and the quantitative findings from the online questionnaire were

summarised. Statistical methods were applied to assess response distributions and evaluate relationships between variables to derive significant conclusions from the quantitative findings.

### 3.3 Measurement

The online questionnaires included 36 items measuring eight constructs: PU, PEOU, COM, EO, CA, SM, SP, and ST, all rated on a 7-point Likert scale (1 = strongly disagree, 7 = strongly agree).

### 3.4 Data Analysis

SEM was utilised to examine the interrelationships among the constructs. The process commenced with the assessment of the model's reliability and validity, followed by the validation of the proposed relationships within the structural model [42; 43].

## 4. Results

### 4.1 Descriptive Information

The analysis of the demographic data from the questionnaire respondents, comprising 776 entrepreneurs from SMEs based in Thailand, was performed using frequency and percentage calculations, as presented in Table 1.

**Table 1**  
Descriptive Information

	Category	Frequency	Percentage
Gender	Male	227	29.3
	Female	499	64.3
	LGBTQ	50	6.4
	Total	776	100
Age	18-30 years	278	35.8
	31-40 years	304	39.2
	41-50 years	154	19.8
	Above 51 years	40	5.2
	Total	776	100
Education	High School	259	33.4
	Bachelor's Degree	456	58.8
	Master's Degree	51	6.6
	Professional Degree	10	1.3
	Total	776	100
Regions	Central	514	66.2
	West	19	2.4
	East	91	11.7
	Northeast	56	7.2
	South	45	5.8
	North	51	6.6
	Total	776	100
	Total	776	100
Business Position	Business Owner	261	33.6
	Management	328	42.3
	Partner	187	24.1
	Total	776	100

### 4.2 The Results of the Measurement Model and Expert Consensus on Rough Set e-Delphi

The Rough Set e-Delphi method was employed for the qualitative analysis to collect expert opinions, refine, and validate the research constructs. This process involved three rounds of online questionnaires distributed to 20 experts, gathering their insights and qualitative data. Table 2

provides a detailed overview of the results from the confirmatory factor analysis.

**Table 2**

The Results of Expert Consensus on Rough Set e-Delphi and Measurement Model

Construct	Code	Rough Set QL ≥ 0.75	Result	Factor Loading	R <sup>2</sup>	CR	AVE
Perceived Usefulness	PU1	1.00	Agreed	0.74	0.55	0.84	0.56
	PU2	1.00	Agreed	0.87	0.76		
	PU3	1.00	Agreed	0.64	0.41		
	PU4	1.00	Agreed	0.73	0.53		
Perceived Ease of Use	PEOU1	0.95	Agreed	0.64	0.41	0.78	0.55
	PEOU2	0.75	Agreed	0.69	0.48		
	PEOU3	0.81	Agreed	0.87	0.76		
Compatibility	COM1	1.00	Agreed	0.70	0.49	0.87	0.57
	COM2	0.95	Agreed	0.76	0.58		
	COM3	1.00	Agreed	0.74	0.54		
	COM4	1.00	Agreed	0.79	0.62		
	COM5	0.95	Agreed	0.80	0.63		
Entrepreneurial Orientation	EO1	0.90	Agreed	0.82	0.67	0.83	0.55
	EO2	0.95	Agreed	0.87	0.75		
	EO3	0.95	Agreed	0.65	0.42		
	EO4	0.90	Agreed	0.61	0.37		
Competitive Advantage	CA1	1.00	Agreed	0.69	0.48	0.78	0.55
	CA2	0.90	Agreed	0.72	0.52		
	CA3	1.00	Agreed	0.80	0.64		
Social Media Usage	SM1	1.00	Agreed	0.73	0.53	0.90	0.57
	SM2	1.00	Agreed	0.71	0.51		
	SM3	0.95	Agreed	0.78	0.61		
	SM4	1.00	Agreed	0.81	0.65		
	SM5	1.00	Agreed	0.79	0.62		
	SM6	1.00	Agreed	0.77	0.60		
	SM7	1.00	Agreed	0.71	0.51		
SMEs' Performance	PF1	0.95	Agreed	0.77	0.59	0.59	0.62
	PF2	1.00	Agreed	0.78	0.60		
	PF3	0.95	Agreed	0.81	0.66		
	PF4	0.90	Agreed	0.78	0.61		
	PF5	0.95	Agreed	0.78	0.61		
SMEs' Sustainability	ST1	0.95	Agreed	0.79	0.62	0.91	0.67
	ST2	0.90	Agreed	0.82	0.67		
	ST3	0.95	Agreed	0.83	0.69		
	ST4	0.95	Agreed	0.81	0.65		
	ST5	0.95	Agreed	0.84	0.70		

Table 2 presents the results from a panel of 20 experts, which included government sector representatives, university professors, and successful SMEs entrepreneurs. These experts participated in three rounds of online questionnaires, comprising one open-ended round and two rounds using a 7-point Likert scale [44]. This process contributed to establishing content validity and refining the measurement items for each construct. Additionally, the criteria used are discussed in the relevant section.

#### 4.3 The Results of SEM's Development of Sustainability of the Digital Business of SMEs in Thailand

The overall impact of external and internal variables was measured by assessing the size of the influence between the variables in the model. The results of Direct Effects, Indirect Effects, and Total Effects revealed complex relationships between the key variables influencing SMEs performance and



sustainability. SM is significantly impacted by PU, PEOU, EO, and COM, all showing direct effects. CA is strongly influenced by EO, with a path coefficient ( $\lambda = 0.824$ ). PF is shaped by EO, SM, PU, PEOU, and CA through both direct and indirect pathways, with COM having a significant indirect effect. Additionally, ST is directly driven by PF, with a strong path coefficient ( $\lambda = 0.934$ ), and is indirectly influenced by six latent variables, including PEOU, COM, EO, SM, and CA, all of which positively contribute to ST, as presented in Table 3.

**Table 3**

The Path Coefficients, P-Value, Remarks

Latent Variable	Hypotheses	Path Coefficient ( $\lambda$ )	P-Value	Remarks
PU $\rightarrow$ SM	H1	- 0.124	$p < 0.001$	Supported
PEOU $\rightarrow$ SM	H2	0.339	$p < 0.001$	Supported
COM $\rightarrow$ SM	H3	0.191	$p < 0.01$	Supported
EO $\rightarrow$ SM	H4	0.504	$p < 0.001$	Supported
EO $\rightarrow$ CA	H5	0.380	$p < 0.001$	Supported
SM $\rightarrow$ PF	H6	0.570	$p < 0.001$	Supported
CA $\rightarrow$ PF	H7	0.392	$p < 0.001$	Supported
PF $\rightarrow$ ST	H8	0.934	$p < 0.001$	Supported

#### 4.4 Results of SEM Analysis of Digital Business Sustainability of SMEs in Thailand

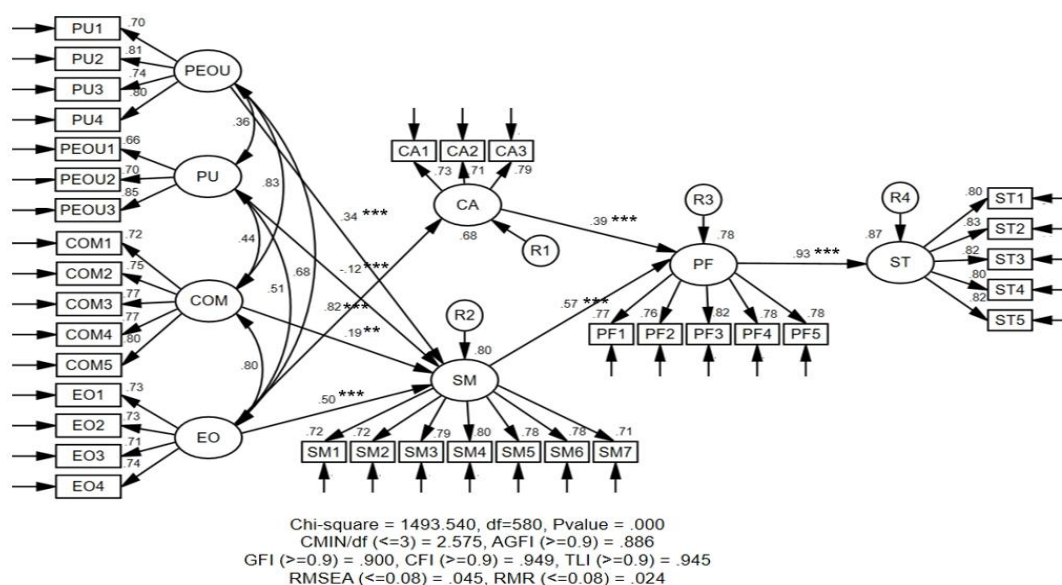
To validate the SEM analysis, which employs linear structural equation modelling to determine variable causality, the Chi-Square statistic from Maximum Likelihood (ML) parameter estimation should produce a P-value above 0.05. The evaluation includes the relative Chi-Square statistic (CMIN/DF), RMR, GFI, AGFI, and PGFI, as they are valid indicators. The Chi-Square test yielded a P-value of 0.00. Consistency test results showed a Chi-Square statistic of 1493.54 with 580 degrees of freedom, a CMIN/DF of 2.575, a GFI of 0.900, and an RMSEA of 0.045. Table 4 details the consistency results, indicating strong model consistency.

**Table 4**

The Statistical Value of Consistency from the Structural Equation Modelling Analysis.

Statistics used for verification	Evaluation Criteria	Statistical Values	Consideration
CMIN/DF	$< 3.00$	2.575	Within Acceptable Range
GFI	$\leq 0.90$	0.900	Within Acceptable Range
TLI	$\leq 0.90$	0.945	Within Acceptable Range
CFI	$\leq 0.90$	0.949	Within Acceptable Range
RMSEA	$< 0.08$	0.045	Within Acceptable Range
RMR	$< 0.08$	0.024	Within Acceptable Range

The statistical analysis results in Table 4 indicate that the model is well-aligned with the empirical data, and as such, no adjustments are necessary. The analysis demonstrates that the model is consistent and coherent with the data, evidenced by the statistical values: Chi-square ( $\chi^2$ ) = 1493.54, degrees of freedom (df) = 580, CMIN/DF = 2.575, GFI = 0.900, RMR = 0.024, and RMSEA = 0.045. Additionally, the path coefficients for both direct and indirect influences are statistically significant at the 0.000 and 0.001 levels, although one direct influence value is not statistically significant. Overall, the data supports the model's consistency. The results are illustrated in Figure 4.



**Fig.4.** The SEM's Analysis Results of the Sustainability of the Digital Business of SMEs in Thailand

Figure 3 highlights key findings, including significant positive associations between PU, PEOU, COM, and EO with SM. Additionally, SM demonstrated strong positive effects on SP, while SMEs performance exhibited a robust positive impact on sustainability. The study confirms the crucial role of SM in driving both the performance and long-term sustainability of SMEs in Thailand. The successful adoption of social media by SMEs is influenced by the importance of entrepreneurial orientation and technology acceptance factors.

## 5. Discussion

The findings uncover complex dynamics in the digital sustainability of Thai SMEs, with EO being identified as a crucial driver of successful digital transformation. The strong influence of EO on all outcome variables indicates that adopting an entrepreneurial mindset is vital for effective digital platform integration, competitive positioning, and long-term business sustainability. These results align with existing studies that underline the importance of EO in organisational success and extend this understanding to the realm of digital transformation [45]. The negative correlation between PU and SM presents an intriguing contradiction that challenges conventional technology acceptance models. This unexpected result may be indicative of the mandatory digital adoption precipitated by recent global shifts, where businesses were compelled to engage in digital transformation, irrespective of their initial assessment of its utility. However, the significant PEOU suggests that usability remains a key factor in adopting digital platforms, particularly for SMEs with limited resources. Digital readiness is also becoming increasingly vital for the survival and expansion of these SMEs, with larger digital enterprises shifting focus to the SMEs market segment.

The substantial positive correlation between performance and sustainability ( $\lambda = 0.934$ ) supports theoretical frameworks linking operational excellence with long-term sustainability. This finding implies that immediate performance indicators can serve as precursors to sustainable business practices, highlighting the value of balanced scorecard approaches that integrate both short-term achievements and long-term goals. The high proportion of variance explained in sustainability ( $R^2 = 0.873$ ) further reinforces the model's capacity to identify key factors driving sustainable digital business operations. These elements should be incorporated into management strategies to foster sustainability, circular systems, environmentally conscious proposals, and machine learning advancements [46]. The combined use of social media and competitive advantage facilitates the

conversion of EO into improved performance while simultaneously enhancing organisational sustainability by fostering strategic digital capabilities. Successful digital transformation demands not only the adoption of appropriate tools but also a strategic framework for implementation to achieve optimal outcomes. The model's strong fit scores and the significant variance in the dependent variables validate the applicability of the theoretical model [47].

This study contributes valuable insights into the factors driving the sustainability of digital SMEs in Thailand. The study confirms that EO significantly influences social media adoption, enabling SMEs to effectively leverage digital tools for sustainable development, as corroborated by [25], [48], and [49]. The strong connection between performance and sustainability further affirms the importance of operational efficiency in achieving long-term success [50]. The indirect effects observed demonstrate how an entrepreneurial mindset drives social media strategies that create competitive advantages [51; 52]. The use of statistical analysis to process questionnaire data collected online allowed for the identification of significant patterns and relationships among variables, while distribution trends were evaluated through descriptive statistics, mean comparisons, and inferential analysis. This rigorous approach led to meaningful conclusions from the quantitative analysis [53].

## **6. Limitations and Suggestions**

This research centers on Thai SMEs, which may limit the generalisability of the findings to other cultural contexts. As such, subsequent studies could replicate this research across different countries or conduct cross-cultural comparisons to assess the robustness of the findings in diverse environments. Additionally, future research could explore the impact of other digital technologies, such as AI and blockchain, on ST rather than SM, considering potential moderating factors like industry type, entrepreneurial size, or environmental volatility in the identified relationships.

## **7. Conclusion**

The research on digital business sustainability in Thai SMEs was analysed through a comprehensive SEM model, illustrating how social media utilisation, entrepreneurial orientation, and technological acceptance contribute to both performance and sustainability outcomes. This study positions entrepreneurial orientation as a critical success factor for sustainability through interconnected pathways, thereby enhancing existing theories and integrating technological elements with organisational strategies, building on established technology acceptance models. Based on the research's practical implications, SMEs managers, policymakers, and technology providers are encouraged to undertake three key initiatives: fostering entrepreneurial capabilities, developing strategic digital competencies, and establishing supportive sustainability frameworks for digital transformation.

In addition, students get hands-on exposure to the latest technologies and green practices through public-private partnerships, that ensure the learning program produces skills in sync with global sustainability objectives. Equitable access to AI-driven vocational education is conditioned with policies that are inclusive. Diversifying STEM fields with female participation is possible through gender-inclusive initiatives. Embedding sustainability principles into all vocational curricula will enable institutions to empower our students to face global environmental challenges by referencing circular economy and green innovation principles. The study employed secondary data and assessed a regional trend in vocational education and AI adoption.

In future research, primary data collection, such as through case studies or field surveys should be used to gain localized insights. Additionally, there should be the efficacy testing of the AI-based frameworks in improving outcomes of educational and sustainability initiatives through longitudinal studies. Specific industries and their specific sustainability challenges could be the subject matter of

an expanded analysis resulting in more specific recommendations. Vocational colleges are best positioned to drive sustainable development by incorporating AI and sustainability in their study programs. When these institutions adopt inclusive policies, invest in digital infrastructure, and coordinate on a global partnership basis, they will become hubs of innovation that equip their students with the ability to head green startups and participate in global sustainability goals.

## References

- [1] Malesev, S., & Cherry, M. (2021). Digital and social media marketing-growing market share for construction smes. *Construction Economics and Building*, 21(1), 65-82. <https://doi.org/10.5130/AJCEB.v21i1.7521>
- [2] Oyewobi, L. O., Adedayo, O. F., Olorunyomi, S. O., & Jimoh, R. (2021). Social media adoption and business performance: the mediating role of organizational learning capability (OLC). *Journal of Facilities Management*, 19(4), 413-436. <https://doi.org/10.1108/JFM-12-2020-0099>
- [3] Neumeyer, X., Santos, S. C., & Morris, M. H. (2021). Overcoming barriers to technology adoption when fostering entrepreneurship among the poor: The role of technology and digital literacy. *IEEE Transactions on Engineering Management*, 68(6), 1605-1618. <https://doi.org/10.1109/TEM.2020.2989740>
- [4] Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly: Management Information Systems*, 13(3), 319-339. <https://doi.org/10.2307/249008>
- [5] Ndubisi, N. O., & Agarwal, J. (2014). Quality performance of SMEs in a developing economy: Direct and indirect effects of service innovation and entrepreneurial orientation. *Journal of Business and Industrial Marketing*, 29(6), 454-468. <https://doi.org/10.1108/JBIM-07-2013-0146>
- [6] Jöreskog, K. G. (1970). A general method for analysis of covariance structures. *Biometrika*, 57(2), 239-251. <https://doi.org/10.1093/biomet/57.2.239>
- [7] Korcsmáros, E., & Csinger, B. (2022). Sustainable Competitiveness in the Case of SMEs—Opportunities Provided by Social Media in an International Comparison. *Sustainability (Switzerland)*, 14(19), 12505. <https://doi.org/10.3390/su141912505>
- [8] Pollák, F., & Markovič, P. (2021). Economic activity as a determinant for customer adoption of social media marketing. *Sustainability (Switzerland)*, 13(7), 3999. <https://doi.org/10.3390/su13073999>
- [9] Barnes, S. J., & Mattsson, J. (2017). Understanding collaborative consumption: Test of a theoretical model. *Technological Forecasting and Social Change*, 118, 281-292. <https://doi.org/10.1016/j.techfore.2017.02.029>
- [10] Venkatesh, V., & Davis, F. D. (2000). Theoretical extension of the Technology Acceptance Model: Four longitudinal field studies. *Management Science*, 46(2), 186-204. <https://doi.org/10.1287/mnsc.46.2.186.11926>
- [11] Böhme, R., Christin, N., Edelman, B., & Moore, T. (2015). Bitcoin: Economics, technology, and governance. *Journal of Economic Perspectives*, 29(2), 213-238. <https://doi.org/10.1257/jep.29.2.213>
- [12] Alshatter, Z., & Al Mubarak, M. (2024). From Green Tech to Digital Tech: Leveraging Digital Solutions for Sustainable Development (SD) in B2B Markets. In S. Seifi & D. Crowther (Eds.), (Vol. Part F3444, pp. 151-171). Springer. [https://doi.org/10.1007/978-981-97-4742-9\\_7](https://doi.org/10.1007/978-981-97-4742-9_7)
- [13] Raihan, A. (2024). A review of the potential opportunities and challenges of the digital economy for sustainability. *Innovation and Green Development*, 3(4), 100174. <https://doi.org/10.1016/j.igd.2024.100174>

- [14] Chairaksa, N., & Pankham, S. (2023). Modern Entrepreneur for the Success of Online Businesses for Small and Medium Enterprise in Thailand. *TEM Journal*, 12(2), 956-966. <https://doi.org/10.18421/TEM122-42>
- [15] Karahanna, E., & Straub, D. W. (1999). The psychological origins of perceived usefulness and ease-of-use. *Information and Management*, 35(4), 237-250. [https://doi.org/10.1016/S0378-7206\(98\)00096-2](https://doi.org/10.1016/S0378-7206(98)00096-2)
- [16] Ahmad, S. Z., Abu Bakar, A. R., & Ahmad, N. (2019). Social media adoption and its impact on firm performance: the case of the UAE. *International Journal of Entrepreneurial Behaviour and Research*, 25(1), 84-111. <https://doi.org/10.1108/IJEBr-08-2017-0299>
- [17] Narwane, V. S., Raut, R. D., Gardas, B. B., Narkhede, B. E., & Awasthi, A. (2022). Examining smart manufacturing challenges in the context of micro, small and medium enterprises. *International Journal of Computer Integrated Manufacturing*, 35(12), 1395-1412. <https://doi.org/10.1080/0951192X.2022.2078508>
- [18] Adams, D. A., Nelson, R. R., & Todd, P. A. (1992). Perceived usefulness, ease of use, and usage of information technology: A replication. *MIS Quarterly: Management Information Systems*, 16(2), 227-247. <https://doi.org/10.2307/249577>
- [19] Saadé, R. G. (2007). Dimensions of Perceived Usefulness: Toward Enhanced Assessment. *Decision Sciences Journal of Innovative Education*, 5(2), 289-310. <https://doi.org/10.1111/j.1540-4609.2007.00142.x>
- [20] Capuano, N., Gaeta, M., Ritrovato, P., & Salerno, S. (2008). How to integrate technology-enhanced learning with business process management. *Journal of Knowledge Management*, 12(6), 56-71. <https://doi.org/10.1108/13673270810913621>
- [21] Rattanapongpinyo, T. (2016). Business Performance Success by Local Thai Firms Applying Innovation Management and Social Media. *Journal Humanities and Social Sciences*, 36(3), 113-125. <https://so06.tci-thaijo.org/index.php/utccjournalhs/article/view/187808>
- [22] Ramdani, B., Kawalek, P., & Lorenzo, O. (2009). Predicting SMEs' adoption of enterprise systems. *Journal of Enterprise Information Management*, 22(1/2), 10-24. <https://doi.org/10.1108/17410390910922796>
- [23] Ramiller, N. C. (1994). Perceived compatibility of information technology innovations among secondary adopters: Toward a reassessment. *Journal of Engineering and Technology Management*, 11(1), 1-23. [https://doi.org/10.1016/0923-4748\(94\)90022-1](https://doi.org/10.1016/0923-4748(94)90022-1)
- [24] Chau, P. Y. K. (1996). An Empirical Assessment of a Modified Technology Acceptance Model. *Journal of Management Information Systems*, 13(2), 185-204. <https://doi.org/10.1080/07421222.1996.11518128>
- [25] Hernandez, B., Jimenez, J., & Martin, M. J. (2008). Business acceptance of information technology: Expanding TAM using industry sector and technological compatibility. *International Journal of Enterprise Information Systems*, 4(4), 62-79. <https://doi.org/10.4018/jeis.2008100105>
- [26] Chen, Y. C., Lin, Y. H., & Tsai, H. T. (2020). Toward Greater Understanding of the Relationship Between Entrepreneurial Orientation and International Performance. *Management International Review*, 60(2), 211-245. <https://doi.org/10.1007/s11575-020-00414-x>
- [27] Ardito, L., Raby, S., Albino, V., & Bertoldi, B. (2021). The duality of digital and environmental orientations in the context of SMEs: Implications for innovation performance. *Journal of Business Research*, 123, 44-56. <https://doi.org/10.1016/j.ibusres.2020.09.022>
- [28] Rodríguez-Gutiérrez, M. J., Moreno, P., & Tejada, P. (2015). Entrepreneurial orientation and performance of SMEs in the services industry. *Journal of Organizational Change Management*, 28(2), 194-212. <https://doi.org/10.1108/JOCM-01-2015-0020>



- [29] Canhoto, A. I., Quinton, S., Pera, R., Molinillo, S., & Simkin, L. (2021). Digital strategy aligning in SMEs: A dynamic capabilities perspective. *Journal of Strategic Information Systems*, 30(3), 101682. <https://doi.org/10.1016/j.jsis.2021.101682>
- [30] Borah, P. S., Iqbal, S., & Akhtar, S. (2022). Linking social media usage and SME's sustainable performance: The role of digital leadership and innovation capabilities. *Technology in Society*, 68, 101900. <https://doi.org/10.1016/j.techsoc.2022.101900>
- [31] Ghobakhloo, M., & Ching, N. T. (2019). Adoption of digital technologies of smart manufacturing in SMEs. *Journal of Industrial Information Integration*, 16, 100107. <https://doi.org/10.1016/j.jii.2019.100107>
- [32] Cheng, C. C. J., & Shiu, E. C. (2019). How to enhance SMEs customer involvement using social media: The role of Social CRM. *International Small Business Journal: Researching Entrepreneurship*, 37(1), 22-42. <https://doi.org/10.1177/0266242618774831>
- [33] Eggers, F., Hatak, I., Kraus, S., & Niemand, T. (2017). Technologies That Support Marketing and Market Development in SMEs—Evidence from Social Networks. *Journal of Small Business Management*, 55(2), 270-302. <https://doi.org/10.1111/jsbm.12313>
- [34] Alarcón-del-Amo, M. d. C., Rialp-Criado, A., & Rialp-Criado, J. (2018). Examining the impact of managerial involvement with social media on exporting firm performance. *International Business Review*, 27(2), 355-366. <https://doi.org/10.1016/j.ibusrev.2017.09.003>
- [35] Blonska, A., Storey, C., Rozemeijer, F., Wetzels, M., & de Ruyter, K. (2013). Decomposing the effect of supplier development on relationship benefits: The role of relational capital. *Industrial Marketing Management*, 42(8), 1295-1306. <https://doi.org/10.1016/j.indmarman.2013.06.007>
- [36] Thong, J. Y. L. (1999). An integrated model of information systems adoption in small businesses. *Journal of Management Information Systems*, 15(4), 187-214. <https://doi.org/10.1080/07421222.1999.11518227>
- [37] Sukoco, B. M., Hardi, H., & Qomariyah, A. (2018). Social capital, relational learning, and performance of suppliers. *Asia Pacific Journal of Marketing and Logistics*, 30(2), 417-437. <https://doi.org/10.1108/APJML-02-2017-0022>
- [38] Du, X., Wang, N., Lu, S., Zhang, A., & Tsai, S.-B. (2024). Sustainable competitive advantage under digital transformation: an eco-strategy perspective. *Chinese Management Studies*, ahead-of-print(ahead-of-print). <https://doi.org/10.1108/CMS-01-2024-0077>
- [39] Fernandes, C., Pires, R., & Gaspar Alves, M. C. (2023). Digital Entrepreneurship and Sustainability: The State of the Art and Research Agenda. *Economies*, 11(1), 3-3. <https://doi.org/10.3390/economies11010003>
- [40] George, G., Merrill, R. K., & Schillebeeckx, S. J. D. (2021). Digital Sustainability and Entrepreneurship: How Digital Innovations Are Helping Tackle Climate Change and Sustainable Development. *Entrepreneurship: Theory and Practice*, 45(5), 999-1027. <https://doi.org/10.1177/1042258719899425>
- [41] Holzmann, P., & Gregori, P. (2023). The promise of digital technologies for sustainable entrepreneurship: A systematic literature review and research agenda. *International Journal of Information Management*, 68, 102593. <https://doi.org/10.1016/j.ijinfomgt.2022.102593>
- [42] Nilplengsang, Y., & Pankham, S. (2023). STP Plus C Strategy Superior Marketing Strategies for Online Service Businesses. *Kurdish Studies*, 11(2), 5272-5285. <https://kurdishstudies.net/menu-script/index.php/KS/article/view/1087>
- [43] Shook, C. L., Ketchen, D. J., Hult, G. T. M., & Kacmar, K. M. (2004). An assessment of the use of structural equation modeling in strategic management research. *Strategic Management Journal*, 25(4), 397-404. <https://doi.org/10.1002/smj.385>

- 
- [44] Chinsiraprapa, A., & Silpcharu, T. (2020). A structure equation model of strategic management for driving country economy of provincial chamber of commerce. *Applied Science and Engineering Progress*, 13(3), 195-201. <https://doi.org/10.14416/j.ijast.2019.01.005>
  - [45] Ritala, P., Baiyere, A., Hughes, M., & Kraus, S. (2021). Digital strategy implementation: The role of individual entrepreneurial orientation and relational capital. *Technological Forecasting and Social Change*, 171, 120961. <https://doi.org/10.1016/j.techfore.2021.120961>
  - [46] Sreenivasan, A., & Suresh, M. (2023). Factors influencing sustainability in start-ups operations 4.0. *Sustainable Operations and Computers*, 4, 105-118. <https://doi.org/10.1016/j.susoc.2023.03.002>
  - [47] Mulaik, S. A., James, L. R., Van Alstine, J., Bennett, N., Lind, S., & Stilwell, C. D. (1989). Evaluation of Goodness-of-Fit Indices for Structural Equation Models. *Psychological Bulletin*, 105(3), 430-445. <https://doi.org/10.1037/0033-2909.105.3.430>
  - [48] Amoako-Gyampah, K., & Salam, A. F. (2004). An extension of the technology acceptance model in an ERP implementation environment. *Information and Management*, 41(6), 731-745. <https://doi.org/10.1016/j.im.2003.08.010>
  - [49] Anim, P. A., Arthur, E., & Amoako, G. K. (2023). Entrepreneurial orientation, social media and SME performance: an emerging economy perspective. *Asia-Pacific Journal of Business Administration*, 16(5), 1037-1066. <https://doi.org/10.1108/APJBA-12-2022-0514>
  - [50] Chen, Y. S., Lin, M. J. J., & Chang, C. H. (2009). The positive effects of relationship learning and absorptive capacity on innovation performance and competitive advantage in industrial markets. *Industrial Marketing Management*, 38(2), 152-158. <https://doi.org/10.1016/j.indmarman.2008.12.003>
  - [51] Ali, M., Seny Kan, K. A., & Sarstedt, M. (2016). Direct and configurational paths of absorptive capacity and organizational innovation to successful organizational performance. *Journal of Business Research*, 69(11), 5317-5323. <https://doi.org/10.1016/j.jbusres.2016.04.131>
  - [52] Yuen, K. F., Wong, Y. D., Ma, F., & Wang, X. (2020). The determinants of public acceptance of autonomous vehicles: An innovation diffusion perspective. *Journal of Cleaner Production*, 270, 121904. <https://doi.org/10.1016/j.jclepro.2020.121904>
  - [53] Taeratanachai, C., Wonglorsaichon, P., & Agmapisarn, C. (2024). Relationship Quality As a Mediator of the Effects of Social Commerce on Purchase Intentions. *ABAC Journal*, 44(2), 94-122. <https://doi.org/10.59865/ABACJ.2024.20>