SCIENTIFIC OASIS

Decision Making: Applications in Management and Engineering

Journal homepage: www.dmame-journal.org
ISSN: 2560-6018, eISSN: 2620-0104

Operational Research-Driven Social Media Strategies for Sustainable SMEs Growth in Thailand's Technology Sector

David Kiatsangsilp[1], Sumaman Pankham[2*]

1 College of Digital Innovation Technology, Rangsit University, Pathum Thani, Thailand. Email: david.k66@rsu.ac.th ORCID: https://orcid.org/009-003-5965-9280
2 College of Digital Innovation Technology, Rangsit University, Pathum Thani, Thailand. ORCID: https://orcid.org/0009-0002-6821-7049

ARTICLE INFO

Article history:
Received 5 September 2025
Received in revised form 19 May 2025
Accepted 7 June 2025
Available online 29 June 2025

Keywords:
SMEs Sustainable Growth, Operational Research, Decision-Making, Fuzzy Delphi, Social Media Usage, Structural Equation Modelling, Computer Technology

ABSTRACT

Small and medium-sized enterprises (SMEs) operating within the computer technology sector constitute a significant contributor to Thailand's digital economic advancement. This study employs the principles of operational research to both construct and validate a Structural Equation Model (SEM), with the objective of identifying sustainable growth trajectories for technology-based SMEs in the country. Expert consensus was gathered from a panel of 20 professionals representing academia, entrepreneurial practice, and public policy. A mixed-methods research design was adopted, wherein the qualitative phase utilised the e-Fuzzy Delphi method. For the quantitative phase, SEM was applied to data obtained through a structured online survey completed by 848 SMEs entrepreneurs. The resulting model integrates existing empirical findings across behavioural and technological domains. It focuses on how factors such as social media use, service quality, perceived behavioural control, and attitude, along with the influence of subjective norms, contribute to predicting user satisfaction, usage intentions, actual usage behaviour, and ultimately, sustainable enterprise growth. Findings highlight the pivotal influence of social expectations in shaping both the intention to use and the corresponding user behaviour, which are essential to achieving sustained development. This research exemplifies the synergy between operational research methodologies and strategic decision-making processes within a data-informed modelling framework. It further identifies key behavioural drivers that provide policymakers with practical recommendations for advancing digital sustainability in Thailand's SMEs landscape.

1. Introduction

The expansion of emerging digital economies, such as that of Thailand, is significantly driven by SMEs [13; 34]. SMEs in the computer technology sector have gained prominence through their contributions to enhancing digital competitiveness, fostering technological innovation, and generating employment opportunities, all of which have been amplified by the ongoing digital transformation [4]. The national emphasis on the Thailand 4.0 digital strategy has resulted in SMEs

* *Corresponding author.*
E-mail address: sumaman.p@rsu.ac.th

https://doi.org/10.31181/dmame8120251434

placing considerable reliance on social media platforms, although sustained digital capability remains a critical area of focus [28]. These digital platforms facilitate customer engagement, brand development, and interactive communication at relatively low operational costs. Empirical investigations, including those by Sivalingam and Lawrence [29], have demonstrated that the use of digital platforms functions as a strategic enabler, contributing to customer satisfaction, reinforcing brand trust, and influencing user behaviour. However, the relationship between digital platform utilisation and the long-term sustainable growth of SMEs within Thailand's computer technology sector remains underexplored. Existing research has primarily centred on short-term marketing outcomes and social media engagement patterns, without addressing the broader strategic value of these platforms in promoting sustainable business objectives [26].

Previous studies have predominantly employed either quantitative or qualitative methodologies in isolation, thereby limiting the richness and contextual insight of their findings. The present research addresses this limitation by adopting a mixed-methods approach. The Fuzzy Delphi Method is utilised to construct the model through expert consensus, while SEM serves to empirically validate the model in the quantitative phase. This methodological integration allows for a comprehensive examination of both behavioural and technological constructs, including social media utilisation, service quality, attitudes, perceived self-efficacy, social expectations, satisfaction, intention to use, and usage behaviour, which collectively influence sustainable growth in digitally-oriented SMEs [10]. As dependence on digital networks intensifies, the strategic significance of SMEs in the computer technology sector has grown, making research on social media increasingly pertinent [20].

This study contributes both theoretically and practically by validating a contextualised model that elucidates the interrelationships among these factors within the Thai digital economy. Consequently, the research seeks to identify and confirm the key behavioural and technological drivers that connect social media engagement with the sustainable development of SMEs in Thailand's computer technology industry. The findings aim to equip entrepreneurs, digital strategists, and government policymakers with actionable insights for enhancing the digital sustainability and resilience of SMEs in the current competitive digital environment.

2. Literature Review

2.1 Fuzzy Delphi Method (FDM)

The FDM refines the traditional Delphi approach by integrating Fuzzy logic, thereby reducing ambiguity in expert opinions and improving the precision of consensus measurement [33]. Through the application of triangular Fuzzy numbers, the method facilitates the evaluation of expert agreement in research contexts characterised by uncertainty and subjectivity [32]. Within the analysis of SMEs, FDM functions as both an identification and validation mechanism, combining expert insights with quantitative computational techniques. This integration enables the effective alignment of qualitative expertise with quantitative modelling frameworks.

2.2 Theoretical Background: Theory of Planned Behaviour (TPB)

According to Ajzen [3], intention is primarily influenced by three constructs: attitude, subjective norms, and perceived behavioural control. These elements reflect an individual's evaluation of the behaviour, the perceived social pressures, and the perceived ease or difficulty of executing the behaviour. The TPB offers a valuable framework for understanding digital behavioural intentions among employees and enterprises utilising social media and digital marketing technologies. This study adopts TPB to investigate how behavioural factors—specifically intention and actual technology adoption—contribute to the sustainable development of SMEs. To more accurately capture the

digital practices of SMEs leaders, the proposed model incorporates additional dimensions, namely satisfaction and service quality.

2.3 Research Constructs and Hypotheses

This section outlines the principal constructs comprising the conceptual model and formulates hypotheses grounded in prior empirical studies and relevant theoretical frameworks.

2.3.1 Social Media Usage (SMU)

Alkhasoneh et al. [7] define SMU as the manner in which SMEs engage with digital platforms—such as Facebook, LinkedIn, and Instagram—to communicate with customers, promote their offerings, and support interactive, bidirectional customer service. Prior studies have indicated that the effective utilisation of social media can enhance perceived service quality, increase customer satisfaction, influence user attitudes [23; 25], and strengthen perceived behavioural control and subjective norms by fostering a sense of interactivity. Based on these insights, the following hypothesis is proposed:

H1: Social Media engagement effectively influences Service Quality.
H2: Social Media engagement effectively influences Satisfaction.
H3: Social Media engagement effectively influences Attitude.
H4: Social Media engagement effectively influences Perceived Behavioural Control.
H5: Social Media engagement effectively influences Subjective Norms.

2.3.2 Service Quality (SQ)

Service quality is conceptualised as customers' perceptions regarding the reliability, responsiveness, and overall effectiveness of services provided via digital platforms [31]. Empirical evidence has demonstrated a positive association between high service quality and enhanced customer satisfaction [5]. Accordingly, the following hypothesis is proposed:

H6: Service Quality effectively influences Satisfaction.

2.3.3 Attitude (ATT)

Attitude refers to an individual's favourable or unfavourable evaluation of engaging with social media-based services. Within the TPB framework, attitude is regarded as a fundamental predictor of behavioural intention [3]. Positive attitudes towards technology use are known to enhance the likelihood of intention to adopt it [2; 18; 22; 30]. Therefore, the following hypothesis is formulated:

H7: Attitude effectively influences Intention to Use.

2.3.4 Perceived Behavioural Control (PBC)

PBC denotes an individual's confidence in their ability to effectively adopt and utilise social media technologies [19]. This construct encompasses both self-efficacy and external barriers. Within SMEs, PBC has been shown to be a significant predictor of both the intention to use and the actual adoption of such technologies [14]. Consequently, the following hypothesis is advanced:

H8: Perceived Behavioural Control effectively influences Intention to Use.

2.3.5 Subjective Norms (SN)

Subjective norms refer to the perceived social pressure to engage in or refrain from a particular behaviour, typically shaped by peers, customers, and prevailing industry standards. Within digitally oriented SMEs, these norms can encourage both owners and employees to embrace new technologies [18; 19]. Accordingly, the following hypothesis is proposed:

H9: Subjective Norms effectively influences Intention to Use.

2.3.6 Satisfaction (SAT)

This construct relates to favourable service experiences that generate emotional responses, commonly referred to as satisfaction. Satisfaction acts as a mediator of service quality and plays a key role in fostering customer loyalty and the intention to continue engaging with the service. Therefore, the following hypothesis is advanced:

H10: Satisfaction effectively influences Intention to Use.

H11: Satisfaction effectively influences Use Behaviour.

2.3.7 Intention to Use (ITU)

Intention to use denotes the motivational preparedness of an SMEs to participate in social media activities. Within the TPB framework, it serves as a direct antecedent of actual usage behaviour and is influenced by attitude, subjective norms, and perceived behavioural control [8; 9]. Accordingly, the following hypothesis is proposed:

H12: Intention to Use effectively influences Use Behaviour.

2.3.8 Use Behaviour (UB)

Use behaviour refers to the actual application of digital tools in routine business activities. Regular utilisation of these technologies enhances operational efficiency, market presence, and innovation capacity. Empirical research has established that use behaviour has a direct positive impact on organisational performance [12; 21]. Therefore, the following hypothesis is proposed:

H13: Use Behaviour effectively influences SMEs Sustainable Growth.

2.3.9 SMEs Sustainable Growth (SG)

Sustainable growth of SMEs denotes the ongoing advancement of small and medium-sized enterprises across critical indicators including sales revenue, net profit, expansion of the customer base, market share, and diversification of products or services. This growth signifies the enterprise's capacity to adapt successfully within evolving digital environments [27].

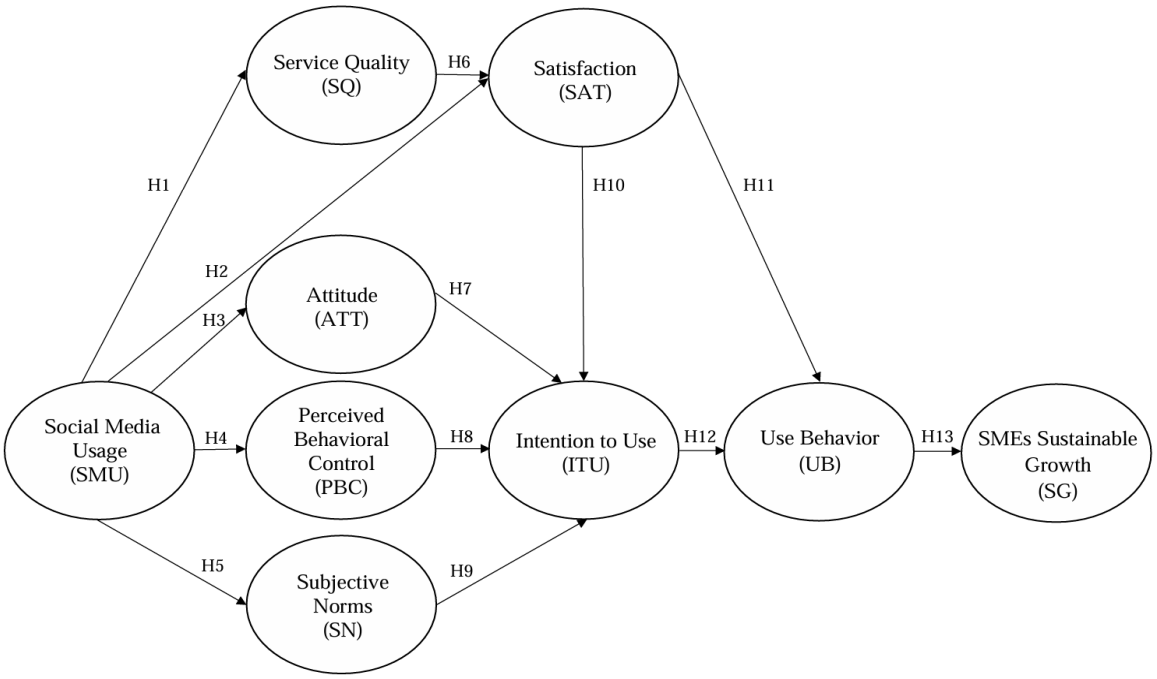

Fig.1: The Conceptual Model

3. Methodology

The primary aim of this study was to develop and validate a SEM designed to elucidate the sustainable growth of SMEs within Thailand's computer technology sector (see Figure 1). The research approach combines qualitative and quantitative phases to ensure both theoretical comprehensiveness and empirical robustness. Ethical approval for the study was granted voluntarily by the Ethics Review Board of Rangsit University and is formally recorded under COA No. RSUERB2024-106, confirming that the research complies with established ethical guidelines for human subject research.

3.1 Qualitative Research

A qualitative research inquiry utilising the Fuzzy Delphi Method was undertaken to secure expert consensus on key behavioural and technological factors contributing to the sustainable development of SMEs within Thailand's computer technology sector. This process followed a systematic four-stage procedure, as illustrated in Figure 2.

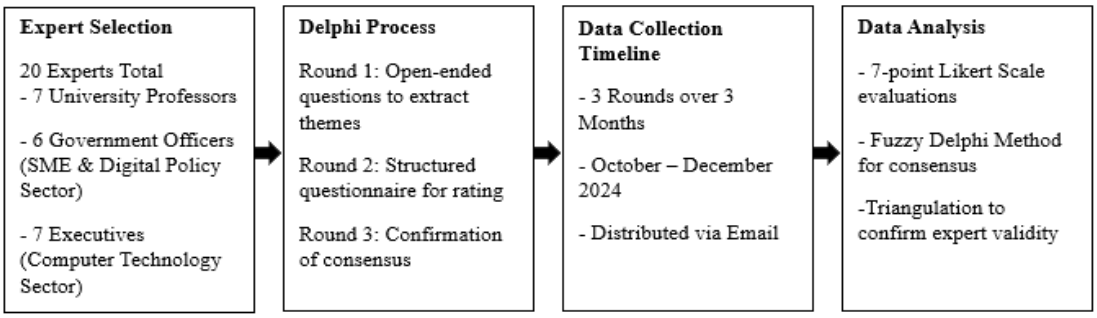

Figure 2: Qualitative Research Framework Using Fuzzy Delphi Method

3.1.1 Population and Sampling

The study involved a panel of 20 experts selected via purposive sampling, categorised into three distinct groups. Group 1 included seven academic staff members specialising in business administration, marketing, social media, or computer technology, each possessing a minimum of three years' experience in academia. Group 2 comprised six government officials or public sector executives with comprehensive knowledge and at least three years of experience related to SMEs, marketing, social media, or digital policy. Group 3 consisted of seven entrepreneurs or senior managers from private sector firms focusing on computer technology, all with no less than three years of managerial and business operational experience.

3.1.2 Research Instruments

Data for questions 2 and 3 were gathered through an online questionnaire conducted over three successive rounds. In the initial round, an open-ended question was posed to elicit expert opinions and insights on key constructs, with responses collected via Google Forms. The second round utilised a structured questionnaire developed from themes identified in Round 1, employing a seven-point Likert scale (1 = inappropriate to 7 = appropriate) for experts to systematically assess the relevance of each item. The third round involved redistributing the same questionnaire format, supplemented by visual feedback to facilitate expert reflection. Specifically, for each item, the frequency distribution of all experts' responses on the seven-point scale was displayed, with 1 representing the lowest and 7 the highest appropriateness rating. Each expert's previous rating was indicated on the histogram, enabling comparison against the overall group's distribution. This visual feedback process enhanced transparency within the consensus-building exercise and encouraged experts to re-evaluate their assessments in light of their peers' opinions, thereby improving the reliability and validity of the final

agreement.

3.1.3 Data Collection

Data collection for this study was conducted over a three-month period from October to December 2024, utilising online questionnaires distributed by email. The Delphi process involved three rounds, enabling the progressive refinement of expert opinions and systematic establishment of consensus.

3.1.4 Data Analysis

During the qualitative phase, expert evaluations were analysed employing the Fuzzy Delphi Method, which incorporates Fuzzy set theory to address uncertainty and vagueness in expert judgments. Responses recorded on a seven-point Likert scale were converted into Triangular Fuzzy Numbers (TFNs) to quantify the level of consensus. The specific values utilised for converting the linguistic scale into Fuzzy numbers are detailed in Table 1. Following the transformation of data, the Fuzzy Arithmetic Mean was computed for each item by aggregating the TFN values provided by all experts. Subsequently, a defuzzification process was conducted to convert the Fuzzy mean values into crisp scores to facilitate decision-making. This procedure applied a cut-off threshold of 0.83, as proposed by [11]. Values exceeding this threshold were retained, while those below it were excluded from the model. This approach enhanced the accuracy and objectivity of the expert consensus and supported the development of a robust, empirically validated conceptual model for the sustainable growth of SMEs within the PC technology sector.

Table 1
Triangular Fuzzy Number (TFN) Scale for 7-Point Likert Responses

Likert Scale Point	TFN Value (l, m, u)
1 = Least Appropriate	(0.00, 0.00, 0.17)
2 = Slightly Appropriate	(0.00, 0.17, 0.33)
3 = Moderately Inappropriate	(0.17, 0.33, 0.50)
4 = Neutral	(0.33, 0.50, 0.67)
5 = Moderately Appropriate	(0.50, 0.67, 0.83)
6 = Very Appropriate	(0.67, 0.83, 1.00)
7 = Most Appropriate	(0.83, 1.00, 1.00)

3.2 Quantitative Research

Following the findings from the initial research phase, the structural model was validated through a quantitative research approach. The model comprises nine constructs and fifty indicators, which were transformed into a structured online questionnaire distributed to SMEs entrepreneurs within Thailand's computer technology sector. A total of 862 responses were collected, of which 848 were considered valid for further analysis. SEM was applied, employing established fit indices and criteria to evaluate construct validity and overall model fit. The process is outlined in Figure 3.

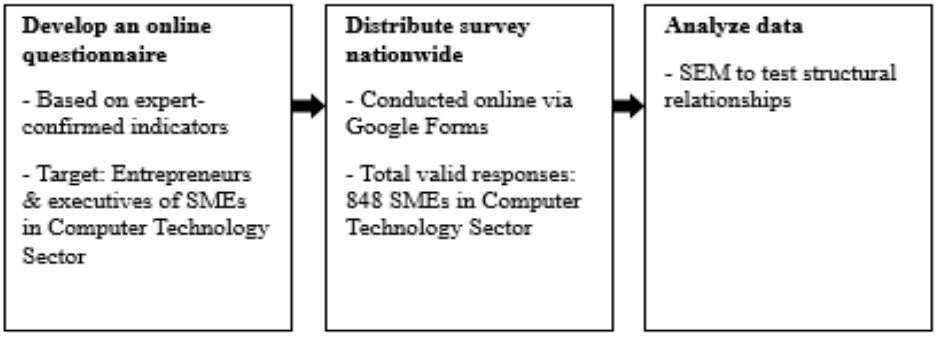

Figure 3: Quantitative Research Framework Using Structural Equation Modelling

3.2.1 Population and Sampling

The target population for this study comprised entrepreneurs managing SMEs within Thailand's computer technology sector. National statistics indicate that 857,511 SMEs were officially registered by the end of 2022. Participants were selected using a simple random sampling technique, focusing on those who had operated their businesses for more than three years. Following the structural equation modelling guidelines proposed by Hoelter [15], which advise a minimum of 10 to 20 samples per observed variable and no fewer than 200 cases to ensure model fit, and considering the study's 50 observed variables, a minimum sample size of 500 was deemed necessary. Ultimately, 848 valid responses were obtained and utilised for analysis.

3.2.2 Research Instruments

Drawing on findings from the qualitative phase utilising the Fuzzy Delphi Method, the questionnaire for this study was developed grounded in theoretical frameworks, existing literature, and the consensus of experts achieved through collaborative processes. The instrument was designed to assess constructs related to the sustained development of SMEs within the computer technology sector. The questionnaire was divided into three parts: an eligibility screening question, demographic information, and scale items corresponding to the latent variables in the conceptual model. The initial section featured a screening question to verify that respondents were owners or executives of SMEs in the computer technology sector that had been operational for over three years. The second section gathered demographic data, including gender, age, educational qualifications, business type, annual revenue, and number of employees. The third section comprised nine constructs containing fifty items: SMU, SQ, ATT, PBC, SN, SAT, ITU, UB, and SMEs SG. Each item was rated on a seven-point Likert scale ranging from 1 (Strongly Disagree) to 7 (Strongly Agree), allowing respondents to indicate agreement or disagreement with each statement, thereby providing extensive variability in responses. This structured questionnaire proved to be an effective tool for collecting high-quality quantitative data aligned with the research framework.

3.2.3 Data Collection

Data were collected via an online questionnaire distributed to entrepreneurs and executives of SMEs utilising computer devices in Thailand. The primary eligibility criterion required participants to have managed their businesses for a minimum of three years. Between January and February 2025, a total of 862 responses were received. Following data cleaning and validation, 848 responses were retained for subsequent analysis. The demographic profile of respondents is detailed in Table 2. Among the 848 participants, 47.2% identified as male, 46.9% as female, and 5.9% as other genders. The largest age group was 31 to 40 years (44.9%), followed by those aged 41 to 50 years (29.1%), and over 51 years (15%). Concerning marital status, 55.7% were single, 41.7% married, and 2.6% divorced or separated. Educational attainment revealed that 44.2% held bachelor's degrees, 38% master's degrees, and 15.7% doctoral qualifications. Geographically, 65% of respondents resided in the central region, 16% in the northern region, and 6.8% in the eastern region. Regarding roles within the business, 70.4% were owners, 18.2% shareholders, and 11.4% held managerial positions. The majority of enterprises (65.8%) operated in the trade sector, with 34.2% in the service sector. Annual revenues varied, with 34.1% of firms reporting earnings between 51 and 100 million baht, and 37.4% between 100 and 200 million baht. In terms of workforce size, 48.8% employed 6 to 50 staff, 32.3% between 51 and 100 employees, and 11.7% between 101 and 200 employees. This comprehensive dataset facilitated the use of SEM, ensuring statistical reliability and enabling valid, generalisable conclusions regarding the development of SMEs within Thailand's digital economy.

Table 2
Demographic Characteristics of Respondents

Characteristics		Frequency	Percentage (%)
Gender	Male	400	47.20
	Female	398	46.90
	Other	50	5.90
Age (in years)	18 - 30	93	11.00
	31 - 40	381	44.90
	41 - 50	247	29.10
	51+	127	15.00
Marital Status	Single	472	55.70
	Married	354	41.70
	Divorced/Separated	22	2.60
Education	Below Bachelor's	18	2.10
	Bachelor's	375	44.20
	Master's	322	38.00
	Doctorate	133	15.70
Region	Central	551	65.00
	North	136	16.00
	East	58	6.80
	Northeast	42	5.00
	West	29	3.40
	South	32	3.80
Position in Business	Owner	597	70.40
	Shareholder	154	18.20
	Manager	97	11.40
Business Type	Service	290	34.20
	Trade	558	65.80
Annual Revenue	< 50M THB	157	18.50
	51 - 100M THB	289	34.10
	100 - 200M THB	317	37.40
	> 200M THB	85	10.00
Number of Employees	≤ 5	61	7.20
	6 - 50	414	48.80
	51 - 100	274	32.30
	101 - 200	99	11.70

3.2.4 Analysis of Data

This study employed both descriptive and inferential statistical techniques to analyse the data, facilitating the evaluation of the SEM and the testing of the proposed hypotheses. Demographic variables were summarised using descriptive statistics, including frequency, percentage, mean, standard deviation, skewness, and kurtosis, to examine the normality of the observed variables. To satisfy the assumption of univariate normality, absolute values of kurtosis and skewness were required to remain within ±3.00. Inferential analysis of the relationships among latent constructs was conducted using SEM. The reliability and validity of the measurement model were verified through regression analysis employing CFA. Model validity was evaluated based on established fit indices, including CMIN/df ≤ 3, GFI, AGFI, CFI, and TLI ≥ 0.90, alongside RMSEA and RMR values below 0.08 [16].

4. Results

4.1 Expert Consensus

To develop the structural model, expert consensus was obtained via the Electronic Fuzzy Delphi Method (e-FDM). Twenty experts—seven university professors, six government officers (SME and digital policy sectors), and seven computer technology executives—rated 50 indicators across nine constructs using a 7-point Likert scale. Responses were converted into TFN (Figure 4).

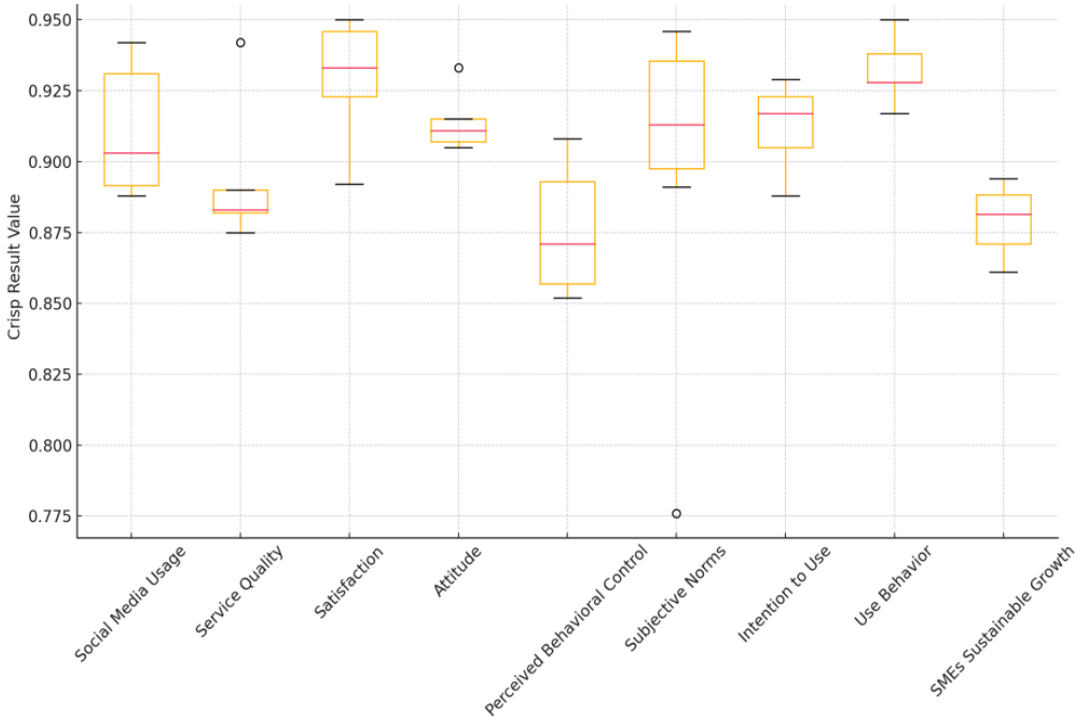

Fig.4: Illustrates the Fuzzy Delphi Method Expert Consensus Results

Indicators with Crisp values above 0.83 were retained; all 50 met this threshold and were included in the next phase (Table 3). Moreover, rhe results of the FDM among experts are illustrated in Figure 4, covering dimensions such as SMU, SQ, SAT, ATT, PBC, SN, ITU, UB, and SG. Each construct comprises several indicators, with a crisp score of 1 indicating full agreement among experts. Notably, three constructs—SAT, UB, and SQ—exhibited higher median scores, reflecting stronger consensus regarding their significance. Overall, the figure demonstrates consistently high expert agreement across all factors, highlighting their perceived importance within the study.

Table 3
Expert Consensus Results Based on Fuzzy Delphi Method

Social Media Usage	Crisp	Result	Attitude	Crisp	Result	Intention to Use	Crisp	Result
SMU1	0.903	Agreed	ATT1	0.933	Agreed	ITU1	0.917	Agreed
SMU2	0.942	Agreed	ATT2	0.915	Agreed	ITU2	0.929	Agreed
SMU3	0.888	Agreed	ATT3	0.911	Agreed	ITU3	0.888	Agreed
SMU4	0.888	Agreed	ATT4	0.907	Agreed	ITU4	0.905	Agreed
SMU5	0.929	Agreed	ATT5	0.905	Agreed	ITU5	0.923	Agreed
SMU6	0.933	Agreed	Perceived Behavioural Control	Crisp	Result	Use Behaviour	Crisp	Result
SMU7	0.895	Agreed	PBC1	0.908	Agreed	UB1	0.917	Agreed
Service Quality	Crisp	Result	PBC2	0.871	Agreed	UB2	0.928	Agreed
SQ1	0.890	Agreed	PBC3	0.852	Agreed	UB3	0.938	Agreed
SQ2	0.882	Agreed	PBC4	0.857	Agreed	UB4	0.928	Agreed
SQ3	0.942	Agreed	PBC5	0.893	Agreed	UB5	0.950	Agreed
SQ4	0.883	Agreed	Subjective Norms	Crisp	Result	SMEs Sustainable Growth	Crisp	Result
SQ5	0.875	Agreed	SN1	0.776	Agreed	SG1	0.890	Agreed
Satisfaction	Crisp	Result	SN2	0.913	Agreed	SG2	0.868	Agreed
SAT1	0.933	Agreed	SN3	0.925	Agreed	SG3	0.861	Agreed
SAT2	0.923	Agreed	SN4	0.904	Agreed	SG4	0.880	Agreed
SAT3	0.950	Agreed	SN5	0.891	Agreed	SG5	0.894	Agreed
SAT4	0.892	Agreed	SN6	0.946	Agreed	SG6	0.883	Agreed
SAT5	0.946	Agreed	SN7	0.946	Agreed			

4.2 Discriminant Validity and Descriptive Statistics of Constructs

Descriptive statistics and discriminant validity analysis were conducted to examine the constructs' distribution, relationships, and overall suitability for structural equation modeling (Figure 5). As shown in Table 4, the mean scores for all constructs ranged from 6.33 to 6.45, indicating strong agreement among respondents. Standard deviations were all below 0.60, reflecting low variability in responses. Skewness values ranged from –1.18 to –0.95, and kurtosis values from 2.78 to 2.96, all within the acceptable ±3.00 range, confirming univariate normality. These results support the appropriateness of the data for further SEM analysis. Discriminant validity was assessed using the Fornell-Larcker criterion. Diagonal values represent the Average Variance Extracted (AVE) square roots, while off-diagonal values show inter-construct correlations. The strongest correlation was found between ITU and UB (r = 0.787), and the weakest between SQ and UB (r = 0.526). Since each construct's AVE exceeds its squared correlations with other constructs, the model demonstrates acceptable discriminant validity and measurement quality.

Table 4
Discriminant Validity and Descriptive Statistics of Constructs

Constructs	Discriminant Validity									Mean	S.D.	Skewness	Kurtosis
	SQ	ATT	PBC	SAT	ITU	SMU	SN	SG	UB				
SQ	**0.757**									6.33	0.52	-1.03	2.88
ATT	0.717***	**0.769**								6.38	0.53	-1.01	2.84
PBC	0.674***	0.733***	**0.746**							6.37	0.52	-1.02	2.86
SAT	0.806***	0.803***	0.689***	**0.733**						6.36	0.50	-0.95	2.84
ITU	0.622***	0.712***	0.696***	0.678***	**0.720**					6.41	0.47	-0.97	2.81
SMU	0.664***	0.704***	0.695***	0.707***	0.708***	**0.715**				6.43	0.48	-1.18	2.96
SN	0.645***	0.771***	0.739***	0.682***	0.785***	0.672***	**0.762**			6.38	0.53	-1.08	2.92
SG	0.527***	0.556***	0.686***	0.566***	0.635***	0.695***	0.563***	**0.744**		6.45	0.47	-0.98	2.78
UB	0.526***	0.620***	0.720***	0.607***	0.787***	0.761***	0.643***	0.700***	**0.732**	6.42	0.47	-1.13	2.91

Figure 5 presents a bar graph displaying the descriptive statistics of several constructs, including SQ, ATT, PBC, SAT, ITU, SMU, SN, SG, and UB.

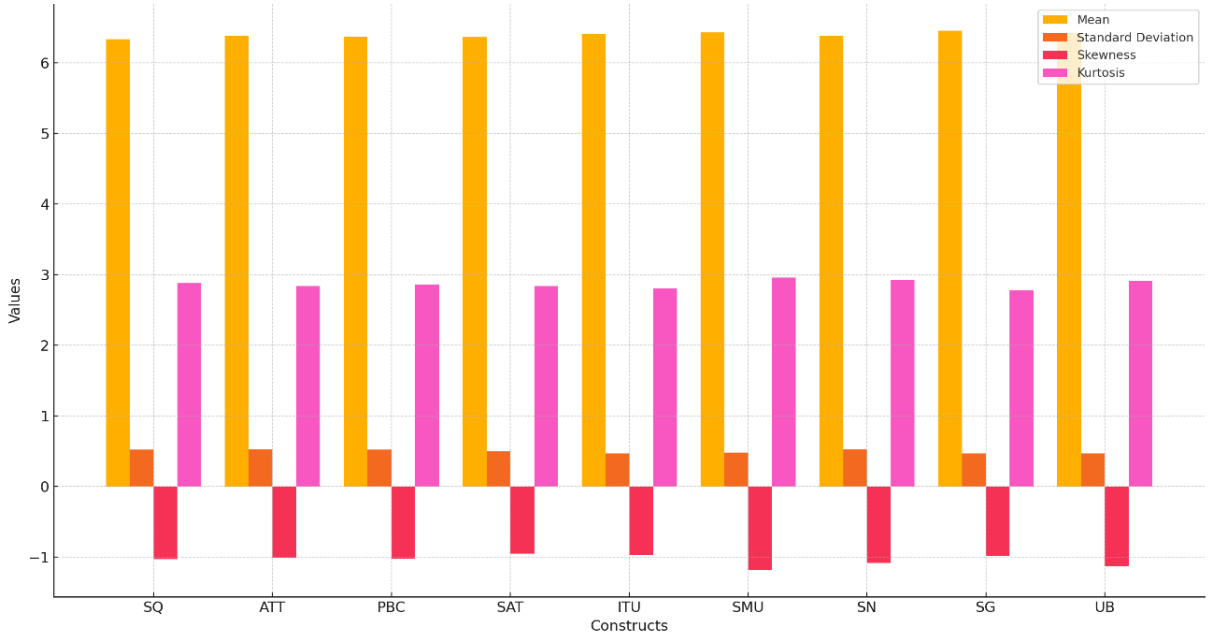

Fig.5: Descriptive Statistics of Constructs

Each construct is evaluated using four statistical measures: mean, standard deviation, skewness,

and kurtosis. The mean values for all constructs exceed 6.3, indicating generally strong positive perceptions among respondents. Standard deviations are low, reflecting limited variability in responses. Skewness values are consistently negative, indicating a left-skewed distribution with a greater concentration of higher ratings. Kurtosis values range between 2.8 and 2.9, suggesting a slightly leptokurtic distribution characterised by a sharper peak compared to a normal distribution. These consistent data distribution patterns across all constructs support the reliability of expert evaluations and the uniformity of data distribution in this study.

4.3 Hypothesis Testing

The structural model was assessed using SEM with advanced statistical software. The results demonstrated an excellent fit, with all fit indices meeting the acceptable criteria [16]. The path analysis results are summarised in Tables 5 and 6 and visualised in Figures 6 and 7.

Table 5
Model Fit Indices of the Structural Model

Goodness of Fit Index	Cut-off Value	Result	Explanation
CMIN/df	< 3.0	1.76	Fit
AGFI	≥ 0.9	0.90	Fit
GFI	≥ 0.9	0.91	Fit
CFI	≥ 0.9	0.96	Fit
IFI	≥ 0.9	0.96	Fit
TLI	≥ 0.9	0.96	Fit
RMSEA	< 0.08	0.03	Fit
RMR	< 0.08	0.02	Fit

Of the 13 hypotheses, 12 were supported at $p < 0.001$, while H7 (Attitude → Intention to Use) was not statistically significant. Key findings include strong positive effects of Social Media Usage on Attitude (β = 0.887), Perceived Behavioural Control (β = 0.846), and Subjective Norms (β = 0.835). UB was the strongest predictor of SMEs' SG (β = 0.758). Figure 6 presents the structural model fit indices, all of which meet the acceptable cut-off criteria. The CMIN/df is 1.76, below the recommended maximum of 3, indicating good model fit. AGFI and GFI are ≥ 0.90, while CFI, IFI, and TLI each reach 0.96, surpassing the minimum threshold of 0.90. RMSEA and RMR are very low at 0.03 and 0.02, respectively, significantly below the recommended cut-off value of 0.08. Overall, the structural model demonstrates strong alignment with all fit indices, confirming its adequacy and robustness.

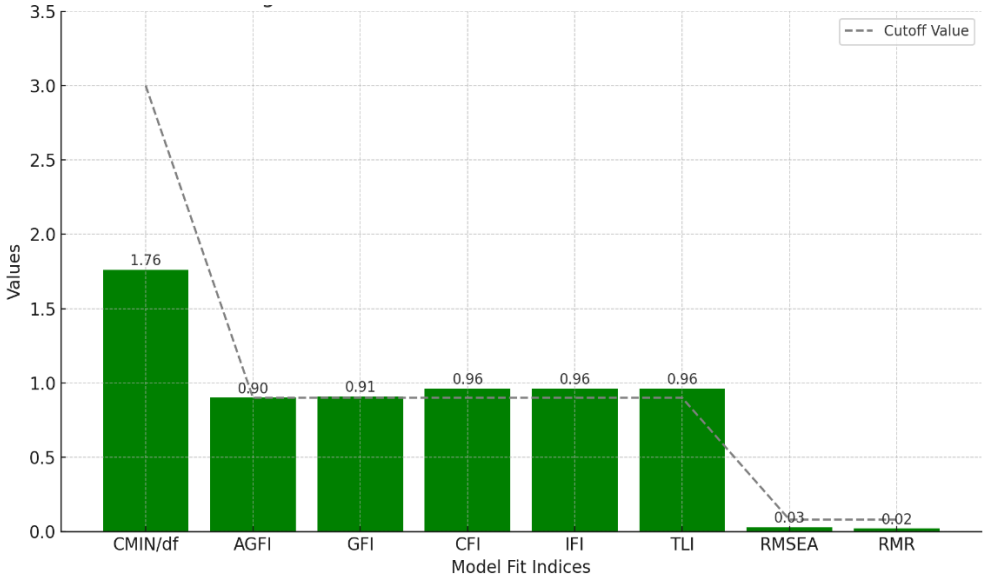

Fig.6: Model Fit Indices of the Structural Model

Table 6
Structural Estimates and Tests of the Main Hypotheses

Hypothesis	Path	Standardized Regression Weights	P-Value	Results
H1	Social Media Usage → Service Quality	0.785	***	Supported
H2	Social Media Usage → Satisfaction	0.562	***	Supported
H3	Social Media Usage → Attitude	0.887	***	Supported
H4	Social Media Usage → Perceived Behavioural Control	0.846	***	Supported
H5	Social Media Usage → Subjective Norms	0.835	***	Supported
H6	Service Quality → Satisfaction	0.366	***	Supported
H7	Attitude → Intention to Use	0.098	-	Not Supported
H8	Perceived Behavioural Control → Intention to Use	0.253	***	Supported
H9	Subjective Norms → Intention to Use	0.463	***	Supported
H10	Satisfaction → Intention to Use	0.113	*	Supported
H11	Satisfaction → Use Behaviour	0.179	***	Supported
H12	Intention to Use → Use Behaviour	0.688	***	Supported
H13	Use Behaviour → SMEs Sustainable Growth	0.788	***	Supported

*p<0.05, **p<0.01, ***p<0.001

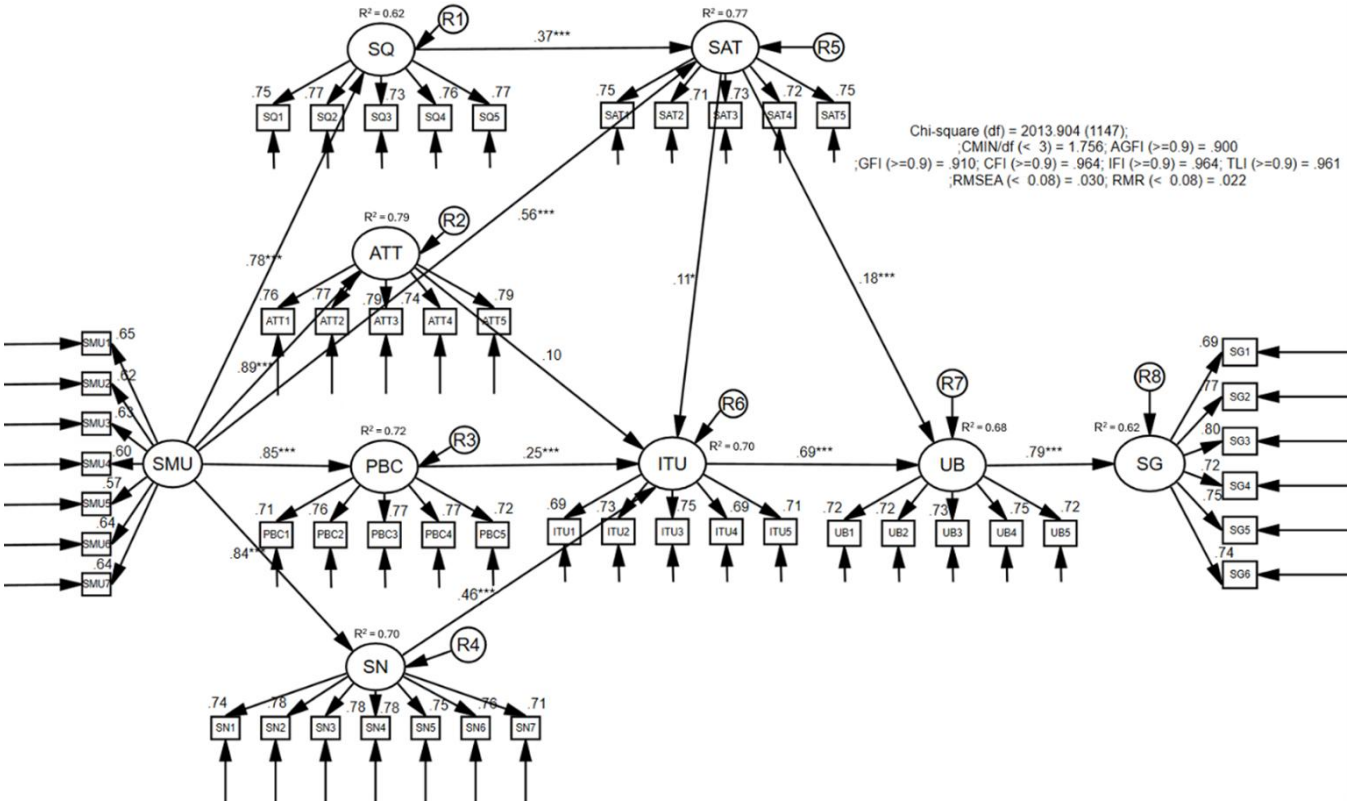

Fig.7: Results of SEM Analysis

5. Discussion

This study employed a novel mixed-methods approach to develop and validate a comprehensive framework analysing the relationship between SMEs growth and SMU within Thailand's computer technology sector. The integration of FDM and SEM facilitated the identification of key factors supporting sustainable growth. This approach addresses limitations observed in earlier research that relied on a single method [1]. Recent studies, including that of Ali Qalati et al. [6], have investigated SMEs adaptation to technology adoption and utilisation. The model demonstrated excellent fit indices (CMIN/df = 1.76, CFI = 0.96, GFI = 0.91, RMSEA = 0.03), confirming its strong explanatory capability. SMU was found to exert direct effects on multiple behavioural constructs, especially ATT, PBC, and SN. These outcomes align with Pop et al.'s (2020) findings on the role of social media in

shaping attitudes within digital contexts. Moreover, SMU showed a significant association with enhanced SQ (β = 0.785), supporting [17] assertion that firms active on social media are perceived to deliver superior SQ.

Among TPB constructs, SN had the greatest influence on ITU (β = 0.463), followed by PBC (β = 0.253). This diverges somewhat from the traditional TPB model, as ATT also had a notable impact. In contrast to Peng and Yan [22], who reported strong ATT effects in adoption settings, no significant ATT–ITU link was observed here, suggesting that SMEs technology adoption decisions in Thailand are primarily driven by external normative pressures rather than individual attitudes. Given Thailand's collectivist culture, societal norms considerably affect ITU, as highlighted by [28]. The strong impact of SN (β = 0.463) suggests SMEs entrepreneurs are highly sensitive to perceived social and industry expectations regarding SMU, bearing important implications for policies promoting digital adoption. Additionally, the findings partly support Rahman et al. [24] conclusions about SAT's influence on digital continuance, revealing modest but significant effects of SAT on ITU (β = 0.113) and UB (β = 0.179). This indicates that sustained SMU among Thai SMEs is shaped by normative factors and perceived behavioural control.

Notably, UB proved to be a strong predictor of SG (β = 0.758), supporting the key hypothesis that effective SMU directly enhances business sustainability. This finding builds on de Oliveira et al. [12], who linked digital technology use to organisational performance, by situating the relationship within Thailand's computer tech SMEs sector. The high path coefficient indicates that beyond adoption, the practical integration of SM into business operations significantly drives SG. The validated model accounts for substantial variance in SG, demonstrating that the combined behavioural and technological constructs capture the core dynamics of sustainable SMEs growth in Thailand's digital economy. This framework fills the gap noted by Singh and Singh [26] on the link between SMU and long-term business sustainability in emerging digital markets.

6. Conclusion

This study aimed to develop and validate a model illustrating how DPU supports SG in Thailand's computer tech SMEs. A comprehensive mixed-methods approach was adopted, combining expert consensus via FDM and construct validation through SEM. The research identified nine interconnected constructs—SMU, SQ, ATT, PBC, SN, SAT, ITU, UB, and SG—that collectively explain the drivers of SMEs sustainability. Key findings reveal several critical relationships. Firstly, DPU strongly influences multiple attitudinal and behavioural constructs, reaffirming its role as a transformative technological enabler altering entrepreneurs' perceptions and actions. Secondly, ITU is predominantly shaped by SN, highlighting the importance of normative pressures within Thailand's collectivist business culture. Most importantly, SG is significantly impacted by UB, emphasising the crucial role of practical SMU for business sustainability. The results extend TAM and TPB by integrating sustainability dimensions specific to Thailand's digital SMEs context. The model provides a comprehensive understanding of behavioural and technological factors underlying sustainable development in emerging digital economies. Practically, the findings suggest SMEs should actively engage in industry networks and digital communities to foster positive adoption behaviours. Given the strong association between DPU and SG, entrepreneurs are encouraged to embed digital platforms into core operations to enhance sustainability outcomes. For policymakers, enhancing normative support for digital adoption could mitigate perceived control barriers among SMEs entrepreneurs and accelerate digital transformation efforts, thereby promoting resilience in the SMEs sector. In conclusion, this study addresses a significant gap by empirically validating the impact of DPU on SG in Thailand's computer tech SMEs, offering a robust framework to understand behavioural and technological influences on sustainable business practices within the digital economy.

7. Limitations and Suggestions for Future Research

This study offers valuable insights into the relationship between digital platform usage and sustainable growth in Thailand's computer tech SMEs, but several limitations should be noted. Due to its cross-sectional design, causal inferences are limited. Future research should adopt longitudinal and experimental approaches to clarify causal links and assess specific social media interventions on business sustainability. The sample, while large and diverse, focused solely on Thailand's computer tech sector, limiting generalisability to other industries or cultures. Extending the model to different sectors and countries would help test its broader applicability. This study only considered owner and executive perspectives, so including other stakeholders like employees, customers, and supply chain partners in future work could provide a more comprehensive view of social media's impact on sustainability. The model may also omit relevant factors such as digital leadership, organisational learning, and external environmental influences, which future studies could integrate alongside objective performance metrics. Lastly, relying on quantitative methods limits contextual depth; thus, more qualitative or mixed-methods research, such as case studies of successful SMEs, would deepen understanding of how social media drives sustainable outcomes. Addressing these limitations will enhance knowledge of how digital technologies support SMEs sustainability in emerging economies and offer practical guidance for entrepreneurs and policymakers aiming to strengthen digital resilience.

References

[1] Achieng, M. S., & Malatji, M. (2022). Digital transformation of small and medium enterprises in sub-Saharan Africa: A scoping review. *The Journal for Transdisciplinary Research in Southern Africa*, *18*(1), 1257. https://hdl.handle.net/10520/ejc-transd_v18_n1_a1257

[2] Agyemang, K. O. (2022). A Bayesian inference model for sustainable crowd source logistics for small and medium scale enterprises (SME) in Africa. *American Journal of Industrial and Business Management*, *12*(4), 750-773. https://doi.org/10.4236/ajibm.2022.124038

[3] Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*(2), 179-211. https://doi.org/10.1016/0749-5978(91)90020-T

[4] Al-Alawi, A. I., Munir, M. M., & Munir, F. M. (2024). Digital Transformation and Competitive Strategies: Insights Into Innovation, SMEs, and AI Startups. 2024 International Conference on Decision Aid Sciences and Applications (DASA), 9798350369106. https://doi.org/10.1109/DASA63652.2024.10836611

[5] Al-Azawei, A., Abdullah, A. A., Mohammed, M. K., & Abod, Z. A. (2023). Predicting online learning success based on learners' perceptions: the integration of the information system success model and the security triangle framework. *International Review of Research in Open and Distributed Learning*, *24*(2), 72-95. https://doi.org/10.19173/irrodl.v24i2.6895

[6] Ali Qalati, S., Li, W., Ahmed, N., Ali Mirani, M., & Khan, A. (2020). Examining the factors affecting SME performance: the mediating role of social media adoption. *Sustainability*, *13*(1), 75. https://doi.org/10.3390/su13010075

[7] Alkhasoneh, O. M., Jamaludin, H., Bin Zahar, A. R. i., & Al-Sharafi, M. A. (2025). Drivers of social media use among SMEs and its impact on brand awareness and customer engagement. *Asia-Pacific Journal of Business Administration*, *17*(3), 595-615. https://doi.org/10.1108/APJBA-02-2024-0102

[8] Amin, M., Gohar, M., & Ali, I. (2025). Impact of digital transformation on SME's marketing performance: role of social media and market turbulence. *Discover Sustainability*, *6*(1), 1-24. https://doi.org/10.1007/s43621-025-01228-3

[9] Boateng, A. A., Li, C., & Sampene, A. K. (2022). Factors that influence acceptance and use of social media marketing tool within SMEs industries in emerging economies: Empirical analysis

from Ghana. *International Journal of Multidisciplinary Research and Growth Evaluation*, *3*(5), 283-293. https://doi.org/10.54660/anfo.2022.3.5.9

[10] Butt, S., Mahmood, A., Saleem, S., Rashid, T., & Ikram, A. (2021). Students' performance in online learning environment: The role of task technology fit and actual usage of system during COVID-19. *Frontiers in psychology*, *12*, 759227. https://doi.org/10.3389/fpsyg.2021.759227

[11] Chairaksa, N., & Pankham, S. (2023). Successful Entrepreneurs of Online Small and Medium Enterprises in Thailand. *Academic Journal of Interdisciplinary Studies*, *12*(3), 336-347. https://doi.org/10.36941/ajis-2023-0082

[12] de Oliveira, U. R., Menezes, R. P., & Fernandes, V. A. (2024). A systematic literature review on corporate sustainability: contributions, barriers, innovations and future possibilities. *Environment, development and sustainability*, *26*(2), 3045-3079. https://doi.org/10.1007/s10668-023-02933-7

[13] Harendra, K. (2024). Factors Affecting Small and Medium-Sized Businesses (SMEs) Development and Growth. *Journal of Nepalese Management and Research*, *6*(1), 40-50. https://doi.org/10.3126/jnmr.v6i1.72081

[14] Hien, N. N., & Nhu, T. N. H. (2022). The effect of digital marketing transformation trends on consumers' purchase intention in B2B businesses: The moderating role of brand awareness. *Cogent Business & Management*, *9*(1), 2105285. https://doi.org/10.1080/23311975.2022.2105285

[15] Hoelter, J. W. (1983). The analysis of covariance structures: Goodness-of-fit indices. *Sociological Methods & Research*, *11*(3), 325-344. https://doi.org/10.1177/0049124183011003003

[16] Hu, L. t., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural equation modeling: a multidisciplinary journal*, *6*(1), 1-55. https://doi.org/10.1080/10705519909540118

[17] Khashman, R. a. M. K. (2021). The Usage of Social Media for Improving the Customer Satisfaction: The Mediating Role of Electronic Services Quality. *International Business Research*, *14*(11). http://dx.doi.org/10.5539/ibr.v14n11p15

[18] Kusonwattana, P., Prasetyo, Y. T., Vincent, S., Christofelix, J., Amudra, A., Montgomery, H. J., Young, M. N., Nadlifatin, R., & Persada, S. F. (2022). Determining factors affecting behavioral intention to organize an online event during the COVID-19 pandemic. *Sustainability*, *14*(20), 12964. https://doi.org/10.3390/su142012964

[19] Leong, L.-Y., Hew, T.-S., Ooi, K.-B., Metri, B., & Dwivedi, Y. K. (2023). Extending the theory of planned behavior in the social commerce context: A meta-analytic SEM (MASEM) approach. *Information Systems Frontiers*, *25*(5), 1847-1879. https://doi.org/10.1007/s10796-022-10337-7

[20] Mothapo, M., Thango, B., & Lerato, M. (2024). Tracking and Measuring Social Media Activity: Key Metrics for SME Strategic Success-A Systematic Review. *Available at SSRN 4992468*. https://dx.doi.org/10.2139/ssrn.4992468

[21] Patma, T. S., Wardana, L. W., Wibowo, A., Narmaditya, B. S., & Akbarina, F. (2021). The impact of social media marketing for Indonesian SMEs sustainability: Lesson from Covid-19 pandemic. *Cogent Business & Management*, *8*(1), 1953679. https://doi.org/10.1080/23311975.2021.1953679

[22] Peng, M. Y.-P., & Yan, X. (2022). Exploring the influence of determinants on behavior intention to use of multiple media kiosks through technology readiness and acceptance model. *Frontiers in psychology*, *13*, 852394. https://doi.org/10.3389/fpsyg.2022.852394

[23] Pop, R.-A., Săplăcan, Z., & Alt, M.-A. (2020). Social media goes green—The impact of social media on green cosmetics purchase motivation and intention. *Information*, *11*(9), 447.

https://doi.org/10.3390/info11090447

[24] Rahman, S., Ramakrishnan, T., & Ngamassi, L. (2020). Impact of social media use on student satisfaction in Higher Education. *Higher Education Quarterly*, *74*(3), 304-319. https://doi.org/10.1111/hequ.12228

[25] Role of social media in influencing attitude and purchase intention: a case for m-commerce services, (2016). https://www.researchgate.net/publication/309173701

[26] Singh, P., & Singh, S. (2024). Understanding Social Media Application for Sustainable Development Goals. *International Journal of Research-GRANTHAALAYAH*, *12*(7), 109-127. https://doi.org/10.29121/granthaalayah.v12.i7.2024.5691

[27] Singh, R. K., Luthra, S., Mangla, S. K., & Uniyal, S. (2019). Applications of information and communication technology for sustainable growth of SMEs in India food industry. *Resources, Conservation and Recycling*, *147*, 10-18. https://doi.org/10.1016/j.resconrec.2019.04.014

[28] Siriyotha, S., & Lekcharoen, S. (2024). Factors Influencing the Firm Performance of Digital Merchandising Businesses in Thailand. *Journal of Ecohumanism*, *3*(8), 7597–7616-7597–7616. https://doi.org/10.62754/joe.v3i8.5386

[29] Sivalingam, M., & Lawrence, J. (2024). A Bibliometric Study on the Effect of Social Media Marketing Activities on Customer Brand Experience. https://dx.doi.org/10.2139/ssrn.5077766

[30] Vărzaru, A. A., Bocean, C. G., Rotea, C. C., & Budică-Iacob, A.-F. (2021). Assessing antecedents of behavioral intention to use mobile technologies in e-commerce. *Electronics*, *10*(18), 2231. https://doi.org/10.3390/electronics10182231

[31] Xianguang, W., Dan, H., Lingling, X., & Xiaoyan, B. (2025). Service Quality and Customers Trust Towards Crafting Business Strategy for Courier Service Company. *Journal of Business and Management Studies*, *7*(1), 62-80. https://doi.org/10.32996/jbms.2025.7.1.5

[32] Xie, J. (2023). Multi-attribute decision-making model based on triangular fuzzy numbers and prospect theory. *7th International Conference on Economics and Management, Education, Humanities and Social Sciences (EMEHSS 2023)*. https://doi.org/10.54691/bcpbm.v49i.5382

[33] Yaccob, N. S., Yunus, M. M., & Hashim, H. (2024). A quest for experts' consensus on the knowledge domain for an ESL global competence framework using fuzzy delphi method analysis. *International Journal of Learning, Teaching and Educational Research*, *23*(11), 1-31. https://doi.org/10.26803/ijlter.23.11.1

[34] Zhang, C., & U-on, V. . (2024). International Management Strategy of Small and Medium Enterprises in Thailand: Challenges and Strategic Adaptation in a Globalized Economy. *International Journal of Business and Economics Research*, *13*(6), 194-201. https://doi.org/10.11648/j.ijber.20241306.16