

CONSTRUCTING A RESILIENCE MEASUREMENT MODEL FOR SMALL AND MEDIUM-SIZED ENTERPRISES IN VIETNAM: A PLS-SEM APPROACH

Hien Thi Thu Dinh

Ho Chi Minh City Open University, Ho Chi Minh City, Vietnam

Quyên Lê Hoàng Thủy Tô Nguyễn

University of Economics Ho Chi Minh City (UEH), Ho Chi Minh City, Vietnam

Phong Thanh Nguyễn

Ho Chi Minh City Open University, Ho Chi Minh City, Vietnam

ABSTRACT

Small and medium-sized enterprises (SMEs) constitute around 97% of the total number of businesses in Vietnam, which contributes to 60% of the national growth. In a dynamic and uncertain business environment, both domestically and internationally, the resilience of SMEs has become a topic of significant interest among researchers and practitioners. Resilience, however, is a multifaceted concept that depends on the specific context in which it is applied. Therefore, this study aims to construct a measurement model for assessing the resilience of SMEs in Vietnam. Drawing from a dataset collected from 500 SMEs and employing the PLS-SEM technique, the findings of this research indicate that the resilience index is a combination of reflective and formative models. Resilience at level three is a formative construct comprising four prioritized components: agility, anticipatory capability, flexibility, and adaptability. The reflective measurement model of agility, anticipation, flexibility, and adaptability confirms its reliability and validity. These findings form the basis for the effective allocation of resources to enhance resilience within SMEs. Understanding the nuanced aspects of resilience can benefit in developing targeted strategies to bolster SMEs against the challenges posed by an ever-changing business landscape.

Keywords: small and medium- sized enterprises (SMEs); resilience; PLS-SEM; Vietnam

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INTRODUCTION

Small and Medium-Sized Enterprises (SMEs) account for up to 40% of national income (GDP) in emerging economies and provide up to 60% of

total employment (Ndiaye et al., 2018). SMEs have created 80% of all new jobs in Europe in the last five years (Pedraza, 2021), and they are considered a crucial driver of world economic growth, global supply chains, innovation, and

employment. SMEs in Vietnam are no exception (OECD, 2017; Naradda Gamage et al., 2020), as SMEs share around 97% of the businesses, and contribute 60% of the national economic growth in Vietnam (Nguyen et al., 2020; Dinh et al., 2022). In recent years, the world has experienced potential changes, risks, uncertainty, complexity, and unpredictability (Sword-Daniels et al., 2018; Dishon & Gilead, 2021). This has challenged the resilience of SMEs given their limited resources (Eggers, 2020). As a result, they frequently endure a high rate of failure, which can be linked to high operational costs, fierce market competition, and unpredictable environmental changes (Saad et al., 2021).

'Resilience' comes from the Latin word 'Resilio', which means 'to bounce back' (Willans & Stewart-Brown, 2021). Resilience was introduced in ecosystem research in the 1970s and has since expanded into many different fields, such as economics, risk management, sociology, psychology, and computer networks (Hu & Pavao-Zuckerman, 2019; Ngoc & Vy, 2023). Resilience is defined as the ability to regain equilibrium after experiencing an adverse event (Shepherd & Williams, 2020). It is not an end state of existence but a process of adaptation and growth in a challenging context. The resilience of a business is manifested in the way it survives and thrives in a volatile and uncertain environment (Gölgeci et al., 2020). Resilience includes the ability to capture signals from the external environment, decode them, quickly take action to improve or reinvest in the business model, or even reshape the industry in which the business operates. The resilience of SMEs can be said to be a multi-dimensional and context-dependent concept (Falciola et al., 2023).

The objective of this study is to create a comprehensive index that will assess the resiliency of SMEs in Vietnam. It is anticipated that three contributions will be made to the existing body of literature. First, the multi-dimensional dimensions of SME resilience in the context of Vietnam will be defined and measured. Second, it will combine reflective and formative measurement approaches to create a hierarchical model of resilience. Third, it will offer a basis for additional micro-research on its results by offering an empirical measuring model of SME resilience. The paper is organized with the theoretical review in the subsequent section, followed by the research methodologies and

findings. Last, insights into the study's implications and conclusions are presented in the final section.

LITERATURE REVIEW

Resilience, as defined by Ramezani and Camarinha-Matos (2020), encompasses an organism's capacity to adapt, recover, and potentially flourish despite adverse circumstances. This concept extends beyond mere survival to include the ability to adjust successfully in the face of challenges, harm, tragedies, threats, and major shocks. Resilience operates at various levels, from individual attributes to meso investigations covering groups, communities, and organizations (Linkov & Trump, 2019; Ngoc & Vy, 2023). At the individual level, resilience is described as a process involving the utilization of resources to sustain well-being (Vella & Pai, 2019). On the organizational front, resilience is perceived as the ability of a dynamic system to adapt effectively (Ma et al., 2018). Organizational resilience, as described by Varajão et al. (2021), involves managing disturbances and workflow to restore stability and achieve organizational objectives securely and promptly. Duchek (2020) defined organizational resilience as the capability not only to survive but also to thrive in the face of adversity. According to Ungar (2018), resilience is an essential trait shared by individuals, groups, organizations, and systems, enabling successful adaptation to adverse circumstances.

While resilience is often dichotomously approached to represent its presence or absence (Cissé & Barrett, 2018), it typically exists on a continuum and manifests across various levels. Resilience evolves as a function of development and interaction with the environment. Li et al. (2020) proposed that the resilience of a social-ecological system encompasses the ability to learn, integrate experiences and knowledge, adjust to external changes, and thrive within a stable range. This aids in maintaining processes despite changes in internal needs and external pressures on the social-ecological system.

Vietnamese SMEs, defined as per criteria stipulated in the Government's decree No. 80/2021/ND-CP summarized in Table 1, are vital components of the country's economic landscape and are characterized by their dynamic nature and operation within complex

socio-economic contexts. SMEs in Vietnam face numerous challenges, such as limited resources, access to finance, regulatory constraints, and

market fluctuations (Ngoc & Vy, 2023), which often necessitate them to enter recovery phases to mitigate losses and resume normal operations.

Table 1. Criteria of Vietnamese SMEs stipulated in the Government's decree No. 80/2021/ND-CP

Business scope	Micro-enterprises	Small enterprises	Medium enterprises
Agriculture, forestry, aquaculture, industry and construction	Average annual number of employees who participate in social insurance not exceeding 10 people, total revenue in the year not exceeding 3 billion VND or total capital of the year not exceeding 3 billion VND	Average annual number of employees who participate in social insurance not exceeding 100 people, total revenue in the year not exceeding 50 billion VND or total capital of the year not exceeding 20 billion VND	Average annual number of employees who participate in social insurance not exceeding 200 people, total revenue in the year not exceeding 200 billion VND or total capital of the year not exceeding 100 billion VND
Commerce and service	Average annual number of employees who participate in social insurance not exceeding 10 people, total revenue in the year not exceeding 10 billion VND or total capital of the year not exceeding 3 billion VND	Average annual number of employees who participate in social insurance not exceeding 50 people, total revenue in the year not exceeding 100 billion VND or total capital of the year not exceeding 30 billion VND	Average annual number of employees who participate in social insurance not exceeding 100 people, total revenue in the year not exceeding 300 billion VND or total capital of the year not exceeding 100 billion VND

Source: Government (2021)

The resilience of businesses, including SMEs, has gained significant attention from researchers exploring their ability to survive shocks and risks (Coles, Ritchie, & Wang, 2021; Hillmann & Guenther, 2021). In this study, enterprise resilience within the context of Vietnamese SMEs is defined as the use of resources to respond and make positive adjustments to consolidate, maintain, and develop business operations, performance, and long-term competitive advantages (Ngoc & Vy, 2023). This encompasses diverse approaches to managing uncertainty, including a focus on anticipation, agility, flexibility, and adaptability (Sinniah et al., 2022).

Anticipation involves the proactive identification and assessment of potential risks, opportunities, and trends that may impact SMEs' operations and performance. By anticipating future scenarios, SMEs can develop strategic foresight and contingency plans to mitigate risks and capitalize on emerging opportunities (Sinniah et al., 2022; Zighan & Ruel, 2023). Agility denotes the ability of SMEs to respond promptly and effectively to changes in their external environment, market dynamics, or internal

conditions. Agile SMEs exhibit fluidity in decision-making, resource allocation, and operational adjustments, enabling them to seize opportunities, overcome obstacles, and maintain competitive advantages in dynamic markets (Jafari-Sadeghi et al., 2022; Sinniah et al., 2022). Flexibility refers to the capacity of SMEs to adapt and modify their strategies, processes, and structures in response to changing circumstances or stakeholder needs. Flexible SMEs demonstrate resilience in their ability to pivot, innovate, and reallocate resources to align with evolving market demands and organizational objectives (Miroshnychenko et al., 2021; Sinniah et al., 2022). Adaptability encompasses the broader ability of SMEs to evolve and transform in response to long-term trends, systemic changes, or disruptive events. Adaptive SMEs embrace change as an inherent aspect of their organization, fostering a culture of continuous learning, innovation, and improvement to thrive in uncertain and volatile environments (Sinniah et al., 2022).

METHODOLOGY

The primary data used for this research was collected through surveys of SMEs in Vietnam that would be used to measure the resilience of SMEs in Vietnam. The survey's scope provided a dataset suitable for Partial Least Squares Structural Equation Modeling (PLS-SEM) analysis, comprising a total of 600 SMEs in Vietnam. The survey area focused on locations in the Northern, Central, and Southern regions of Vietnam, which have a high number of active businesses, according to statistics from the Ministry of Planning and Investment. These regions include Ho Chi Minh City (Southern) with 268,465 businesses, accounting for 31.3% of total active businesses nationwide, Hanoi with 178,493 businesses, accounting for 20.8%, and Da Nang with 24,703 businesses, accounting for 2.9%. The research applied random sampling based on a sampling frame that consisted of a list of SMEs in Ho Chi Minh City, Hanoi, and Da Nang.

The hierarchical model of SMEs' resilience was developed based on PLS-SEM. PLS-SEM is a

statistical technique used in social sciences and business research to build and analyze measurement models and structural models simultaneously (Doan, Le, Nguyen, Nguyen, & Dang, 2022; Hoang & Le Tan, 2023). According to Hair Jr et al. (2021), when applying PLS-SEM to build a measurement model, the following key steps should be taken:

Step 1: Select a set of observable variables or indicators for each latent construct. These indicators should be theoretically relevant and reliable measures of the underlying construct.

Step 2: Conduct data cleaning to handle missing values and outliers and ensure it meets the assumptions of PLS-SEM.

Step 3: Define the relationships between the latent constructs and their corresponding indicators. In PLS-SEM, two types of measurement models can be explored, including reflective and formative models, as indicated in Table 2.

Table 2. Reflective and formative measurement models

Reflective construct	Formative construct
<p>The construct causes indicators: $X_i = \beta_j Y + \varepsilon_i$ where X_i: the i^{th} indicator; Y: the reflective construct; β_j: the coefficient measuring the expected impact of Y on X_i; ε_i: the measurement error for X_i.</p>	<p>Indicators cause the construct: $Y = \gamma_i X_i + \delta$ where X_i: the i^{th} indicator; Y: the formative construct; γ_i: the weight contributed by X_i; δ: the common error term.</p>

Step 4: Evaluate the goodness-of-fit of the measurement model using various criteria such as the Average Variance Extracted (AVE), Composite Reliability (CR), and factor loadings for reflective measurement models and collinearity among indicators (VIF) and the significance and relevance of outer weights (Haile & Kang, 2020). PLS-SEM is particularly useful with relatively small sample sizes or complex models with multiple latent constructs, as it allows for flexibility in model specification and provides insights into the relationships between constructs and their indicators.

Given the diversified definitions of resilience, the hierarchical model of its measurement can differ in each research that is tailored to meet

specific objectives. In line with the rationale outlined in Section 2, a measurement model for SME resilience following the indicators presented by Chu (2015) and Sinniah et al. (2022) was developed. The development of measurement scales for assessing the SMEs' resilience involved a systematic three-step approach. Initially, a comprehensive literature review was conducted, followed by brainstorming sessions aimed at identifying and delineating four core dimensions pertinent to SME resilience: anticipation, agility, flexibility, and adaptability. Subsequently, a preliminary version of the measurement instrument was drafted in both Vietnamese and English languages and disseminated among domain experts for critical evaluation and feedback.

Through iterative rounds of review and refinement incorporating insights and suggestions from these experts, the draft instrument underwent successive revisions until achieving consensus among the expert panel. In the final step, the revised instrument was subjected to pilot testing among a sample of 30 SME board members in Ho Chi Minh City to evaluate its practical applicability and

acceptability within the target population. The pilot testing phase aimed to gauge the feasibility and relevance of the instrument in capturing the intended constructs of SME resilience. Ultimately, the refined measurement scale, comprising four distinct dimensions and a total of 23 itemized indicators, is presented in detail in Table 3 of this study.

Table 3. Resilience measurement

Code	Indicators
AT	Anticipation
AT1	Our organization consistently keeps a close watch on changes in the markets.
AT2	Our organization consistently keeps a close watch on competitors' actions
AT3	Our organization consistently keeps a close watch on changes of consumer preference.
AT4	Our organization consistently keeps a close watch on changes in regulatory/legal issues.
AT5	Our organization consistently keeps a close watch on economic shifts.
AT6	Our organization consistently keeps a close watch on technological advancements
AD	Adaptability
AD1	Our organization often embraces new techniques.
AD2	Our organization regularly launches new products or services.
AD3	Our organization often makes changes to our products or services.
AD4	Our organization regularly embraces new technologies and acquires fresh skills.
AG	Agility
AG1	Our organization swiftly adapts to shifts in the overall consumer demand.
AG2	Our organization promptly responds to competitors' new product or service introductions.
AG3	Our organization rapidly implements updated pricing structures in reaction to shifts in competitors' pricing.
AG4	Our organization swiftly adjusts the range of products or services available for sale, whether expanding or reducing it.
AG5	Our organization swiftly changes suppliers for a competitive cost, good quality or shorter lead time.
AG6	Our organization rapidly embraces innovative technologies to enhance the production of superior, more efficient, and cost-effective products or services.
AG7	Our organization swiftly ventures into new domestic or international markets.
FL	Flexibility
FL1	Our organization demonstrates flexibility in the allocation of marketing resources to promote a wide range of products or services.
FL2	Our organization displays flexibility when it comes to allocating production resources to produce a variety of products or services.
FL3	Our organization maintains flexibility in product design to accommodate a multitude of potential products and services.
FL4	Our organization is flexible in modifying the product strategy to match the targeted markets
FL5	Our organization efficiently reallocates organizational resources to align with our company's planned strategies.
FL6	Our organization adapts the resources available for the development, manufacturing, and delivery of its intended products or services to specific target markets.

Source: Adapt from Chu (2015); Sinniah et al. (2022)

RESULTS

Trained data collectors distributed questionnaire surveys to 600 SMEs situated in Vietnam. A total of 540 responses were received from members of management boards, yielding an impressive 90% response rate. On average, participants took 20 minutes to complete the survey. After a thorough data screening, 40 incomplete responses were excluded. Summary characteristics of the study sample can be seen in Table 4. With regard to gender, 46.8% of the respondents were men and 53.2% were women. The majority of participants fall within the age groups of 30 to 40 (32.8%) and 41 to 50 (32.8%), comprising a combined total of 65.6%. Overall, the education levels of SMEs' management board members demonstrate a commendable commitment to learning within enterprises; 81.0% of them possess graduate and postgraduate qualifications, with the highest percentage, 42.2%, holding graduate university degrees. Those having just a high school diploma represented the lowest percentage, 1.4%.

Table 4. Sample description

Description	%
Gender	
Male	46.8
Female	53.2
Location	
Hanoi (North)	31.4
Danang (Central)	10.0

Table 5. Construct reliability

Construct	Cronbach's alpha	Rho-A	Composite reliability (CR)	Average variance extracted (AVE)
AT	0.893	0.895	0.918	0.651
AD	0.867	0.872	0.909	0.715
AG	0.903	0.914	0.924	0.638
FL	0.899	0.905	0.922	0.664

Source: author's work.

The evaluation of indicator reliability reveals that all indicators have a Cronbach's Alpha coefficient exceeding 0.7, indicating an acceptable level of reliability. The lowest Cronbach's Alpha value corresponds to the latent variable AD at 0.867, while the highest is associated with AG at 0.903, as shown in Table 5. The Composite Reliability (CR) coefficient,

Description	%
Ho Chi Minh City (South)	58.6
Age group	
Under 30 years	24.2
30-40 years	32.8
41-50 years	32.8
51-60 years	10.2
Education	
Grade 12	1.4
Vocational school	3.0
College	14.6
Graduate	42.2
Master	30.2
PhD	8.6

Source: author's work.

Assessment of the Level 2 resilience reflective measurement model was conducted. Enhanced loadings on a construct imply a substantial degree of shared characteristics among the associated indicators. Following an examination of the loading coefficient criteria, the scale's reliability was assessed using various measures, namely Cronbach's Alpha, Roh_A, Composite Reliability (CR), and Average Variance Extracted (AVE). To meet the recommended standards set by Hair Jr et al. (2021), Cronbach's Alpha and Roh_A values should be equal to or greater than 0.7, satisfactory CR values should be between 0.7 and 0.9, and AVE should surpass 0.5.

presented in Table 4, demonstrates the consistency among the indicators within measurement model elements. All CR results for the scales range from above 0.8 to below 0.95, affirming that the indicators used to gauge the latent variable are relevant, and the model's indicators are suitable.

Table 6 provides evidence of discriminant

validity for the reflective measurement model. According to the Fornell-Larcker criterion, the square root of the Average Variance Extracted (AVE) for each construct exceeds the highest correlation with any other construct, confirming the distinctiveness of the constructs in the model.

Table 6. Fornell- Larcker criterion

	AD	AG	AT	FL
AD	0.846			
AG	0.440	0.799		
AT	0.496	0.592	0.807	
FL	0.468	0.566	0.607	0.815

Source: author's work.

The level 3 resilience formative model in Table 7 indicates no collinearity between VIF (<5) and the significant outer weights.

Table 7. Formative model

Resilience dimension	Weights	VIF
AT	0.345	2.181
AD	0.209	2.166
AG	0.396	2.322
FL	0.279	2.311

Source: author's work.

The results of formative and reflective measurement models of SMEs' resilience are in Table 8. The findings indicate that agility contributes the most to resilience, followed by anticipation. Flexibility plays the third most important role, with adaptability being the least significant factor.

Table 8. Formative and reflective measurement models of SMEs' resilience

Dimension	Weight	Indicators	Loadings
AT	0.345	AT1	0.789
		AT2	0.818
		AT3	0.820
		AT4	0.805
		AT5	0.797
		AT6	0.813
AD	0.209	AD1	0.867
		AD2	0.800
		AD3	0.852
		AD4	0.861

AG	0.396	AG1	0.869
		AG2	0.809
		AG3	0.829
		AG4	0.808
		AG5	0.823
		AG6	0.834
		AG7	0.788
FL	0.279	FL1	0.805
		FL2	0.824
		FL3	0.769
		FL4	0.832
		FL5	0.849
		FL6	0.807

Source: author's work.

DISCUSSION

The findings of this study shed light on the dimensions contributing to resilience among SMEs in Vietnam, with a particular emphasis on agility (0.396), anticipation (0.345), flexibility (0.279), and adaptability (0.209). The significance of agility in bolstering resilience is highlighted, a result that resonates with the dynamic business landscape prevailing in Vietnam. Given the rapid changes and uncertainties characterizing the Vietnamese market, SMEs that can swiftly adjust their strategies and operations are better equipped to navigate challenges and disruptions effectively. This aligns with global research trends emphasizing the pivotal role of agility in enhancing business resilience (Nyamrunda & Freeman, 2021; Olaleye et al., 2021; Hadjielias et al., 2022).

The substantial contribution of anticipation to resilience underscores the importance of a forward-looking approach among Vietnamese SMEs. By proactively identifying potential threats and opportunities, SMEs can develop strategic plans to mitigate risks and capitalize on emerging trends (Zighan & Ruel, 2023). This emphasizes the significance of strategic planning and risk assessment in the Vietnamese business context, aligning with best practices advocated in global business resilience literature.

While flexibility remains a crucial aspect of resilience, its slightly lower ranking compared to agility and anticipation suggests that Vietnamese SMEs prioritize swift adaptation and proactive planning over sheer adaptability. Flexibility nonetheless remains a key component of resilience, complementing agility and

anticipation in building robustness within SMEs. This nuanced understanding underscores the need for SMEs to strike a balance between agility, anticipation, and flexibility to effectively navigate the volatile business environment in Vietnam (Ngoc & Vy, 2023).

The relatively lower contribution of adaptability to resilience in the Vietnamese context suggests that, while important, the ability to transform and evolve over time may not be as immediately critical for Vietnamese SMEs as are agility and anticipation. This implies that in the short term, rapid response and proactive planning are more valued strategies among Vietnamese SMEs, however, businesses must also maintain a degree of adaptability to remain competitive in the long term while navigating the specific challenges and opportunities within the Vietnamese market.

Comparing these results with other research underscores the variability of factors contributing to resilience across different industries, regions, and economic conditions (Sinniah et al., 2022). While agility and anticipation emerge as primary strategies for enhancing resilience among Vietnamese SMEs, the relative importance of these factors may differ in other contexts. Nonetheless, in the context of Vietnam—a developing economy with a fast-paced business environment—these findings underscore the critical role of agility and anticipation in fostering resilience among SMEs.

In conclusion, the findings of this study highlight the importance of agility and anticipation as primary strategies for enhancing resilience among SMEs in Vietnam. While flexibility and adaptability remain essential, the dynamic business landscape in Vietnam prioritizes swift adaptation and proactive planning to effectively navigate challenges and capitalize on opportunities. These insights have implications for policymakers, practitioners, and researchers seeking to support the resilience and sustainability of SMEs within the Vietnamese economy.

CONCLUSIONS AND RECOMMENDATION

In Vietnam, there has been limited exploration of the measurement model for SMEs' resilience through the development of an integrated index using PLS-SEM. This statistical modeling approach is particularly suitable for research scenarios characterized by constraints such as

small sample sizes, non-normally distributed data, and complex models, which are frequently encountered in the field of social sciences. The resilience index for SMEs in Vietnam comprises four essential components: anticipation, agility, flexibility, and adaptability. This structure aligns with established theory and prior empirical findings, making it a practical representation of a comprehensive set of indicators for further research on resilience outcomes within the Vietnamese context. The notable strength of this integrated index lies in its ability to discern the individual contribution of each dimension to the components and, subsequently, to the overall index. These findings shed light on the specific attributes critical for enhancing resilience among Vietnamese SMEs. Within this context, the capacity to promptly adapt and respond to evolving circumstances (agility) and the ability to foresee potential challenges (anticipation) emerge as pivotal factors. While flexibility also holds significance, adaptability, characterized by the capacity to undergo gradual adjustments and transformations over time, appears to exert a comparatively lower influence on overall resilience. This insight underscores the significance of proactive and agile strategies in fortifying the resilience of SMEs operating in Vietnam's dynamic environment.

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ABOUT THE AUTHORS

- Dr. Phong Thanh Nguyen, email: phong.nt@ou.edu.vn (Corresponding Author)
- M. Hien Dinh Thi Thu** is currently is currently working as a Ph.D. candidate and a lecturer of the Accounting – Auditing Department at Ho Chi Minh City Open University, Vietnam. Her research interest includes business accounting and audit & assurance.
- Dr. Quyen Le Hoang Thuy To Nguyen** is currently working as a senior researcher and lecturer at the Public Governance and Developmental Issues Research Group (PGDI), School of Government, University of Economics Ho Chi Minh City, Ho Chi Minh City. Her teaching and research interest includes economics and society, public management, public health, and sustainable development.
- Dr. Phong Thanh Nguyen** is currently a leader of Professional Knowledge & Project Management Interdisciplinary Research Team (K2P), Ho Chi Minh City Open University, Vietnam. He is also a lecturer at Ho Chi Minh City Open University. His teaching and research interests include mathematics education, PPP project management, construction economics & management, behavioral sciences, interdisciplinary research, quantitative analysis, business industry, and risk management.