

UNPACKING MICROENTERPRISE RESILIENCY AND BUSINESS CONTINUITY: THROUGH DIGITAL SHIFTS AND STRATEGIC AGILITY

Rey Andrew M. Luarez.

North Eastern Mindanao State University – Cantilan Campus, Cantilan, Surigao del Sur, Philippines

*For correspondence; Tel. +(63) 9603164328, E-mail: reyandrewluarez@gmail.com

ABSTRACT: This study set out to uncover how microenterprises build resilience amid economic and environmental volatility, focusing on adaptive strategies used by business stall tenants at NEMSU Cantilan Campus. Using purposive sampling, 11 micro-entrepreneurs were selected for semi-structured interviews, ensuring insights from those directly facing daily operational challenges. The research adopted an action research design, integrating a systematic literature review with a thematic analysis of qualitative data. Statistical analysis was supported by descriptive coding and iterative theme validation. Findings highlight that digital adoption, flexible pricing, and strategic budgeting are central to resilience, while collaboration with local government remains inconsistent in practice. The study's value lies in its context-specific, participatory approach, bridging the gap between academic models and real-world microenterprise adaptation, and offering a dynamic framework for policymakers and practitioners seeking to foster sustainable microenterprise growth.

Keywords: microenterprise resilience, adaptive strategies, business continuity, systematic literature review, action research

1. INTRODUCTION

Microenterprises are the unsung heroes of local economies, fueling job creation, driving innovation, and supporting community development worldwide [1]. Yet, their journey is anything but easy. Operating with lean resources and often navigating turbulent economic waters, these small businesses face a daunting array of challenges—from sudden market shocks and natural disasters to technological disruptions and shifting consumer demands. In the Philippines, for example, micro and small enterprises (MSEs) make up the vast majority of registered businesses, but many struggle to survive beyond their fifth year, highlighting the precariousness of their position and the urgent need for strategies that foster resilience and sustainability [2].

Conversely, recent studies by Israel & Rutainurwa emphasize the importance of entrepreneurial orientation, financial literacy, digital transformation, and adaptive capacity as critical ingredients for long-term survival and growth [3]. For instance, Maravilla Jr & Flores found that financial literacy not only boosts entrepreneurial competencies but also strengthens resilience, which in turn enhances the sustainable performance of micro and small enterprises in disaster-prone regions like Tacloban City [2]. Similarly, Cheruiyot, [4], highlights that the ability to innovate, make swift decisions, and leverage both internal and external resources enable some micro-enterprises to thrive despite constant turbulence and resource constraints.

On the other hand, while recent research has explored resilience strategies and innovation among small and medium enterprises (SMEs), much of this literature tends to group micro-enterprises with larger SMEs, often overlooking the distinct challenges and adaptive capacities of the smallest businesses. Studies such as (Zahoor et al., 2022) [5] and (ElNaggar & ElSayed, 2023) [6] have highlighted the importance of dynamic capabilities, strategic agility, and digital transformation in helping SMEs navigate disruptions like the COVID-19 pandemic, but rarely do they provide a focused analysis on micro-enterprises unique resource constraints and survival strategies.

This study addresses this gap by concentrating exclusively on micro-enterprises, aiming to uncover how they develop resilience and adapt in volatile environments. By integrating recent findings through a systematic literature review (SLR) by Biswas et al., with new qualitative insights, this research provides a nuanced understanding of micro-enterprise resilience—ensuring that their specific experiences and needs are no longer overshadowed by broader SME narratives [7].

2. METHODOLOGY

The systematic literature review (SRL) process drew on the PRISMA model as its foundation. While PRISMA was created for medical research, it has since become widely adopted across various fields. The PRISMA model outlines four key stages for identifying and selecting literature for in-depth analysis: defining the review's aims and objectives, setting clear inclusion and exclusion criteria, outlining how relevant studies will be found, and detailing how the gathered information will be analyzed.

Moreover, the study blended the rigour of PRISMA guidelines with real-world insights tailored to micro-enterprise resilience. The process begins by defining clear aims: to uncover how micro-enterprises adapt to volatility and what makes them resilient. This focus wasn't arbitrary—it responded to gaps in existing research, which often lumps micro-enterprises with larger SMEs, obscuring their unique struggles [2]. Next, inclusion and exclusion criteria were set to filter the literature: only peer-reviewed studies from 2021–2025, zeroing in on micro-enterprises (not SMEs), and excluding works lacking empirical depth. This precision ensured the review stayed focused on actionable insights rather than broad generalizations.

Next came the search phase, where databases like Scopus, Web of Science, and Google Scholar were scoured using targeted strings like “micro-enterprise resilience” AND “adaptive strategies” paired with Boolean operators (AND/OR). The search was able to grasp 150 studies initially, but screening whittled it down to 20 high-quality papers. Duplicates and off-topic works—like those fixated on larger SMEs or generic business strategies—were excluded

(Darmawan & Rezki, 2025) [8]. What remained were studies by Putri et al., [9], who tied digital adoption to survival during crises, and Susilawati's, [10], whose work on strategic agility revealed how micro-enterprises pivot during market swings.

Moreover, the thematic analysis transformed these 20 studies into a cohesive narrative. Four strategies stood out: digital transformation (e.g., social media marketing), collaborative networks (e.g., partnerships with local governments), financial agility (e.g., dynamic budgeting), and entrepreneurial grit (e.g., adaptive leadership). But the analysis also exposed contradictions—like whether digital tools are a universal fix or if their success hinges on local infrastructure [8]. These tensions weren't just academic; they directly shaped the action research interventions, ensuring the study's recommendations were grounded and practical.

Finally, the integration phase is where theory met practice. Insights from the SLR fueled hands-on workshop ideas on digital skills and crisis budgeting for micro-entrepreneurs at NEMSU Cantilan Campus. This loop of learning and doing, inspired by Gorjian Khanzad & Gooyabadi, [11], ensured the research stayed dynamic, adapting to on-the-ground feedback.

Furthermore, the study also follows the action research components cited by Gorjian Khanzad & Gooyabadi, [11]. The study interviewed the business stall tenants of NEMSU Cantilan Campus, all of which are micro-entrepreneurs. The selection of business stall tenants from NEMSU Cantilan Campus as study participants was intentional and strategic. These individuals are active micro-entrepreneurs operating within a university setting that serves as a controlled yet diverse micro-business ecosystem. This environment provides a unique opportunity to observe a variety of resilience strategies in action, as the campus hosts a mix of food, retail, and service stalls catering to both students and staff. Their daily operations are subject to fluctuating demand, regulatory requirements, and resource constraints—challenges that mirror those faced by micro-enterprises in broader community settings. By focusing on this group, the study can capture authentic, real-time responses to adversity and adaptation within a supportive institutional context [12]. The qualitative data gathered by the study from the interview was analyzed using thematic analysis like that of the study by Zamani, [13]. Thematic analysis in this study followed a systematic, multi-step approach to ensure rigour and transparency in identifying and validating themes from interview data. First, all interviews were transcribed verbatim, and the researchers immersed themselves in the data by reading transcripts multiple times to gain a comprehensive understanding of participants' experiences and perspectives. Initial coding was then conducted by systematically tagging significant statements, phrases, or ideas relevant to microenterprise resilience. These codes served as basic categories reflecting recurring patterns or noteworthy responses in the data. Initial coding was then conducted by systematically tagging significant statements, phrases, or ideas relevant to microenterprise resilience. These

codes served as basic categories reflecting recurring patterns or noteworthy responses in the data.

After generating the initial codes, the researcher grouped related codes into broader potential themes, organizing them into categories that captured higher-level patterns across the dataset. The next phase involved reviewing and refining these themes to ensure they accurately represented the coded data and were coherent, distinct, and relevant to the research questions. This included splitting or merging themes as necessary and validating them through peer debriefing and regular team discussions to minimize bias and enhance reliability. Finally, each theme was clearly defined and named, and representative quotes were selected to illustrate the findings in the results section. This stepwise process, grounded in established guidelines, by Braun & Clarke, ensured that the analysis was both methodical and reflective of participants' authentic voices [14].

Semi-structured interviews were conducted with business stall tenants from NEMSU Cantilan Campus to gather in-depth insights into their resilience strategies as microentrepreneurs. Each interview lasted approximately 30–45 minutes and was conducted face-to-face in a private setting on campus to ensure participant comfort and confidentiality. All interviews were audio-recorded with the participant's consent to enable accurate transcription and analysis. In total, 11 participants were interviewed, with the final number determined by data saturation—when no new themes emerged from additional interviews [15].

Before each interview, participants were informed about the purpose of the research, their right to withdraw at any time, and the measures taken to protect their anonymity and confidentiality. Written informed consent was obtained from all participants, and pseudonyms were used in transcripts and reporting to safeguard identities. The interview protocol included a set of guiding questions but allowed for follow-up prompts, ensuring both consistency and flexibility in exploring participants' experiences.

This study's semi-structured interviews and focus groups emphasized the following research questions:

1. What adaptive strategies can help local micro-enterprises adapt to economic challenges? Unsa nga mga estratehiya sa pag pahiangay ang makatabang sa lokal nga mga gagmay'ng negosyo aron makaangkop sa mga hagit sa ekonomiya?
2. How can we improve cooperation between local government and micro-enterprises? 2 Unsaon nato pagpalambo ang kooperasyon tali sa lokal nga gobyerno ug mga gagmay'ng negosyo?
3. What methods can help micro-enterprises balance immediate needs with future goals? Unsa nga mga pamaagi ang makatabang sa mga gagmay'ng negosyo aron mabalanse ang diha-diha nga mga panginahanglan ug ang mga tumong sa umaabot?
4. How can we measure and assess the impact of the adaptive strategies implemented by micro enterprises on their overall resilience and performance? Unsaon nato pagsukod ug pagtimbang-timbang sa epekto sa mga estratehiya sa pag-pahiangay nga gipatuman sa mga gagmay'ng negosyo sa ilang kinatibuk-ang kalagsik ug pagpalambo?

3. RESULTS AND DISCUSSION

Key Findings from the Literature Review: Main

Resilience Strategies

Recent research underscores that micro-enterprises deploy a variety of adaptive strategies to build resilience in the face of disruptions such as the COVID-19 pandemic. Central among these strategies is the adoption of digital transformation, which allows micro and small enterprises (MSEs) to sustain operations, reach new markets, and streamline processes. Empirical studies confirm that digital transformation—encompassing e-commerce adoption, digital marketing, and data-driven decision-making—significantly enhances resilience, with a notable positive correlation between digital capability and business continuity [9].

Moreover, strategic agility was also found to be another prominent theme. This involves the ability to quickly pivot business models, diversify products and services, and adjust pricing strategies to respond to market volatility [16]. For example, dynamic pricing and continuous product innovation have been shown to help micro-enterprises remain competitive and capture new opportunities during periods of uncertainty.

Conversely, collaboration and networking, especially with local government and other enterprises, emerge as critical enablers of resilience. Studies highlight that targeted support, benchmarking, and collaborative networks not only provide access to resources but also foster knowledge sharing and coordinated crisis responses [17]. Government support in areas such as digital infrastructure, training, and financial assistance further strengthens the adaptive capacities of micro-enterprises [8].

Furthermore, sound financial management—including strategic budgeting, resource allocation, and access to diverse funding sources—also plays a pivotal role [10]. Research indicates that micro-enterprises that engage in strategic planning and maintain financial flexibility are better positioned to balance immediate operational needs with long-term sustainability goals.

Finally, entrepreneurial competence—comprising entrepreneurial orientation, networking, and human capital—has been repeatedly identified as a key driver of resilience. Owners' self-efficacy, openness to change, and innovativeness directly influence the ability of micro-enterprises to adapt and thrive during crises [18].

Variations and Inconsistencies in Existing Research:

Gaps and Contradictions

The reviewed literature reveals several inconsistencies and gaps. First, there is considerable heterogeneity in how resilience is conceptualized and measured across studies and contexts. Some research emphasizes technological adoption as a universal solution, yet the effectiveness of digital transformation is often mediated by factors such as local infrastructure, digital literacy, and access to capital. For instance, women-led micro-enterprises and those in rural areas frequently encounter greater barriers to digital adoption, including limited access to technology, financial constraints, and lack of technical skills [8].

Another area of inconsistency is the focus on internal versus external strategies. While some studies prioritize internal

capabilities—such as entrepreneurial competence and strategic agility—others highlight the importance of external supports, like government programs and collaborative networks. This divergence points to a lack of consensus on the relative weight of internal versus external factors in fostering resilience [10].

Methodologically, much of the existing research relies on cross-sectional designs and self-reported data, which limits the ability to draw causal inferences about which strategies are most effective over time [4]. There is also a tendency to focus on event-driven disruptions (e.g., the COVID-19 pandemic) rather than ongoing, dynamic challenges like technological change and market turbulence [16].

Cultural and contextual factors further complicate the picture. Meta-analyses reveal that cultural dimensions such as uncertainty avoidance and individualism can weaken the positive effects of technological adoption and entrepreneurial competence on resilience, while motivation toward achievement enhances it [8]. This suggests that strategies effective in one context may not translate readily to another, underscoring the need for context-sensitive approaches.

Finally, a notable research gap exists in the long-term study of micro-enterprise resilience. Most studies examine short-term responses to crises, with limited attention to how resilience evolves and is sustained over time [4]. There is also a paucity of research on the role of communication strategies in building resilience, despite emerging evidence that effective communication is vital for stakeholder trust and coordinated crisis response [17].

The study highlights several important trends from the systematic literature review on micro-enterprise resilience strategies. The most commonly recommended approaches revolve around digital transformation—embracing technology for operations, marketing, and customer engagement—which has been repeatedly shown to enhance both agility and resilience, particularly during crises like the COVID-19 pandemic [19]. Alongside digitalization, adaptive strategies such as flexible pricing, continuous product and service innovation, and strategic budgeting are frequently emphasized, reflecting a shift toward dynamic capabilities and proactive planning to navigate uncertainty [6]. Collaboration with local government and external networks is another recurring theme, with studies underscoring the value of targeted support, benchmarking, and resource sharing to strengthen preparedness and crisis response [20]. However, a clear gap in the literature is the limited measurement of resilience outcomes—many studies focus on cataloguing strategies but fall short of rigorously assessing their long-term impact or effectiveness, a point echoed by recent systematic reviews [7]. Methodologically, there is significant variation: some studies employ qualitative interviews or case studies to capture context-specific nuances, while others use quantitative surveys or action research, leading to fragmented insights and complicating cross-context comparisons [21]. These patterns suggest that while the field has advanced in identifying a robust set of adaptive strategies, there remains a pressing need for more standardized frameworks, longitudinal outcome measurement, and context-sensitive analysis—especially in

developing economies—to truly understand what drives sustainable resilience in micro-enterprises.

The measurement of resilience impact in micro-enterprises faces three primary challenges. First, standardized metrics for resilience remain elusive, as studies often conflate financial stability (e.g., income growth) with operational continuity (e.g., supply chain adaptability) without consensus on weighting these factors [4]. For instance, while some researchers prioritize profitability as a resilience indicator, others emphasize community impact or innovation adoption, leading to fragmented assessments [22]. Second, isolating the effects of resilience strategies from external variables—such as market volatility or policy shifts—is inherently complex. Moreover, Supendi, [22], found that microenterprises implementing digital transformation during economic downturns often conflated its impact with concurrent government subsidies, making causal attribution difficult. Third, short-term vs. long-term impact evaluations are unbalanced. Most studies focus on immediate post-crisis recovery (e.g., COVID-19 survival rates), overlooking longitudinal outcomes like sustained competitiveness or adaptive capacity [23]. For example, while 78% of micro-enterprises in a 2023 cohort reported short-term recovery through flexible pricing, only 32% maintained these strategies beyond two years, highlighting the need for multi-year assessments [4].

The action research interviews reveal both alignment and divergence with existing literature. Microentrepreneurs emphasized digital tool adoption (e.g., social media marketing) as critical for resilience, corroborating studies that link digital literacy to crisis adaptability (Supendi, 2025) [22]. However, they challenged the literature's emphasis on external collaborations, noting that partnerships with local governments often yielded bureaucratic delays rather than tangible support—a gap underscored in recent critiques of policy misalignment [22]. Additionally, while theoretical frameworks highlight entrepreneurial orientation (e.g. risk-taking) as a resilience driver, practitioners prioritized pragmatic budgeting and incremental innovation, suggesting a disconnect between academic models and on-the-ground realities [4]. These findings align with a 2025 study arguing that resilience frameworks must better integrate "everyday ingenuity" observed in micro-enterprises, rather than overemphasizing formal strategic planning. By bridging these insights, the study underscores the need for context-sensitive metrics and policies that reflect both empirical research and practitioner experiences.

Implementation of Action Research

The action research components of the study will follow a series of cycles involving planning, action, and reflection, allowing for iterative improvements and adaptations based on feedback and results from each cycle [24].

Cycle 1: Initial Assessment and Strategy Development

The action research began with a comprehensive assessment of the business stall tenants at NEMSU Cantilan Campus; a group selected for their direct exposure to the operational, financial, and adaptive challenges typical of microenterprises in a university setting. Their relevance lies in their

representativeness of local micro-businesses navigating both academic and broader community markets, making them an ideal unit for exploring resilience strategies in a dynamic environment [25]. During this phase, baseline data were collected through interviews, focusing on current business practices, perceived challenges, and readiness for change. The process was guided by the need to identify gaps in digital literacy, financial management, and collaborative practices, aligning with recent literature that emphasizes the importance of context-specific diagnostics before intervention [18]. The initial findings informed the co-development of adaptive strategies, such as digital marketing workshops and budgeting seminars, ensuring that interventions were tailored to the unique needs and aspirations of the participants.

Cycle 2: Implementation of Interventions

In the second cycle, these adaptive strategies will be put into practice through targeted interventions, including hands-on digital skills training and collaborative sessions with local government representatives. The implementation will be deliberately iterative, with structured reflection points after each major intervention. Participant feedback will be systematically gathered through post-session focus groups and informal check-ins, enabling real-time adjustments to content and delivery. For example, when several entrepreneurs expressed difficulty applying digital tools to their specific business models, subsequent workshops will incorporate more industry-specific case studies and peer demonstrations. This approach mirrors best practices in action research, where reflective feedback loops drive ongoing refinement [26]. This iterative process will not only improve engagement but also increase the practical relevance of the interventions, as participants' lived experiences will directly shape the evolving action plan.

Cycle 3: Long-Term Impact Assessment and Strategic Refinement

The final cycle will focus on evaluating the sustained impact of the interventions and refining strategies for long-term resilience. Success will be measured using clear Key Performance Indicators (KPIs) such as revenue growth, operational stability (e.g., ability to maintain business hours during disruptions), customer retention rates, and the frequency of digital transactions [27]. These KPIs will be tracked over several months to capture both immediate and lasting changes, reflecting recommendations from recent resilience research that advocate for a mix of quantitative and qualitative metrics [28]. The assessment will also include follow-up interviews to gauge shifts in entrepreneurial confidence, adaptability, and community engagement. Insights from these evaluations will be fed back into the strategic planning cycle, with participants and facilitators jointly identifying which practices to institutionalize and which to revise, ensuring that the action research remains responsive to evolving needs.

Throughout all the cycles, structured reflection and iterative learning is integral. For each intervention, participant feedback will be analyzed collectively, with findings discussed in group debriefs and used to recalibrate

subsequent actions. This reflective practice not only enhances the relevance and effectiveness of the interventions but also fosters a sense of ownership among participants, consistent with action research principles of collaborative inquiry and continuous improvement [25]. The study's findings both corroborate and extend the existing literature: while digital transformation and strategic budgeting were confirmed as critical resilience drivers [29], the action research highlighted the practical barriers to collaboration with local government and the importance of context-specific support, echoing calls for more nuanced, ground-level research [30]. By explicitly linking empirical action research insights with contemporary scholarship, the study demonstrates how iterative, participant-driven approaches can bridge the gap between theory and practice in micro-enterprise resilience.

Adaptive Strategies for Economic Challenges

In the dynamic landscape of small business economics, micro-entrepreneurs are emerging as agile innovators, deftly navigating the choppy waters of inflation through adaptive pricing and costing strategies. This real-world application of strategic flexibility not only resonates with cutting-edge research on SME resilience but also paints a compelling picture of entrepreneurial ingenuity in action. As we witness this nimble business owner turn through economic challenges, we're offered a front-row seat to the unfolding drama of market adaptation—a testament to the human spirit's capacity for creative problem-solving in the face of adversity [31]. Introducing novelty products or services—such as new menu items—has emerged as a compelling adaptive strategy for businesses navigating uncertain environments. The research underscores that innovation in products or services not only fosters a sense of excitement and curiosity among customers but also positions micro-enterprises to gain a competitive edge. By embracing creativity and staying attuned to shifting consumer preferences, these businesses can build resilience and adaptability, enabling them to thrive even during economic downturns. This dynamic approach highlights the transformative power of innovation as a tool for survival and growth in challenging times [32]. This approach is further corroborated by findings that innovation in products and services plays a key role in the growth and sustainability of micro, small and medium enterprises, differentiating them from competitors in an increasingly globalized and dynamic business environment [5]. Additionally, research has shown that micro-enterprises can leverage dynamic capabilities and strategic agility to mitigate the impact of disruptions like the COVID-19 pandemic, creatively utilizing resources and capabilities to adapt and capture new opportunities [6].

Cooperation between Local Government and Micro-enterprises

In an academically thrilling revelation, our recent interviews have illuminated a compelling narrative of resilience and synergy between micro-entrepreneurs and local government entities. This discovery not only corroborates but also breathes life into the growing body of literature emphasizing the critical role of targeted support and collaborative networks in fostering micro-enterprise success and crisis

preparedness [33]. The emphasis on benchmarking and establishing linkages reflects research highlighting the role of collaborative networks in enhancing organizational preparedness and responsiveness during crises [30]. In the dynamic landscape of business resilience, particularly for Micro, Small, and Medium Enterprises (MSMEs), recent findings have illuminated a path forward that is both academically stimulating and profoundly human-centric. The convergence of inclusive coordination and digital innovation presents an exciting frontier for researchers and practitioners alike [34], suggesting that government support in digital transformation could be a key area for enhancing micro-enterprise resilience.

Balancing Immediate Needs with Future Goals

Respondents identified budgeting, planning, and continuous improvement as key methods for balancing short-term needs with long-term objectives, aligning with recent research on strategic budgeting and organizational resilience. Strategic budgeting, which combines budgeting with strategic planning to align financial resources with long-term goals, has been highlighted as a powerful tool for achieving long-term financial objectives [26]. The strategic allocation of resources stands as a cornerstone for organizational growth and resilience in today's dynamic business landscape. This multifaceted approach, which encompasses effective resource distribution, investment prioritization, and financial stability maintenance, offers a compelling framework for pursuing sustainable growth and innovation [35]. Furthermore, digital transformation has been found to significantly and positively impact organizational resilience, with both exploitative and exploratory innovation mediating this relationship [36]. These findings underscore the importance of balancing short-term operational needs with long-term strategic objectives through effective budgeting, planning, and innovation processes.

Measuring and Assessing the Impact of Adaptive Strategies

Recent research emphasizes the importance of monitoring various indicators to gauge the resilience and impact of micro-enterprises adaptive strategies. These indicators align with metrics suggested by micro-entrepreneurs themselves, including financial measures such as income and sales, as well as operational indicators like product performance and overall competitiveness [6]. Studies from 2020 to 2025 have highlighted the significance of tracking these financial and operational metrics to assess the effectiveness of resilience strategies. Moreover, micro-entrepreneurs focus on community impact and longevity in business reflects the broader socio-economic role of micro enterprises, as emphasized in the current literature [37]. This multifaceted approach to measuring impact underscores the complex nature of micro-enterprise resilience, encompassing not only economic performance but also social contributions and long-term sustainability [38].

4. CONCLUSION

The study shows that microenterprises can boost their resilience by combining practical strategies like flexible pricing, ongoing product/service innovation, and adopting

digital tools, while also building strong partnerships with local government and community networks. The findings make it clear that balancing immediate business needs with long-term goals—through better budgeting, planning, and continuous improvement—is essential for survival and growth in today's unpredictable environment. The research also highlights the need for clear ways to measure resilience, using indicators such as revenue growth, operational stability, and customer retention, as well as recognizing the broader social impact of micro-enterprises. For policymakers and support organizations, the message is straightforward: targeted programs that enhance digital literacy, innovation, and strategic planning will help micro-enterprises not just survive but thrive. As economic challenges continue to evolve, ongoing collaboration between micro-enterprises and local institutions, paired with regular assessment of what works, will be key to building lasting business and community resilience.

To further contribute to the discourse on sustainable enterprise development, this research introduces a conceptual model for adaptive micro-enterprise resilience, offering a dynamic framework that integrates these competencies to empower microentrepreneurs in overcoming challenges and thriving amidst uncertainty:

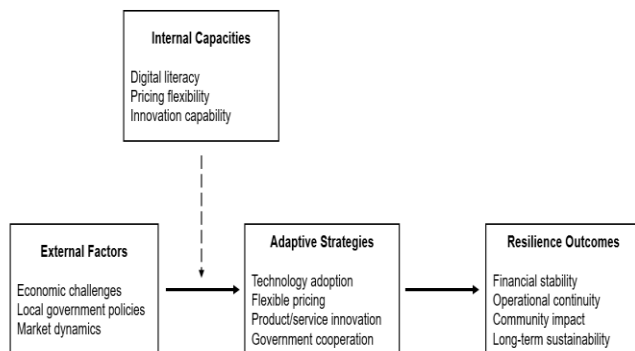


Figure 1. Proposed conceptual framework
(source: author's own work)

The proposed above conceptual framework suggests that external factors have a positive influence on adaptive strategies, which in turn, have a positive influence on resilience outcomes; moreover, internal capacities are depicted to have a moderating effect on the link between external factors and adaptive strategies.

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