

Leveraging Technology for Sustainable Growth: An Analysis of Micro, Small, and Medium, Enterprises (MSMEs) in Iloilo Province during the Post-Pandemic Milieu

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Abstract: This research examined how MSMEs in Iloilo Province adopted digital transformation during the post-pandemic era. Adopting narrative inquiry, data were gathered using focus group discussions, online interviews, and surveys among 25 owners and managers of MSMEs in both rural and urban settings. Through the Technology–Organization–Environment (TOE) framework, the research identified drivers and challenges of digital adoption. Participants explained experiences applying e-commerce sites, mobile apps, and automation software to keep businesses going. By analyzing cases of Panublion Handicrafts, Farm to Kariton, and Innovate Iloilo, the study emphasized sector-specific innovations and adaptations. Results indicated that digital technologies increased customer interaction, operational efficiency, and market exposure, amidst financial challenges and limited infrastructure. The research provides policy insights for policymakers, development actors, and support institutions that seek to enhance MSME resilience and inclusive digital development in provincial environments.

Keywords: Digital Transformation, MSMEs, Post-Pandemic Recovery, Narrative Inquiry, Technology Adoption

1. Introduction

MSMEs are the lifeblood of developed and developing economies alike, representing about 90% of all businesses and providing over half of all employment worldwide (World Bank, 2020). MSMEs role was amplified in developing economies, not only to contribute significantly to economic activity but are also critical to innovation, regional development, and ensuring an even distribution of income (Cueto et al.2022; OECD,2017). In the Philippines, MSMEs account for 99.52% of businesses and 63% of employment, enhancing inclusive entrepreneurship and regional resilience (DTI, 2018). MSMEs also enhance inclusive entrepreneurship and community resilience, especially for the underprivileged and geographically scattered areas.

Today, being relevant and competitive requires more than the traditional means of conducting business. Digitalization has become a vital strategy for MSMEs to streamline operations, reach wider markets, and adapt to a dynamic consumer behavior (Mazzarino, 2020; Porter & Heppelmann, 2014). Even before the outbreak of the COVID-19 pandemic in the Philippines, a strong trend had already been noted among MSMEs as they adopted digital technology, driven by policies that promoted technological innovation and provided access to digital resources (Asia-Pacific MSME Trade Coalition, 2019; Dinh et al., 2020).

The pandemic hastened the shift. The Philippine economy shrunk by 9.5% in 2020, a stark witness to the impact of the pandemic (Asian Development Bank, 2020; Blanza, 2023). Due to thin margins, MSMEs were vulnerable. Many suffered in revenue decrease, supply chain disruption and witnessed consumer demand plunge. These vulnerabilities created an urgent necessity for digital transformation, and businesses responded by shifting to e-commerce, adopting contactless transactions, enforcing remote work arrangements, and strengthening online customer service (Priyono et al., 2020; Sharma & Rai, 2023; Gumasing, 2022). More than just operational changes, these shifts signify fundamental reimagining of business practices.

Iloilo Province, Philippines offers a compelling topic for investigation. Its blend of rural and urban economies presents rich microcosms of opportunities and challenges in digital transformation. Despite their resilience, many MSMEs in the province face barriers like poor infrastructure, low digital literacy, and uneven policy enforcement (UP Visayas, 2018). Additionally, the province's rich economic heritage and strong MSME profile offer a valuable context for exploring digital transformation amid economic and cultural diversity.

To systematically explore these dynamics, this study uses Tornatzky and Fleischer's (1990) TOE approach. This framework allows for a systematic exploration of digital adoption of MSMEs, considering internal capabilities and resources within the Organization Context, external pressures and opportunities in the Environment Context, and the nature of the technologies within the Technology Context. Applying the TOE framework to Iloilo's MSMEs, this research aligns with digital transformation best practices while highlighting an often-overlooked context.

There is dearth in literature on MSMEs especially in provincial regions like Iloilo. Likewise, most studies are focusing on large companies which have more resources and have already built digital infrastructures. Moreover, while various studies examine immediate reactions after the pandemic, few investigate long-term recovery approaches and the continuous adoption of digital practices. It is with this study that we attempt to address two critical gaps: the lack of empirical focus on MSMEs in less-urbanized settings in the Philippines and the limited application of holistic frameworks like TOE in these situations. Through this initiative, the study provides insights and recommendations for MSME stakeholders by mapping Iloilo's digitalization journey, highlighting key challenges, enablers, and innovations to inform sustainable regional and national planning.

1.1 Objectives of the Study

This study aims to evaluate the post-COVID 19 digital technology adoption by MSMEs in Iloilo Province, providing a roadmap for sustainable growth and future resilience. Specifically, the study aimed to achieve the following objectives:

1. To determine baseline level of technological integration among MSMEs in Iloilo before and after the onset of the pandemic;
2. To challenges and barriers did these enterprises encounter during their digital transformation journey;
3. To identify the notable successes, innovations, and best practices that have been embraced by MSMEs in Iloilo's digital transformation;
4. To provide actionable insights and recommendations that can be derived from the study's findings to enhance support for the digital evolution of MSMEs in the Iloilo region.

2. Review of Related Literature

2.1 Digital Transformation and MSMEs

Digitalization drives MSME competitiveness by streamlining operations, enhancing customer experience, and opening new markets in today's tech-driven economy (Bharadwaj et al., 2021; OECD, 2021). Current studies demonstrate that MSMEs that utilize digital solutions are significantly faster and more adaptive to market changes (Vial, 2019; Kane et al., 2023). This shift was accelerated by COVID-19 pandemic, forcing MSMEs to rely on digital solutions ensuring business continuity during worldwide disruptions (World Bank, 2022; UNCTAD, 2021).

Digitalization enables MSMEs overcome the constraints of market access, enabling remote work, digital payments, and customer insights through data (Li, Liu, & Zhao, 2021). Automated inventory, customer support online, and social media marketing are now critical tools in sustaining businesses, particularly in locations where resources are scarce (Balida et al, 2022). However, the success of transformation often rests on the ability of an MSME to adjust, their awareness and degree to which digitalization was embedded in their strategic considerations (Sharma & Rai, 2023).

2.2 Impacts of the Pandemic on MSMEs Globally and Regionally

COVID-19 exposed MSME vulnerabilities, including revenue losses, supply disruptions, and closures (ILO, 2022). In Southeast Asia, tourism, food, and retail, among others, experienced severe declines, through mobility restrictions and changes in demand (ASEAN, 2021). To recover, MSMEs shifted to digital models, emphasizing online sales, virtual services, and contactless transactions. (OECD, 2022).

In the pandemic's first year, Philippine MSME e-commerce registrations rose by 45% (DTI, 2022). This growth shifted digital tools from support roles to essential drivers of MSME development and resilience (Saarikko, Westergren, & Blomquist, 2020). Digitally adopting MSMEs rebounded and innovated better, but gaps in access and tech capability persist (Abdelrahim et al., 2023).

2.3 Barriers and Enablers to Digital Transformation

Despite their potential, digital adoption by MSMEs is hindered by financial, skill, and infrastructure gaps (Balida, 2024), particularly in underdeveloped areas (Verma et al., 2023; World Bank, 2022). MSMEs often lack formal IT strategies, and decision-makers may be hesitant due to perceived complexity and cybersecurity risks (Mazzarino, 2021). Digital uptake is boosted by enablers like tax incentives, upskilling programs, and infrastructure support

from the government (OECD, 2022; DTI, 2022). Furthermore, the rising demand for digital transactions and marketplaces creates new revenue opportunities for MSMEs, while tech partnerships and digital ecosystems boost access to innovation and support (Parviainen et al., 2020; Hou et al., 2020).

2.4 Outcomes of Digital Transformation

Westergren, Holmström, and Mathiassen (2022) emphasized that effective digital adoption brings MSMEs key benefits like efficiency, cost savings, and customer loyalty, driven by data-informed decisions and real-time services. Meanwhile, e-commerce drives MSME internationalization, reducing reliance on physical stores (UNCTAD, 2021). On the other hand, automation, AI forecasting, and CRM systems enhance MSME agility and scalability, especially in volatile times (Bughin et al., 2020; Kane et al., 2023). Digital innovation also fosters continuous learning and adaptation. However, these gains require sustained investment, strategic planning, and supportive institutions (Sharma & Rai, 2023).

2.5 Case-Based Insights into MSME Digital Adaptation

Iloilo MSMEs show how digital innovation addressed pandemic challenges, offering sector-specific insights beyond broad global trends. One classic example is how Panublion Handicrafts, used social media, virtual workshops, and online partnerships to stay afloat during hard hit by the pandemic. These efforts retained local customers and opened global markets, showing how heritage firms can thrive through digital innovation (Lopez, 2022; Ong, 2021). In the agricultural space, Farm to Kariton swiftly adopted mobile apps and local logistics to go direct-to-consumer, bridging supply gaps and building a loyal base, proving digital models work for perishables (Santos, 2021; Villanueva, 2022). Finally, Innovate Iloilo, a tech incubator, used digital platforms to sustain and grow its ecosystem through virtual mentorships and global webinars, expanding partnerships despite lockdowns (Reyes, 2021; Tan, 2022). These concrete field examples reflect broader research linking digital agility to MSME resilience (UNCTAD, 2022; OECD, 2021) and underscore the TOE framework's value in explaining how environments shape digital adoption.

3. Methodology

3.1 Research Design and Methods

This study adopted a qualitative approach using narrative inquiry, to explore how MSMEs in Iloilo Province traversed the volatile path of digital transformation during the COVID-19 crisis. The research design yielded rich insights into MSME stakeholders' experiences, strategies, and perceived enablers and barriers (Creswell & Poth, 2018). Narrative inquiry and the art of meaning making were used to deeply explore business transformations through MSME owners' and managers' personal stories (Clandinin, 2016). To enrich data and broaden scope, the study used a mixed-method design with structured questionnaires, enabling theme development, trend analysis, and data triangulation (Fetters et al., 2013). It also applied the TOE framework to assess the fit between internal capabilities, external pressures, and technology use (Tornatzky & Fleischer, 1990).

3.2 Population and Sampling

Using purposive and snowball sampling, the study targeted MSME owners and decision-makers, e.g., operations or marketing manager, actively involved in or responsible for digital transformation projects during or after the pandemic. This criterion ensure that the information obtained reflected both strategic and operational perspectives toward digital uptake (Palinkas et al., 2015). The study involved 25 participants, 10 in two face-to-face focus groups and 15 in Zoom interviews, balanced between urban and rural MSME owners from sectors like food, handicrafts, agri-business, retail, and digital services. See Table 1 for details.

Table 1: Distribution of Participants

Data Collection Method	Population Criteria	Number of Participants
Face-to-Face Focus Group	MSME owners/managers (urban/rural)	10
Online Interviews	MSME owners/managers (urban/rural)	15
Total		25

3.3 Data Collection Methods

Data were collected using two qualitative methods: (1) face-to-face focus group discussions and (2) web-based semi-structured interviews from January to March 2024. The focus groups were organized in collaboration with local chambers and business enterprise centres, which helped connect the researchers with verified MSME operators. Each 90-minute session explored shared experiences, challenges, and coping strategies and was audio-recorded with participants' informed consent. Semi-structured online interviews, lasting about 45 minutes each, accommodated participants in various locations or those unable to attend in person. Interviews focused on digital adoption drivers, challenges, and operational shifts.

A pre-interview survey was distributed to all participants, collecting data on demographics, digital technology use, business size, and perceived post-pandemic performance. This two-mode approach enabled methodological triangulation and enhanced internal validity (Bryman, 2016). Ethical protocols were implemented including informed consent, assurance of anonymity, and participants' right to withdraw at any time.

3.4 Data Analysis

The interview transcripts were analysed using thematic analysis and axial coding to reveal emerging themes and identify underlying patterns. The reviews of the three cases (Panublion Handicraft, Farm to Kariton, and Innovate Iloilo) supported the findings by emphasizing into the challenges they encountered and the successes they reached. Comparative analysis of different cases drew out the similarities and differences in their challenges and digital solutions. This methodology provided a rich understanding of MSMEs' experiences, as well as useful insights into their adaptation strategies in a constantly changing digital landscape.

4. Findings and Discussion

This section presents key themes from the experiences of Iloilo MSMEs during and after the pandemic. Drawing from interviews, surveys, and case narratives, it highlights major challenges, digital strategies, and outcomes. The findings offer insights into how MSMEs adapted, innovated, and transformed in response to a rapidly changing business environment.

Table 2: Can you describe the most significant challenges your business faced during and after the pandemic?

Challenge Themes	Specific Issues Encountered
Financial Strain	Reduced revenue and profitability
	Cash flow and liquidity concerns
	Increased operational costs
	Difficulty accessing financial support
Adaptation and Digital Transformation	Swift transition to remote work
	Initial hurdles in adopting digital tools
	Shortage of technological skills
	Balancing online and offline strategies
Supply Chain Disruptions	Delays in sourcing raw materials
	Logistic challenges and transportation issues
	Inconsistencies in supplier deliveries
	Increased costs due to scarcity of goods
Workforce and Employee Well-being	Remote work challenges
	Employee burnout and mental health concerns

Challenge Themes	Specific Issues Encountered
	Maintaining productivity in remote setup
	Addressing health and safety concerns

Table 2 highlights the complex challenges Iloilo MSMEs faced during the post-pandemic period. Financial strain marked by revenue loss, cash flow issues, and limited access to support was widespread (OECD, 2020). The shift to digital platforms introduced integration hurdles and skill gaps (Cueto et al., 2022). Disrupted supply chains and rising input costs compounded operational difficulties (UNCTAD, 2021). Remote work further intensified concerns around productivity, mental health, and employee well-being (ILO, 2021), reflecting the multifaceted nature of MSMEs' adaptation struggles.

Table 3: How did technology play a role in overcoming these challenges?

Challenge	Role of Technology
Financial Strain	Online platforms expanded customer reach. Digital payment systems enabled contactless transactions. Automation improved operational efficiency. Online financial platforms eased loans' access.
Adaptation and Digital Transformation	Collaborative tools supported remote work. Webinars bridged the skills gap. Online courses build digital skills. Hybrid models offer customer flexibility
Supply Chain Disruptions	Supply chain software enabled real-time tracking/sourcing. logistics platforms optimized deliveries. Communication tools improved suppliers coordination.
Workforce and Employee Well-being	Collaboration software kept remote teams connected. Well-being apps addressed mental health concerns. Project management tools sustained remote productivity. Health apps supported work place safety.

Table 3 underscores the vital role of digitalization in addressing MSME challenges. Online platforms and digital payments stabilized revenues (OECD, 2020), while automation reduced operational costs (World Bank, 2021). Remote collaboration tools and online training mitigated skill gaps and supported virtual operations (ILO, 2021). Hybrid models allowed flexibility in service delivery (UNCTAD, 2021). Supply chain issues were addressed through real-time tracking and AI-driven inventory systems (PwC, 2020). Workforce well-being was supported by digital tools promoting communication, productivity, and health. As Cueto et al. (2022) note, digitalization is now a core strategy for resilience and growth, not merely a technological upgrade.

Table 4: Were there any technologies or digital strategies that proved exceptionally beneficial for your business?

Theme	Technologies or Strategies
Innovations in Sales and Marketing	E-commerce Platforms, Social Media Advertising, Influencer Collaborations
Operational Efficiency and Automation	Inventory Management Software ,CRM Systems , Automated Workflows
Customer Engagement and Experience	Personalized Email Campaigns ,Live Chat Support , Customer Feedback Platforms
Supply Chain Optimization	Real-time Tracking and Monitoring, Supplier Collaboration Platforms Demand Forecasting Tools
Remote Work and Collaboration	Video Conferencing Tools, Cloud-based Collaboration Suites Virtual Team Management Tools

Table 4 shows that MSMEs use digital tools to boost visibility, streamline operations, and engage customers. E-commerce and social media drive sales (OECD, 2020), while CRM and automation enhance efficiency (World Bank, 2021). Tools for customer interaction and supply chain tracking improve responsiveness (UNCTAD, 2021; PwC, 2020). Remote work is supported by collaboration platforms, reinforcing that digital adoption improves both business performance and customer experience (Cueto et al., 2022).

Table 5: What motivated you to adopt or resist certain technological tools or platforms?

Themes	Sub-Themes	Motivations/Resistance Factors
Business Needs and Goals	Improving Customer Engagement	Primary driver for technology adoption
	Enhancing Operational Efficiency	Motivated adoption to streamline processes
	Expanding Market Reach	Desire to reach new markets fueled adoption
Resource Constraints	Budget Limitations	Limit and restrict adoption
	Limited Technical Expertise	Skills gap hindered adoption
	Time and Resource Allocation	Resources constraints influence choices
Perceived Benefits	Potential for Increased Revenue	Significant motivator for adoption
	Competitive Advantage	Desire to stay ahead drove adoption
	Improved Customer Experience	Improved engagement encourage adoption
Technological Literacy	Willingness to Embrace Innovation	Openness supported adoption
	Lack of Familiarity or Comfort	Resulted in resistance to adoption
	Training and Skill Development	Adoption depended on training

Table 5 shows that MSMEs adopt digital tools to improve engagement, efficiency, and market reach (Vial, 2019; Bharadwaj et al., 2021). However, barriers like cost, limited skills, and resource gaps persist, especially in provincial areas (Balida, 2024; Verma et al., 2023). Motivators include revenue growth and competitiveness, while adoption is influenced by digital literacy and training access (Sharma & Rai, 2023; Abdelrahim et al., 2023), aligning with the TOE framework’s focus on organizational and environmental factors (Tornatzky & Fleischer, 1990).

Table 6: How has digital transformation positively impacted customer engagement?

Themes	Sub-Themes	Notable Observations
Successful Implementations	Improved Customer Engagement	Improved customer interactions.
	Enhanced Operational Efficiency	Processes became more efficient.
	Expanded Market Reach	New markets were reached.
Challenges Faced	Technical Hurdles	Technology integration was challenging.
	Change Management	Transition management was difficult.
	Resource Constraints	Limited sources slowed progress.
Lessons Learned	Importance of User Adoption	User buy-in was essential to success.
	Need for Adequate Planning	Planning was crucial for success.
	Continuous Learning and Adaptation	Continuous adoption was needed.

Table 6 shows that MSMEs pursue improved engagement, efficiency, and market reach through digital tools. However, they face challenges in technology integration, change management, and limited resources (Verma et

al., 2023; Balida, 2024). As noted by Sharma and Rai (2023), success depends on user buy-in, strategic planning, and adaptability to evolving digital trends.

Table 7: How supportive or challenging did you find the environment (e.g., local regulations, customer behaviors, competition) in Iloilo for your digital transformation efforts?

Environmental Factors	Themes	Responses' Observations
Supportive Factors	Local Regulatory Support	Supportive policy aided transformation.
	Customer Behavior and Demand	Customers embraced digital offerings.
	Collaboration and Networking	Local networking boosted efforts.
Challenging Factors	Complex Regulatory Landscape	Complex regulations created barriers.
	Limited Digital Literacy	Digital unfamiliarity limited adoption.
	Intense Competition	Market competition was intense.
	Infrastructure Constraints	Poor infrastructure slowed progress.

Table 7 shows that Iloilo MSMEs face both enablers and barriers to digital transformation. Supportive policies, customer openness, and collaboration drive adoption (OECD, 2022), while complex regulations, low digital literacy, and weak infrastructure hinder progress (Balida, 2024; Verma et al., 2023). These factors shape the region’s digital landscape and affect MSME success.

Table 8: What advice would you offer to other MSMEs in Iloilo about leveraging technology for growth?

Themes for Successful Technology Integration	Key Advice for MSMEs
Operational Tips	Start small and scale gradually; Train employee continuously.
Customer Focus	Focus on customer needs and engagement.
Strategic Planning	Align technology with business goals; Stay updated and adaptive to trends.
Collaboration	Build network and collaborate; Explore partnerships
Risk Management	Prioritize cybersecurity and privacy; Establish contingency plans to mitigate risks.

Table 8 presents key strategies for tech-driven growth. Starting small, investing in training, and focusing on customer needs improve adoption (Saarikko et al., 2020). Aligning technology with business goals, monitoring trends, and fostering collaboration enhance resilience and innovation (Sharma & Rai, 2023). To mitigate risks, MSMEs must prioritize cybersecurity, data privacy, and backup systems—critical safeguards in digital integration (Mazzarino, 2021; Abdelrahim et al., 2023).

Table 9: Spotlight on Innovative MSME Entities in Iloilo Post-Pandemic

Entity	Background	Challenge	Adaptation	Outcome
Panublion Handicrafts	Traditional crafts with modern designs	Tourism decline	Boosted online presence: social media, workshops, e-commerce	Retained local clients, gained international buyers
Farm to Kariton	Organic produce supplier	Disrupted supply chains	Direct-to-consumer model via mobile apps, community partnerships	Increased loyal subscribers, positive local impact
Innovate Iloilo	Tech start-up hub	Loss of on-site interactions	Online mentorships, virtual networking, global webinars	Expanded global reach, increased overseas collaborations

Table 9 highlights how three Iloilo MSMEs adapted through digital innovation. Panublion Handicrafts used social media and e-commerce to retain local clients and attract international buyers (Lopez, 2022; Ong, 2021). Farm to Kariton adopted mobile platforms and local partnerships to address supply gaps and grow its customer base (Santos, 2021; Villanueva, 2022). Innovate Iloilo shifted to virtual mentorships and global webinars, expanding

reach and collaboration (Reyes, 2021; Tan, 2022). These cases reflect broader findings that link digital agility to MSME resilience and competitiveness (UNCTAD, 2022; OECD, 2021).

Table 10: Digital Adoption Rates among MSMEs in Iloilo

Digital Adoption Metric	Percentage of MSMEs
Adoption of at least one digital tool	82%
Online presence (websites, e-commerce)	70%
Use of digital marketing strategies	65%
Integration of digital payment systems	58%

Table 10 presents survey data on digital adoption among MSMEs in Iloilo during the post-pandemic period. Findings reveal that 82% of respondents adopted at least one digital tool, 70% established an online presence, 65% used social media marketing, and 58% integrated digital payments. These trends signal a strong shift toward digitalization, driven by changing consumer behavior and the need for operational resilience (UNCTAD, 2021; Abdelrahim et al., 2023). As digital platforms became essential for business continuity, MSMEs leveraged them to improve efficiency, expand reach, and meet evolving market demands (OECD, 2022; Sharma & Rai, 2023).

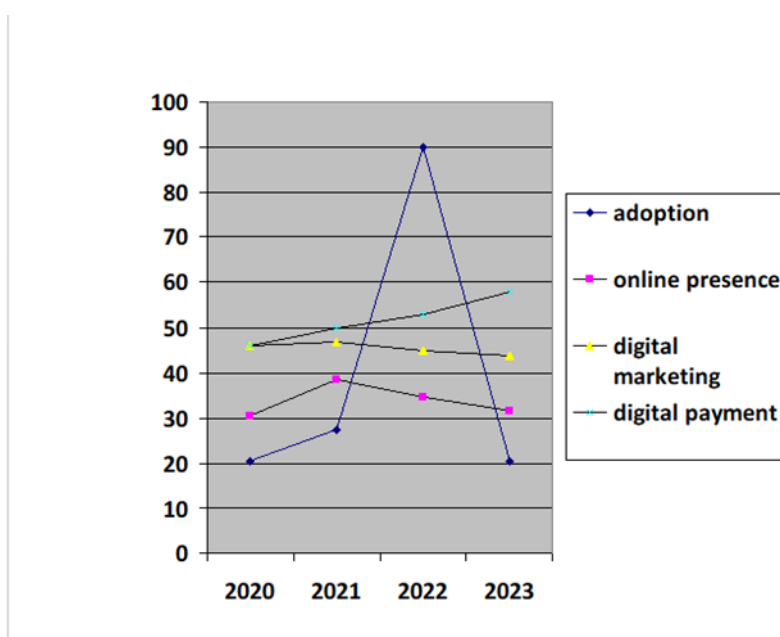


Figure 1: Line Graph Illustrating Digital Adoption Rates among MSMEs in Iloilo

Figure 1 illustrates the steady rise in digital adoption among Iloilo MSMEs from 2020 to 2023, marking their strategic pivot to technology-enabled operations in response to pandemic disruptions.

5. Implications of the Overall Findings

The study shows that digital transformation among Iloilo’s MSMEs has evolved from a reactive measure into a strategic approach reshaping how businesses operate, compete, and grow. Early adoption of digital tools—particularly in marketing, sales, and payment—demonstrates a strong shift toward digital integration with policy and regional development implications.

Findings highlight the need for stronger institutional support, including improved internet access in rural areas and advanced training in data analytics, cybersecurity, and e-commerce. MSMEs can drive regional recovery if equipped with digital finance access, tailored mentorship, and sector-specific support. Given varying levels of digital maturity, localized and context-driven interventions are essential.

Using the TOE framework, the study emphasizes that digital uptake is influenced by internal capacities, external pressures, and technological availability. Despite challenges, MSMEs are poised for innovation, provided they operate within an enabling ecosystem. A collaborative strategy involving government, academe, and industry is crucial to sustain inclusive, tech-enabled growth.

6. Conclusion and Recommendations

This study examined how MSMEs in Iloilo Province accelerated digitalization in response to the COVID-19 pandemic. Most enterprises adopted at least one digital tool, primarily online platforms, digital marketing, and cashless payments, reflecting a strategic shift in operations and customer engagement. Rather than temporary responses, these changes indicate deeper integration of digital practices. However, adoption remains uneven due to infrastructure gaps, limited digital skills, and fragmented policy support, particularly in rural areas.

To promote inclusive digital transformation, expanding broadband—especially in underserved areas—through public-private partnerships is crucial. Capacity-building must go beyond basic digital skills to include cybersecurity, data analytics, and e-commerce, in collaboration with universities, NGOs, and development agencies. Enhanced financial support through tax breaks, grants, and loans can enable MSMEs to invest in digital tools and formalize operations. Collaborative platforms for marketing and knowledge-sharing can foster peer learning and collective growth. A coordinated effort among government, academe, and industry is vital to build a resilient digital ecosystem.

Finally, agency like the DTI and local councils should implement evidence-based monitoring systems to track digital adoption and adjust policies accordingly. Collectively, these measures can create a resilient, inclusive, and innovation-driven MSME sector, where digitalization becomes a long-term strategy for sustainable growth beyond the pandemic.

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