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Driving Success in Micro-Digital Printing: The Impact of Financial Performance with the Mediating Role of Technological Innovations

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Abstract

Micro-digital printing businesses in Santa Cruz, Manila are on the rise as they respond to the increased levels of competition, changing customer demands, and the fast technological shifts. The study looked at the impact of the financial performance of a firm on the capability of the latter to invest in new digital printing technologies and the role of these investments on the daily operations and business performance through time. This study employed a quantitative, descriptive–correlational research design incorporating mediation analysis. Data were collected from a purposive sample of 100 participants, comprising owners, managers, and supervisors of printing establishments, with emphasis on both the functional and financial dimensions of their operations. The findings demonstrated a strong and statistically significant positive association between financial performance and technology adoption ($\beta = 0.643$, $p < .001$). This suggests that enterprises with greater financial stability are better positioned to invest in advanced machinery, thereby improving print quality and accelerating production processes. The analysis further revealed that financial capability and the utilization of modern technology function synergistically to sustain the viability of micro-digital printing enterprises. This interplay not only mitigates operational inefficiencies but also fosters resilience and steady growth, even within a highly saturated local market. In less complex terms, those who manage their resources properly are the ones who can maintain the improvements and keep up with the demands of modern printing operations. In its attempt to reinforce its performance and make it relevant in the rapidly changing printing industry, this study highlights the practical importance of financial stability that can be used to inform small printing businesses on the timing and manner of investing in new technology to ensure their long-term sustainability in the industry.

Keywords: micro-digital printing, financial performance, technology adoption, business growth, operational efficiency, competitiveness, small enterprises

INTRODUCTION

Printing remains a dynamic global industry, strengthened by evolving digital technologies that deliver faster, flexible, and customized solutions, empowering businesses, governments, and individuals with innovative services that enhance efficiency, personalization, and adaptability (Gelato, 2024; Lambert, 2022). In this context, printing is becoming a timeless industry, and it can adapt itself to the demands of the more digitalized world with relative comfort (1981 Digital, 2024; Smithers, 2023). This market is projected to reach USD 34.34 billion in 2025 and USD 48.51 billion in 2030, reflecting consumers' growing preference for individualized, adaptable printing services and sustaining demand for flexible, customer-driven solutions (Mordor Intelligence, 2025; Grand View Research, 2023). This transformation has greatly influenced micro and small enterprises, especially the introduction of micro-digital printing companies with small capital bases, although they make use of digital resource to cater to localized markets (ERIA, 2022; Atienza et al., 2024). Digital technologies in printing technologies, such as inkjet, laser, sublimation, and direct-to-garment printing, enable these enterprises to print on any medium, such as paper, vinyl, canvas, fabric, and glass, without using printing plates of traditional technologies (CMYK PH, 2021; Printify, 2025). These technologies allow micro enterprises to compete in terms of speed,

customization, and flexibility in their operations, particularly in urban high-density environments (Troise et al., 2022; Cueto et al., 2022).

In the Philippines, Santa Cruz, Manila, is emerging as a popular area for micro-digital printing shops (Manila City Hall, 2025; DTI, 2024) in which, more than 100 small print shops are registered catering to the needs of the students as well as professionals and micro-enterprises. These businesses, which typically are resource-constrained, employ less than 10 people and face reduced financial resources, thus, remain dependent on digital printing technologies to remain competitive (Lim et al., 2020; DAI, 2021). While technology is benefiting operations, the extent to which they embrace and use digital tools depends largely on their financial capacity and managerial capability (Abbas, 2024). Although the micro-digital printing businesses have become more significant in the local economies, very little attention has been given to the literature on how financial performance can be translated into business success with the adoption of technology, especially in micro-enterprise environments in developing economies (Radicic & Petkovic, 2023; Mishrif & Manzoor, 2023). The existing literature has tended to investigate financial performance and technology adoption separately, without leaving adequate knowledge of the mechanism by which financial resources are transformed into operational and competitive results. This disparity is particularly pronounced in localized business agglomerations like Santa Cruz, Manila, where companies can work in a comparable business environment yet with different degrees of technological advancement and performance (Philbin et al., 2022; Mafukidze and Chiutsi, 2025).

The above literature gap has led this study to inquire on these variables. What is unique to this research is that it explores the role of technology adoption as a mediating variable between perceived financial performance and success within micro-digital printing businesses in an urban cluster. The study considers perceptual financial measures as opposed to audited financial statements, therefore, capturing the reality of practical financial decisions that shape operations in micro-enterprises (Alexander, 2020; Zulfadhli et al., 2024).

Theoretical Framework. Theoretically, this study is anchored in the Technology Acceptance Model (TAM) and the Resource-Based View (RBV). Traditionally, TAM examined personal user acceptance, emphasizing perceived usefulness and ease of use as key determinants of adoption (Davis, 1989; Hadalgekar & Desai, 2025). Within micro-digital printing companies, owners, managers, and supervisors act both as direct users and decision-makers, actively comparing, piloting, and adopting technological tools. Consequently, TAM provides a suitable lens for understanding adoption perceptions and behaviors. Alongside this, RBV highlights that competitive advantage derives from financial, technological, and human resources (Komakech et al., 2024; Zvarimwa & Zimuto, 2022). Financial performance reflects the mobilization of resources, while technology converts these resources into operational success (Newbert, 2023; Cristofaro, 2025). With the integrated approach of TAM and RBV, the study captures both user perceptions and organizational resource utilization, offering a clear explanation of how micro-digital printing businesses leverage resources to achieve operational success.

Conceptual Framework. The conceptual framework posits that financial performance (independent variable) moderates business success (dependent variable) both directly and indirectly through technological innovations (mediating variable). Financial performance provides owners and managers with a clear view of the firm's financial health, reflecting its capacity to sustain daily operations and support innovation. Technological innovations encompass the adoption of technology, automation, and perceptions of usefulness and ease of use, which collectively enhance efficiency, print quality, and service delivery (Arshad et al., 2024; Sarita, 2025). Business success is measured not merely by profitability

but by long-term profitability, customer satisfaction, market presence, and operational efficiency (Hussien et al., 2024; Troise et al., 2022).

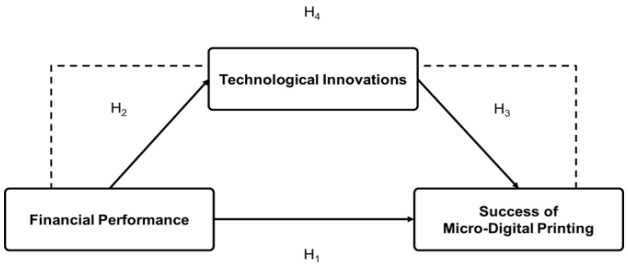

Figure 1
Research Paradigm

Although micro-digital printing businesses contribute significantly to the economies of the localities and offer creative services in the city centers, there has been little research on how these micro-businesses balance financial resources as they adjust to new technologies. Most of the literature addresses bigger MSMEs or general tendencies toward adopting technology and does not cover how micro-enterprises can use limited financial resources to gain efficiency, growth and competitiveness.

This paper fills this gap by looking at how financial performance affects the business success of micro-digital printing businesses and the mediating capacity of technology towards this relationship. In particular, this study explores the role of financial investment choices and the integration of technology in enhancing operational performance, customer satisfaction, market and sustainability.

Referencing above, this research measures the impact of technology acceptance in determining the association between financial performance and business performance. Although the results cannot be directly related to big printing companies and other sectors, the research makes industry-specific conclusions about the financial and technological processes that affect the performance of micro-enterprises. The lessons derived can also inform policymakers and support organizations seeking to enhance the competitiveness and sustainability of small businesses (Philbin et al., 2022; ERIA, 2022; ADB, 2024). Building on this foundation, the following hypotheses are proposed for empirical testing:

H_{01}: There is no significant relationship between financial performance and business success in micro-digital printing in Santa Cruz, Manila.

H_{02}: There is no significant effect of technological innovations on the financial performance of micro-digital printing businesses.

H_{03}: There is no significant contribution of the use of micro-digital printing technologies in achieving financial performance through technological innovations.

H_{04}: Technological advancements do not mediate the relationship between financial performance and business success in micro-digital printing businesses.

Lastly, the research has theoretical and practical contributions. It is theoretically an expansion of TAM and RBV because it empirically shows the relationship between financial resources and business outcomes in micro-enterprises through the mediating effects of technology adoption. In practice, the results provide insight into how micro-digital printing entrepreneurs should manage financial operations in accordance with strategic technology adoption. On a larger scale, the study bears the policy effort in line with the United Nations Sustainable Development Goals, especially SDG 8 (Decent Work and Economic Growth) and SDG 9 (Industry, Innovation, and Infrastructure), by pointing to the importance of innovation in the sustainability of micro-enterprises (United Nations, n.d.; UNIDO, 2021).

LITERATURE REVIEW

History of Micro-Digital Printing. Printing has radically developed since the movable type of press of Gutenberg in Europe in the 15th century and has expanded worldwide, even to India and the Philippines (Ranganathan, M., 2021). Literacy

and communication started with printing in the 1600s, Tomas Pinpin, the so-called Prince of Printers, published Librong Pag-aaralan nang mga Tagalog nang Uicang Castilla in 1610 (Lee, 2021). With time, Philippine printing has evolved since religious texts and newspaper prints have been replaced with commercial prints, keeping up with the global printing innovations such as plain presses, offset printing, and digital printing (Grand View Research, 2023; Fortune Business Insights, 2025). Although the print media needs are declining, specialty print, packaging, and hybrid print-digital products are strong with the micro-digital printing shops in Santa Cruz, Manila, being lucrative in terms of customization, speed, and flexibility (1981 Digital, 2024; Mordor Intelligence, 2025). The emergence of digital printing started in the early 2000s when affordable technology made family-owned micro-enterprises in Metro Manila enter the market and develop strategically and offer accessible printing solutions to businesses, schools, and urban communities (Philippine Printing Industry Report, 2025; PSA, 2023).

Outlook and Growth Projection of the Industry. Printing is still a very important aspect of the creative, business, and educational industries. Packaging, signs, and customized printing products comprise most of the worth of the market, which is projected to be USD 433 billion at present and USD 484 billion in 2027 (Smithers, 2023; Mordor Intelligence, 2025).

Digital printing has become a mainstream method and is not a replacement for traditional media. Specialty printing and packaging have demonstrated an increase in spite of its falling conventional media (Grand View Research, 2023; 1981 Digital, 2024). Metro Manila has small and micro printing enterprises serving schools, shops, and local organizations that require low-cost and easily available services (PSA, 2023; Seiko Epson Corporation, 2023).

The latter are funded, trained, and equipped to improve efficiency and competitiveness through the assistance of government support, such as the Magna Carta of MSMEs (Congress of the Philippines, 1991/2008), and programs that are aligned with the UN Sustainable Development Goals (United Nations, n.d.; ASEAN and East Asia, 2018). Growth strategies of micro-digital printing shops often include the expansion of services (such as clothing printing, giveaways, and signs) and the redistribution of profits in the form of an increase in the customer base (PIDS, 2024).

Financial Viability and Challenges. Micro-digital printing companies require economic sustainability to sustain and develop. Gitman and Zutter (2003) explained that economic viability is the capacity to cover expenses and generate profits to reinvest. Economic sustainability is achieved by proper financial management, which monitors profitability and strategic reinvestments by record-keeping (Alexander, 2020).

The micro-enterprises in the Philippines are experiencing the challenges of a lack of capital, rising prices of materials, and intense competition (Pueblos and Timoteo, 2023; PSA, 2023). Most of the micro-enterprises in the Philippines do not have accounting systems, which restricts access to external capital (PIDS, 2024; ILO, 2023). Small printing companies are also experiencing the same challenges worldwide, but those that are strategic in terms of technology are more adaptable and sustainable (Guzikova, 2019; Angeles, Calara, and de Guzman, 2019).

Technology's Influence on Financial Performance. The digital printing industry has undergone a revolution because of technological development, and small business owners are able to increase efficiency, minimize costs, and have high-quality output. It has been demonstrated that modern printing machines and online tools have a positive effect on profitability and productivity (Lambert, 2022; Zvarimwa and Zimuto, 2022; Lim et al., 2020; Saroso et al., 2019).

Micro and small printing businesses that employ digital means of business in the Philippines have noted improved cash flow,

customer retention, and operational efficiency (Cueto et al., 2022; DAI, 2021). This involves the use of high-speed inkjet printers and environmentally friendly installations, which lowers costs, wastage, and ensures financial stability in the long term (Abbas, 2024; Alkan and Yildirim, 2024; PrintWeek, 2024; Seiko Epson Corporation, 2023).

Technology's Role in Linking Finance and Business Success. Technology is a mediating variable that intensifies the relationship between financial resources and business performance. Companies going digital turn financial benefits into operational ones, competitiveness in the market, and sustainable development (Abdulnabi, 2024; Barroga et al., 2021; Kluczek et al., 2022; Pyzyk and Lucas, 2023; Ford and Despeisse, 2016; Stasiak-Betlejewska, 2019).

Efforts at using technology effectively led to higher customer loyalty, quality of service, and market sustainability, and fill the gap between financial performance and long-term business success (Fagbola et al., 2018; UNIDO, 2021; Pascual, 2023; Ismail et al., 2023). SMEs in Malaysia and Saudi Arabia have provided evidence to support the idea that IT capability and knowledge management are the critical bridges between innovation and business performance (Kumar, 2021; Hussien et al., 2024).

Government Policies for Sustainability Initiatives. Sustainability initiatives receive support from government policies, which create dedicated resources for their implementation. Government initiatives are particularly helpful in supporting micro-enterprises in integrating technology and financial management. The Department of Science and Technology (DOST) and Department of Trade and Industry (DTI) programs provide mentorship and equipment resources and funding support to help develop digital printer technology for small businesses (DOST-AMCen 2021, DTI 2024 SME Finance Forum 2019).

The initiatives are in line with the UN Sustainable Development Goals and help the micro-enterprise achieve environmentally sustainable operations, efficient functioning, and greater economic engagement (United Nations, n.d.; UNIDO, 2021; Republic Act No. 9501, 2008). The research on the region, such as APEC (2023), also highlights the positive impact of the government helping small businesses utilize digital tools and grow sustainably.

Knowledge Gaps and Research Justification. Although numerous studies have examined financial performance, SMEs, and technology adoption in urban settings, limited research has explored how small businesses convert their financial resources into operational success through the adoption of digital technologies. The latter gap is specifically prominent when it comes to micro-digital printing enterprises, which frequently have limited capital on their back but cannot afford to keep the processes of their operations highly technology-dependent to continue running (Barroga et al., 2021; Cueto et al., 2022; Atienza et al., 2024; Yu, 2025; ADB, 2024).

This paper fills this gap by looking at technological innovation as an intervening variable between business success and financial performance. It is anticipated that the results will contribute to theory and offer practical advice to the owners of small businesses, financial institutions, and policymakers.

METHODS

Research Design. A quantitative-descriptive method was employed to examine micro-digital printing businesses in their natural operations without interference (Troise, Cueto, & Agaton, 2022). This research design enabled the researcher to describe systematically the behaviors, practices, and performances of the printing businesses without disturbing their environment. Additionally, correlation and mediation analyses were used to examine the relationships between financial performance, technology adoption, and technological innovations, and to determine whether technology adoption mediates the effect of

financial performance on business success (Radicic & Petković, 2023).

Locale and Respondents. The sample was selected from registered micro-digital printing companies in Santa Cruz, Manila, due to the high concentration of printing establishments in the area, with high level of competition, as well as its varied clientele. Purposive sampling was applied to select respondents who are owners, managers, and supervisors of micro-digital printing companies (Angeles, Calara, & de Guzman, 2019) and are directly involved in the operation and financial decision-making (Etikan, Musa, & Alkassim, 2016; Creswell & Creswell, 2018; Cohen, Manion, & Morrison, 2018; Troise, Cueto, & Agaton, 2022). Businesses that have been in operation for at least one year were considered in the study to get the best and most experienced responses. According to the Rasoft calculator, at least 91 samples were recommended. However, the research utilized 100 respondents.

Research Instrument. The questionnaire comprised five sections organized into three categories: Geographical Setting, Technology Utilization, Financial Performance, Technological Innovations, and Overall Business Performance. Demographic information was also collected, including respondent role, years in operation, and customer type. Content validity was ensured through evaluation by an expert panel consisting of financial analysts, a printing business owner, an IT specialist, and a statistician. Reliability was tested through a pre-survey with 30 respondents, and results indicated that the Cronbach's alpha coefficient exceeded 0.70 across all scales, confirming the instrument's reliability (Hadalgekar & Desai, 2025).

Data Gathering Procedure. Data was collected over a period of six weeks, between June 29 and August 12, 2025, enabling engagement with selected participants in-depth. The university Research Management Office (RMO) Ethical Review Board was able to approve the ethical nature of the research. To comply with ethics, each respondent was assured of confidentiality and the participation was voluntary, without any coercive measures.

The list of micro-digital printing companies was obtained from the Manila City Hall Bureau of Permits. The list enumerated 631 registered digital printing businesses in the city of Manila, with 118 businesses strategically located in Santa Cruz (Manila City Hall, 2025). The surveys were done in two ways: (1) face-to-face by use of printed questionnaires; and, (2) online via Google Forms. Among the 1118 surveys sent, 100 valid responses were obtained (56 in-person and 44 online).

Some of the practical challenges that were experienced during the data collection process were time constraints, availability of respondents, privacy, and environmental interferences. Follow-ups, flexible scheduling, and communication of confidentiality protocols were used to address them and contribute to the maximum response rate possible (Troise, Cueto, and Agaton, 2022).

Statistical Analysis. Respondents were profiled and key variables were summarized using descriptive statistics (frequencies and means) (Troise, Cueto, & Agaton, 2022). The direct and indirect effects of technology adoption on financial performance were tested using the Partial Least Squares Structural Equation Modeling (PLS-SEM) (Hair, Hult, Ringle, and Sarstedt, 2021; Radicic & Petković, 2023). The assumption checks were done to ensure robustness.

Normality. The Central Limit Theorem was applied because, although the results of the Shapiro-Wilk test were not normal ($p < 0.001$), $n > 30$ indicates that the test can be statistically performed effectively (Zvarimwa & Zimuto, 2022).

Homogeneity of Variances. Checked with the Levene test, all the p-values were above 0.05, which confirms that there are no different variances among groups (Zvarimwa & Zimuto, 2022).

These steps guaranteed a valid, reliable, and powerful analysis that allowed determining the overall business performance in the micro-digital printing business through technology adoption and innovation.

RESULTS

Respondent Profile and Key Demographic Findings. In terms of years in the micro-digital printing business (Figure 2), findings reveal that 42% of the businesses have operated for 1-3 years, showing that the industry is still young and in the growth stage. This indicates that most of the firms in the industry have yet to stabilize and optimize their financial and technology operations.

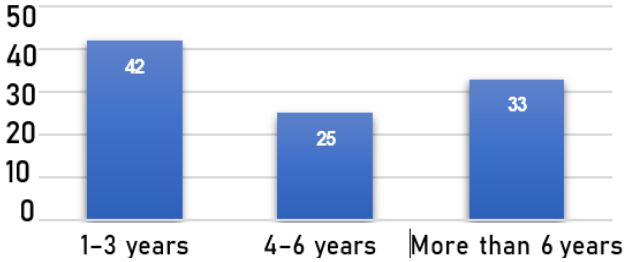

Figure 2
Respondents by Years in Business

Table 1
Respondents by Role/Position

Position	Frequency	Percent (%)
Owner	60	60.00 %
Manager	21	21.00 %
Supervisor	19	19.00 %
Total	**100**	**100.00 %**

More significantly, 60% (Table 1) of the respondents were business owners, suggesting that most respondents likely had a strong understanding of financial performance, technology adoption, and operational decision-making.

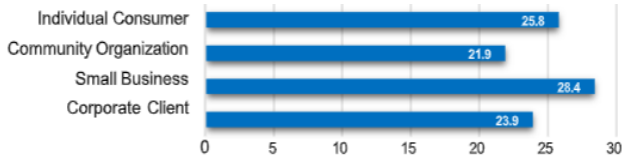

Figure 3
Respondents by Customer Type
**Multiple Response*

When it comes to the dominant technologies used, the main adopted technologies included Inkjet printing (19.9%), Tarpaulin printing (17.1%), and Dye Sublimation (15.8%). The adopted technologies have been influenced by the nature of the business offered by companies operating in the micro-digital printing sector.

Descriptive Statistical Results. Descriptive statistics were calculated using the weighted mean to evaluate the present condition of financial performance, innovation, success, and sustainability.

Table 2
Descriptive Statistics of Key Variables (n = 100)

Variable Construct	Mean	Highest-rated Item	Lowest-rated Item	Key Interpretation
Financial Performance	4.02	Revenue Growth	Cash Flow Sufficiency (3.48)	Positive performance; liquidity management remains a challenge
Perceived Usefulness (PU)	4.25	Customer Satisfaction Improvements	Contribution to Competitiveness (4.10)	Enhances quality and satisfaction; competitiveness can be improved
Perceived Ease of Use (PEOU)	4.12	Staff Training Effectiveness	Technical Accessibility (3.95)	Easy to use; additional technical support may improve integration
Operational Success	4.18	Production Capacity Improvement	Performance Tracking Metrics (3.95)	Improves efficiency; formal monitoring systems still developing
Technology as Mediator	4.22	Efficiency Gains	Direct Financial Conversion (4.06)	Financial resources enable adoption; strategic use needed for outcomes
Financial Growth & Sustainability	4.22	Operational Efficiency & Customer Satisfaction	-	Technology bridges financial performance to tangible operational success

Financial Performance. As shown in Table 2, the respondents are generally in agreement that their business is experiencing positive financial performance, with an overall weighted mean of 4.02 in agreement. There is stability in revenue growth and operating costs. The financial adequacy in meeting daily and unexpected expenses is in contrast with the mean score in cash sufficiency at 3.48, which implies difficulties in satisfying the day-to-day operation requirements and the emergent costs.

This finding implies that even though the revenues are, in general, steady, cash flow management is an issue. A significant number of micro-digital printing enterprises have to deal with delayed payments, unplanned costs, or access to emergency funds. This is consistent with the previous literature on small businesses, which suggests that optimistic trends in revenues do not necessarily ensure the liquidity of operational conditions (Ampong & Adams, 2018). What this means is that cash management practices should be employed to make a business resilient.

Technological Innovation: Perceived Usefulness (PU). The perception of usefulness in technology was high, with a mean value of 4.25 (Agree). The respondents agreed that technology has increased productivity and enhanced service delivery. Nevertheless, the lowest-rated item under this variable is the contribution of technology towards competitiveness (4.10, Agree).

The findings reveal that even though the adoption of technology enhances the efficiency of operations, not every firm can translate this into a definite competitive advantage. This can be attributed to poor strategic use of technology or the absence of complementary resources, say in terms of skilled staff or process optimization. The results reiterate that technology is not sufficient, but it needs to be coupled with strategic integration so that it can be used to generate real business advantages.

Technological Innovation: Perceived Ease of Use (PEOU). The respondents affirmed that digital printing technologies are easy to operate (mean = 4.12). Although the respondents have indicated that they have support systems in place, the lowest rate (3.95, Agree) has shown that technical assistance should be more aggressive, especially in troubleshooting and updating the systems.

Ease of use promote adoption; however, poor technical support can undermine the maximum use of technology. This is critical to micro-businesses with low IT skills, as it is recommended that easy-access training and services be made available to maximize the effectiveness of technology investments.

Business Success. The indicators of business success were steadily on the increase, with an average of 4.18 (Agree). The respondents shared that they had an improved production capacity, client satisfaction, and profitability. Nevertheless, the performance-tracking systems obtained a relatively lower mean (3.95, Agree), which implies that formal monitoring systems are yet to be established among the micro-digital printing firms.

The results indicate that the results are operational and financial, although many micro-businesses do not have a system of performance measurement. Lack of proper monitoring could make it hard to maintain growth and make informed strategic decisions. Incorporating straightforward tracking applications would promote responsibility.

Technology as Mediating Variable. Technology lies at the heart of connecting financial performance and business success, with an overall mean of 4.22 (Agree). On the other hand, although there was quite strong recognition from respondents of technology as a source of efficiency, the statement regarding the direct translation of financial resources into measurable outcomes received a relatively lower mean of 4.05, showing that financial resources alone do not automatically translate into improved outcomes unless combined with strategic and efficient technology use.

This shows that financial resources are not enough to spearhead business success. The effective application of technology is also critical to enhancing financial capacity and converting it into better operations, productivity, and service delivery. The ones with effective use of technology in their businesses can optimize their resources and have sustainable growth.

Financial Sustainability & Growth. The respondents had a positive outlook on the prospect of further growth in the next 2-3 years, with an overall mean of 4.15, which corresponded to Agree. However, there were somewhat lower hopes for self-funded growth, with an average of 4.00, or Agree, but with a tinge of pessimistic optimism considering the lack of funds and resources.

Although the future looks bright, access to financial resources might be an impediment to growth. This underscores the need to undertake financial planning, allocation of resources, and seek external funding sources to help in long-term sustainability. The findings indicate that hope should be coupled with realistic plans to achieve the growth potential.

Path Analysis Results. The path analysis was used to analyze the direct and indirect relationships between the financial performance, technological innovation, and business success of micro-digital printing businesses in the city of Santa Cruz, Manila. This analysis was done to test the proposed hypotheses and to establish the mediating function of technological innovation in the relationship between financial performance and business success.

The findings also show that the direct paths that were hypothesized to be significant were all significant, which means that there is strong empirical support for the proposed research model.

To begin with, Hypothesis 1 proves the presence of a direct and positively correlated relationship between Financial Performance and Business Success (β = 0.222). The occurrence of the research outcome is the foundation of the relationship. Reflects the fact that micro-digital printing businesses are economically sustainable, can continue to operate and serve customers, and succeed.

Second, Hypothesis 2 shows that Financial Performance is a strong positive predictor of Technological Innovation (β = 0.643). This finding suggests that financially adept organizations have more ability for innovation in digital printing technology investments, improvements in equipment, or innovative practices.

Third, Hypothesis 3 reveals that other factor of success is the most predictive variable of Technological Innovation, with a value of β=0.680. This shows the importance of technology as a factor for the improvement of the current production, accuracy of the operation, number of services, and satisfaction of the customer.

These findings reinforce the notion that while financial performance may be critical, its ability to improve business performance is much enhanced by technological innovation, in support of the mediated structure hypothesized.

Table 3

Hypothesis Testing Results on the Mediating Role of Technological Innovations Between Financial Performance and Business Success

Hypothesis	Path Relationship	Path Coefficient	t-Value	p-Value	LLCI	ULCI	Conclusion	Decision
H1	Financial Performance -> Business Success	0.222	3.302	0.001	0.890	0.356	Reject H1	Significant
H2	Financial Performance ->Technological Innovations	0.643	10.008	0.0001	0.515	0.770	Reject H2	Significant
H3	Technological Innovations -> Business Success	0.68	9.127	0.0001	0.532	0.828	Reject H3	Significant
H4	Financial Performance -> Business Success (Mediating Role of Technological Innovations)	0.437	-	-	0.316	0.566	Reject H4	Significant

Mediation Analysis: Intermediating Role of Technology Adoption. The analysis in Table 3 revealed that Technological Innovation does, in fact, mediate between Financial Performance and Business Success in micro-scale digital printing companies in Santa Cruz, Manila.

The 95% confidence interval for the indirect effect (0.316 to 0.566) does not include zero, providing strong evidence of a statistically significant mediation effect. This indicates that financial resources alone are not sufficient to ensure business success. Instead, technology adoption serves as a critical mechanism through which financial capacity is transformed into measurable operational improvements, enhanced service quality, and long-term business sustainability.

This finding shows that micro-digital printing firms whose financial performance is stable but invest in technology in an un-strategic or limited manner face more difficulties in sustaining growth in the competitive market environment. Conversely, those that address both financial planning and technology strategy are in better shape to support the efficiency of operations, align with closing performance gaps, and meet customer needs as dictated by changing requirements. Briefly stated, the findings underscore that adopting technology is a strategic platform that converts financial strengths into sustained competitive advantages rather than being an aid to various business operations.

The results in Table 4 demonstrate that financial performance, technology adoption, and business success are closely interrelated in the micro-digital printing business. The stability of

finances provides these companies with the ability to invest in digital technologies, and such investments are not enough. It is whether the perception of the technology as being useful and easy to use, as this affects its level of integration into the daily operations.

Table 4

Mediation Analysis Results

Path Relationship	Effect Type	Path Coefficient (ß)	95% Confidence Interval
Financial Performance-> Business Success	Direct Effect	0.222	-
Financial Performance->Technological Innovations	Direct Effect	0.643	-
Technological Innovations-> Business Success	Direct Effect	0.68	-
Financial Performance->Technological Innovations-> Business Success	Indirect Effect	-	0.316-0.566

Mediation was tested using Partial Least Squares Structural Equation Modeling (PLS-SEM). A confidence interval excluding zero confirms the presence of a mediating effect.

Another potential implication of the results is that increased revenue does not necessarily result in long-term success. The finances must be used prudently and channeled towards technologies that can make the organization more efficient, less prone to errors, and offer better customer service. Other businesses might possess the financial capability, but they lack a proper plan on how to utilize the technology; the projected changes in performance might not be entirely achieved.

This trend is very much evident in Santa Cruz, Manila, where micro-digital printing firms operate in a very competitive scenario with minimal resources. Within this kind of environment, those who integrate financial planning and considerate and meaningful technology adoption will have a better chance at being flexible, responsive to customer demands, and long-term viable. Technology in this context is put into a more practical use, which is to put the monetary ability into a stable increase and operational achievement in the daily routine.

DISCUSSION

Management of Financial Performance and Cash Flow. Companies demonstrate steady revenues; however, liquidity problems continue because of day-to-day business requirements, unforeseen costs, and the inability to access emergency capital. To ensure its operations and growth, it needs effective cash flow management, prioritization, and planning.

Adoption and Competitive Advantage of Technology. Technology enhances efficiency and productivity, but strategic integration is necessary to come up with competitive advantages. Lack of complementary resources or optimization of the process restricts the effect on the business performance that may be introduced through adoption.

Monitoring and Performance Measuring. Production capacity, client satisfaction, and profitability are being used as the indicators of success, but due to the non-use of standardized tracking systems, the strategic decision-making is restricted. The use of Daily Operational Checklists and performance logs can be used to improve accountability and operations.

Technology as a Mediator. Technology adoption is a very important moderator as it transforms financial resources into business efficiency, better quality of services, and business survival. Micro-enterprises that involve financial planning and strategic use of technology are in a better position to be flexible, responsive, and viable in the long term.

Financial Sustainability and Future Growth

Growth outlooks must be accompanied by feasible financial planning. Financial sustainability in the long run needs reinvestment strategies, improvements, and allocation of resources. Without proper financial discipline and prioritization, growth projects could add to the burden of operations instead of improving business sustainability and competitiveness.

Conclusion. The significance of financial management and technology application in the success of micro-digit printing ventures has been brought out explicitly in the given study. A positive financial outcome forms the basis for business stability. But despite the effective

financial management system implemented by the owners, the challenge of short-term financial adequacy persists. This problem can be overcome by effective and constant financial flow management. The vital needs, such as business operations, employee salaries, rent, and utility payments, must be given priority, and then progressive spending on technology and staff training can take place.

Businesses recognize these technologies and tools as highly valuable for enhancing the efficiency of their business operations and the quality of their products and/or services. At the same time, it appears that the potential for utilizing technology to gain a business advantage has remained largely untapped. Setting up effective problem-solving and training programs can help improve the application of technology and limit business downtime.

Technology has increased efficiency and customer satisfaction. However, formal mechanisms of monitoring and tracking the performance remain under development. The identification of standardized operational procedures, which would include the daily checklists and supervisory reviews on a regular basis, will provide the much-needed structure to ensure maintenance of quality, identify recurring problems, and make continuous improvement. When the operations are organized in line with financial planning and technology investment, micro-enterprises have the potential to transform the resources into quantifiable gains that enhance the performance in the daily operations as well as competitiveness in the long run.

Lastly, it will be long-term growth due to meticulous control of financial discipline and intelligent use of technology. It is through incremental re-investment, through machinery, processes, and people skills, coupled with the utilization of growth logs and review sessions, that growth is accurately targeted and maintained. In the micro-digital printing business, therefore, success is not dependent on luck but on determined action toward a strategic synthesis of finance management, technology management, and business processes into a distinct strategic vision. Future research would be interesting on how such strategies would be applicable differently through changing technologies or how the same strategic focus could be applied through various micro-enterprise areas.

Recommendations. In light of the findings and analyses presented, the following recommendations are advanced to guide policymakers, practitioners, and stakeholders in strengthening the competitiveness and sustainability of micro-digital printing businesses.

Strengthen Cash Flow Management. The daily cash flow activities will be recorded using a Cash Flow Prioritization Plan. The priority should be accorded to necessary expenditures such as utilities, salaries, rent, and consumables, followed by minor repairs and computer upgrades. To prevent interruptions in the daily business activities, it is advisable to allocate a minimum of 5-10% of the income as an emergency fund to meet unforeseen expenses.

Maximize Technology Benefits. Create a Problem-Solving Storage based on a proactive approach, containing a database of common problems and solutions. Have regular hands-on training for the employees to enhance their skills and confidence levels. With the feeling that the staff can support and be ready, the efficiency of the machines is enhanced, the amount of downtime decreases, and the daily operations are simplified and more trusted.

Operational Process Improvement. Implement a Daily Operational Checklists and performance report. Supervisors monitor recurring problems and customer feedback, while the management monitors overall performance and projects of improvement. This mutual monitoring technique aids in identifying minor issues at their initial phases, promotes responsibility among employees, and facilitates the work processes of daily activities.

Align Finances and Technology for Operational Gains. Regular meetings between the owners and managers are necessary to discuss cash flow, technology upgrades, and results. The supervisors give the managers feedback on the performance of the equipment, the adaptation of the employees, and the impact on the workflow, which enables the managers to make informed decisions. By focusing on equipment and technology that will improve their operations, small businesses can optimize their use of resources and become more competitive over time.

Support Steady Growth and Long-Term Sustainability. Put aside 5-10 percent of your monthly income for strategic re-investment. Growth Tracking Log can be utilized to track sales, customer retention, and production volume. This will ensure incremental, measurable, and sustainable growth without overproduction. Periodic analysis of the Growth Tracking Log will also enable the team to identify which strategies are ideal and make slight adjustments to keep the business on track.

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REFERENCES

1981 Digital. (2024). *The relevance of print media in a digital age.* Zimmer Communications. https://info.zimmercommunications.com/blog/the-relevance-of-print-media

Abdulnabi, S. M. (2024). Adoption of business intelligence among Iraqi SMEs culture: Impact of technology acceptance model, information quality, and organizational readiness. *Journal of Intercultural Communication, 24*(3). https://immi.se/index.php/intercultural/article/view/Abdulnabi-2024-3

Abbas, J. (2024). Financial innovation and digitalization promote business performance: Evidence from emerging economies. *Journal of Economic Studies.* Advance online publication. https://doi.org/10.1016/j.jes2023.08.001

Alexander, J. (2020). *Financial planning & analysis and performance management (Wiley Finance).* Wiley. https://www.wiley.com/en-us/Financial+Planning+%26+Analysis+and+Performance+Management-p-9781119567590

Alkan, S., & Yildirim, S. (2024). *Artificial intelligence in the printing industry: A systematic review of industrial applications, challenges, and benefits.* ResearchGate. https://www.researchgate.net/publication/384778207_Artificial_Intelligence_in_the_Printing_Industry_A_Systematic_Review_of_Industrial_Applications_Challenges_and_Benefits

Al-Htaybat, K., & von Alberti-Alhtaybat, L. (2017). *Big data and corporate reporting:*

Impacts and paradoxes. Revue Française d'Economie et de Gestion. Retrieved October 14, 2025, from https://www.revuefreg.fr/index.php/home/article/download/1962/1580/6419

Ampong, G. O. A., & Adams, S. (2018). Cash flow management practices: An empirical study of small and medium enterprises (SMMEs) in the retail sector. Risk in Contemporary Economy, 333-342. https://virtusinterpress.org/IMG/pdf/10-22495_rgcv4i2c1art1.pdf

Angeles, I. T., Calara, M. S. P., & de Guzman, A. B. (2019). The mediating effect of microfinancing on access to finance and growth of microenterprises: Evidence from the Philippines. *Journal of Global Entrepreneurship Research, 9*(1), Article 24. https://doi.org/10.1186/s40497-019-0150-x

Arshad, A., Ghaffar, A., Siddique, M. U., & Rehman, S. (2024). Information technology adoption, organization performance and organizational agility: A study of small and medium enterprises. *Journal of Emerging Management Studies.* https://journals.smarcons.com/index.php/jems/article/download/181/260

Asian Development Bank. (2024). *Asia small and medium-sized enterprise monitor 2024: Designing an MSME ecosystem for resilient growth in Asia and the Pacific.* https://www.adb.org/publications/asia-sme-monitor-2024 Retrieved from http://dx.doi.org/10.22617/SGP240536-2

Atienza, L., Mendoza, D., & Cruz, P. (2024). *Digital tools adoption and business growth of micro and small enterprises (MSEs) in Calapan City, Oriental Mindoro.* ResearchGate. https://doi.org/10.30574/wjarr.2024.24.3.3972

Barroga, E., et al. (2021). Level of awareness of smart manufacturing technologies and its nexus. *Philippine Journal of Science, 150* (6A). https://philjournalsci.dost.gov.ph/images/pdf/pjs_pdf/vol150no6A/level_of_awareness_of_smart_manufacturing_technologies_and_its_nexus_.pdf

CMYK PH. (2021, March 27). *The different types of printing techniques.* https://www.cmyk.ph/types-of-printing/

Cohen, L., Manion, L., & Morrison, K. (2018). *Research methods in education (8th ed.).* Routledge. https://staibabussalamsula.ac.id/wp-content/uploads/2024/03/Louis-Cohen-Lawrence-Manion-Keith-Morrison-Research-Methods-in-Education-Routledge-2018-staibabussalamsula.ac_.id_.pdf

Congress of the Philippines. (1991). *Republic Act No. 6977, as amended by RA 8289 (1997) and RA 9501 (2008) –Magna Carta for Micro, Small and Medium Enterprises.* https://www.smefinanceforum.org/sites/default/files/blogs/2010_RA_9501_Magn a_Carta_for_MSMEs.pdf

Congress of the Philippines. (2008). *Republic Act No. 9501: An act to promote, develop and assist micro, small and medium enterprises through the creation of a Micro, Small and Medium Enterprise Development (MSMED) Council, and for other purposes.* Official Gazette. https://www.officialgazette.gov.ph/2008/05/23/republic-act-no-9501/

Congress of the Philippines. (n.d.). *Republic Act No. 6977, as amended by Republic Act No. 8289 and Republic Act No. 9501.*

https://www.officialgazette.gov.ph/1991/05/01/republic-act-no-6977/

Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches (5th ed.).* Sage Publications. https://spada.uns.ac.id/pluginfile.php/510378/mod_resource/content/1/creswell.pdf

Cristofaro, M. (2025). *The impact of resource allocation strategies on new venture performance: The moderating role of entrepreneurial experience.* Long Range Planning. Advance online publication. https://doi.org/10.1016/j.lrp.2025.00016

Cueto, L. J., Frisnedi, A. F. D., Collera, R. B., Batac, K. I. T., & Agaton, C. B. (2022). Digital innovations in MSMEs during economic disruptions: Experiences and challenges of young entrepreneurs. *Administrative Sciences, 12*(1), Article 8. https://doi.org/10.3390/admsci12010008

DAI. (2021). *MSMEs and digital tool use amidst the COVID-19 pandemic* — Philippines country brief. https://www.dai.com/uploads/final-msme-reports/philippines-country-brief.pdf

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13*(3), 319–340. https://parsmodir.com/wp-content/uploads/2018/11/TAM-Davis-1989.pdf https://www.jstor.org/stable/249008

Department of Science and Technology – Regional Office 1. (n.d.). *SETUP program.* Retrieved October 10, 2025, from https://region1.dost.gov.ph/setup/

Department of Trade and Industry (DTI). (2024). *Definition of micro enterprises.* https://www.dti.gov.ph/resources/laws-and-policies/msme/

Department of Trade and Industry. (2024). *Micro, small, and medium enterprise development plan 2023-2028.* Republic of the Philippines. https://dtiwebfiles.s3.ap-southeast-1.amazonaws.com/BSMED/MSMED+Plan+2023-2028/MSMED+Plan+2023-2028_approved+07Nov2024.v2.pdf

Department of Trade and Industry. (n.d.). *Shared service facilities.* Retrieved October 10, 2025, from https://www.dti.gov.ph/dti-business-center/dti-programs-projects/dti-shared-service-facilities

ERIA (Economic Research Institute for ASEAN and East Asia). (2022). *Empowering micro businesses in Southeast Asia.* https://www.eria.org/uploads/Empowering-Micro-Businesses-in-Southeast-Asia.pdf

Etikan, I., Musa, S. A., & Alkassim, R. S. (2016). Comparison of convenience sampling and purposive sampling. American Journal of Theoretical and Applied Statistics, 5(1), 1–4. https://doi.org/10.11648/j.ajtas.20160501.11

Fagbola, O. D., Ojo, O. P., & Adewuyi, A. S. (2018). Implementing sustainable manufacturing practices in a printing company: A case study. *International Journal of Engineering and Technology, 7*(3), 145–152. https://doi.org/10.1016/j.ijengtec.2018.05.002

Ford, S., & Despeisse, M. (2016). Additive manufacturing and sustainability: An exploratory study of the advantages of

3D printing. *Journal of Cleaner Production, 137*, 1573–1587. https://doi.org/10.1016/j.jclepro.2016.04.150

Fortune Business Insights. (2025). *Packaging printing market size, share, industry report, 2032.* https://www.fortunebusinessinsights.com/packaging-printing-market-110133

Gelato. (2024, July 25). *What is digital printing? Benefits and applications. Gelato.* https://www.gelato.com/blog/what-is-digital-printing

Gitman, L. J., & Zutter, C. J. (2003). *Principles of managerial finance (10th ed.)* [PDF]. University of Mataram Repository. https://opac.uma.ac.id/repository/30459588-Principles-of-Managerial-Finance-by-Gitman.pdf

Grand View Research. (2023). *Packaging printing market size, share | industry report, 2030.* https://www.grandviewresearch.com/industry-analysis/packaging-printing-market-report

Grand View Research. (2023). *Printer market size, share & trends analysis report.* https://www.grandviewresearch.com/industry-analysis/printer-market

Guzikova, L. (2019). *How printing industry meets technological and financial challenges [Paper presentation].* UBT International Conference. https://doi.org/10.33107/ubt-ic.2019.352

Hair, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Danks, N. P., & Ray, S. (2021). Partial least squares structural equation modeling (PLS-SEM) using R: A workbook. Springer. https://doi.org/10.1007/978-3-030-80519-7

Hadalgekar, S., & Desai, N. (2025). Role of perceived ease of use and perceived usefulness in adoption of mobile computing technology. *International Journal of Social Science and Human Research, 8*(6), 4458–4462. https://doi.org/10.47191/ijsshr/v8-i6-58

Hussien, B. S. A., Benlaria, H., Sadaoui, N., Ahmed, S. A. K., Lzabat, L., & Badreldin, B. M. A. (2024). Sustainable innovation and business success: The mediating roles of information technology capability and knowledge management. *International Journal of Advanced and Applied Sciences, 11*(5), 166–176. https://doi.org/10.21833/ijaas.2024.05.018

International Labour Organization. (2023). *World employment and social outlook 2023: Trends 2023 (Report No. WCMS_834081).* https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_834081.pdf

Ismail, I. S., Ghazali, N., Hamid, N. A., Abdullah, N., & Palil, M. R. (2023). The impact of technology acceptance and technology compliance costs on SMEs' business resilience. *Economic Affairs, 68*(3), 1521–1530. https://doi.org/10.46852/0424-2513.3.2023.19

Kluczek, A., Gladysz, B., Buczacki, A., Krystosiak, K., Ejsmont, K., & Palmer, E. (2022). Aligning sustainable development goals with Industry 4.0 for the design of business model for printing and packaging companies. *Packaging Technology and Science, 35*(4), 307–325. https://doi.org/10.1002/pts.2713

Komakech, R. A., Ombati, T. O., Kikwatha, R. W., & Wainaina, M. G. (2024). Resource-based view theory and its applications in supply chain management: A systematic literature review. *Management Science Letters, 15*(3), 261–272. https://doi.org/10.5267/j.msl.2024.6.004

Kumar, P. (2021). The role of information technology and its impact on knowledge management process: Evidence from organizations. *Journal of Information and Knowledge Management, 11*(2), 195–210. https://ir.uitm.edu.my/65517/1/65517.pdf

Lambert, J. (2022). *What are the advantages of digital printing?* INX International. https://www.inxinternational.com/blog/digital-printing/what-are-advantages-digital-printing

Lee, G. (2021, July 7). Early printing in the Philippines. *BiblioAsia, 17*(2). National Library Board Singapore. https://biblioasia.nlb.gov.sg/vol-17/issue-2/jul-sep-2021/early-printing/

Levene, H. (1960). *Robust tests for equality of variances.* In I. Olkin (Ed.), Contributions to Probability and Statistics (pp. 278–292). Stanford University Press. Retrieved November 24, 2025, from https://www.6sigma.us/six-sigma-in-focus/levenes-test/

Lim, J. E. K., Aquino, J. K., Garcia, J. A., Ong, R. J., & Soliman, D. (2020). The impact of demand side barriers and supply side barriers to financial inclusions: A study on micro enterprises in Metro Manila. *Review of Integrative Business and Economics Research, 9*(Supplementary Issue 3), 295–334. https://buscompress.com/uploads/3/4/9/8/34980536/riber_9-s3_28_h19-137_295-334.pdf

Mafukidze, B. S., & Chiutsi, A. T. (2025). Digital transformation and competitive advantage in SMEs: Evidence from Zimbabwe. *Open Access Library Journal, 12.* https://www.scirp.org/journal/paperinformation?paperid=147890

Manila City Hall. (2025). *Bureau of permits: Accredited printing establishments.* https://www.manilacityhall.gov.ph/bureau-of-permits

Mishrif, A., & Manzoor, A. (2023). Technology adoption as survival strategy for small and medium enterprises during COVID-19 pandemic: A comparative study between India and Pakistan. *Journal of Innovation and Entrepreneurship, 12*(1), Article 53. https://doi.org/10.1186/s13731-023-00317-9.

Mordor Intelligence. (2025, June 23). *Digital printing market size, trends, share & research report 2030.* Mordor Intelligence. https://www.mordorintelligence.com/industry-reports/digital-printing-market

Newbert, S. L. (2023). Resource-based view factors driving SME growth. *International Journal of Management and Organization, 2*(4), 56-77. https://www.itiptw.com/IJMO/IJMO-95-DOI-013.pdf

Organisation for Economic Co-operation and Development, & Economic Research Institute for ASEAN and East Asia. (2018). *SME policy index: ASEAN 2018—Boosting competitiveness and inclusive growth (ISBN 9789264305328).* https://asean.org/wp-content/uploads/2021/09/Report-ASEAN-SME-Policy-Index-2018.pdf

Pascual, M. P. (2023). Digital transformation strategies for small businesses in the Philippines. *International Journal of Applied Engineering and Technology, 5*(2), 97–100.

https://romanpub.com/resources/ijaet%20v5-2-2023-16.pdf

Philbin, S., León-Gómez, A., & Calderón-Almendros, I. (2022). Understanding how digital transformation can enable SMEs to achieve sustainable development. *Sustainability Business and Innovation Review,* *1*(1), 1-25. https://sbir.upct.es/index.php/sbir/article/view/473

Philippine Institute for Development Studies. (2024, December 31). *Digital divide, lack of awareness hinder AI integration in Philippine businesses.* PIDS News. https://www.pids.gov.ph/details/news/in-the-news/digital-divide-lack-of-awareness-hinder-ai-integration-in-philippine-businesses

Philippine Printing Industry Report. (2025). *State of the Philippine printing industry.* Retrieved September 7, 2025, from https://www.scribd.com/document/642088896/Philippine-Report

Philippine Statistics Authority (PSA). (2023). *2021 annual survey of Philippine business and industry (ASPBI) - Manufacturing section: Final result.* https://psa.gov.ph/content/2021-annual-survey-philippine-business-and-industry-aspbi-manufacturing-section-final

Philippine Statistics Authority. (2023). *2023 Philippine statistical yearbook.* https://psa.gov.ph/philippine-statistical-yearbook

Printify. (2025). *What is digital printing? Types of digital printing.* https://printify.com/pod-glossary/digital-printing/

PrintWeek. (2024). *Print industry AI challenges identified in report.* PrintWeek. https://www.printweek.com/content/news/print-industry-ai-challenges-identified-in-report

Pueblos, J., & Timoteo, E. (2023). Impact of E-Payment platforms among selected micro-entrepreneurs in Taguig City: Determinants for enhanced guidelines in collection and disbursement process. *Indonesian Journal of Business Analytics,* *3*(4), 1401–1424. https://doi.org/10.55927/ijba.v3i4.4884

Pyzyk, K., & Lucas, S. (2023, November 29). *'Revolutionary' digital printing technology uptake expected to accelerate for packaging.* Packaging Dive. https://www.packagingdive.com/news/digital-inkjet-printing-packaging-flexography/700750/

Radicic, D., & Petković, S. (2023). Impact of digitalization on technological innovations in small and medium-sized enterprises (SMEs). *Technological Forecasting and Social Change, 191*, Article 122474. https://doi.org/10.1016/j.techfore.2023.122474

Ranganathan, M. (2021, June 15). Print history: Printing museums in India - A clarion call. PrintWeek. https://www.printweek.in/features/print-history-printing-museums-in-india-a-clarion-call-54740

Sarita, V. B. (2025). The role of technology management in enhancing competitive advantage among MSMEs. *International Journal of Research and Innovation in Applied Science,* *10*(3), 860–869. https://doi.org/10.51584/IJRIAS.2025.10030065

Saroso, H., Hudiyanto, H., Sidik, B. P., Parwanto, P., & Oswan, I. R. (2019). The challenge to technology acceptance model (TAM): Attitude toward risk in developing micro and small businesses (MSME) with ICT adoption. *International Journal of Innovation, Creativity and Change,* *10*(8), 338–348.

https://www.ijicc.net/images/vol10iss8/10825_Saroso_2019_E_R.pdf

Seiko Epson Corporation. (2023). *Integrated report 2023 [Corporate report].* https://corporate.epson/en/investors/publications/pdf/integrated-report/epson_ir2023_all_e.pdf

Smithers. (2023, December 21). *The future of global printing to 2028.* Smithers. https://www.smithers.com/services/market-reports/printing/the-future-of-global-printing-to-2028

Stasiak-Betlejewska, R. (2019). Smart technology and SME resilience in competitive markets. *Management Systems in Production Engineering, 27*(1), 45–50. https://doi.org/10.1515/mspe-2019-0007

Stasiak-Betlejewska, R. (2019). *The improvement of sustainability with reference to the printing industry: Case study.* ResearchGate. https://doi.org/10.1007/978-3-030-17269-5_19

Troise, C., Corvello, V., Ghobadian, A., & O'Regan, N. (2022). How can SMEs successfully navigate VUCA environment: The role of agility in the digital transformation era. *Technological Forecasting and Social Change, 174*, 121227. https://doi.org/10.1016/j.techfore.2021.121227. Retrieved from https://www.sciencedirect.com/science/article/abs/pii/S0040162521006600?via%3Dihub

United Nations. (n.d.). *Sustainable development goals.* Retrieved September 1, 2025, from https://www.un.org/sustainabledevelopment/

UNIDO. (2021). *UNIDO's vision and mission for MSME development.* SMEStreet. https://smestreet.in/limelight/unidos-vision-and-mission-for-msme-development/

Yu, Y. (2025). Research on technological innovation and optimization strategies in the digital transformation of small and medium-sized financial institutions. *Finance & Economics, 11*, 123–140. https://www.deanfrancispress.com/index.php/fe/article/view/2945/FE005232.pdf

Zulfadhli, Z., Desfitrina, D., & Pramajaya, J. (2024). The effect of financial literacy, access to capital, entrepreneurial orientation, and market orientation on the growth and sustainability of micro and small enterprises in Palembang. *The Es Economics and Entrepreneurship, 3*(2), 189–[page end]. https://doi.org/10.58812/esee.v3i02.376

Zvarimwa, C., & Zimuto, J. (2022). Valuable, rare, inimitable, non-substitutable and exploitable (VRINE) resources on competitive advantage. *EPH - International Journal of Business & Management Science, 8*(1), 9–21. https://doi.org/10.53555/ephbms.v8i1.1915