

Marketing Transformation Through ICT: The Case of Small Printing Businesses

Noemi C. Vega¹, Edsan A. Abalos¹, Arish DC. Domingo¹, Elizalde Figueroa¹, Jade Asley S. Pangilinan¹

¹ College of Management and Business Technology, San Isidro Campus, Nueva Ecija University of Science and Technology, Philippines

Corresponding author: noemicondino@gmail.com¹

Abstract

With the rapid advancement of digital technologies, small and medium-sized printing businesses are leveraging information and communication technology (ICT) to enhance marketing, improve customer engagement, and expand operations. This study investigates ICT adoption among printing businesses in Nueva Ecija, focusing on tools used, benefits gained, and challenges encountered. Using a descriptive research design, data were gathered from 20 purposively selected business owners through structured online surveys. Results show high reliance on social media platforms like Facebook (mean = 3.66) and messaging apps, while formal digital tools such as websites remain underutilized (mean = 2.00). ICT use has positively impacted customer reach, marketing efficiency, and revenue. However, barriers such as high costs, limited digital literacy, time constraints, and poor internet access persist. The findings highlight the need for improved digital infrastructure and capacity-building support to maximize ICT potential. This study directly contributes to Sustainable Development Goal 9: Industry, Innovation, and Infrastructure, by promoting the integration of technology in small enterprises to foster innovation, inclusive industrial growth, and resilient infrastructure. Future studies may expand the sample size to include a broader range of printing businesses across different regions for greater generalizability. Researchers are also encouraged to use mixed-methods approaches that include interviews or case studies for deeper qualitative insights. Additionally, longitudinal research can explore how sustained ICT adoption influences business growth over time. Comparative studies between urban and rural contexts or between printing and other creative industries would also offer valuable perspectives on digital transformation trends in SMEs.

Keywords: Customer Engagement; Digital Marketing; ICT Adoption; Printing Industry; SDG 9; Small Businesses; Social Media; Sustainable Development

1. Introduction

In 2025, small businesses are poised to navigate a landscape shaped by both opportunity and resilience. Data has shown us that access to capital is a top priority as entrepreneurs increasingly seek diversified funding sources to stabilize and grow their ventures. With rising operational costs and an uncertain economic climate, tools such as grants, loans, and alternative financing models will play a pivotal role in enabling small businesses to maintain financial resilience. Strategic planning and careful management of operational credit will become even more critical, ensuring that companies can adapt to evolving market conditions. (AllBusiness, 2025). The application of ICT, primarily e-commerce, provides ease of purchase, reduced costs, and faster response, can expand market reach and increase the competitiveness of SMEs both locally and internationally (Indrayanto et al., 2024). Franks (2024) Staying ahead of the curve is essential for the survival and growth of small businesses. By adapting to today's trends, such as leveraging large platforms, moving to e-commerce, seeking innovative funding, adopting SaaS tools, and creating a strong digital presence, small businesses can prepare for a promising future. Ricoh (2025) The printing industry has been one of the longstanding industry in the world. And it continues to be resilient despite the "Print is dead" statements. Indeed, technology has really made everything faster and easier that people are thinking that print and printing is obsolete. But, print is here to stay. It has innovated and kept up with the times which is why it will never be dead. Wilson (2025) In printing industry, differentiation and innovation across hardware, cybersecurity, sustainability, cloud, and workflow are critical for success in the year ahead, and AI will play a role in all of these as businesses focus on unlocking its potential in diverse use cases. Jjennings (2024) Effective communication and advertising are crucial for any business looking to attract and retain customers. High-quality printing is vital in producing professional and visually appealing materials that convey important information and create a positive impression. Bhatt (2025) The Internet of Things (IoT) and Artificial Intelligence have managed to carve out a niche for themselves everywhere today. Both AI and IoT are playing vital roles in revolutionizing the printing industry.

This research aims to gain a comprehensive understanding of how printing businesses in Nueva Ecija utilize Information and Communication Technology (ICT) tools in various aspects of their operations, particularly in relation to their business profiles, marketing strategies, experiences with these technologies, and the challenges they face in adoption and implementation. As digital advancements continue to reshape industries, small and medium-sized printing businesses must integrate ICT effectively to remain competitive, enhance customer engagement, and streamline operations. This study seeks to assess the extent of ICT adoption, its impact on business performance, and the benefits it provides, such as improved marketing reach, operational efficiency, and revenue growth. Additionally, it will identify barriers to ICT implementation, including high costs, lack of technical expertise, and infrastructure limitations. The objective of this research is to continuously promote and sustain growth aligned with Sustainable Development Goal 9, which focuses on building resilient infrastructure, promoting inclusive and sustainable industrialization, and fostering innovation. By exploring and implementing innovative technological adaptations, this study collects insights directly from printing business owners and managers to provide practical recommendations that enhance digital transformation efforts, support data-driven decision-making, and promote the sustainable growth of printing businesses in Nueva Ecija. The Philippine printing industry is composed of diverse sectors, such as publication printing (including books, newspapers, and magazines), commercial printing (such as brochures and posters), security printing (e.g., stamps and examination booklets), office supply printing (like invoices), and special printing for packaging materials such as boxes and cartons (Jagat, n.d.). A notable proportion of businesses in this sector operate on a small scale, particularly within commercial and office supply segments. Most of these enterprises are categorized as micro or small businesses, aligning with national statistics reported by the Department of Trade and Industry (DTI, 2023), which revealed that 90.43% of enterprises in the Philippines are micro (employing 1–9 individuals), and 8.82% are small (employing 10–99 individuals). The years in operation for these businesses vary significantly. In a study conducted in Nueva Ecija, 54% of small printing firms had operated between one and seven years, while 36% had been in business for 8 to 14 years, and a smaller proportion for more than 15 years (Academia.edu, 2023). These figures suggest that while new players continue to emerge, a number of businesses have also demonstrated operational sustainability. Local communities form the core target market for these firms, with services tailored to schools, small businesses, and government offices, typically producing educational materials, promotional items, and standard business forms (Jagat, n.d.).

Although there is limited data on exact monthly sales figures, industry projections are promising. According to 6Wresearch (2024), the Philippine printing industry is expected to grow at a compound annual growth rate (CAGR) of 7.9% from 2025 to 2031, signaling increasing revenue opportunities for these enterprises. The digital transformation of the industry is also noteworthy, with several intelligent systems being employed in printing operations. These include intelligent information systems, expert systems, computational and logical systems, hybrid intelligent systems, and reflexive intelligent systems. Intelligent information systems support natural language queries for data searches, while hybrid systems integrate multiple modeling approaches like neural networks, expert systems, and fuzzy logic to replicate human decision-making processes (Makatora et al., 2023; Tuliao, Santos, & Ortega, 2025). Expert systems act as digital counterparts to domain specialists, solving specific problems using rule-based logic. Computational and logical systems are used to tackle design and management tasks, and reflex systems use algorithms to interpret combinations of input actions to produce likely responses (Makatora et al., 2023; Ortiz, Ortega, & Santos, 2025; Ortega, Daños, & Gevero, 2025).

The use of information and communication technology (ICT) for marketing has become prevalent. According to Kotler et al. (2021), over 70% of printing businesses actively use social media platforms to promote products, connect with clients, and maintain engagement. Smith (2019) found that the integration of e-commerce platforms can improve customer acquisition by 30–50%. Bracamontes (2021) emphasized the importance of posting with regular frequency, such as three to five times a week, to maintain traffic and visibility. Commonly used marketing platforms include Facebook and Instagram. Printmate Indonesia, for example, uses these platforms to post product details, promotional content, and event participation, resulting in expanded customer reach (Hamluddin & Wibowo, 2023). Social media also functions as a digital portfolio, enabling clients to view samples of work and reinforcing brand credibility. With tools like Meta Ads, businesses can target demographics and locations precisely, thus reaching potential niche audiences (Ops, 2024). Decision-making is increasingly driven by customer data, especially in ensuring service quality. Bengtsson et al. (2022) highlighted the value of customer reviews and referrals in influencing consumer decisions, while Puspitasari (2022) pointed out that indicators like repeat purchases and the absence of complaints signify satisfaction. Emotional factors in customer satisfaction, such as the feeling of being understood or valued, were emphasized by Ali et al. (2022), who argued that quality and satisfaction remain separate but crucial elements of customer retention.

With ICT tools such as CRM systems, websites, and social media, small printing businesses experience improved customer interaction and responsiveness. These tools allow personalized communication, quotation generation, and feedback collection, enhancing the overall customer experience (Chaffey & Smith, 2022). Personalized marketing has been linked to increased customer loyalty. Further, ICT tools have a significant impact on sales and revenue. As found by Tiago and Veríssimo (2019), digital marketing strategies such as SEO and PPC not only increase web traffic but also enhance conversion rates. For small businesses in Nueva Ecija, the adoption of online ordering systems and digital invoicing has reduced transactional delays, while platforms like Shopee and Lazada help in expanding their reach beyond local boundaries.

Compared to traditional marketing, ICT tools save time and costs. Scheduled posts and automated email marketing enable efficient communication and reallocation of human resources to other business functions. Laudon and Traver (2020) found that digital marketing can cut promotional expenses by up to 60%, all while improving engagement. Additionally, platforms such as Google My Business and SEO techniques allow local businesses to be discovered by customers across different regions, further enhanced by logistics partnerships that ensure prompt delivery (Zhu & Kraemer, 2020). Despite these advantages, some barriers to ICT adoption remain. One primary challenge is the high cost of digital tools and services. Bondoc et al. (2021) noted that many business owners resort to hiring marketing agencies due to a lack of personal technical expertise. Dsilva and Singh (2021), Jadhav et al. (2023), and Alsharif and Ismail (2024) all reported that financial constraints limit access to digital platforms, making it difficult for small businesses to compete. Similarly, Santiago (2024) observed that limited marketing budgets hinder SMEs from running large-scale digital campaigns.

Another issue is the lack of digital marketing knowledge. According to Gupta (2021), entrepreneurs need continuous access to updated digital marketing strategies to make timely business decisions. Bondoc and Danzen (2022) further revealed that limited technical skills prevent SMEs from effectively integrating digital tools. Cesaroni and Consoli (2021) also identified that SMEs struggle to build structured digital marketing frameworks due to knowledge gaps. Time constraints represent another practical concern. Small business owners often handle multiple roles simultaneously, which limits the time available for digital marketing activities (Gillin, 2025). As MarketingCharts (2024) reports, most small businesses devote less than an hour daily to marketing, prioritizing core operations and customer service instead. Lastly, internet connectivity is a critical factor affecting online marketing performance. Slow internet connections lead to delayed website loading, poor response times, and frustrated customers—potentially resulting in lost sales and reduced productivity (EIRE Systems, 2025).

2. Methodology

This study employed a descriptive research design to examine the use of Information and Communication Technology (ICT) in marketing among small printing businesses in Nueva Ecija. The descriptive approach allowed the researchers to systematically gather data through structured surveys and direct communication with printing business owners, aiming to assess ICT adoption, benefits, and the challenges these businesses face in implementing digital strategies. By collecting first-hand responses, the study sought to provide practical insights that could enhance data-driven marketing practices in the local printing industry. The research was conducted within the province of Nueva Ecija, Philippines, focusing on selected printing enterprises actively engaged in marketing through ICT. A total of 20 respondents, consisting of business owners and key representatives, were chosen based on their active involvement in managing or supervising the marketing operations of their respective businesses. These individuals were considered well-positioned to provide reliable feedback regarding their experience with digital marketing tools and platforms.

To gather data, a structured survey questionnaire was utilized. The instrument was divided into key sections, including business profiles, ICT tool usage, perceived benefits, and encountered challenges. A four-point Likert scale was employed to measure the respondents' level of agreement with each provided statement. The survey was distributed via Google Forms, allowing the researchers to reach participants through online communication channels, which proved efficient and accessible given the geographic distribution of the businesses involved. Purposive sampling was used to identify and select respondents, focusing specifically on small printing businesses known to engage in ICT-based marketing. This non-probability sampling technique ensured that only qualified and relevant participants were included in the study, providing more focused and accurate results. However, the researchers recognize the inherent limitations of purposive sampling, particularly regarding the generalizability of the findings. Since selection was based on specific criteria, the sample may not fully represent all small printing businesses in the province, and there is a possibility of selection bias due to the reliance on researcher judgment.

For data analysis, descriptive statistical tools were applied. Frequency and percentage distributions were used to describe the demographic and operational profiles of the respondents, while mean and weighted mean were used to evaluate their perceptions of ICT's role in marketing. The responses were interpreted using a defined range of mean scores to classify levels of agreement. In terms of ethics, the study strictly adhered to research standards ensuring the privacy and confidentiality of all participants. Informed consent was obtained prior to participation, and all data were handled in accordance with the provisions of the Data Privacy Act of 2012. The researchers ensured that all information was collected and processed lawfully, used exclusively for academic purposes, and secured through appropriate safeguards to prevent unauthorized access or disclosure.

3. Results and discussion

3.1. Business Profile of the Respondents

The business profiles of the 20 respondents from small printing enterprises in Nueva Ecija revealed a diverse yet locally rooted industry. The majority of these businesses operate within specific niches, with sublimation printing being the most common at 30%, followed by commercial and custom apparel printing at 25% each, and digital printing at 20%. Most businesses maintain lean operations, with 40% employing 6–10 workers and 30% having only 1–5 employees—typical of micro-enterprises in the province. Regarding business longevity, 35% have operated for 4–6 years, 30% for 1–3 years, and 25% for more than 6 years, suggesting many have already attained operational stability. A dominant 70% of these businesses serve local customers within Nueva Ecija, while the remaining 30% cater to clients on a nationwide scale; none reported having international customers. In terms of financial performance, 45% of businesses reported monthly earnings of PHP 50,001–100,000, followed by 40% earning PHP 20,001–50,000, with only one respondent (5%) earning over PHP 100,000 monthly. These data suggest that small printing businesses in the area are primarily micro-enterprises with stable yet modest earnings and a strong orientation toward local markets.

3.2. Types of ICT Tools Used

Respondents strongly agreed that social media platforms and messaging apps play a central role in their marketing efforts, both receiving a perfect weighted mean of 4.00. These tools are widely used for business promotion and customer inquiries. However, there was a notable gap in web-based infrastructure, with a weighted mean of only 2.00 indicating disagreement on having a business website or e-commerce page. While there was moderate agreement (3.00) on the use of data analytics tools to track customer behavior, the average weighted mean of 3.25 still classified overall ICT tool usage as "Strongly Agree." This highlights heavy reliance on social media and mobile communication, with room for improvement in adopting more advanced digital systems.

3.3. Frequency of ICT Usage for Marketing Purpose

The average weighted mean for this category was 3.36, interpreted as "Strongly Agree." All respondents affirmed that they promote their businesses online at least once a week (4.00), reflecting a proactive stance in digital engagement. They also strongly agreed that checking customer feedback online is routine (3.25). Meanwhile, there was moderate agreement on regularly updating their online presence (3.00) and responding promptly to inquiries (3.20), underscoring a commitment to maintaining an active and responsive online business profile.

3.4. Main Marketing Platforms Used

Digital platforms are widely utilized, with Facebook emerging as the dominant channel (3.66 – Strongly Agree). Respondents also agreed on using Instagram or TikTok to attract younger demographics (3.21) and reported using paid advertising tools like Facebook Ads or Google Ads (3.17). Interestingly, there was strong disagreement with the statement that they prefer traditional marketing methods (1.25), resulting in an overall average of 2.82 (Agree). This suggests a clear transition toward digital platforms, although some may not yet be fully optimizing them.

3.5. Level of Reliance on Customer Data for Marketing Decisions

There was a strong consensus (3.32 – Strongly Agree) that data-driven marketing is integral to strategic planning. Respondents highly valued analyzing customer data before making marketing decisions (3.60) and tracking engagement metrics like likes, shares, and comments (3.45). There was strong agreement that such approaches improved overall business performance (3.25). Although collecting customer feedback scored slightly lower (3.00 – Agree), the results still confirmed a strong culture of evidence-based marketing.

3.6. Increase in Customer Engagement

The respondents strongly agreed (average weighted mean = 3.40) that ICT has elevated their engagement with customers. Online visibility received the highest score (3.95), with other items such as increased customer inquiries (3.20), better relationship building via social media (3.30), and overall customer interaction (3.15) also

scoring well. These findings affirm the crucial role of digital platforms in enhancing customer connectivity and presence.

3.7. Growth in Sales and Revenue after Using ICT Tools

Respondents agreed that ICT-driven marketing has contributed to business growth, with an average weighted mean of 3.20. They noted increased sales (3.20), more inquiries and orders online (3.00), and general revenue growth attributed to digital efforts (3.20). A strong agreement was also observed in the effectiveness of online advertising in acquiring new customers (3.40). These indicators reflect a tangible benefit of digital tools in scaling small business revenues.

3.8. Time and Cost Savings Compared to Traditional Marketing

The cost-effectiveness of ICT tools was also positively received, with an average weighted mean of 3.16. Respondents agreed that online marketing is less expensive (3.20) and helps avoid additional labor costs (3.10). Automated tools like scheduled posts and chatbots were also seen as significant time savers (3.35). These advantages indicate that ICT allows small businesses to run efficient, lean operations while maintaining marketing impact.

3.9. Ability to Reach New Customers Outside Their Local Area

Respondents agreed (3.08) that digital marketing enabled them to reach customers beyond their local base. ICT was reported to help in expanding market reach (3.20) and driving inquiries from outside the usual business area (3.15). The ability to serve clients beyond Nueva Ecija was moderately confirmed (3.00), showing progress in geographic expansion, albeit with further room to grow.

3.10. High Costs of Digital Tools or Advertising

The financial burden of digital marketing tools was acknowledged as a barrier, with an average weighted mean of 3.28 (Strongly Agree). Online advertisements were viewed as costly (3.40), and many found it difficult to afford premium tools (3.00). Respondents also strongly agreed that high advertising costs limit scalability (3.50), and that free tools are less effective (3.20), indicating a significant challenge in budget allocation for digital expansion.

3.11. Lack of Knowledge or Training on Digital Marketing Strategies

Lack of technical expertise emerged as a major barrier, scoring the highest average weighted mean in the entire study at 3.44 (Strongly Agree). Respondents reported difficulty implementing digital strategies (3.66), a need for training (3.45), and acknowledgment that limited knowledge hindered their potential (3.25). These results clearly call for capacity-building programs tailored to the digital needs of small enterprises.

3.12. Difficulty in Managing Online Marketing Platforms Due to Time Constraints

The average weighted mean was 3.18 (Agree), with strong agreement that limited time restricts digital marketing efforts (3.25) and that hiring support staff would be helpful (3.30). While online marketing is valued, its consistency and maintenance were seen as burdensome (3.00), especially when balanced with other business tasks (3.20). These results reflect the multifaceted role of small business owners and the practical challenges they face in managing digital channels.

3.13. Poor Internet Connection Affecting Online Marketing Efforts

Internet connectivity remains a substantial barrier, with an average weighted mean of 3.41 (Strongly Agree). Respondents strongly agreed that slow internet hinders marketing (3.45), affects content uploads (3.25), limits real-time engagement (3.55), and that reliable internet access is essential for success (3.40). These insights underline the infrastructural challenges that must be addressed to fully unlock the benefits of ICT-driven marketing in rural settings.

4. Conclusion

This study concludes that the strategic adoption of Information and Communication Technology (ICT) has brought significant benefits to small printing businesses in Nueva Ecija, particularly in marketing. Businesses demonstrated a strong reliance on social media platforms such as Facebook and messaging apps for promoting services and communicating with customers. The data revealed increased customer engagement, greater market visibility, and growth in sales and revenue as a result of ICT integration. Tools like automated messaging, scheduled posts, and customer analytics enabled business owners to save time and reduce marketing costs. These developments support Sustainable Development Goal 9 (SDG 9) by promoting inclusive industrial innovation and digital transformation in the local enterprise sector. Despite these gains, the study also highlighted notable barriers

that hinder the full potential of ICT utilization. Chief among these were the high costs of digital tools and advertising services, limited knowledge and training in digital marketing strategies, time constraints due to multitasking responsibilities, and persistent issues with poor internet connectivity. These challenges prevented many businesses from developing websites or exploring more advanced ICT solutions such as e-commerce platforms and data-driven automation systems. As such, while many small printing businesses have embraced digital marketing practices at the basic level, they remain constrained in scaling these efforts effectively. In light of these findings, the study recommends a multi-faceted approach to support digital advancement among small printing businesses. First, targeted capacity-building programs should be implemented to equip entrepreneurs with practical digital marketing skills, covering topics such as content planning, audience targeting, and analytics interpretation. Second, government agencies and local business development centers may offer subsidies or grants to help cover the cost of digital tools and advertising credits. Third, internet service providers, in collaboration with LGUs, must work toward improving connectivity infrastructure, particularly in rural towns. Finally, support mechanisms such as shared digital consultants, community-based marketing cooperatives, or university extension services can be introduced to assist time-constrained business owners in managing their digital presence more efficiently. With proper support and sustained effort, small printing businesses in Nueva Ecija can overcome these challenges and harness ICT more effectively—not only to survive but to thrive in an increasingly competitive digital economy.

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Conflict of interest statement

The authors declare no conflict of interest or competing interests related to this study or any of the products or institutions mentioned.

Ethical Approval

The present research work does not contain any studies performed on animals or human subjects by the authors.

Statement of Informed Consent

Informed consent was obtained from all individual participants included in the study.

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