

INTEGRATING DIGITAL MARKETING IN TRADISIONAL FISH PROCESSING: OPPORTUNITES AND CHALLENGES

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Article history

Received date : 28-4-2026

Revised date : 29-4-2026

Accepted date : 3-5-2026

Published date : 10-6-2026

To cite this document:

Che Cob, C. M. S., Sakarji, S. R., Aminuddin, A. S., Abu Bakar, H., Nik Man, N. F., & Md Apandi, H. F. (2026). Integrating digital marketing in traditional fish processing: Opportunities and challenges. *International Journal of Accounting, Finance and Business (IJAFB)*, 11 (65), 67 - 77.

Abstract: *The integration of digital marketing strategies into traditional fish processing industries represents a critical pathway toward enhancing market competitiveness, expanding customer reach, and improving value-chain efficiency. Despite the growing penetration of digital technologies across agri-food sectors, traditional fish processors, particularly small and medium enterprises (SMEs) face structural, technological, and capability-related constraints that limit digital adoption. This conceptual paper develops a framework that explains how digital marketing integration can transform traditional fish processing businesses by leveraging digital platforms, social media engagement, e-commerce systems, and data-driven marketing. The paper further identifies key opportunities and challenges influencing adoption and proposes a conceptual model linking digital readiness, marketing capability, perceived benefits, and business performance. The study contributes to the literature by bridging digital marketing theory with traditional food processing contexts and offering strategic implications for policymakers, industry stakeholders, and rural entrepreneurs.*

Keywords: *Digital Marketing, Traditional Fish Processing, SMEs, Digital Transformation, Market Expansion*

Introduction

Traditional fish processing plays a crucial role in sustaining rural economies, preserving cultural heritage, and ensuring food security, particularly in developing regions. It contributes significantly to livelihood resilience, women's economic participation, and the preservation of indigenous knowledge systems (FAO, 2022; HLPE, 2023). In regions such as Southeast Asia and Sub-Saharan Africa, small-scale fisheries account for nearly 40% of global fish production and employ over 90% of workers across the fisheries value chain, many of whom operate within informal or semi-formal traditional processing systems (FAO, 2022). In Malaysia and similar maritime economies, practices such as drying, salting, fermenting, and smoking remain deeply embedded in local culture and rural economic ecosystems.

Despite this socio-economic importance, traditional fish processing enterprises continue to rely heavily on conventional marketing approaches, including word-of-mouth referrals, local intermediaries, physical marketplaces, and small-scale distribution networks. While these channels support community trust and localized demand stability, they significantly constrain business scalability, limit geographic market reach, and reduce price competitiveness in an increasingly digitalized global economy (OECD, 2023; UNCTAD, 2024). This limitation is particularly critical in the context of the rapid expansion of digital commerce, accelerated by post-pandemic shifts in consumer behaviour, which has transformed market access, branding strategies, and customer engagement across agri-food industries (UNCTAD, 2024).

Digital marketing technologies, such as social media platforms, e-commerce systems, search engine optimization, and data-driven customer engagement tools offer substantial opportunities to modernize traditional fish processing businesses. Empirical evidence from agri-food SMEs indicates that digital marketing adoption enhances market visibility, operational agility, customer relationship management, and overall sales performance (Dwivedi et al., 2023; Nuseir et al., 2022). Moreover, digital platforms enable producers to bypass intermediaries, improve profit margins, and directly access broader urban and international markets, thereby strengthening value chain integration.

However, despite these potential benefits, the adoption of digital marketing among traditional fish processors remains limited and uneven. Small-scale operators face multiple structural and capability-related barriers, including low digital literacy, inadequate technological infrastructure, financial constraints, perceived complexity of digital tools, and resistance to change (Ainin et al., 2023; OECD, 2023). Additionally, strong cultural attachment to conventional business practices and low perceived usefulness of digital systems further hinder the transition toward digitalization. These challenges indicate that digital transformation within this sector extends beyond technological adoption, requiring shifts in organizational practices, capabilities, and mindset.

Although prior studies have examined technology adoption in SMEs using frameworks such as the Technology Acceptance Model (TAM), Unified Theory of Acceptance and Use of Technology (UTAUT), and Technology-Organization-Environment (TOE) framework, these models are often applied in isolation and predominantly within general SME or agri-food contexts. Limited research integrates these theoretical perspectives to specifically examine digital marketing adoption within traditional fish processing. Furthermore, existing studies rarely establish a clear linkage between digital marketing adoption, marketing capability development, and business performance outcomes in this sector.

Therefore, a critical gap exists in understanding how digital marketing can be effectively integrated into traditional fish processing enterprises, particularly within developing economies where socio-cultural, infrastructural, and capability constraints are pronounced. This study seeks to address this gap by proposing a multi-theoretical framework that integrates individual, organizational, and environmental determinants to examine digital marketing adoption and its impact on marketing capabilities and business performance. By doing so, the study provides both theoretical contributions to digital transformation literature and practical insights for policymakers and practitioners aiming to promote sustainable rural economic development.

Literature Review

Digital Marketing in Traditional Fish Processing Enterprises

Traditional fish processing enterprises play a significant role in rural livelihoods, food security, and local economic sustainability, particularly in coastal and fisheries-dependent communities. In many developing economies, including Malaysia, traditional fish processing activities such as drying, salting, smoking, and fermenting are predominantly operated by small-scale and family-based enterprises embedded within informal or semi-formal food systems. These enterprises contribute not only to income generation but also to cultural preservation and local food supply chains (FAO, 2022; Rowan, 2023). However, despite their socio-economic importance, traditional fish processors often face limited market access, weak branding capability, and dependence on conventional marketing channels.

Recent developments in digital transformation have altered how agri-food enterprises engage with markets and consumers. Digital marketing, broadly defined as the use of online platforms and digital technologies to promote products and manage customer relationships, has become increasingly important for SMEs operating in competitive food markets (Jung, 2023; Sharabati et al., 2024). Within fisheries and rural food systems, digital marketing tools such as social media platforms, e-commerce marketplaces, mobile applications, and analytics-driven customer engagement mechanisms provide opportunities for small-scale producers to expand beyond geographically constrained local markets (Saleh, 2025).

Unlike large food manufacturers, traditional fish processors operate under unique socio-cultural and structural conditions. Their businesses are often characterized by limited technological capability, informal management structures, dependence on relational marketing networks, and strong attachment to traditional business practices. Consequently, digital marketing adoption within this sector involves not only technological change but also organizational adaptation and cultural transition. This explains why digital transformation in traditional food systems remains uneven despite increasing digitalization across broader agri-food industries (OECD, 2023).

Opportunities of Digital Marketing Integration in Traditional Fish Processing

The integration of digital marketing presents substantial opportunities for traditional fish processing enterprises, particularly in improving market accessibility and enhancing competitiveness within rural food economies. Studies on agri-food SMEs suggest that digital platforms reduce dependency on intermediaries by enabling direct-to-consumer interactions, thereby improving producer margins and expanding geographic market reach (OECD, 2021; Google, Temasek, & Bain & Company, 2024). For traditional fish processors, this is especially important because conventional distribution systems are often localized and controlled by middlemen, limiting profitability and market expansion.

Digital marketing also supports value creation through branding and product differentiation. Traditional fish products frequently possess distinctive cultural, heritage, and artisanal characteristics that can be leveraged strategically through storytelling, visual promotion, and social media engagement. From the Resource-Based View (RBV), intangible resources such as authenticity, local identity, and customer trust represent valuable strategic assets capable of generating competitive advantage (Barney, 1991). Digital platforms allow traditional processors to communicate these unique product identities more effectively to urban and international consumers seeking authentic and traceable food products.

Another important opportunity relates to customer engagement and market intelligence. Digital marketing technologies enable enterprises to collect real-time consumer feedback, monitor purchasing behaviour, and tailor promotional strategies accordingly. In rural food SMEs, such capabilities enhance responsiveness to changing customer preferences and improve marketing effectiveness (Dwivedi et al., 2023). Within traditional fish processing contexts, where producers previously relied heavily on informal communication and physical marketplaces, digital engagement mechanisms provide new channels for sustaining customer relationships and increasing market visibility.

Digital marketing further contributes to business resilience within traditional food systems. Research conducted during and after the COVID-19 pandemic demonstrates that food SMEs with digital capabilities adapted more effectively to disruptions by maintaining customer communication, facilitating online transactions, and diversifying sales channels (World Bank, 2022). For traditional fish processors vulnerable to supply chain interruptions and fluctuating local demand, digital integration therefore functions not only as a growth mechanism but also as a resilience strategy.

Challenges of Digital Marketing Integration in Traditional Fish Processing

Despite these opportunities, the adoption of digital marketing among traditional fish processors remains constrained by multiple structural, technological, and socio-cultural barriers. One of the most significant challenges involves limited digital literacy and technological capability among rural food entrepreneurs. Many small-scale processors operate within informal business environments and possess limited exposure to digital technologies, reducing their ability to manage online platforms, e-commerce systems, or digital analytics effectively (OECD, 2021; World Bank, 2022).

Infrastructure limitations further complicate digital transformation within fisheries-based communities. Traditional fish processing activities are commonly concentrated in rural and coastal areas where internet connectivity, logistics systems, and digital payment infrastructure may remain underdeveloped. According to the Technology-Organization-Environment (TOE) framework, environmental conditions significantly influence firms' innovation adoption decisions (Tornatzky & Fleischer, 1990). Inadequate infrastructure therefore weakens firms' ability to sustain effective digital engagement and online market participation.

Financial constraints also limit digital adoption among traditional food SMEs. Although digital marketing is generally considered more affordable than conventional advertising, initial investments in smartphones, internet access, advertising budgets, content production, and platform management may still impose substantial burdens on microenterprises. From the RBV perspective, limited access to financial and human resources restricts firms' ability to develop digital capabilities necessary for sustained competitiveness (Barney, 1991).

In addition to structural barriers, cultural resistance represents a critical challenge within traditional fish processing systems. Many enterprises rely on long-established relational marketing networks and community-based trust mechanisms. Transitioning toward digital marketing may therefore be perceived as disruptive to traditional business norms and practices. Rogers (2003) argues that resistance to innovation frequently emerges from uncertainty, fear of failure, and attachment to established routines. Within traditional food sectors, such behavioural resistance may significantly slow digital transformation despite growing market pressure for online engagement.

Regulatory complexity also presents emerging concerns for small-scale food processors engaging in digital commerce. Compliance with food safety regulations, product labelling requirements, taxation policies, and platform governance standards may create additional burdens for enterprises with limited institutional support or legal knowledge. These constraints suggest that digital transformation within traditional fish processing is shaped not only by technological readiness but also by broader institutional and policy environments.

Hypothesis Development

Digital Readiness and Digital Marketing Adoption

Recent literature increasingly recognizes digital readiness as a key determinant of digital transformation in SMEs and rural food enterprises. Digital readiness encompasses technological infrastructure, workforce digital skills, leadership commitment, and organizational preparedness for digital adoption (Alqam, 2024; Chen, 2024). Within traditional fish processing enterprises, digital readiness is particularly important because many firms operate with limited technological exposure and informal organizational structures.

Although the Technology Acceptance Model (TAM), Unified Theory of Acceptance and Use of Technology (UTAUT), and Technology-Organization-Environment (TOE) framework have been widely used to explain technology adoption, recent scholarship argues that combining these perspectives provides stronger explanatory power for understanding digital transformation in SMEs (Abbasi et al., 2022; Sharabati et al., 2024). TAM explains how perceived usefulness and ease of use shape adoption intention, whereas TOE captures organizational and environmental constraints particularly relevant in rural agri-food settings. Empirical studies consistently demonstrate that firms with stronger digital infrastructure, supportive leadership, and higher workforce digital competence are more likely to adopt digital marketing technologies successfully (Su, 2023; Sharabati et al., 2024). In traditional fish processing enterprises, digital readiness therefore functions as an enabling capability that determines whether digital marketing can be integrated effectively into business operations.

Accordingly, this study proposes:

H1: Digital readiness positively influences digital marketing adoption.

Mediating Role of Perceived Usefulness and Perceived Ease of Use

The Technology Acceptance Model (TAM) posits that perceived usefulness (PU) and perceived ease of use (PEOU) are central determinants of technology adoption behaviour (Davis, 1989). In traditional fish processing enterprises, where digital literacy levels may vary considerably, perceptions regarding the usefulness and complexity of digital marketing tools become especially important.

Recent studies suggest that organizational digital readiness enhances firms' perceptions of the usefulness and manageability of digital technologies, which subsequently increases adoption likelihood (Enshassi et al., 2025; Salleh, 2025). In rural food SMEs, digital marketing technologies are more likely to be adopted when entrepreneurs perceive them as capable of improving market access, reducing dependency on intermediaries, and increasing sales performance.

However, empirical debates remain regarding whether digital readiness influences adoption directly or indirectly through TAM constructs. Several studies report partial mediation effects, suggesting that digital readiness shapes adoption both through cognitive perceptions and through broader organizational capability mechanisms (Sharabati et al., 2024; Su, 2023). Within traditional fish processing systems, this relationship may be further influenced by low digital confidence and cultural attachment to conventional business practices.

Therefore, this study proposes:

H2: Perceived usefulness and perceived ease of use positively mediate the relationship between digital readiness and digital marketing adoption.

Digital Marketing Adoption, Marketing Capability, and Business Performance

Recent literature increasingly positions digital marketing adoption as a capability-building mechanism rather than merely a technological activity. Drawing on Dynamic Capability Theory and RBV, digital marketing technologies enhance firms' ability to gather market intelligence, engage customers, and respond to changing consumer preferences (Teece, 2018; Wang & Ahmed, 2007).

For traditional fish processors, digital marketing adoption may improve marketing capability by strengthening online branding, customer communication, and promotional effectiveness. Research on food SMEs indicates that firms integrating digital marketing into broader business processes achieve stronger sales growth, customer retention, and competitive positioning than firms engaging only in superficial online activities (Dwivedi et al., 2023; Quinton et al., 2023). Moreover, digital marketing capabilities contribute to resilience within rural food systems by enabling producers to diversify market channels and maintain customer engagement during disruptions. These findings suggest that performance benefits emerge not simply from technology adoption itself but from the development of enhanced marketing capabilities.

Accordingly, this study proposes:

H3: Digital marketing adoption positively affects marketing capability enhancement and business performance.

Moderating Role of Government Support

Government support has emerged as an important institutional factor influencing digital transformation among SMEs and rural enterprises. Such support includes financial assistance, infrastructure development, digital training programs, and regulatory facilitation (OECD, 2023; Li et al., 2022).

Within traditional fish processing systems, institutional support is particularly important because many enterprises operate with limited financial resources and technological capability. Government-funded digital literacy programs, e-commerce initiatives, and rural connectivity

improvements can reduce adoption barriers and strengthen firms' ability to benefit from digital marketing integration.

Grounded in the TOE framework and institutional theory, government support is therefore expected to strengthen the relationship between digital marketing adoption and business performance by providing complementary resources and reducing environmental uncertainty.

Thus, this study proposes:

H4: Government support moderates the relationship between digital marketing adoption and performance outcomes.

Proposed Conceptual Framework

This paper proposes a conceptual framework where Digital Readiness (infrastructure, skills, financial capacity) influences Digital Marketing Adoption. Adoption is mediated by Perceived Usefulness and Perceived Ease of Use, which subsequently impact Marketing Capability Enhancement and Business Performance (sales growth, brand visibility, customer retention). External factors such as government support and digital ecosystem maturity moderate the relationships. Based on the constructs identified from prior studies and an extensive review of the literature, a conceptual framework was developed and is presented in Figure 1.

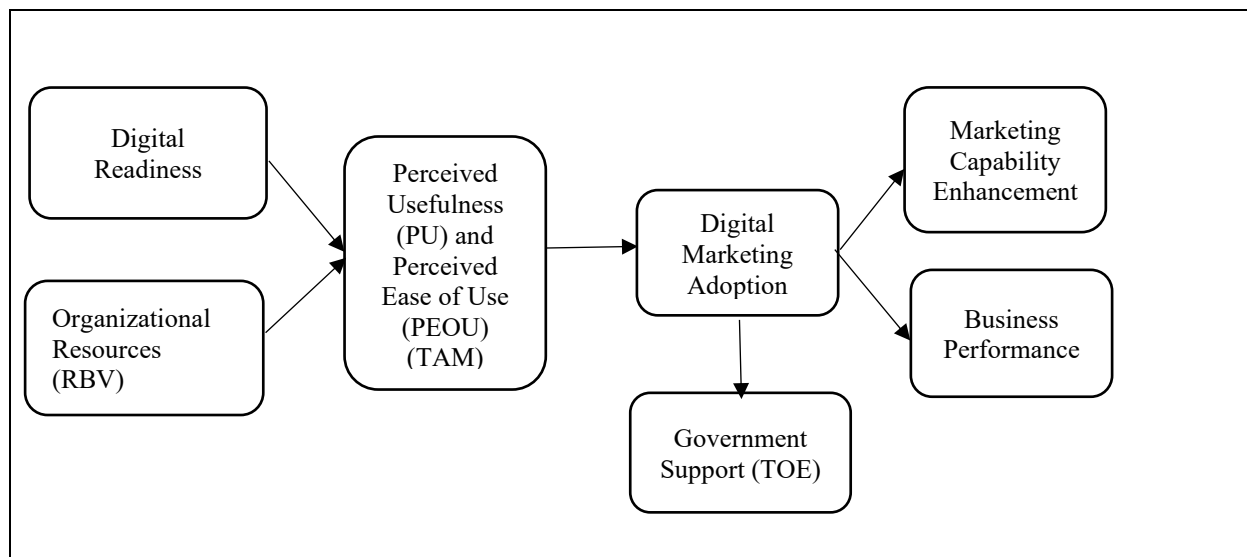


Figure 1: Conceptual Framework

Source: TAM (Davis, 1989), TOE (Tornatzky & Fleischer, 1990), and RBV (Barney, 1991).

Research Propositions

H1: Digital readiness positively influences digital marketing adoption.

H2: Perceived usefulness and perceived ease of use positively mediate the relationship between digital readiness and digital marketing adoption.

H3: Digital marketing adoption positively affects marketing capability enhancement and business performance.

H4: Government support moderates the relationship between digital marketing adoption and performance outcomes.

Conclusions

This study synthesizes recent theoretical and empirical advancements to examine the relationships among digital readiness, perceived usefulness, perceived ease of use, digital marketing adoption, marketing capability enhancement, business performance, and the moderating role of government support. Grounded in the Technology Acceptance Model (TAM), the Technology-Organization-Environment (TOE) framework, the Resource-Based View (RBV), and Dynamic Capability Theory, the findings collectively reinforce the strategic importance of digital transformation in marketing contexts.

First, digital readiness emerges as a foundational organizational capability that shapes firms' preparedness to implement digital marketing technologies effectively. Firms with strong infrastructure, digital skills, leadership commitment, and adaptive culture demonstrate higher levels of technology acceptance and adoption intensity. Second, perceived usefulness and perceived ease of use play critical mediating roles in translating digital readiness into digital marketing adoption. These psychological and cognitive mechanisms explain how organizational preparedness influences behavioural and strategic technology utilization. Third, digital marketing adoption contributes significantly to marketing capability enhancement. Firms that integrate analytics, automation, and omnichannel engagement tools strengthen customer sensing, engagement, targeting precision, and responsiveness capabilities. These enhanced marketing capabilities subsequently translate into superior business performance outcomes, including revenue growth, improved profitability, competitive advantage, and resilience in dynamic environments. Fourth, the effect of digital marketing adoption on performance is not uniform but contingent upon institutional conditions. Government support, through financial incentives, policy facilitation, infrastructure development, and capability-building programs amplifies the positive relationship between digital marketing adoption and performance outcomes. Firms operating within supportive regulatory and policy ecosystems are better positioned to extract value from digital investments.

Overall, the integrated model confirms that digital marketing success is not merely technology-driven but capability-enabled and institutionally reinforced. Sustainable performance improvements require alignment among internal readiness, cognitive acceptance mechanisms, strategic capability development, and supportive external environments. Collectively, the theoretical, practical, and policy implications underscore that digital marketing performance is the result of a systemic alignment among organizational readiness, cognitive acceptance mechanisms, strategic capability development, and supportive institutional ecosystems. Sustainable competitive advantage in the digital era requires coordinated efforts at firm and policy levels to build resilient, adaptive, and innovation-oriented marketing systems. In conclusion, achieving superior business performance through digital marketing adoption requires a holistic ecosystem approach that integrates internal readiness, cognitive acceptance mechanisms, strategic capability development and strong institutional support.

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