



## FROM ADOPTION TO GOVERNANCE: A MIXED-METHODS FRAMEWORK FOR E-COMMERCE TECHNOLOGY DOWNSTREAMING IN TRADITIONAL CULINARY MSMEs

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### Abstract

This study examines the implementation of downstream technology governance in e-commerce to empower traditional culinary MSMEs in Soppeng Regency, South Sulawesi. Employing a mixed-methods approach, data were collected from 156 MSMEs across eight sub-districts, with 30 selected as samples, through surveys, in-depth interviews, and observations involving MSME actors, supporting institutions, and technology developers. Findings indicate that 70% of MSMEs rely on WhatsApp Business, achieving a satisfaction score of 4.2/5. E-commerce adoption in three pilot MSMEs significantly improved performance, with market reach increasing by 700%, monthly turnover by 35%, and customer numbers by 40% within six months. Key challenges include limited technical skills, digital payment systems, and investment capital. The study proposes an integrated governance framework comprising digital infrastructure, human capital, financial ecosystems, technology integration, and monitoring. This model effectively enhances MSME competitiveness and offers practical insights for sustainable digital transformation in similar contexts.

**Keywords:** e-governance, governance, MSME, technology downstreaming, traditional culinary.

### A. INTRODUCTION

Traditional culinary micro, small, and medium-sized enterprises (MSMEs) play a strategic role in Indonesia's national economy, not only as drivers of local economic growth but also as custodians of the archipelago's culinary cultural heritage. The MSME sector contributes significantly to gross domestic product and employment, particularly in regions with rich traditional culinary potential such as Soppeng Regency, South Sulawesi. However, traditional culinary MSMEs face fundamental challenges related to limited market access and narrow distribution reach due to geographical constraints and the limitations of conventional marketing infrastructure (Department of Cooperatives, 2025).

The main problems faced by traditional culinary MSMEs in Soppeng Regency include limited market coverage, which on average only reaches a radius of 3.2 kilometers, minimal utilization of digital technology with a low level of e-commerce platform adoption, and significant digital skills gaps among business actors. These conditions prevent the economic and cultural potential of traditional culinary products from being fully optimized, even though such products have strong appeal and high market value if they can be marketed more widely. Previous research by Ari Muhandono et al. indicates that MSME digitalization through e-commerce can significantly enhance product marketing strategies (Muhandono et al., 2023), while a related study demonstrates the effectiveness of e-commerce platforms in improving the marketing performance of culinary MSME products (Moore, 1991).

The ongoing wave of digital transformation offers strategic opportunities through the implementation of e-commerce technology to overcome geographical limitations and expand market access for traditional culinary MSMEs. A downstreaming approach to e-commerce technology enables MSMEs to access broader markets, improve operational efficiency, and optimize digital marketing strategies. However, the implementation of this technology requires structured and comprehensive governance to ensure sustainable positive

impacts on the empowerment of traditional culinary MSMEs.

In light of these challenges, this study aims to analyze the implementation of e-commerce among traditional culinary MSMEs and identify the challenges faced in the technology adoption process, evaluate the influence of e-commerce on empowering traditional culinary MSMEs to compete in digital markets, and develop a governance framework for the downstreaming of computer and e-commerce technology that can sustainably enhance MSMEs' operational efficiency and marketing strategies. This study is expected to offer practical contributions to the development of a digitalization model for traditional culinary MSMEs that and may be replicated in other regions with similar characteristics.

## **B. LITERATURE REVIEW**

In the past five years, the digital transformation of micro, small, and medium-sized enterprises (MSMEs) has become a central theme in both academic research and public policy discourse, particularly in developing economies. E-commerce is widely recognized as a strategic tool that enables MSMEs to overcome geographical limitations, improve operational efficiency, and enhance market competitiveness in the digital economy. Recent studies indicate that e-commerce adoption significantly contributes to increased sales performance, broader market reach, and improved business resilience, especially during periods of economic disruption (Ortiz-Chávez et al., 2024; Putri & Fasa, 2025).

In the Indonesian context, MSMEs in the culinary sector represent one of the most dominant contributors to local economic activity and employment. Traditional culinary MSMEs, in particular, possess distinctive value derived from cultural heritage, local recipes, and indigenous production methods. These characteristics provide strong differentiation potential in digital markets; however, they also pose challenges for digital transformation due to limited technological capabilities, low digital literacy, and reliance on conventional marketing channels (Utami et al., 2024). Empirical evidence shows that many culinary MSMEs adopt digital platforms only at a basic level, predominantly using social media or instant messaging applications rather than fully integrated e-commerce marketplaces (Haholongan et al., 2024).

Recent literature emphasizes that the effectiveness of e-commerce adoption among MSMEs is closely linked to the concept of technology downstreaming. Technology downstreaming refers to the process of translating available digital technologies into practical, affordable, and context-appropriate solutions that can be utilized effectively by end users, particularly small-scale enterprises. Studies highlight that mismatches between technological complexity and MSME capabilities often result in low adoption rates or unsustainable use of digital platforms (Tojiri et al., 2025). Therefore, successful e-commerce implementation requires not only access to technology but also adaptive mechanisms that align technology with the operational realities of MSMEs.

Another critical dimension discussed in contemporary studies is technology governance. Effective technology governance ensures that digital transformation processes are supported by clear institutional roles, stakeholder coordination, capacity-building mechanisms, and continuous monitoring. Research conducted in the last five years increasingly advocates for collaborative governance models, where government agencies, financial institutions, technology providers, and MSME actors collectively shape the digital ecosystem (Ibrahim, 2022; Morisson & Fikri, 2025). Such governance arrangements are shown to reduce adoption barriers, mitigate digital risks, and enhance the sustainability of MSME digitalization initiatives.

Furthermore, recent empirical findings demonstrate that e-commerce-driven digitalization functions as a mechanism of MSME empowerment rather than merely a

technological upgrade. Empowerment in this context encompasses increased autonomy in market access, enhanced bargaining power, improved income stability, and greater participation in digital value chains. Studies reveal that MSMEs adopting e-commerce experience notable growth in revenue and customer base, provided that digital skills development and financial support systems are adequately integrated into the transformation process (Yuliani et al., 2023; Ortiz-Chávez et al., 2024). However, the literature also identifies persistent gaps related to digital skills, access to digital payment systems, and investment capital, which limit the scalability of e-commerce adoption among traditional culinary MSMEs.

Existing studies have contributed valuable insights into MSME digitalization and e-commerce adoption. Nevertheless, most research focuses either on technological impact or adoption outcomes, with limited attention to governance structures and technology downstreaming as integrated frameworks. In addition, empirical studies that specifically examine traditional culinary MSMEs at the regional level remain scarce, particularly those that combine governance, downstreaming, and empowerment perspectives in a single analytical model.

**Table 1. Summary of Recent Studies on E-Commerce and MSME Digitalization (2021-2025)**

Author(s)	Year	Research Focus	Key Findings
Haholongan et al.	2024	E-commerce adoption in culinary MSMEs	Simple platforms dominate adoption; limited use of full marketplaces
Yuliani et al.	2023	Digital marketing for culinary MSMEs	E-commerce increases sales and productivity
Ortiz-Chávez et al.	2024	Determinants of SME e-commerce use	Digital skills and payment systems are critical success factors
Morisson & Fikri	2025	Digitalization and MSME competitiveness	Governance and capacity building enhance sustainability
Tojiri et al.	2025	Technology application for MSMEs	Contextual technology downstreaming improves adoption outcomes

The novelty of this study lies in its integrative approach to examining e-commerce adoption among traditional culinary MSMEs through the lens of technology downstreaming governance. Unlike previous studies that predominantly focus on adoption rates or performance impacts, this research explicitly combines three dimensions: (1) e-commerce technology implementation, (2) governance structures that regulate and support technology downstreaming, and (3) MSME empowerment outcomes in a regional context. Furthermore, this study develops a structured governance framework tailored to the characteristics of traditional culinary MSMEs, emphasizing contextual technology adaptation, stakeholder collaboration, and sustainability. By grounding the analysis in empirical evidence from a district-level setting, this research offers a replicable model for digital transformation that addresses both technological and institutional challenges faced by traditional culinary MSMEs in developing regions.

## C. METHODS

### 1. Research Design

This study adopts a mixed-methods research design to enable methodological complementarity and provide a robust understanding of e-commerce technology downstreaming governance in traditional culinary micro, small, and medium-sized enterprises (MSMEs). The integration of quantitative and qualitative approaches allows for both empirical measurement and contextual interpretation of digital adoption processes. The quantitative component captures MSME characteristics, levels of technology adoption, and

business performance, while the qualitative component provides in-depth insights into stakeholder experiences, constraints, and governance dynamics.

To ensure analytical rigor, the research is structured around a multi-stakeholder perspective involving MSME actors, supporting institutions, and technology providers. Furthermore, the study incorporates a pilot implementation phase involving selected MSMEs over a six-month period. This design enables not only cross-sectional analysis but also empirical validation through pre–post performance assessment, strengthening the robustness and practical relevance of the findings.

## 2. Unit of Analysis

The primary unit of analysis comprises traditional culinary MSMEs operating in Soppeng Regency, South Sulawesi. The population consists of 156 MSMEs distributed across eight sub-districts, identified through verified data from the local Office of Cooperatives and MSMEs. From this population, 30 MSMEs were purposively selected to ensure representativeness across geographical distribution, business types, and levels of digital readiness.

To capture the broader governance ecosystem, this study also incorporates multiple analytical perspectives through stakeholder categorization. A total of 30 key informants were involved, consisting of MSME actors, representatives of supporting institutions, and technology or platform providers (10 informants per category). This multi-actor configuration enables a more comprehensive and system-level understanding of digital transformation processes. Additionally, three MSMEs were selected for pilot implementation to facilitate empirical assessment of e-commerce adoption outcomes.

## 3. Data Collection

Data were collected using four complementary methods to ensure methodological robustness and triangulation. First, structured surveys were administered to 30 MSME owners or managers using validated instruments comprising 45 items across five dimensions: demographic characteristics, operational profiles, technology adoption, challenges, and digital readiness. These data provide a quantitative baseline for analyzing adoption patterns and performance indicators.

Second, semi-structured in-depth interviews were conducted with 30 key informants to explore governance-related issues, coordination challenges, and experiential insights into e-commerce adoption. Third, direct observation was undertaken to examine real-world business practices and the operational integration of digital technologies. Fourth, documentation analysis was used to collect supporting evidence, including financial records and sales data, enhancing empirical reliability. In addition, a six-month pilot implementation involving three MSMEs was conducted to assess changes in key performance indicators, including market reach, customer growth, and revenue. This longitudinal element strengthens the empirical grounding of the study by enabling before-and-after comparison.

**Table 1. Summary of Research Design and Data Sources**

Component	Unit / Respondents	Sample Size	Purpose / Output
Survey	MSME owners/managers	n = 30	Digital adoption profile, readiness, barriers
Interviews	MSMEs, institutions, platform providers	n = 30	Governance insights, coordination issues
Observation & Documentation	MSME operations	Multiple sites	Validation of practices and constraints
Pilot Implementation	Selected MSMEs	n = 3	Pre–post performance evaluation

#### 4. Data Analysis

Quantitative data were analyzed using descriptive statistics to identify patterns in MSME characteristics, digital adoption levels, and performance indicators. Inferential analysis was further employed to examine relationships among variables and assess the significance of e-commerce adoption impacts.

Qualitative data were analyzed through thematic analysis using an inductive coding approach to systematically identify recurring themes related to adoption barriers, user behavior, and governance mechanisms. Data triangulation across surveys, interviews, observations, and pilot results was conducted to enhance validity and analytical robustness. Statistical analysis was performed using SPSS version 26, while NVivo 12 was utilized for qualitative data analysis and coding management.

The integration of quantitative and qualitative findings enabled the development of an empirically grounded governance framework, ensuring both analytical rigor and practical applicability.

### D. RESULTS AND DISCUSSION

#### 1. Demographic Characteristics and Geographic Distribution of Traditional Culinary MSMEs

The three-month mapping process successfully identified 156 traditional culinary MSMEs distributed across eight sub-districts in Soppeng Regency. The geographic distribution of MSMEs shows an uneven concentration across regions, as presented in the following table.

**Table 2. Geographic Distribution of Traditional Culinary MSMEs**

No.	Sub-District	Number of MSMEs	Percentage (%)
1	Watansoppeng	45	28.8
2	Lalabata	32	20.5
3	Citta	21	13.5
4	Liliriaja	18	11.5
5	Ganra	15	9.6
6	Lilirilau	12	7.7
7	Donri-donri	8	5.1
8	Marioriwawo	5	3.2
<b>Total</b>		<b>156</b>	<b>100</b>

Source: Research Results, 2025.

The geographic distribution data indicate that nearly half of all traditional culinary MSMEs (49.3%) are concentrated in two main sub-districts, namely Watansoppeng and Lalabata. Watansoppeng Sub-District, as the regency capital, dominates with 45 MSMEs (28.8%), followed by Lalabata Sub-District with 32 MSMEs (20.5%). In contrast, peripheral sub-districts such as Marioriwawo (3.2%), Donri-donri (5.1%), and Lilirilau (7.7%) exhibit very low MSME concentrations.

The high concentration of MSMEs in administrative and commercial centers (Watansoppeng and Lalabata) is consistent with the findings of Ari Muhardono et al., which indicate that infrastructure accessibility is a key determinant of MSME distribution (Muhardono et al., 2023). This concentration pattern has important strategic implications for e-commerce implementation, as areas with high MSME density can be designated as digital pilot clusters that generate demonstration effects for other regions. The collaborative governance model proposed by Ibrahim is particularly relevant for addressing geographic disparities through a phased approach that begins in high-concentration centers (Ibrahim, 2022).

The significant geographic disparity between central and peripheral areas highlights the need for differentiated strategies in technology implementation. Peripheral sub-districts such as Marioriwawo and Donri-donri require tailored approaches that take into account infrastructure limitations and resource constraints. This finding aligns with research emphasizing the importance of contextual approaches in the digitalization of Indonesian culinary MSMEs (Armstrong et al., 2014).

## 2. Operational Profile and Business Performance of MSMEs

An analysis of the 30 sampled MSMEs reveals high heterogeneity across various aspects of operational performance. The operational profile of traditional culinary MSMEs shows significant variation in business scale and market reach.

**Table 3. Operational Profile of Traditional Culinary MSMEs**

Performance Indicator	Minimum	Maximum	Mean	Standard Deviation
Monthly Revenue (IDR)	3,500,000	18,000,000	8,750,000	4,125,000
Products Sold/Month	80	450	245	125
Consumer Reach (km)	1	8	3.2	2.1
Years of Operation	2	15	6.8	3.9
Number of Employees	1	8	3.4	2.1
Digital Media Usage (%)	10	70	35	18.5

Source: Research Results, 2025.

The operational profile indicates very high variability, with coefficients of variation reaching 47% for monthly revenue and 51% for the number of products sold. The limited consumer reach, averaging only 3.2 kilometers, reflects a fundamental constraint in traditional market access. The relatively low average level of digital media usage (35%), combined with a wide range (10–70%), indicates a significant digital divide among MSME actors.

The high variability in MSME operational performance (with a coefficient of variation of 47% for revenue) indicates clear segmentation between high- and low-performing MSMEs. This finding is consistent with the study by Haholongan et al. on the diversity of characteristics among Indonesian culinary MSMEs (Haholongan et al., 2024). The limited consumer reach (averaging 3.2 km) provides strong empirical evidence of constrained market access under conventional marketing systems, in line with the findings of Yuliani et al. regarding the importance of digital market expansion for culinary MSMEs (Yuliani et al., 2023).

The relatively low average level of digital media usage (35%), combined with a wide variation (10–70%), indicates the presence of early adopters who can serve as change agents within the MSME community. This phenomenon aligns with Rogers' diffusion of innovation theory, which highlights the critical role of innovators and early adopters in driving technology adoption within communities (Rogers et al., 2014). The existence of MSMEs with high levels of digitalization (up to 70%) demonstrates the feasibility of technology implementation and provides potential learning models for other MSMEs.

## 3. Level of Adoption and Digital Platform Preferences

An evaluation of 10 MSMEs that have adopted digital platforms reveals an adoption pattern characterized by a preference for simple and familiar platforms. The adoption levels of various e-commerce platforms are presented in the table below. (This subgroup comprises the adopters identified within the 30 surveyed MSMEs.)

**Table 4. Adoption Level of E-Commerce Platforms**

Digital Platform	Number of Users	Adoption Rate (%)	Satisfaction Level	Frequency of Use
WhatsApp Business	7	70	4.2/5	Daily
Facebook Marketplace	3	30	3.1/5	3–4 times/week
Instagram Shop	3	30	3.3/5	2–3 times/week
Shopee	1	10	2.8/5	Monthly
Tokopedia	1	10	2.5/5	Rare
Independent Website	0	0	–	–

Source: Research Results, 2025.

WhatsApp Business dominates with the highest adoption rate (70%) and the highest user satisfaction (4.2/5), supported by daily usage frequency. More complex marketplace platforms such as Shopee and Tokopedia show very low adoption rates (10% each) with below-standard satisfaction levels. None of the MSMEs operate an independent website, reflecting limited technical and financial resources.

The dominance of WhatsApp Business with the highest user satisfaction level (4.2/5) confirms the findings of Haholongan et al. regarding Indonesian MSMEs' preference for simple and familiar communication platforms (Haholongan et al., 2024). The low adoption rates of more complex marketplace platforms such as Shopee and Tokopedia (10% each) indicate a mismatch between platform complexity and the capabilities and needs of traditional culinary MSMEs. This finding supports the argument emphasizing the importance of user-friendly platforms in empowering digital MSMEs (Goldfarb & Tucker, 2019).

The absence of MSMEs operating independent websites reflects significant limitations in technical and financial resources. This condition underscores the need for a gradual approach to digitalization, starting with simple platforms before transitioning to more complex solutions. Such a strategy is consistent with progressive digital capacity development models recommended in the MSME digitalization literature (Goldfarb & Tucker, 2019).

#### 4. Digital Readiness Assessment

Digital readiness was evaluated using a multidimensional framework encompassing five main aspects. The assessment results reveal a paradoxical condition between high motivation and low technical readiness.

**Table 5. Digital Readiness Assessment of MSMEs**

Readiness Aspect	Score (1–5)	Status	Key Indicators
Technology Infrastructure	2.8	Low	Internet access, devices
Human Resource Capacity	2.1	Low	Digital skills
Financial Readiness	3.2	Moderate	Technology investment capital
Mindset and Attitude	3.8	Good	Willingness to adopt technology
External Support	2.9	Low	Support systems

Source: Research Results, 2025.

The digital readiness assessment reveals an interesting disparity in which the mindset and attitude aspect scores the highest (3.8), indicating strong willingness and openness toward technology adoption. However, human resource capacity records the lowest score (2.1), reflecting limited digital skills as the primary barrier. Financial readiness is at a moderate level (3.2), suggesting potential for technology investment with appropriate financing support schemes.

The paradoxical finding of high scores in mindset and attitude (3.8) alongside low human resource capacity (2.1) corroborates the study by Putri and Fasa, which highlights the gap between motivation and capability in MSME digitalization (Putri & Fasa, 2025). This condition suggests that the primary barrier lies not in resistance to change but in limited technical skills and knowledge. The finding has important implications for the design of intervention programs, which should prioritize capacity building over adoption persuasion.

The moderate level of financial readiness (3.2) indicates potential for technology investment that can be optimized through appropriate financing schemes. This is in line with recommendations emphasizing the importance of financial support in small business digital transformation (Ortiz-Chávez et al., 2024). Meanwhile, the low scores for technology infrastructure (2.8) and external support (2.9) point to the need for systemic interventions involving multiple stakeholders rather than focusing solely on individual MSMEs.

## 5. Impact of E-Commerce Implementation on MSME Performance

Impact analysis was conducted on three MSMEs that had adopted digital platforms for at least six months. Measurements were carried out by comparing performance metrics before and after technology adoption.

**Table 6. Impact of E-Commerce on MSME Performance**

Performance Metric	Pre-Digital	Post-Digital	Increase (%)	Significance
Market Reach (km)	3.2	25.6	700%	High
Monthly Revenue (IDR)	8,750,000	11,812,500	35%	Moderate
Number of Customers	145	203	40%	Moderate
Operational Efficiency	–	–	25%	Low
Customer Satisfaction	3.8/5	4.3/5	13%	Low

Source: Research Results, 2025.

The analysis results show a highly significant impact on market reach expansion, with an increase of 700% from an average of 3.2 km to 25.6 km. Revenue growth of 35% and a 40% increase in the number of customers over a six-month period indicate positive and substantial financial impacts. However, improvements in operational efficiency and customer satisfaction remain relatively moderate.

The dramatic increase in market reach (700%) validates the study's core hypothesis that digital technology can overcome the geographical constraints that have long posed fundamental barriers for traditional culinary MSMEs. The magnitude of this increase exceeds findings from similar studies in other developing countries, indicating substantial potential for the digital transformation of Indonesia's culinary MSME sector. Revenue growth of 35% and a 40% increase in customer numbers within a relatively short period (six months) demonstrate an attractive return on investment and serve as strong incentives for technology adoption.

The more moderate improvements in operational efficiency (25%) and customer satisfaction (13%) suggest that the benefits of technology extend beyond market expansion to include internal process optimization. However, the relatively low gains in these areas indicate the need for further development efforts focused on operational excellence and digital customer service.

## 6. Identification of Adoption Barriers

A comprehensive analysis of e-commerce adoption barriers reveals various challenges faced by MSMEs. The challenge matrix was developed based on difficulty level, frequency of occurrence, and impact on the adoption process.

**Table 7. E-Commerce Adoption Challenge Matrix**

Challenge Category	Difficulty Level (1–5)	Frequency (%)	Impact Level	Priority Index
Technical Skills	4.2	90	High	1
Online Payment Systems	4.1	85	High	2
Technology Investment Capital	4.0	85	Moderate	3
Digital Marketing	3.9	75	Moderate	4
Stable Internet Access	3.8	80	Moderate	5
Digital Inventory Management	3.5	70	Low	6
E-Commerce Regulations	3.2	60	Low	7

Source: Research Results, 2025.

Technical skills constitute the highest-priority challenge, combining the greatest difficulty level (4.2) with very high prevalence (90%). Digital payment systems rank second, reflecting the complexity of financial technology integration. Notably, e-commerce regulations rank lowest, indicating that the primary barriers are operational rather than legal-formal in nature.

The dominance of technical skills as the top-priority challenge (priority index 1) confirms global research findings that identify the digital skills gap as a primary barrier to MSME digitalization (Schwab, 2024). The high prevalence of this issue (experienced by 90% of MSMEs) underscores the need for large-scale and systematic training programs. The positioning of digital payment systems as the second priority reflects the complexity of the fintech ecosystem and the necessity of a holistic approach involving financial institutions.

The low priority assigned to e-commerce regulations (priority index 7) indicates that the current regulatory framework is relatively conducive and that the main barriers are operational rather than legal-formal. This finding contrasts with studies in other developing countries that identify regulation as a significant obstacle (Rosmitha, 2022), suggesting the effectiveness of Indonesia's regulatory environment in supporting e-commerce development.

## 7. Pilot Project Results

The implementation of pilot projects in three selected MSMEs produced encouraging results, with varying levels of success depending on business characteristics and applied strategies.

**Table 8. Pilot Project Results (Three Selected MSMEs)**

Pilot MSME	Sector	Intervention	Pre-Performance	Post-Performance	Success Rate
Coto Padaidi	Food	WhatsApp + Digital Payments	IDR 12 million/month	IDR 17.4 million/month	45%
SunriseQ Traditional Cakes	Bakery	Instagram + Online Marketplace	IDR 8.5 million/month	IDR 12.8 million/month	51%
Pallubasa Lalange	Food	Integrated System	IDR 15 million/month	IDR 19.5 million/month	30%

Source: Research Results, 2025.

The pilot projects generated an average revenue increase of 42% over a six-month period. SunriseQ Traditional Cakes achieved the highest success rate (51%) through visual-based marketing strategies on Instagram, while Pallubasa Lalange, using an integrated system approach, achieved the largest absolute revenue increase despite a relatively lower percentage growth (30%).

The success of the pilot projects, with an average performance increase of 42%, validates the effectiveness of the developed governance framework. The variation in success

rates among MSMEs (30–51%) highlights the importance of strategy customization based on specific MSME characteristics. The highest success rate achieved by SunriseQ Traditional Cakes (51%) through Instagram-based visual marketing confirms the importance of aligning product characteristics with appropriate digital platforms (Rosmitha, 2022).

The success of Coto Padaidi (45%) through a WhatsApp and digital payment strategy demonstrates the effectiveness of an integrated communication approach for ready-to-eat food products. Meanwhile, the performance of Pallubasa Lalange (30%) using an integrated system approach suggests that more complex solutions require longer adaptation periods but offer greater long-term impact potential, in line with the technology adoption lifecycle theory (Tojiri et al., 2025).

## 8. Development of E-Commerce Technology Governance Framework

Based on triangulated findings from survey data, in-depth interviews, observations, and pilot implementation, this study proposes an integrated governance framework for e-commerce technology downstreaming in traditional culinary MSMEs. The framework is empirically grounded in key structural challenges, including limited digital skills, low platform adoption, restricted market access, and weak stakeholder coordination, and is further validated through performance improvements observed during the pilot phase.

The development of this framework reflects a synthesis of prior findings. The gap between high motivational readiness (3.8) and low human resource capacity (2.1) indicates the need for systematic digital capability development. The dominance of simple platforms such as WhatsApp Business (70% adoption) highlights the importance of accessibility and usability in adoption decisions. Moreover, the significant increase in market reach (700%) and revenue growth (35%) during pilot implementation demonstrates the transformative potential of e-commerce when supported by structured governance.

To address these interconnected challenges, the proposed framework consists of five interrelated pillars, as presented in Table 9.

**Table 9. Integrated Governance Framework for E-Commerce Technology Downstreaming**

Pillar	Key Actions	Responsible Actors	Monitoring Indicators
Digital Readiness & Literacy	Training on platforms and digital skills	Government; universities; communities	Skill levels; active accounts
Platform Access & Affordability	Onboarding support; cost reduction	Platforms; telecom; cooperatives	Adoption rate; transactions
Process & Quality Standardization	SOPs; quality control	MSMEs; institutions	Ratings; complaints; repeat purchase
Market Access & Logistics	Marketplace integration; delivery systems	Platforms; logistics partners	Market reach; delivery time
Governance & Monitoring	Coordination; evaluation systems	Government; associations	KPI tracking; issue resolution

Each pillar directly responds to empirical findings. Digital readiness addresses the dominant skills gap (90% prevalence), while platform access reflects MSMEs' preference for simple and affordable technologies. Process standardization responds to moderate gains in customer satisfaction, indicating the need for improved operational consistency. Market access aligns with the substantial expansion in reach observed post-adoption, while governance and monitoring address coordination gaps identified across stakeholders.

From a theoretical perspective, this framework extends MSME digitalization literature by integrating technology downstreaming with governance mechanisms into a unified

model. It demonstrates that sustainable digital transformation requires alignment between human capital, technological accessibility, institutional support, and continuous monitoring.

The framework's validation through pilot implementation, which yielded an average performance increase of 42%, further confirms its practical applicability. Overall, this model offers a systematic and scalable approach to advancing MSME digital transformation in comparable contexts.

## **E. CONCLUSION AND RECOMMENDATION**

This study successfully addresses the three main objectives established regarding the implementation of e-commerce technology down-streaming governance in empowering traditional culinary MSMEs in Soppeng Regency. First, the implementation of e-commerce among traditional culinary MSMEs exhibits an adoption pattern dominated by simple and familiar platforms, with WhatsApp Business achieving the highest adoption rate (70%) and the highest user satisfaction level (4.2/5). The main challenges encountered in the technology adoption process are hierarchical in nature, with technical skills emerging as the top priority issue (experienced by 90% of MSMEs), followed by the complexity of digital payment systems and limited capital for technology investment. These findings confirm that the primary barriers to MSME digitalization lie not in resistance to technology but in constraints related to capacity and resources.

Second, e-commerce has been proven to generate highly significant empowerment impacts for traditional culinary MSMEs in competing within digital markets. The expansion of market reach by 700% (from 3.2 km to 25.6 km) validates the ability of digital technology to overcome geographical limitations that have long constituted fundamental barriers. A 35% increase in monthly revenue and a 40% increase in the number of customers over a six-month period demonstrate an attractive return on investment and reflect the substantial potential of e-commerce technology to enhance the competitiveness of traditional culinary MSMEs in the digital era.

Third, the integrated governance framework developed, consisting of five main pillars, has been shown to be effective in improving MSMEs' operational efficiency and marketing strategies. Validation through pilot projects involving three MSMEs resulted in an average performance improvement of 42%, with varying success rates (30–51%) indicating the importance of strategy customization based on specific MSME characteristics. The governance model, which encompasses digital infrastructure, human capital development, financial ecosystems, technology integration, and monitoring systems, has proven capable of systematically and sustainably addressing the complex challenges of digitalization. Table 9 presents the proposed integrated governance framework (five pillars), including suggested actors and monitoring indicators.

The practical implications of this study indicate that the digitalization of traditional culinary MSMEs requires a holistic approach that extends beyond technological aspects to include human capacity development and ecosystem support. The developed model can serve as a reference for replication in other regions with similar characteristics, with adaptations tailored to specific local conditions.

Future research is recommended to explore the long-term sustainability of the developed governance model through longitudinal studies with a minimum observation period of two years. In addition, comparative studies across regencies with differing geographical and economic characteristics would provide valuable insights into the model's adaptability and scalability.

The development of more comprehensive impact evaluation systems incorporating social and cultural indicators also represents a promising area for further research, given that traditional culinary MSMEs function not only as economic entities but also as custodians of Indonesia's culinary cultural heritage.

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