Proceeding – ICAMEB
International Conference on Accounting, Management, Entrepreneurship and Business (ICAMEB)

Business Transformation of MSMEs in Tegal City Using the Business Architecture and Technology Architecture Phases of the TOGAF Framework

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***Abstract*—**

Micro, Small, and Medium Enterprises (MSMEs) play a crucial role in driving the economy of Tegal City, yet many still face challenges in adapting to digital transformation and optimizing business processes. This research aims to design a business transformation model for MSMEs by applying the Business Architecture and Technology Architecture phases of the TOGAF (The Open Group Architecture Framework) framework. The study employed a qualitative descriptive method, involving interviews, observations, and document analysis with selected MSMEs in Tegal City. The findings reveal that the integration of business process mapping and technology architecture design can significantly improve operational efficiency, customer engagement, and market reach. The proposed model offers a structured roadmap that aligns business strategies with technology implementation, enabling MSMEs to transition towards more sustainable and competitive digital business practices. This study concludes that the TOGAF framework provides a practical approach for guiding MSMEs in achieving effective and scalable digital transformation.

Keywords— ***Business Transformation; MSMEs; TOGAF; Business Architecture; Technology Architecture***

I. INTRODUCTION

Micro, Small, and Medium Enterprises (MSMEs) play a vital role in Indonesia's economy, including in Tegal City. As a strategically located coastal city, Tegal hosts a diverse range of MSMEs operating in sectors such as culinary, fisheries, handicrafts, and services. These enterprises not only create substantial employment opportunities but also act as essential drivers of local economic growth and community welfare. However, in the face of rapid technological advancements, market globalization, and shifting consumer preferences, MSMEs in Tegal City encounter significant challenges in sustaining competitiveness, innovating products, and improving operational efficiency. The transition to online sales through the effective utilization of digital platforms is a crucial milestone in their digital transformation journey, enabling them to expand market reach, enhance customer engagement, and optimize business processes for long-term sustainability (Hoang, D. C., Duc, P. M., & Anh, 2023; Zheng, B., Yuan, Y., Li, H., & Jiang, 2023). Digitalization initially introduces gaps and disparities that can hinder the speed and effectiveness of its implementation process. These challenges may arise from differences in infrastructure, access to technology, and the readiness of users to adapt. However, despite these initial setbacks, once fully implemented, digitalization transforms traditional systems into more efficient, transparent, and scalable models for commerce. This evolution ultimately leads to improved buying and selling experiences, offering greater convenience, wider reach, and enhanced trust between parties involved (Bei Harira Irawan, Deddy Prihadi, Dien Noviany Rahmatika, Catur Nugroho, Jaka Waskita, 2024).

Technology-driven business transformation has become an urgent necessity for MSMEs in the face of increasingly dynamic market competition. This transformation encompasses the modernization of business processes, the integration of advanced information systems, and the strategic optimization of resources to generate greater added value. The shift toward digitalization is largely fueled by MSME actors' ability to adapt to social media and online marketplace platforms, which serve not only as promotional tools but also as vital components in strengthening customer engagement, expanding market reach, and enhancing overall business sustainability (Komala, A. R., & Firdaus, 2023). MSMEs are often confronted with challenges such as a risk-averse culture and a heavy reliance on outdated systems, both of which can significantly hinder the pace of digital adoption. This reluctance to embrace change often stems from limited technological literacy, concerns over investment costs, and uncertainty regarding the measurable benefits of digital transformation. As a result, many MSMEs struggle to modernize their operations, thereby missing opportunities to enhance efficiency, expand market reach, and remain competitive in an increasingly digital-driven economy (Kallmuenzer, A., Mikhaylov, A., Chelaru, M., & Czakon, 2024).

The intensity and strength of interactions among business actors play a crucial role in determining the effectiveness of a network. Frequent and close interactions can amplify the benefits derived from the number of partners while reinforcing trust and long-term collaboration. Such strong ties often facilitate smoother information exchange, faster decision-making, and enhanced coordination. However, this dynamic may also diminish the role of indirect connections, which could otherwise serve as valuable sources of new opportunities, innovations, and diverse perspectives within the broader business ecosystem (Casais, 2023). However, many MSMEs still lack a clear strategic roadmap to guide their transformation efforts. The process of change is often carried out in a fragmented manner, without adequately aligning business strategies with sufficient technological support. Limited access to training programs and digitalization resources hampers their ability to fully leverage digital applications for operational efficiency and market expansion. A significant skills gap persists, not only in digital literacy but also in essential non-technical competencies such as business management, communication, and problem-solving. Existing training initiatives are often insufficient, poorly targeted, and financially inaccessible particularly for women entrepreneurs and young business owners thereby limiting inclusivity and slowing the pace of digital adoption. Without comprehensive, affordable, and context-specific capacity-building programs, the potential for MSMEs to compete in an increasingly digital economy remains constrained (Amaya, A., Campoverde, J., & Granda, 2024; Haylemariam, L. G., Oduro, S., & Tegegne, 2024).

The TOGAF (The Open Group Architecture Framework) provides a systematic and structured approach to designing and implementing enterprise architecture, which can also be applied effectively in the MSME sector. By adopting TOGAF, the business transformation process can be broken down into well-defined phases ranging from initial planning and stakeholder alignment, through in-depth business and technology analysis, to the implementation and continuous improvement stages. This phased methodology not only ensures a clear roadmap for change but also facilitates better risk management, resource allocation, and integration between business objectives and technological solutions. For MSMEs, this structured approach can significantly enhance the efficiency and sustainability of their digital transformation initiatives (Harrison, 2009). Two phases that are particularly relevant for MSMEs are the Business Architecture and Technology Architecture, which focus on mapping business processes and selecting the most suitable technologies to support these strategies. Advances in modern information

and communication technologies enable businesses to establish broader connections at a lower cost, making business networks more dynamic and collaborative. This increased connectivity fosters opportunities for innovation, market expansion, and cross-industry partnerships. The inherent flexibility of these architectures allows companies to respond more effectively to evolving customer needs while simultaneously leveraging and sharing their core competencies. For MSMEs, this means not only improving operational efficiency but also gaining a competitive edge in an increasingly interconnected digital economy (Nurfarida, I. N., Sudarmiatin, Hermawan, A., & Restuningdiah, 2023).

In the initial phase of implementing the TOGAF Framework, the first step is to identify the scope of the architecture within MSMEs in Tegal City, determine the resources required for the MSME system, and establish the framework to be used for building a digital-based business development architecture. This stage serves as the foundation for the entire transformation process, ensuring that objectives are clearly defined, stakeholders are aligned, and the necessary capabilities both technical and organizational are in place. By setting clear boundaries, resource requirements, and guiding principles from the outset, MSMEs can minimize risks, streamline decision-making, and create a coherent roadmap that aligns technological adoption with long-term business goals (Elena Kornyshovaa, 2021). The Business Architecture phase in TOGAF helps identify core processes, workflows, roles, and relationships between business components. This enables MSMEs to understand their market position, existing strengths, and areas requiring improvement. For MSMEs in Tegal City, this phase serves as a foundation to strengthen sales strategies, expand market reach, and enhance customer service quality. Meanwhile, the Technology Architecture phase in TOGAF focuses on the selection, planning, and implementation of technologies that align with business needs. These technologies include hardware, software, networks, and digital platforms designed to improve efficiency and productivity. Applying this phase to MSMEs in Tegal City enables the seamless integration of business strategies with the most suitable technological solutions. By ensuring that technology adoption directly supports business objectives, MSMEs can achieve greater agility, improve operational performance, and create a sustainable competitive advantage in the marketplace.

Tegal City holds significant potential for the development of technology-driven MSMEs, especially with the support of local government initiatives and the increasing accessibility of the internet. However, there remains a considerable gap in the understanding and practical adoption of technology among MSME players. Without well-structured architectural planning, technology investments risk becoming inefficient, yielding minimal impact on overall business performance. This study aims to analyze and design a comprehensive business and technology architecture framework for MSMEs in Tegal City by leveraging two key phases of the TOGAF framework: Business Architecture and Technology Architecture. Through this approach, MSMEs are expected to gain a clear, measurable, and strategic roadmap for business transformation. This roadmap will ensure the alignment of business objectives with technological enablers, enabling MSMEs to optimize resources, improve operational efficiency, expand market reach, and create sustainable competitive advantages in the evolving digital economy.

The findings of this study are expected to serve as a practical guide for MSMEs in implementing a structured and systematic digital transformation process. Furthermore, this research aims to provide an academic contribution to the application of the TOGAF framework within the MSME sector, particularly in urban areas such as Tegal. By establishing a strong synergy between well-formulated business strategies and appropriate technological solutions, MSMEs in Tegal City are anticipated to enhance their competitiveness, optimize operational performance, and rapidly adapt to dynamic market changes. In addition, the outcomes of this study can act as a reference model for other urban MSMEs facing similar challenges, offering a replicable approach to aligning digital initiatives with business objectives. This alignment not only supports sustainable growth but also fosters innovation, encourages market expansion, and strengthens the resilience of MSMEs in an increasingly competitive digital economy.

While several previous studies have applied TOGAF in large enterprises and public institutions, limited research has focused on its implementation within the context of micro, small, and medium enterprises (MSMEs), particularly in developing regions such as Tegal City. This study seeks to address this research gap by demonstrating how TOGAF's Business and Technology Architecture phases can be adapted to the unique characteristics and constraints of MSMEs, such as limited resources, informal business structures, and low technological maturity. The novelty of this research lies in contextualizing TOGAF as a scalable and practical framework for MSMEs, providing a structured roadmap for digital transformation that aligns business objectives with technological adoption. This contribution distinguishes the study from prior works that predominantly emphasize large-scale or theoretical applications of enterprise architecture.

II. METHOD

The method employed in this research is the TOGAF ADM framework, beginning with the Preliminary phase and the Architecture Vision phase to define the vision and scope of the digital transformation architecture for MSMEs in Tegal City. This initial stage aims to identify strategic objectives and key stakeholders while aligning business needs with technological potential, in accordance with the recommended best practices of the TOGAF ADM methodology. By following this structured approach, the study ensures that the transformation process is guided by a clear and well-defined vision that reflects both the current conditions and the desired future state of MSMEs. The alignment between strategic goals and technological capabilities at this stage not only establishes a strong foundation for subsequent phases but also minimizes the risk of misaligned investments. Moreover, this early planning ensures that every technological initiative directly supports business growth, operational efficiency, and long-term sustainability, enabling MSMEs to embrace innovation in a focused and impactful manner (Izzati, B. M., Fajrillah, A. A. N., Saputri, R. A. A., Oktavian, I. T., & Widyastri, 2020). In the Business Architecture phase, the core business processes of MSMEs will be mapped covering the value chain, key stakeholders, and interactions between business functions as the foundation for designing an IT architecture that is fully aligned with business objectives, in accordance with TOGAF principles. This phase plays a crucial role in ensuring that every technological solution is directly tied to actual business needs and operational workflows. By thoroughly analyzing the value chain, the research identifies which processes generate the most value and which require optimization or digital enhancement. Mapping stakeholder roles and cross-functional interactions also helps reveal dependencies, potential bottlenecks, and collaboration opportunities across departments or business units. Through this structured approach, the resulting IT architecture will not only support day-to-day operations but also enable innovation, scalability, and adaptability to future market changes. Ultimately, this ensures that MSMEs in Tegal City can achieve a coherent synergy between business strategy and technology implementation, maximizing efficiency and competitive advantage (Oktavian, I. T., Fajrillah, A. A. N., & Darmawan, 2019). The Technology Architecture phase focuses on defining the requirements for applications, data, infrastructure, and digital platforms that support MSME operations such as online marketplaces, operational management systems, and integrated payment solutions. This stage ensures that all technological components are aligned with business needs, enhancing efficiency, streamlining processes, and opening new market opportunities. It also addresses data security, accessibility, and accuracy to support better decision-making, while planning scalable infrastructure, including hardware, networks, and cloud services. Drawing from proven practices in IT blueprint design for MSME digital transformation, this phase adapts those approaches to the specific context of Tegal City, ensuring technological relevance, sustainability, and readiness for future innovation (Mubarok, P., Tukino, T., Hananto, A., & Hananto, 2024).

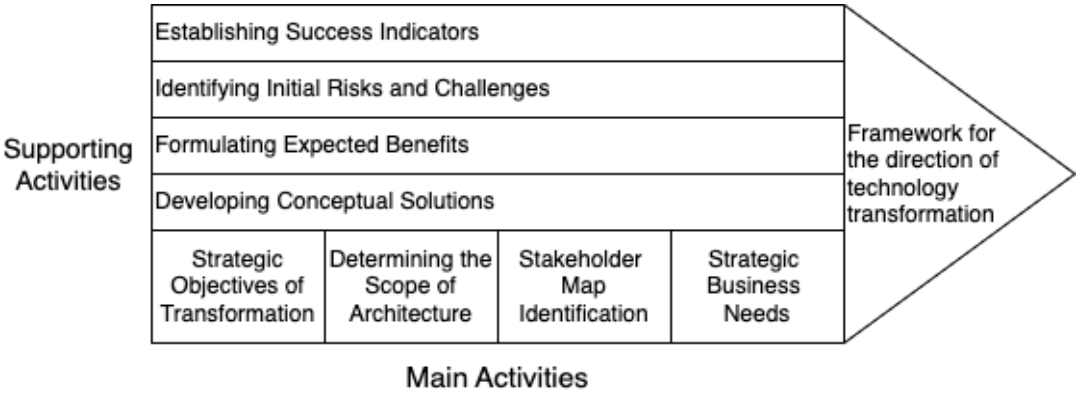

FIGURE 1 DIGITALIZATION VISION ARCHITECTURE FOR MSMES IN TEGAL CITY

This research adopts a qualitative case study design, focusing on the application of the TOGAF ADM framework within the context of MSMEs in Tegal City. The qualitative approach allows for an in-depth exploration of the existing business processes, organizational structures, and technological readiness of MSMEs, capturing contextual nuances that quantitative methods might overlook. Through document analysis, stakeholder interviews, and direct observation, the study identifies current challenges and opportunities in digital transformation. The case study method provides a comprehensive understanding of how the TOGAF framework can be adapted to the specific characteristics of MSMEs, enabling the formulation of a practical, scalable, and contextually relevant enterprise architecture model.

In this study, the primary variables analyzed are Business Architecture variables and Technology Architecture variables, both derived from the TOGAF ADM framework. The Business Architecture variables encompass elements

such as business processes, stakeholder roles, value chains, and operational workflows, which are measured through qualitative indicators including process effectiveness, role clarity, and interdepartmental coordination. Meanwhile, the Technology Architecture variables involve applications, data management, infrastructure, and digital platforms, assessed based on their alignment with business needs, scalability, and contribution to operational efficiency. These variables are operationalized through thematic coding of interview data and document analysis, allowing the identification of relationships between business strategy, technological implementation, and performance improvement within MSMEs. By explicitly defining and measuring these variables, the study establishes a structured analytical framework that enhances the validity and clarity of the research methodology.

The sampling process in this study employed a purposive sampling method, focusing on MSMEs in Tegal City that are actively undergoing or planning digital transformation initiatives. The selection criteria included (1) MSMEs operating in the culinary and service sectors, (2) having been in operation for at least three years, (3) employing between 5 and 50 workers, and (4) utilizing or intending to adopt digital tools such as online marketplaces, point-of-sale systems, or digital marketing platforms. Data were collected through structured interviews and document analysis involving 10 MSME owners or managers, chosen to represent varying levels of technological adoption. This sampling approach ensures that the selected participants adequately reflect the diversity, challenges, and readiness of MSMEs in embracing digital transformation within the local economic context of Tegal City.

TABLE I. SUMMARY OF SAMPLE SELECTION

Sector	Number of MSME's	Average Years of Operation	Average Number of Employees	Key Digital Tools Used
Culinary	6	4,5 years	12	Online ordering, digital marketing
Service	4	5 yraes	9	Onlne booking digital payments
Total	10	--	--	--

The data obtained from interviews, observations, and documentation were analyzed using thematic analysis combined with framework-based mapping aligned to TOGAF ADM phases. The analysis followed three steps: (1) coding, (2) theme categorization, (3) mapping to identify patterns related to business processes, stakeholder roles, digital readiness, and technology adoption. The resulting themes were then aligned with TOGAF's Business Architecture and Technology Architecture domains, producing structured insights that connect empirical findings with the enterprise architecture objectives for MSMEs in Tegal City.

The qualitative data obtained from MSME interviews were analyzed thematically and then mapped onto the TOGAF ADM framework to ensure consistency between the empirical findings and the architectural model. The resulting theme classification, as shown in Table 2, highlights the main issues and opportunities across the Business Architecture and Technology Architecture phases.

TABLE II. THEMATIC MAPPING OF INTERVIEW RESULTS BASED ON TOGAF FARMEWORK

TOGAF Domain / Phase	Identified Themes	Key Findings / Insights	Example Evidence from Respondents
Business Architecture	Business Process Inefficiency	Several MSMEs still perform inventory and sales tracking manually, causing delays and data inconsistencies.	"We record sales using notebooks, so sometimes stock data doesn't match actual inventory."
	Stakeholder Coordination	Lack of communication between owners and employees regarding digital adoption priorities.	"Only I understand how to use the online shop, my staff still struggles with it."
	Customer Interaction and Value Chain	Digital channels are mainly used for promotion, not yet for integrated customer relationship management.	"We use WhatsApp and Instagram, but there's no system to manage customer feedback."
Technology Architecture	Infrastructure and Platform Readiness	Limited access to stable internet and suitable devices affects system implementation.	"Sometimes, our connection is too slow for uploading product data."
	Application and Data Integration	Different digital tools are used independently without synchronization between sales, stock, and finance.	"We use an app for sales, but our financial reports are still made in Excel."
	Security and Scalability Awareness	Most MSMEs have not yet considered data security or system scalability in their operations.	"We don't think about data backup because the apps already store everything."

III. RESULTS AND DISCUSSION

The results of this study are presented based on a qualitative thematic analysis supported by framework-based mapping aligned with the TOGAF ADM structure. Rather than focusing on statistical or numerical data, the findings emphasize patterns, relationships, and insights drawn from participant narratives, document analysis, and observed practices among MSMEs in Tegal City. This approach highlights recurring themes related to business process efficiency, stakeholder coordination, and technology adoption readiness, which are then systematically mapped to the Business Architecture and Technology Architecture phases of TOGAF. By clarifying this analytical orientation, the discussion maintains coherence with the qualitative design and ensures that interpretations are grounded in contextual understanding rather than quantitative generalization.

In the context of MSMEs in Tegal City, Business Architecture focuses on mapping the high-level business structure that links overall business strategy to daily operational processes. At this level, the core capabilities are designed—such as sales, production, procurement, and customer service—along with key process flows, roles and responsibilities (e.g., owner, cashier, marketing), distribution channels (offline stores, marketplaces, social media), and relationships among stakeholders. The outcome of the Business Architecture is a blueprint that clearly defines the what (business needs), who (responsible parties), and how (process execution), ensuring that future technology changes are designed in alignment with business goals and MSME priorities.

Developing a valid Business Architecture requires primary and secondary data, including the Business Model Canvas, SOP flowcharts, organizational structure, product/service details, sales history, inventory and supply chain data, customer segments, marketing performance, KPIs, HR competencies, budgets, IT plans, and current system documentation. These inputs enable structured, measurable, and evidence-based design of capabilities, processes, and change priorities.

TABLE III. BUSINESS ARCHITECTURE COMPONENT

Aspect	Description	Required Data
Business Objectives	Define the strategic goals of digital transformation for SMEs in Tegal City.	Strategic plan documents, business vision and mission statements.
Stakeholders	Identify all relevant parties involved in the business process.	Stakeholder list, organizational chart, role descriptions.
Business Processes	Map the core business activities and supporting activities.	Process flow diagrams, SOPs, transaction records.
Products/Services	Determine the types of products or services offered by the SMEs.	Product/service catalog, sales data, market segmentation reports.
Information Needs	Identify what information is required to support decision-making.	Inventory records, customer databases, supplier information.
Capabilities	Assess existing business capabilities and gaps for future development.	Capability assessment reports, skills inventory, resource availability reports.
Business Rules	Establish policies, regulations, and operational constraints.	Internal policies, government regulations, compliance documents.
Performance Metrics	Define KPIs to measure the success of business transformation.	Historical performance data, financial reports, customer satisfaction surveys.

The Business Architecture is designed to map the interconnections between strategic objectives, stakeholders, and the organization's core processes. This stage provides an initial visualization of the value chain and clarifies the role of each activity in supporting the achievement of organizational goals. By conducting this mapping, it becomes possible to identify essential data requirements, performance indicators, and potential opportunities for digitalization. These insights serve as a critical foundation for developing the subsequent Data, Application, and Technology Architectures. Furthermore, the process ensures that every technological initiative is aligned with strategic priorities, addresses stakeholder needs, and optimizes operational efficiency. In the context of MSMEs, this alignment is vital to ensure that digital transformation efforts are practical, resource-efficient, and capable of delivering measurable business impact.

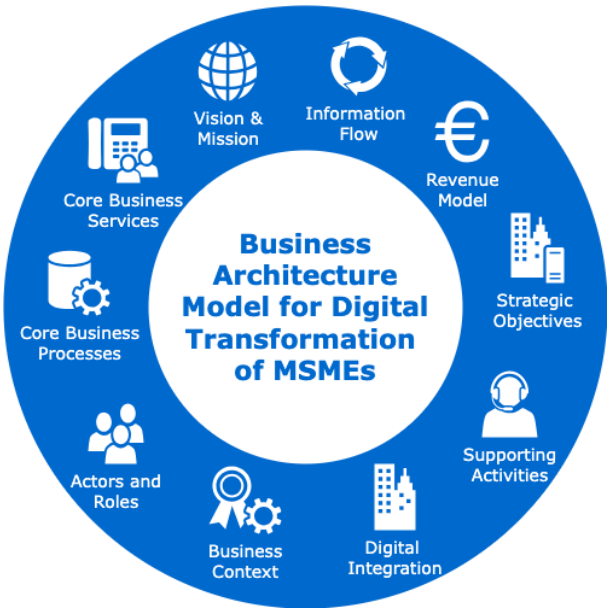

FIGURE 2 BUSINESS ARCHITECTURE DESIGN

The Technology Architecture serves as the foundational infrastructure that supports the management, storage, and exchange of data within the designed system. In this context, the selection of platforms and infrastructure must prioritize performance, scalability, and security. Technologies such as cloud-based servers, reliable network connectivity, and appropriate hardware ensure that the system can operate optimally while accommodating future growth and evolving needs. The adoption of virtualization technologies and cloud services provides flexibility in adjusting capacity according to workload demands, allowing organizations to scale efficiently without unnecessary overhead. Security mechanisms, including firewalls, data encryption, and multi-factor authentication, play a crucial role in safeguarding sensitive information from cyber threats. Additionally, the use of distributed architectures can enhance service availability, ensuring that failures in one component do not disrupt the entire system's operations. To support seamless integration across business processes, the technology architecture leverages APIs and middleware to guarantee interoperability between diverse applications.

Standardizing communication protocols and data formats facilitates real-time information exchange, enabling faster decision-making and operational responsiveness. By implementing a well-structured and integrated technology architecture, organizations can achieve greater operational efficiency while creating opportunities for future digital innovation and transformation. This holistic approach not only addresses current technical needs but also positions the organization to adapt swiftly to technological advancements and market changes.

A business model can be seen as a comprehensive framework that integrates these three components to ensure the sustainability and competitiveness of an organization. The value stream highlights how a company creates and delivers products or services that meet the needs and expectations of its customers, thus fostering long-term relationships and brand loyalty. The revenue stream outlines the diverse methods a business employs to capture value in monetary terms, such as sales, subscriptions, or licensing, which are essential for financial growth. Meanwhile, the logistics stream focuses on the efficient movement, storage, and management of goods, information, and resources within the supply chain, ensuring that value delivery is both timely and cost-effective. When these three elements are effectively aligned, they form a cohesive strategy that drives operational efficiency, profitability, and sustained market relevance (Mahadevan, 2000). This phase's analysis assists users in quickly and easily gaining an overview of the information they require by systematically organizing it in a clear and structured way.

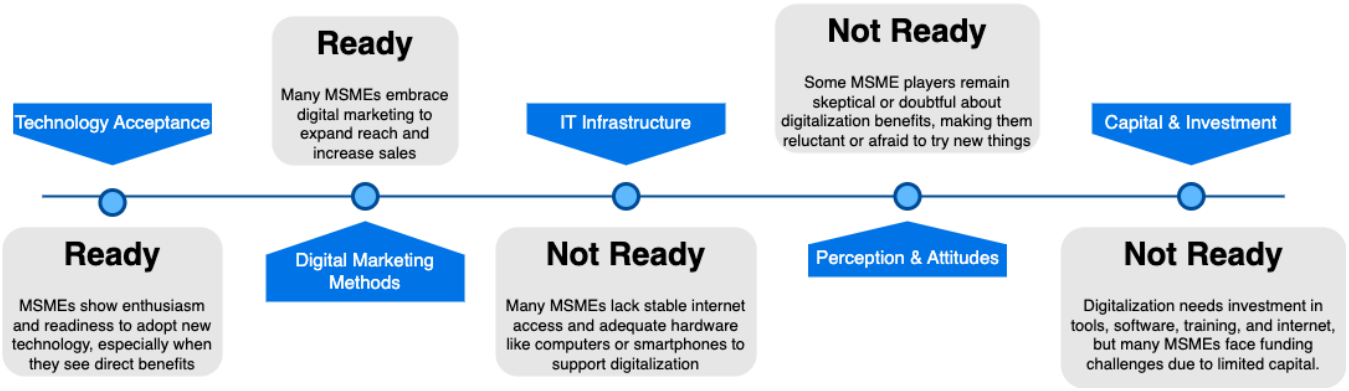

FIGURE 3 TECHNOLOGY ARCHITECTURE READINESS ASSESSMENT

MSMEs should prioritize maximizing the use of existing digital marketing methods and leveraging their readiness to adopt new technologies. By focusing on these areas, they can quickly gain tangible benefits such as expanded market reach and improved operational efficiency. At the same time, it is essential to simultaneously address and improve the underlying challenges that may hinder long-term success—specifically, upgrading IT infrastructure, shifting perceptions and attitudes towards digital transformation, and securing necessary capital and investments. This balanced approach ensures that digital transformation efforts are sustainable and scalable, allowing MSMEs to fully realize the advantages of digitalization while gradually overcoming barriers that could slow their progress.

TABLE IV. PROCESSSS CATEGORIZATION BASED ON MSME READINESS DATA

Process	Relevant / Not Relevant	Recommended Action
Digital Marketing Methods	Relevant	Proceed immediately with utilizing and optimizing digital marketing strategies.
Technology Acceptance	Relevant	Continue training and adoption of new technologies.
IT Infrastructure	Not Relevant	Postpone technology-dependent initiatives until infrastructure improvements and investments are made. Focus on upgrading infrastructure first.
Perception & Attitudes	Not Relevant	Not ready yet; prioritize education and mindset campaigns before further digital transformation efforts.
Capital & Investment	Not Relevant	Prioritize funding and investment strategies to support technology and infrastructure development.

IV. CONCLUSIONS

MSMEs in Tegal City are fundamentally ready to undergo digital transformation, particularly due to their openness to adopting new technologies and digital marketing practices. This readiness aligns well with the structured guidance provided by the TOGAF framework, which supports an effective and scalable transformation process. However, to achieve sustainable progress, critical factors such as IT infrastructure, digital literacy, and capital investment must be carefully addressed. The findings of this study are limited by the qualitative scope and the sample size focused primarily on MSMEs in the culinary and service sectors of Tegal City. Future research could expand by including comparative analyses across different regions or industries, integrating quantitative measurements of digital maturity, and evaluating the long-term impact of enterprise architecture implementation. Such extensions would provide a more comprehensive understanding of digital transformation readiness among MSMEs in diverse contexts.

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