

Business Sustainability and the Future of Keropok Lekor Enterprises in a Changing Market Landscape

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HOW TO CITE:

Mohamed Suhaimi Yusof, Nooraha Abdul Razak, Noraslinda Fauzi, Nurul Fitri Mohd Noor, Mohd Zamari Abu Zin (2026). Business Sustainability and the Future of Keropok Lekor Enterprises in a Changing Market Landscape. International Journal of Special Education, 41(24s), 1472 - 1495

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ABSTRACT:

Traditional food enterprises are increasingly challenged to preserve their cultural identity while developing the capabilities required to remain competitive in a rapidly evolving business environment. This study investigates how technology adoption, marketing strategy, and entrepreneurial skills contribute to business sustainability within Malaysia's keropok lekor industry, a culturally embedded sector where traditional production knowledge increasingly intersects with digitalisation, changing consumer expectations, and intensified market competition. Using a quantitative empirical approach, the study evaluates the relationships between these strategic capabilities and the ability of traditional enterprises to sustain their operations and remain commercially viable. The findings reveal a compelling pattern in which entrepreneurial skills emerge as the most influential driver of business sustainability, highlighting the critical role of managerial competence, opportunity recognition, resource coordination, problem solving, and business decision making. Technology adoption also demonstrates a meaningful contribution, suggesting that appropriately integrated technologies can strengthen operational efficiency and support sustainable business development without compromising traditional product identity. Marketing strategy is positively associated with sustainability, reinforcing the commercial importance of market visibility, customer engagement, and contemporary channels for reaching consumers. Collectively, the findings advance the understanding of sustainability in traditional entrepreneurship by demonstrating that enduring businesses are not sustained by heritage alone. Their future viability depends on the ability to transform traditional strengths into contemporary competitive capabilities while retaining the authenticity that distinguishes them in the marketplace.

Keywords: Technology; Marketing; Entrepreneurship; Sustainability; Capability.

1. Introduction

Small and medium enterprises represent an important foundation of economic activity by generating employment, stimulating entrepreneurship, supporting household income, and sustaining commercial development within local communities. Their economic contribution becomes particularly meaningful in traditional food industries, where business activities are closely connected with cultural heritage, local resources, indigenous knowledge, and distinctive regional products. Keropok lekor enterprises in Terengganu, Malaysia, exemplify this relationship through a traditional fish based food product that has evolved from local consumption into a recognised commercial activity. Nevertheless, cultural recognition and established market demand do not necessarily guarantee long term business sustainability. Small traditional enterprises increasingly operate within environments shaped by technological advancement, changing consumer behaviour, stronger competition, rising operating costs, and rapidly evolving methods of reaching customers. These pressures are particularly consequential for smaller businesses because limited financial resources, managerial capacity, specialised knowledge, and access to technology can restrict their ability to respond effectively to environmental changes. Contemporary research consequently views SME sustainability as increasingly dependent on the development and effective utilisation of internal capabilities rather than continued reliance on established business practices alone (Fazal et al., 2022; Edward et al., 2024). Sustainable development among traditional food enterprises therefore requires an appropriate combination of modern business practices and capabilities capable of preserving commercial viability while responding to emerging market requirements.

Business sustainability within smaller enterprises extends beyond immediate profitability and reflects the capacity to maintain operations, withstand business challenges, adapt to changing market conditions, retain competitiveness, and create opportunities for continued growth. Such capabilities are particularly important among

micro and owner managed enterprises because strategic and operational decisions are commonly concentrated around entrepreneurs themselves. The sustainability of these businesses can consequently be affected by the entrepreneur's ability to manage limited resources while simultaneously responding to technological, customer, competitive, and operational pressures. Malaysian evidence demonstrates that entrepreneurial competency contributes positively to microenterprise sustainability, confirming that sustainable outcomes are closely connected with the capabilities possessed and exercised within smaller businesses (Fazal et al., 2022). Similar evidence involving Malaysian micro-entrepreneurs indicates that entrepreneurial competency contributes significantly to enterprise sustainability performance, particularly when entrepreneurs possess attributes that support confidence, adaptation, achievement, and effective business management (Yusof & Razali, 2020). These findings reinforce a broader understanding of sustainability as an organisational condition that must be continuously developed rather than a business outcome that emerges automatically from longevity or market presence. Within traditional food entrepreneurship, maintaining sustainability therefore requires capabilities that enable businesses to improve operations, engage effectively with customers, make informed managerial decisions, and remain responsive to increasingly dynamic commercial environments.

Technology adoption has become one of the most consequential capabilities influencing how smaller enterprises operate and compete within contemporary markets. Accessible technologies now enable SMEs to improve production activities, maintain digital business records, facilitate electronic payments, communicate with customers, obtain business information, and strengthen operational efficiency without necessarily requiring extensive technological infrastructure. The strategic importance of technology therefore lies not merely in owning digital devices or machinery but in integrating appropriate technologies into activities that create measurable operational and commercial

value. Evidence from Malaysia and Indonesia demonstrates that technology adoption positively influences MSME sustainability, highlighting its importance in strengthening enterprise continuity and economic resilience under changing business conditions (Edward et al., 2024). Malaysian research further demonstrates that digital capability positively influences multiple dimensions of digital business model innovation, while improvements in value creation, value proposition, and value capture can strengthen SME competitiveness (Fang et al., 2024). These findings are highly relevant to traditional food enterprises because technological development does not necessarily require the abandonment of traditional production identity. Appropriate adoption can instead complement established knowledge by improving production efficiency, consistency, financial management, transactions, and decision making. Technology can consequently function as an enabling business capability through which traditional enterprises modernise selected operations while preserving the distinctive characteristics underpinning their market identity.

Marketing strategy represents another important dimension of SME development because the ability to produce a valuable product does not automatically ensure sufficient market visibility, customer engagement, or sustained demand. Smaller enterprises increasingly operate in markets where customers encounter businesses through social media, electronic commerce, digital advertising, product presentation, online content, and interactive communication. Consequently, marketing has expanded beyond conventional selling activities into a broader strategic capability through which SMEs identify opportunities, communicate customer value, build relationships, and respond to changing purchasing behaviour. Gliga and Evers (2023) demonstrate that networking plays an important role in the development of specialised, cross functional, and dynamic marketing capabilities among SMEs, with these capabilities contributing to growth and competitiveness. Yusof et al. (2025) similarly emphasise the importance of marketing capabilities and strategy in helping

SMEs overcome resource related constraints and achieve stronger performance within competitive markets. More directly, Hanaysha and Al-Shaikh (2024) examined marketing capability alongside entrepreneurial and market orientations and demonstrated its relevance to business sustainability within SMEs. For traditional food businesses, marketing strategy can therefore provide an important mechanism for expanding market reach, strengthening customer interaction, responding to contemporary consumption patterns, and transforming cultural product recognition into sustainable commercial demand.

The growing importance of digital markets has further transformed the strategic role of marketing within smaller enterprises. Social media platforms, electronic marketplaces, live selling, digital promotional content, customer feedback mechanisms, agents, distributors, and improved product packaging provide smaller businesses with alternative routes to customers that were previously difficult or costly to access. These mechanisms can be particularly valuable for traditional food enterprises whose market expansion may historically have depended heavily on physical locations, tourism flows, local customers, and conventional distribution channels. Effective marketing strategy enables such enterprises to communicate product value beyond geographical boundaries while strengthening customer relationships and identifying new commercial opportunities. The development of marketing capability among SMEs is not necessarily dependent on large marketing departments because entrepreneurial networking, experiential learning, and interaction with external actors can progressively build dynamic marketing capabilities (Gliga & Evers, 2023). Empirical research also indicates that market orientation and marketing capability are relevant to sustainability outcomes, suggesting that the manner in which smaller enterprises understand and respond to markets can influence their ability to maintain long term business performance (Hanaysha & Al-Shaikh, 2024). Marketing strategy therefore represents more than promotional activity. Within resource

constrained traditional enterprises, it provides a structured means of connecting products with evolving markets, strengthening commercial visibility, and maintaining customer relevance as competitive conditions change.

Entrepreneurial skills provide the managerial foundation through which business owners transform available resources, technologies, and market opportunities into productive outcomes. These skills encompass financial planning, cost management, employee coordination, inventory control, pricing, supplier negotiation, problem solving, innovation, opportunity recognition, experiential learning, and calculated risk taking. Their significance becomes particularly pronounced in smaller enterprises because entrepreneurs frequently perform responsibilities that would normally be distributed among specialised departments within larger organisations. Deficiencies in entrepreneurial capability can consequently affect multiple aspects of business performance simultaneously. Evidence from Malaysian microenterprises demonstrates that commitment, conceptual, opportunity recognition, organising, and relationship competencies positively influence microenterprise sustainability (Fazal et al., 2022). Further Malaysian evidence involving 403 micro-entrepreneurs established a positive effect of entrepreneurial competency on enterprise sustainability performance, reinforcing the importance of human capability in sustaining smaller businesses (Fazal et al., 2022). Research involving Malaysian manufacturing SMEs similarly demonstrates that entrepreneurial competencies can contribute to sustainable performance through their relationship with innovation and organisational knowledge (Saleh et al., 2022; Al Koliby et al., 2024). Entrepreneurial skills can therefore be understood as productive business capabilities that influence how effectively entrepreneurs allocate resources, address operational problems, recognise opportunities, and navigate uncertain commercial environments.

The combined relevance of technology, marketing, and entrepreneurial capability becomes especially apparent within traditional

enterprises undergoing gradual commercial transformation. Technology can improve operational processes, but its potential value may remain underutilised when entrepreneurs lack the skills required to select and manage appropriate applications. Similarly, a business may possess a distinctive traditional product but achieve limited growth when its marketing practices fail to connect that product with changing customer preferences and emerging distribution channels. Entrepreneurial capability provides the managerial competence required to coordinate these resources, while technology and marketing create complementary mechanisms for operational improvement and market engagement. Fang et al. (2024) demonstrate that digital capability can facilitate business model innovation and competitiveness among Malaysian SMEs, indicating that technological resources become strategically meaningful when they are converted into improvements in value creation and commercial activity. Marketing research likewise shows that SMEs develop dynamic marketing capabilities through networking and entrepreneurial processes that support growth and competitiveness (Gliga & Evers, 2023). At the same time, entrepreneurial competency has consistently been connected with sustainable outcomes among Malaysian microenterprises (Yusof, 2026). Collectively, these streams of evidence suggest that sustainable traditional entrepreneurship requires multiple capabilities capable of supporting both internal business efficiency and external market responsiveness.

Despite growing scholarly attention to SME sustainability, important contextual limitations remain within the existing empirical literature. Technology adoption has been associated with MSME sustainability in broader Malaysian and Indonesian samples (Edward et al., 2024), while digital capability research has concentrated on business model innovation and competitiveness among Malaysian SMEs (Fang et al., 2024). Entrepreneurial competency has also received considerable attention in relation to Malaysian microenterprise sustainability and sustainable performance (Fazal et al., 2022; Yusof et al.,

2025). Marketing research, meanwhile, has demonstrated the relevance of marketing capabilities to SME competitiveness, performance, and business sustainability (Gliga & Evers, 2023; Chang et al., 2024; Hanaysha & Al-Shaikh, 2024). However, these streams of research are frequently investigated separately and predominantly within general SME, manufacturing, international business, or broader microenterprise settings. Comparatively less empirical attention has been directed toward how these capabilities operate within culturally embedded traditional food businesses, where commercial modernisation must coexist with established production practices, local identity, owner centred management, and resource limitations. This contextual distinction creates a meaningful empirical opportunity because capabilities that generate performance within conventional SMEs may operate differently within traditional enterprises characterised by distinctive operational structures and market conditions.

A more integrated understanding of technology adoption, marketing strategy, and entrepreneurial skills can therefore provide valuable insight into the sustainability of traditional food enterprises. These capabilities represent different but complementary dimensions of business development. Technology adoption concerns the utilisation of tools capable of improving operational and commercial processes, marketing strategy addresses how enterprises connect their products with customers and markets, while entrepreneurial skills determine how effectively business owners organise resources and respond to opportunities and challenges. Examining these capabilities within the keropok lekor industry provides an empirically relevant setting for extending sustainability research into a traditional business environment where cultural continuity and commercial modernisation increasingly intersect. The resulting perspective also carries practical significance for entrepreneurship development because resource constrained enterprises cannot invest indiscriminately in every possible capability. Greater clarity regarding the relationships between

technological, marketing, and entrepreneurial capabilities and business sustainability can support more focused business development initiatives, training programmes, digitalisation support, and market development interventions. More broadly, strengthening the appropriate combination of these capabilities can assist traditional enterprises in preserving their distinctive commercial identity while developing the operational effectiveness, customer responsiveness, resilience, and competitive capacity required to remain viable within increasingly dynamic markets.

2. Literature Review

The sustainability of small enterprises increasingly depends on their ability to develop capabilities that support operational continuity, market responsiveness, competitiveness, and adaptation to changing business environments. Contemporary research indicates that sustainable performance among SMEs cannot be explained solely by financial resources or established market presence because smaller enterprises must continuously respond to technological advancement, evolving customer behaviour, competitive pressure, and internal capability constraints. Recent evidence demonstrates that digital skills and entrepreneurial development contribute to business sustainability among MSMEs, while strategic and technological practices can strengthen competitiveness and longer term viability (Ardhiyansyah & Juniansyah, 2024; Chen & Wang, 2024; Momtaz & Parra, 2025). Marketing capability has similarly emerged as an important mechanism for supporting sustainability by strengthening customer value creation and market responsiveness (Qalati et al., 2022; Ziółkowska, 2021). These perspectives provide the foundation for examining business sustainability through three complementary capabilities, namely technology adoption, marketing strategy, and entrepreneurial skills.

2.1 Business Sustainability

Business sustainability reflects the capacity of an enterprise to maintain viable operations, preserve economic performance, respond effectively to

changing conditions, and establish a foundation for continued development. Within SMEs, sustainability carries particular importance because smaller enterprises frequently possess limited financial reserves, managerial resources, technological infrastructure, and specialised human capital. Such constraints can increase their vulnerability to competitive pressure, market disruptions, cost fluctuations, and rapidly changing customer expectations. Business sustainability should therefore extend beyond short term profitability and incorporate the capacity to remain operational, resilient, adaptable, competitive, and commercially relevant over time. Yusof (2024) demonstrate that technological development and Industry 4.0 applications can support sustainability within SMEs, while implementation must recognise the particular characteristics and constraints of smaller enterprises. Sagala and Őri (2024) similarly establish that successful SME digital transformation depends upon interacting organisational, technological, and environmental capabilities rather than technological acquisition alone. These perspectives indicate that sustainability represents an evolving organisational capability rather than simply the continuation of business operations. Sustainable enterprises must continually develop resources and competencies that enable them to withstand pressures while simultaneously identifying opportunities for improvement and growth.

The sustainability requirements of traditional food enterprises are particularly distinctive because business continuity involves both economic viability and the preservation of product characteristics that underpin cultural and commercial identity. Traditional enterprises frequently operate through owner centred management structures where individual entrepreneurs assume responsibility for production, finance, employees, suppliers, customers, and strategic decisions. This concentration of responsibility can create flexibility but can simultaneously expose enterprises to managerial and resource limitations. Sustainable development consequently requires capabilities that enable

traditional businesses to modernise appropriate aspects of their operations without undermining the authenticity that differentiates their products. Contemporary evidence shows that sustainable practices within micro and small enterprises differ substantially across industries and institutional environments, demonstrating the importance of contextualising sustainability rather than assuming that identical approaches are appropriate for every enterprise (Jamwal et al., 2026; Liu et al., 2025). Research among MSMEs similarly indicates that digitalisation, human capability, and collaborative mechanisms can strengthen sustainability by improving organisational responsiveness and longer term performance (Soomro et al., 2024; Vrontis et al., 2022). Within traditional food entrepreneurship, business sustainability can therefore be understood as the continuing ability to maintain profitable operations, preserve market relevance, adapt to commercial changes, withstand operational challenges, and create sufficient capacity for future business development.

2.2 Technology Adoption and Business Sustainability

Technology adoption represents the extent to which enterprises accept, integrate, and utilise technological resources within their business activities. For SMEs, these resources may include production machinery, digital record systems, electronic payment facilities, mobile technologies, business applications, digital communication platforms, and other tools capable of improving operational processes. Technology becomes strategically valuable when its utilisation improves productivity, accuracy, transaction efficiency, information availability, and managerial decision making rather than merely increasing the quantity of technological equipment possessed by an enterprise. The increasing digitalisation of business environments has intensified the importance of technological capability because SMEs must respond to customers, suppliers, competitors, and financial systems that increasingly operate through digital channels. Saman et al. (2025) emphasise the strategic importance of technology adoption for strengthening sustainability and

resilience among SMEs. Sangosanya et al. (2025) similarly demonstrate that technological readiness and organisational conditions influence digital entrepreneurship adoption among Malaysian SMEs. Technology adoption can consequently strengthen the operational foundations required for sustainable performance by allowing smaller enterprises to execute activities more efficiently while developing greater capacity to respond to contemporary business requirements.

The contribution of technology becomes especially important within traditional enterprises where modernisation frequently occurs incrementally rather than through comprehensive technological transformation. Smaller traditional businesses may derive substantial benefits from relatively accessible technologies that improve production consistency, reduce operational errors, facilitate financial records, accelerate transactions, or enable entrepreneurs to acquire and utilise information more effectively. Digital capability also allows SMEs to reconsider how value is created and delivered as commercial environments become increasingly technology intensive. However, technology does not automatically generate sustainable outcomes because its effectiveness depends on whether entrepreneurs select appropriate tools and integrate them meaningfully into business processes. Recent evidence indicates that digital technology adoption can contribute to sustainability and value creation when technological utilisation is supported by appropriate entrepreneurial and organisational capabilities (Vrontis et al., 2022; Soomro et al., 2024). The relationship between digital capability and sustainability is also reinforced by evidence showing that digital transformation can improve sustainability related performance through innovation capability (Chen & Wang, 2024). These findings support the proposition that businesses capable of integrating useful technologies into production, financial, and operational activities should possess stronger capacity to maintain performance and respond to future challenges.

Technology adoption is particularly relevant to traditional food enterprises because technological development does not necessarily require the replacement of traditional knowledge or established product characteristics. Instead, technology can complement existing production capabilities by improving selected processes while preserving the distinctive qualities that customers associate with traditional products. The ability to utilise machinery, digital payment systems, electronic records, and other practical technologies can improve business efficiency and reduce dependence on informal operating practices. This capability may also strengthen resilience because better information, more efficient transactions, and improved production processes allow enterprises to respond more effectively to operational pressures. Recent SME sustainability research increasingly recognises digitalisation and technological innovation as important components of longer term business development (Yusof & Abd Wahab, 2020; Wang et al., 2024; Yusof, 2025). The accumulated evidence therefore suggests that technology adoption represents an important organisational resource through which smaller enterprises can strengthen their ability to remain operational, competitive, and adaptable. Within resource constrained traditional enterprises, even relatively modest technological improvements may produce meaningful benefits when they correspond with practical business requirements. Based on these arguments, the following hypothesis is proposed:

H1: Technology adoption has a positive relationship with business sustainability.

2.3 Marketing Strategy and Business Sustainability

Marketing strategy represents the coordinated activities through which enterprises communicate customer value, strengthen market visibility, build customer relationships, identify opportunities, and position their products within competitive environments. For SMEs, effective marketing is particularly important because smaller enterprises frequently lack the financial resources and brand recognition available to

larger organisations. Contemporary marketing practices have nevertheless created more accessible mechanisms through which SMEs can reach customers, including social media, digital promotional content, electronic commerce, live selling, customer feedback, product packaging, agents, wholesalers, and collaborative distribution networks. Marketing capability consequently extends beyond conventional advertising and represents the ability of an enterprise to understand markets and deploy appropriate product, promotional, pricing, and distribution strategies. Qalati et al. (2022) demonstrate that social media adoption enables SMEs to strengthen customer relationships and contributes positively to SME performance. Ziółkowska (2021) similarly establishes that digital transformation has substantial implications for marketing activities within SMEs. These findings indicate that marketing represents a strategic capability through which smaller enterprises can maintain customer relevance and convert market opportunities into sustainable commercial outcomes.

Marketing strategy also contributes to sustainability by helping enterprises respond to changes in customer preferences and competitive conditions. Markets are rarely static, and businesses that fail to adjust their communication, distribution, product presentation, and customer engagement practices may gradually lose relevance even when the underlying product remains valuable. This challenge is particularly significant for traditional food enterprises because strong local recognition may not automatically translate into broader market penetration or continued demand among changing consumer segments. Digital marketing can expand geographical reach, while customer feedback can provide information for improving products and commercial practices. Recent research among MSMEs demonstrates that internet marketing, entrepreneurial marketing, and market orientation are increasingly connected with dimensions of business sustainability, marketing performance, and competitiveness (Munandar et al., 2025). Qalati et al. (2022) similarly demonstrate that social media

usage and customer relationship capabilities can support SME performance in emerging economies. Marketing strategy therefore provides an important mechanism through which enterprises can transform production capabilities into customer demand, strengthen their commercial presence, and develop market relationships that support continuity.

The relationship between marketing capability and sustainability has received growing empirical support, although its magnitude can differ across business contexts. Yusof, (2025) found that e-commerce and digital marketing adoption can influence the financial and sustainability performance of MSMEs, demonstrating the growing strategic importance of digitally enabled market activities. Evidence from Indonesian MSMEs also indicates that marketing and market related capabilities contribute to sustainability and competitiveness, reinforcing the strategic importance of customer facing capabilities for smaller enterprises (Munandar et al., 2025). This relationship has particular relevance for traditional food businesses because their continued development depends not only on producing authentic products but also on communicating their value, attracting customers, maintaining demand, and extending market reach. Social media promotion, electronic commerce, creative content, live selling, attractive packaging, customer feedback, and distribution partnerships can provide complementary routes through which traditional businesses strengthen their market presence. Marketing strategy can consequently support sustainability by improving the enterprise's ability to remain visible, responsive, and commercially connected to its customers. Based on the theoretical reasoning and empirical evidence established in previous research, the following hypothesis is proposed:

H2: Marketing strategy has a positive relationship with business sustainability.

2.4 Entrepreneurial Skills and Business Sustainability

Entrepreneurial skills represent the practical capabilities that enable entrepreneurs to organise

resources, solve business problems, make decisions, identify opportunities, and manage enterprise activities effectively. These capabilities encompass financial planning, pricing, employee management, inventory control, supplier negotiation, problem solving, innovation, experiential learning, opportunity assessment, and calculated risk taking. Their importance is particularly pronounced within small owner managed enterprises because entrepreneurs frequently perform multiple functions simultaneously. Unlike larger organisations where specialist departments distribute managerial responsibilities, small enterprises often depend directly on the entrepreneur's ability to manage both strategic and routine operational activities. Consequently, stronger entrepreneurial capability can improve how effectively limited resources are allocated and how rapidly businesses respond to operational or market challenges. Contemporary MSME research increasingly supports the broader importance of human capability for sustainable enterprise development. Abd Wahab and Yusof (2020) demonstrate that entrepreneurial competency plays an important role in SME sustainability within digitally enabled emerging market environments. Vrontis et al. (2022) similarly establish the strategic relevance of entrepreneurial orientation in the relationship between digital technology adoption, sustainability, and value creation. Entrepreneurial skills therefore represent an essential internal resource through which smaller enterprises can convert available opportunities and resources into effective business action.

The contribution of entrepreneurial skills to sustainability becomes particularly visible when enterprises operate under conditions of uncertainty and resource scarcity. Entrepreneurs must continuously make decisions concerning costs, prices, employees, inventory, suppliers, production, investment, and market opportunities. Poor decisions within any of these areas can immediately affect cash flow, operational continuity, customer satisfaction, or competitive position. Strong entrepreneurial skills provide greater capacity to evaluate alternatives, manage constraints, learn from

previous decisions, and implement corrective actions when business conditions change. Business sustainability research increasingly emphasises capacity building because sustainable outcomes require entrepreneurs who can combine knowledge with practical decision making. The findings of Liu et al. (2025) demonstrate that entrepreneurial competency can facilitate the utilisation of digital platforms and contribute to sustainable SME outcomes. Jamwal et al. (2026) similarly identify skill development, managerial support, organisational readiness, and resource allocation as important elements supporting SME sustainability through technological development. These perspectives reinforce the importance of managerial competence because strategies and technologies can generate value only when entrepreneurs possess sufficient ability to implement them effectively.

Within traditional food enterprises, entrepreneurial skills can determine whether established product knowledge is successfully converted into a commercially sustainable business. Expertise in producing a traditional product does not necessarily provide competence in managing costs, employees, inventories, suppliers, pricing, innovation, or business risk. The increasing complexity of contemporary markets makes these complementary capabilities particularly important. Entrepreneurs must be capable of maintaining operational discipline while recognising opportunities to improve products and processes, negotiate effectively with suppliers, and make informed decisions about future business development. Human capability also becomes increasingly relevant as digitalisation expands because entrepreneurs must learn how to incorporate new technologies and information into established business activities. Evidence demonstrating the contribution of entrepreneurial capability and technology enabled entrepreneurship to SME sustainability reinforces the argument that sustainable business development requires capable decision makers rather than resources alone (Liu et al., 2025; Sangosanya et al., 2025; Vrontis et al., 2022). Strong entrepreneurial skills

should therefore enable traditional business owners to manage resources more efficiently, respond more effectively to business challenges, and pursue opportunities that strengthen continuity and growth. Based on this reasoning, the following hypothesis is proposed:

H3: Entrepreneurial skills have a positive relationship with business sustainability.

2.5 Research Framework

The research framework integrates three business capabilities that may contribute to sustainability within traditional food enterprises. Technology Adoption, Marketing Strategy, and Entrepreneurial Skills are positioned as the independent variables, while Business Sustainability represents the dependent variable. The framework recognises that sustainable enterprise development requires capabilities addressing different dimensions of business

activity. Technology adoption supports operational modernisation and technological utilisation, marketing strategy strengthens market connectivity and customer responsiveness, and entrepreneurial skills provide the managerial competence required to organise resources and respond effectively to business challenges. Previous research provides empirical justification for these relationships. Digital skills and technological innovation have been associated with sustainable SME development (Chen & Wang, 2024; Saman et al., 2025; Xie et al., 2024; Yusof, 2025), while marketing and digitally enabled customer capabilities have demonstrated positive relationships with SME sustainability and performance (Qalati et al., 2022; Ziolkowska, 2021). The framework therefore provides a focused empirical structure for assessing the relationships between technological, market related, and entrepreneurial capabilities and business sustainability.

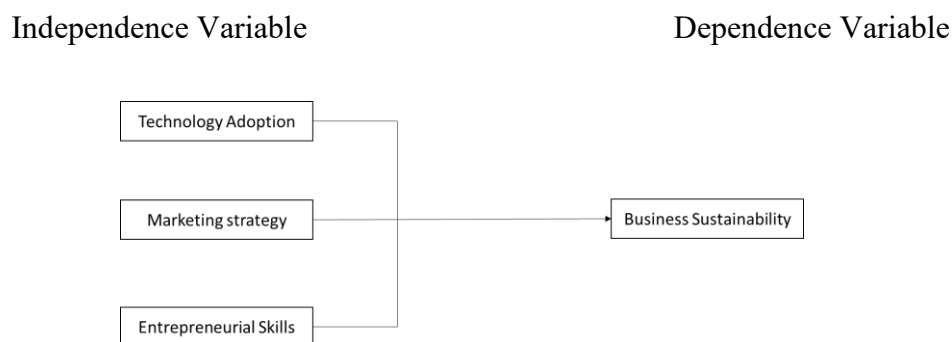


Figure 1: Research Framework

Based on the framework, three relationships are examined:

H1: Technology adoption has a positive relationship with business sustainability.

H2: Marketing strategy has a positive relationship with business sustainability.

H3: Entrepreneurial skills have a positive relationship with business sustainability.

3. Research Methodology

A quantitative methodological approach was employed to provide empirical evidence concerning the relationships between technology adoption, marketing strategy, entrepreneurial skills, and business sustainability within the

keropok lekor industry. The research adopted a cross sectional survey design and collected primary data directly from entrepreneurs through a structured questionnaire. The methodological procedures encompassed research design, population and sampling, measurement of the study constructs, data collection, and statistical analysis. These procedures provided a systematic basis for evaluating the proposed relationships and generating empirical evidence relevant to the sustainability of traditional food enterprises.

3.1 Research Design

A quantitative cross sectional research design was adopted to investigate the relationships among technology adoption, marketing strategy,

entrepreneurial skills, and business sustainability. The quantitative approach was appropriate because the constructs were operationalised through measurable questionnaire items and the proposed relationships required statistical evaluation. A cross sectional design enabled information concerning current technological practices, marketing activities, entrepreneurial capabilities, and sustainability conditions to be obtained from participating entrepreneurs within a single period of investigation. This approach was particularly suitable for examining traditional small enterprises because comparable information could be collected systematically from multiple business operators without requiring repeated observations over an extended period. A structured questionnaire served as the principal research instrument, allowing responses to be converted into numerical measurements for subsequent statistical analysis. The original methodological design similarly established a quantitative survey approach using structured questionnaires administered to keropok lekor entrepreneurs. The individual entrepreneur constituted the unit of analysis because owners and operators possessed direct knowledge of technological utilisation, marketing practices, business management capabilities, and the sustainability conditions experienced within their enterprises. The research design therefore provided an appropriate empirical foundation for evaluating the relationships represented within the research framework.

3.2 Population and Sampling

The target population comprised entrepreneurs actively involved in keropok lekor business activities in Terengganu, Malaysia. The research context concentrated on entrepreneurs operating within established keropok lekor production areas because these businesses provided direct exposure to the operational, technological, marketing, and managerial conditions relevant to the research model. Major areas identified within the original research design included Kuala Terengganu, Marang, Kuala Nerus, Hulu Terengganu, and Setiu. The population primarily consisted of owners and operators involved directly in managing keropok lekor enterprises,

thereby ensuring that participants possessed practical knowledge of their respective business activities. Simple random sampling was specified as the sampling approach to provide eligible entrepreneurs with an appropriate probability of selection and minimise systematic selection bias. The original methodological framework similarly identified simple random sampling as the intended procedure for obtaining representation from the target population. Following data collection and screening, 68 valid responses were retained for statistical analysis. The final sample therefore comprised entrepreneurs capable of providing direct assessments of the technological, marketing, entrepreneurial, and sustainability practices operating within their businesses.

3.3 Research Instrument and Measurement

Primary data were collected using a structured questionnaire comprising multiple measurement items representing the constructs incorporated into the empirical framework. Technology Adoption was measured using ten items covering machinery and digital tool utilisation, production efficiency, product consistency, digital financial records, electronic payments, reduction of production errors, technological learning, technology seeking behaviour, the perceived future importance of technology, and business improvement following technological adoption. Marketing Strategy was originally measured through ten items addressing social media promotion, electronic commerce, product packaging, online advertising, customer feedback, creative promotional content, live selling, market development, distribution partnerships, and continuous learning of contemporary marketing techniques. Following reliability assessment, two items, Strategy 4 and Strategy 8, were removed, resulting in eight items being retained for the final Marketing Strategy measurement. Entrepreneurial Skills was measured using ten items encompassing cost and profit planning, employee management, inventory management, pricing, operational problem solving, supplier negotiation, product innovation, experiential learning, entrepreneurship training, and calculated

business risk taking. Business Sustainability was measured through ten items representing business continuity, demand, profitability, adaptability, future continuity, customer growth, development potential, supply continuity, operational resilience, and competitiveness. All measurement items employed a five point Likert scale, providing standardised responses suitable for quantitative statistical analysis.

3.4 Data Collection

Data were collected directly from entrepreneurs involved in the keropok lekor industry within the selected research setting. Questionnaire based data collection was considered appropriate because the constructs investigated required information concerning actual business practices and entrepreneur level assessments that could not be adequately captured through secondary information alone. The original methodological design provided for questionnaire administration through both face to face and online approaches, allowing greater flexibility in reaching entrepreneurs across different production areas. Participation focused on individuals directly responsible for operating or managing their businesses because these respondents possessed first hand knowledge of technological utilisation, marketing practices, entrepreneurial capabilities, and business sustainability. The use of a standardised questionnaire ensured that participants responded to a consistent set of measurement items and enabled meaningful comparison across observations. Completed questionnaires were subsequently screened and prepared for statistical analysis. A total of 68 valid cases were retained in the final dataset. The resulting observations provided the empirical information required to examine the relationships between the three independent variables and business sustainability within the specific context of traditional food entrepreneurship.

3.5 Data Analysis

The empirical data were analysed using IBM SPSS Statistics through a sequence of statistical procedures aligned with the research framework and hypotheses. Reliability analysis was initially

conducted using Cronbach's alpha to evaluate the internal consistency of the measurement items representing each construct. Following reliability assessment, composite mean scores were calculated for Technology Adoption, Marketing Strategy, Entrepreneurial Skills, and Business Sustainability. Marketing Strategy was calculated using the eight items retained following the removal of Strategy 4 and Strategy 8. Descriptive statistics were subsequently employed to determine the mean, standard deviation, minimum, and maximum values of the study constructs. Pearson correlation analysis was performed to assess the direction, strength, and statistical significance of the bivariate relationships between the independent variables and Business Sustainability. Multiple linear regression analysis was then conducted to determine the unique contribution of Technology Adoption, Marketing Strategy, and Entrepreneurial Skills to Business Sustainability when the three predictors were considered simultaneously. Regression diagnostics were also examined, including tolerance, variance inflation factor, Durbin Watson statistics, residual normality, linearity, and homoscedasticity. This analytical sequence enabled the empirical assessment to progress systematically from measurement consistency and descriptive characteristics to correlation and multivariate evaluation of the proposed relationships.

4. Results

The empirical results were analysed systematically to evaluate the measurement reliability and examine the relationships between Technology Adoption, Marketing Strategy, Entrepreneurial Skills, and Business Sustainability. A total of 68 valid responses were included in the analysis. The statistical procedures comprised reliability analysis, descriptive statistics, Pearson correlation analysis, and multiple regression analysis. These analyses enabled the consistency of the measurement scales to be established before assessing the strength and significance of the relationships among the study constructs. The findings are presented according to the sequence of the statistical analyses performed.

4.1 Reliability Analysis

Reliability analysis was conducted to evaluate the internal consistency of the measurement items representing each construct. Cronbach's alpha was employed as the principal reliability indicator, with coefficients of 0.70 or above generally demonstrating satisfactory internal consistency. Technology Adoption recorded a Cronbach's alpha coefficient of 0.834 across ten items, indicating good reliability. Entrepreneurial Skills demonstrated the strongest internal consistency, with a Cronbach's alpha coefficient of 0.902

across ten items, while Business Sustainability recorded a coefficient of 0.869, also demonstrating strong reliability. For Marketing Strategy, two items, S4 and S8, had previously been removed during the reliability assessment, leaving eight items in the final measurement. The resulting construct demonstrated an acceptable level of internal consistency. Collectively, the reliability findings indicate that the measurement scales retained for subsequent analyses were sufficiently consistent for representing their respective constructs. The results are illustrated in Table 1.

Table 1: Reliability Analysis of the Study Constructs

No.	Construct	Number of Items	Cronbach's Alpha	Interpretation
1	Technology Adoption	10	.834	Good
2	Marketing Strategy	8	.735	Acceptable
3	Entrepreneurial Skills	10	.902	Excellent
4	Business Sustainability	10	.869	Good

The results demonstrate that all constructs achieved acceptable internal consistency. Entrepreneurial Skills produced the highest reliability coefficient, followed by Business Sustainability and Technology Adoption. Although Marketing Strategy recorded a comparatively lower coefficient, its Cronbach's alpha remained above the acceptable threshold following the removal of S4 and S8. The measurement scales were therefore retained for subsequent statistical analyses.

4.2 Descriptive Analysis

Descriptive analysis was conducted to establish the overall levels and variability of the study constructs. The findings reveal consistently high mean scores across Technology Adoption, Marketing Strategy, Entrepreneurial Skills, and

Business Sustainability. Marketing Strategy recorded the highest mean score at 4.4945 (SD = 0.40716), followed by Technology Adoption at 4.4441 (SD = 0.45691) and Business Sustainability at 4.4382 (SD = 0.46873). Entrepreneurial Skills recorded a slightly lower but nevertheless high mean of 4.3235 (SD = 0.58491). The minimum scores ranged between 2.70 and 3.40, whereas the maximum score for every construct was 5.00. These findings suggest that respondents generally reported favourable levels across all constructs included in the empirical model. Entrepreneurial Skills demonstrated the greatest variation among respondents, whereas Marketing Strategy exhibited the lowest variability. The results are illustrated in Table 2.

Table 2. Descriptive Statistics of the Study Constructs

No.	Construct	N	Minimum	Maximum	Mean	Std. Deviation
1	Technology Adoption	68	3.20	5.00	4.4441	.45691

No.	Construct	N	Minimum	Maximum	Mean	Std. Deviation
2	Marketing Strategy	68	3.38	5.00	4.4945	.40716
3	Entrepreneurial Skills	68	2.70	5.00	4.3235	.58491
4	Business Sustainability	68	3.40	5.00	4.4382	.46873

The descriptive results indicate that all constructs were rated favourably by the respondents. Nevertheless, high mean scores alone do not establish statistical relationships between the independent and dependent variables. Pearson correlation analysis was therefore performed to determine whether variations in the independent variables were significantly associated with Business Sustainability.

4.3 Correlation Analysis

Pearson correlation analysis was conducted to determine the direction, strength, and statistical significance of the relationships among the study constructs. Technology Adoption demonstrated a significant positive relationship with Business Sustainability, with $r = .600$, $p < .001$. Marketing

Strategy was also positively and significantly associated with Business Sustainability, producing $r = .449$, $p < .001$. Entrepreneurial Skills demonstrated the strongest relationship with Business Sustainability, with $r = .694$, $p < .001$. Significant positive correlations were additionally observed between Technology Adoption and Marketing Strategy ($r = .356$, $p = .003$) and between Technology Adoption and Entrepreneurial Skills ($r = .515$, $p < .001$). Marketing Strategy was also significantly associated with Entrepreneurial Skills ($r = .359$, $p = .003$). Overall, the results demonstrate that all three independent variables were positively and significantly related to Business Sustainability at the bivariate level. The results are illustrated in Table 3.

Table 3. Pearson Correlation Analysis of the Study Constructs

No.	Construct	1	2	3	4
1	Technology Adoption	1			
2	Marketing Strategy	.356**	1		
3	Entrepreneurial Skills	.515**	.359**	1	
4	Business Sustainability	.600**	.449**	.694**	1

Note. N = 68. Correlation is significant at the 0.01 level (2-tailed).

The strongest bivariate association with Business Sustainability was observed for Entrepreneurial Skills ($r = .694$), followed by Technology Adoption ($r = .600$) and Marketing Strategy ($r = .449$). Importantly, none of the correlations among the independent variables approached levels normally associated with severe multicollinearity. The correlation results therefore provide preliminary empirical support for positive relationships between all three independent variables and Business Sustainability.

4.4 Multiple Regression Analysis

Multiple linear regression analysis was subsequently conducted to determine whether Technology Adoption, Marketing Strategy, and Entrepreneurial Skills significantly predicted Business Sustainability when their effects were considered simultaneously. The overall regression model was statistically significant, $F(3, 64) = 30.217$, $p < .001$. The model produced $R = .766$ and $R^2 = .586$, indicating that the three independent variables collectively explained approximately 58.6% of the variance in Business

Sustainability. The adjusted R^2 of .567 further indicates that approximately 56.7% of the variance remained explained after adjustment for the number of predictors incorporated into the

model. The Durbin-Watson statistic was 1.689, providing no indication of serious residual autocorrelation. The results are illustrated in Table 4.

Table 4. Multiple Regression Model Predicting Business Sustainability

.Model	R	R ²	Adjusted R ²	Std. Error	F	p	Durbin-Watson
1	.766	.586	.567	.30852	30.217	< .001	1.689

The substantial R^2 indicates that the combined contribution of Technology Adoption, Marketing Strategy, and Entrepreneurial Skills accounted for more than half of the observed variation in Business Sustainability. However, the statistical significance of the overall regression model does not necessarily indicate that every

independent variable contributes significantly after the effects of the remaining predictors are controlled. The individual regression coefficients were therefore examined to determine the unique contribution of each predictor. The results are presented in Table 5.

Table 5. Regression Coefficients for Business Sustainability

No.	Predictor	B	Std. Error	β	t	p	Tolerance	VIF
1	Technology Adoption	.297	.099	.289	3.010	.004	.701	1.427
2	Marketing Strategy	.199	.102	.173	1.957	.055	.831	1.203
3	Entrepreneurial Skills	.387	.077	.483	5.024	< .001	.699	1.430

Technology Adoption demonstrated a positive and statistically significant contribution to Business Sustainability ($\beta = .289$, $t = 3.010$, $p = .004$). Entrepreneurial Skills also demonstrated a significant positive contribution ($\beta = .483$, $t = 5.024$, $p < .001$) and emerged as the strongest predictor based on its standardized regression coefficient. Marketing Strategy produced a positive coefficient ($\beta = .173$), but its unique contribution did not reach the conventional 0.05 level of statistical significance ($t = 1.957$, $p = .055$) after Technology Adoption and Entrepreneurial Skills were controlled. The VIF values ranged from 1.203 to 1.430, indicating that multicollinearity was not problematic within the regression model.

4.5 Hypothesis Testing

The hypotheses were evaluated by considering both the direction of the relationships and the

statistical evidence obtained from the inferential analyses. Technology Adoption demonstrated a significant positive relationship with Business Sustainability in the correlation analysis ($r = .600$, $p < .001$) and remained a significant predictor in the multiple regression model ($\beta = .289$, $p = .004$). Entrepreneurial Skills similarly exhibited a strong positive correlation with Business Sustainability ($r = .694$, $p < .001$) and retained a significant positive contribution when the predictors were considered simultaneously ($\beta = .483$, $p < .001$). Marketing Strategy demonstrated a significant positive bivariate relationship with Business Sustainability ($r = .449$, $p < .001$); however, its unique regression contribution was not statistically significant at the 0.05 level ($\beta = .173$, $p = .055$). The results of hypothesis testing are summarised in Table 6.

Table 6. Summary of Hypothesis Testing

No.	Hypothesis	Relationship	Correlation	Regression β	p	Decision
1	H1	Technology Adoption $\rightarrow$ Business Sustainability	.600**	.289	.004	Supported
2	H2	Marketing Strategy $\rightarrow$ Business Sustainability	.449**	.173	.055	Not Supported in Regression
3	H3	Entrepreneurial Skills $\rightarrow$ Business Sustainability	.694**	.483	< .001	Supported

The findings therefore provide strong empirical support for the contributions of Technology Adoption and Entrepreneurial Skills to Business Sustainability. Entrepreneurial Skills emerged as the most influential predictor, followed by Technology Adoption. Marketing Strategy was significantly associated with Business Sustainability at the bivariate level, but its unique predictive contribution became statistically non-significant when the other independent variables were incorporated simultaneously. This distinction is important and should be carried forward carefully into the Discussion, rather than describing Marketing Strategy simply as having no relationship with Business Sustainability.

5. Discussion on the Strategic Drivers of Business Sustainability in Traditional Food Enterprises

The empirical findings provide important insights into the capabilities associated with business sustainability among traditional food enterprises. Overall, Technology Adoption, Marketing Strategy, and Entrepreneurial Skills demonstrated positive associations with Business Sustainability, although their contributions differed when the variables were evaluated simultaneously. The regression model explained 58.6% of the variance in Business Sustainability, indicating that the selected capabilities collectively provide substantial explanatory value. Entrepreneurial Skills emerged as the strongest significant predictor, followed by Technology

Adoption, whereas Marketing Strategy demonstrated a significant bivariate relationship but did not retain a statistically significant unique effect in the multivariate model. These differences suggest that sustainable performance among traditional food enterprises is shaped not simply by the presence of individual business practices but by the relative capacity of those practices to contribute independently when other organisational capabilities are considered. The findings therefore provide a more differentiated understanding of how technological, market related, and entrepreneurial capabilities operate within resource constrained traditional enterprises.

5.1 Technology Adoption and Business Sustainability

The findings demonstrate that Technology Adoption represents an important capability associated with stronger Business Sustainability. Technology Adoption exhibited a significant positive correlation with Business Sustainability ($r = .600$, $p < .001$) and maintained a statistically significant contribution in the regression model ($\beta = .289$, $p = .004$). The persistence of this relationship after Marketing Strategy and Entrepreneurial Skills were considered simultaneously indicates that technological utilisation provides a distinctive contribution to sustainable business outcomes rather than merely reflecting broader entrepreneurial capability. This result is consistent with Edward et al. (2024), who

established that technology adoption positively contributes to MSME sustainability in Malaysia and Indonesia. Similarly, research on Malaysian SMEs indicates that digital capability can facilitate business model innovation and strengthen competitiveness through improvements in value creation and commercial processes (Fang et al., 2024). The result therefore reinforces the argument that technological resources can enhance the sustainability of smaller enterprises when they are incorporated meaningfully into operational activities. For traditional food enterprises, the contribution of technology appears particularly relevant because improvements do not necessarily require comprehensive digital transformation. Practical technologies supporting production, transactions, financial recording, operational accuracy, and information management can generate meaningful improvements while allowing enterprises to preserve the traditional characteristics that differentiate their products.

The positive contribution of Technology Adoption also suggests that traditional enterprises should not be characterised as businesses that must choose between preserving traditional practices and pursuing technological modernisation. The two can coexist when technology is introduced selectively to improve processes rather than fundamentally alter product identity. Technologies that accelerate production, improve consistency, reduce errors, support digital transactions, or facilitate business record keeping can strengthen operational capacity without removing the traditional knowledge embedded within the final product. This interpretation corresponds with contemporary SME research emphasising the role of digital skills and technological capability in improving sustainable business outcomes (Sihotang et al., 2025). The finding also aligns with broader evidence indicating that technological innovation can strengthen competitiveness and profitability among micro and small enterprises when implementation corresponds with their organisational circumstances (Becerra-Bizarrón & Gomez-Bernal, 2025). Importantly, the standardized regression coefficient indicates that

Technology Adoption contributes independently even after entrepreneurial capability is controlled. This implies that capable entrepreneurs may still benefit from technological resources that enhance the efficiency and effectiveness of their decisions. Sustainable development within traditional food enterprises can therefore be strengthened when technological adoption is practical, accessible, compatible with existing operations, and directed towards business activities capable of generating tangible improvements in productivity and continuity.

5.2 Marketing Strategy and Business Sustainability

Marketing Strategy presents a more nuanced empirical pattern. Pearson correlation analysis demonstrated a significant positive association between Marketing Strategy and Business Sustainability ($r = .449, p < .001$), indicating that enterprises reporting stronger marketing practices also tended to report stronger sustainability. This result is consistent with research positioning marketing capability as an important contributor to SME sustainability and market performance. Hanaysha and Al-Shaikh (2024), for example, demonstrate that marketing capability can contribute positively to business sustainability, while Gliga and Evers (2023) emphasise the role of dynamic marketing capabilities in supporting SME growth and competitiveness. The significant correlation observed in the present analysis therefore indicates that activities such as social media promotion, electronic commerce, product presentation, customer feedback, promotional content, live selling, distribution partnerships, and continuous marketing learning are meaningfully associated with sustainable business outcomes. This relationship is particularly understandable within traditional food markets, where commercial sustainability depends not only on production but also on maintaining customer awareness and ensuring that products remain accessible and attractive to evolving consumer segments. Marketing activities can consequently facilitate market visibility, customer interaction, demand generation, and geographical

expansion beyond conventional local selling environments.

However, the multiple regression analysis provides an important qualification to this relationship. When Technology Adoption and Entrepreneurial Skills were considered simultaneously, the unique contribution of Marketing Strategy did not achieve conventional statistical significance ($\beta = .173$, $p = .055$). This does not mean that Marketing Strategy is irrelevant or unrelated to Business Sustainability. Instead, the finding indicates that Marketing Strategy did not explain sufficient additional variance in sustainability after the contributions shared with technological and entrepreneurial capabilities were statistically controlled. The p -value of .055 is also very close to the conventional .05 threshold, making it inappropriate to describe the relationship as entirely absent. A more defensible interpretation is that marketing practices are associated with sustainability at the bivariate level, but their independent predictive contribution is comparatively weaker within the combined model. This outcome may reflect the interconnected nature of contemporary SME marketing. Digital promotion, electronic commerce, live selling, and customer communication frequently depend upon technological capability, while the effectiveness of marketing decisions depends upon entrepreneurial judgement and business management skills. Consequently, part of the sustainability benefit associated with Marketing Strategy may overlap with the broader capabilities represented by Technology Adoption and Entrepreneurial Skills.

5.3 Entrepreneurial Skills and Business Sustainability

Entrepreneurial Skills emerged as the most influential predictor of Business Sustainability. The construct demonstrated the strongest bivariate relationship with Business Sustainability ($r = .694$, $p < .001$) and the largest standardized regression coefficient ($\beta = .483$, $p < .001$). These results provide strong evidence that the ability of entrepreneurs to manage financial, operational, human, supplier, and strategic responsibilities is

central to the sustainability of traditional small enterprises. The finding is consistent with Malaysian evidence demonstrating that entrepreneurial competencies positively contribute to microenterprise sustainability and sustainable SME performance (Fazal et al., 2022; Al Koliby et al., 2024). It also supports research demonstrating that entrepreneurial capabilities facilitate the effective mobilisation of organisational resources and contribute to stronger sustainable outcomes. The comparatively large standardized coefficient is particularly significant because it indicates that Entrepreneurial Skills retain substantial explanatory power even after technological and marketing capabilities are simultaneously controlled. Thus, sustainable performance within traditional enterprises appears to depend considerably on the entrepreneur's ability to translate available resources into effective business actions. Technology and marketing opportunities may be available, but their potential commercial value ultimately depends on decisions concerning investment, implementation, resource allocation, operational control, and strategic direction.

The importance of Entrepreneurial Skills is also consistent with the organisational characteristics of small traditional food businesses. Owners frequently perform multiple roles involving production planning, cost calculation, pricing, employee supervision, inventory management, supplier negotiation, problem solving, innovation, and business development. Consequently, entrepreneurial capability influences numerous areas of the enterprise simultaneously. Stronger skills can enable entrepreneurs to respond more effectively when raw material costs increase, operational problems occur, customer preferences change, or new commercial opportunities emerge. The finding therefore extends beyond the general proposition that skilled entrepreneurs perform better. It suggests that entrepreneurial competence provides an integrative capability through which other business resources can be coordinated and converted into sustainable outcomes. This interpretation is compatible with Al Koliby et al.

(2024), who demonstrate that entrepreneurial competencies contribute to sustainable performance and that knowledge management plays an important role within this relationship. For traditional food enterprises, capability development should therefore encompass more than production expertise. Financial planning, inventory management, supplier negotiation, problem solving, innovation, and calculated risk taking are equally important because sustainability requires entrepreneurs to manage both the preservation of established business strengths and the adaptation necessary for continued competitiveness.

5.4 Comparative Influence of Technology Adoption, Marketing Strategy, and Entrepreneurial Skills on Business Sustainability

Comparison of the three predictors provides a clearer understanding of their relative importance. The overall regression model was statistically significant and explained 58.6% of the variance in Business Sustainability, demonstrating that the selected capabilities collectively possess considerable explanatory power. Nevertheless, their individual contributions were not equivalent. Entrepreneurial Skills produced the strongest standardized effect ($\beta = .483, p < .001$), followed by Technology Adoption ($\beta = .289, p = .004$), whereas Marketing Strategy generated a smaller and statistically non-significant unique contribution ($\beta = .173, p = .055$). This hierarchy suggests that sustainable performance within traditional food enterprises is particularly dependent on internal capability and operational competence. Entrepreneurial Skills provide the decision making and managerial foundation required to coordinate business activities, while Technology Adoption offers tools through which these activities can be performed more efficiently. Marketing Strategy remains relevant because of its significant positive correlation with sustainability, but its effectiveness may depend more substantially on the technological and entrepreneurial capabilities supporting its implementation. The findings therefore discourage an isolated interpretation of individual

business practices and instead suggest that sustainable enterprise development emerges through combinations of complementary capabilities.

From a broader perspective, the findings indicate that modernisation within traditional food enterprises should not be equated exclusively with digitalisation or marketing expansion. Sustainable development requires capable entrepreneurs who can determine which technologies are appropriate, how resources should be allocated, which marketing opportunities should be pursued, and how operational challenges should be addressed. Technology Adoption provides important infrastructure for improving business processes, while Marketing Strategy creates mechanisms for connecting products with markets. Entrepreneurial Skills, however, appear to provide the strongest underlying capability for coordinating these resources effectively. This interpretation is particularly relevant to resource constrained enterprises because investment priorities must be carefully selected. Allocating resources exclusively to digital tools or promotional activities without strengthening the entrepreneur's managerial capability may limit the sustainability benefits obtained from those investments. Conversely, entrepreneurial development accompanied by appropriate technology and market access can create a more integrated foundation for business continuity and growth. The empirical evidence consequently positions sustainable traditional entrepreneurship as a capability driven process in which technological, marketing, and entrepreneurial resources contribute differently but collectively to the enterprise's capacity to remain competitive, adaptable, and commercially viable.

6. Strategic Recommendations for Strengthening Business Sustainability

The empirical findings provide a clear basis for developing strategic recommendations that can strengthen business sustainability among traditional food enterprises. The results demonstrate that entrepreneurial skills represent the strongest significant predictor of business

sustainability, followed by technology adoption, while marketing strategy maintains a significant positive association with sustainability despite its weaker unique contribution in the regression model. These findings indicate that sustainable development requires more than isolated improvements in individual business activities. Entrepreneurs need managerial capabilities that enable them to make effective decisions, technologies that strengthen operational efficiency, and marketing practices that connect their products with evolving markets. Accordingly, the recommendations emphasise entrepreneurial capability development, practical technology adoption, market oriented improvement, integration of complementary business capabilities, and institutional support appropriate to the operational realities of traditional food enterprises.

6.1 Strengthening Entrepreneurial Skills for Sustainable Growth

Entrepreneurial skills should be positioned as a primary development priority because they demonstrated the strongest contribution to business sustainability in the empirical findings. Traditional food entrepreneurs frequently perform multiple managerial responsibilities involving financial planning, pricing, inventory management, employee supervision, supplier negotiation, problem solving, innovation, and investment decisions. Capability development programmes should therefore concentrate on these practical areas rather than providing broad entrepreneurship training with limited application to actual business operations. Entrepreneurs should be equipped to calculate production costs accurately, establish appropriate profit margins, control inventory levels, evaluate supplier alternatives, manage employees efficiently, and assess business opportunities before committing resources. Previous research has similarly demonstrated that entrepreneurial competencies contribute positively to sustainable performance by strengthening the entrepreneur's capacity to organise resources and respond to business challenges (Fazal et al., 2022; Al Koliby et al., 2024). Training should also incorporate problem based learning using actual situations

encountered by entrepreneurs, enabling participants to translate knowledge directly into managerial improvements. Strengthening these competencies can reduce dependence on informal decision making and provide entrepreneurs with greater confidence and analytical capability when confronting changes in costs, demand, competition, technology, and market conditions. Entrepreneurial skills should therefore be developed continuously as enterprises progress from small scale operations toward more structured and competitive businesses.

6.2 Advancing Technology Adoption for Operational Improvement

Technology adoption should be encouraged through a practical and business driven approach that prioritises measurable operational improvements. The significant contribution of technology adoption to business sustainability demonstrates that technological resources can strengthen enterprise continuity when they are appropriately integrated into production and management activities. Traditional food entrepreneurs should therefore identify technologies according to specific operational requirements rather than adopting digital tools merely because they are widely available. Production machinery can improve efficiency and product consistency, while digital financial applications can strengthen expenditure monitoring, sales recording, and cash flow management. Electronic payments, QR transactions, online banking, inventory applications, and other accessible technologies can similarly reduce administrative inefficiencies and improve information availability. Research demonstrates that digital capability can strengthen SME competitiveness and business model development, while technological innovation can contribute to the sustainable development of smaller enterprises (Fang et al., 2024; Becerra-Bizarrón & Gomez-Bernal, 2025). Technology support should nevertheless recognise the financial and knowledge limitations frequently experienced by smaller businesses. Financial assistance should therefore be complemented by practical training,

demonstrations, technical guidance, and implementation support. A gradual technology adoption strategy is particularly appropriate because it allows traditional enterprises to modernise selected processes without creating excessive financial pressure or disrupting the product characteristics that provide their distinctive market identity.

6.3 Enhancing Marketing Strategy for Market Competitiveness

Marketing strategy should be strengthened by shifting attention from promotional activity alone toward measurable customer and market outcomes. Although marketing strategy demonstrated a significant positive correlation with business sustainability, its unique contribution became weaker when technology adoption and entrepreneurial skills were considered simultaneously. This finding suggests that marketing remains commercially relevant but may generate stronger outcomes when supported by appropriate technological and managerial capabilities. Traditional food enterprises should therefore develop marketing practices that improve customer acquisition, repeat purchasing, market reach, brand recognition, and sales conversion rather than concentrating solely on increasing the volume of promotional content. Social media, electronic commerce, live selling, customer feedback, attractive packaging, creative digital content, agents, wholesalers, and distribution partnerships can provide valuable channels for reaching customers beyond traditional geographical markets. Hanaysha and Al-Shaikh (2024) demonstrate that marketing capability contributes to SME sustainability, while Gliga and Evers (2023) emphasise the importance of dynamic marketing capabilities for SME competitiveness and growth. Traditional food entrepreneurs should consequently combine the cultural authenticity of their products with contemporary methods of market communication. Marketing decisions should also be supported by customer information and sales evidence so that entrepreneurs can determine which channels and promotional activities produce meaningful commercial returns.

6.4 Integrating Business Capabilities for Sustainable Performance

Technology adoption, marketing strategy, and entrepreneurial skills should be developed as complementary capabilities rather than independent areas of business improvement. The findings demonstrate that the three constructs are positively associated with business sustainability, although entrepreneurial skills and technology adoption provide stronger unique contributions when examined simultaneously. This pattern suggests that sustainability may depend on how effectively entrepreneurs combine managerial competence with technological resources and market oriented activities. Technology can improve production and information management, but its potential value may remain limited when entrepreneurs lack the ability to evaluate investments, control costs, or integrate new systems into existing operations. Similarly, marketing initiatives can increase business visibility, but greater customer attention may not translate into sustainable performance when enterprises lack production capacity, inventory control, financial management, or effective pricing decisions. An integrated capability development approach should therefore connect entrepreneurial training with technology utilisation and market development. Entrepreneurs could, for example, learn financial management alongside digital accounting applications or combine marketing training with electronic commerce and customer data analysis. Such integration would enable businesses to convert individual improvements into coordinated organisational capabilities. Sustainable performance is consequently more likely when entrepreneurs possess the managerial competence required to select, organise, and utilise technological and marketing resources according to the strategic requirements of their businesses.

6.5 Strengthening Institutional Support for Traditional Enterprises

Institutional support should become more targeted toward the actual capabilities and development requirements of traditional food

enterprises. Government agencies, entrepreneurship development organisations, financial institutions, training providers, and industry associations should avoid assuming that all small enterprises require identical forms of assistance. Businesses differ substantially in their managerial capabilities, technological readiness, production capacity, market access, and financial resources. Support programmes should therefore begin with an assessment of individual enterprise needs before recommending training, financing, technology, or marketing interventions. Entrepreneurs with limited managerial capability may require intensive development in financial management, pricing, inventory control, and strategic decision making, while businesses with stronger managerial foundations may benefit more substantially from technology upgrading or market expansion assistance. Enterprises possessing sufficient production capacity could receive targeted support for digital commerce, packaging development, certification, branding, distribution networks, and access to wider markets. Institutional assistance should also incorporate continuous guidance rather than relying exclusively on short term training programmes because the application of new capabilities frequently requires time, experimentation, and adjustment. A more targeted support structure can improve the effectiveness of entrepreneurship development resources while enabling traditional food enterprises to strengthen commercial performance without compromising the distinctive product characteristics and local knowledge that contribute to their competitive identity.

7. Conclusion

The sustainability of traditional food enterprises increasingly depends on their ability to preserve the strengths of established business practices while responding effectively to a rapidly changing commercial environment. Technology adoption, marketing strategy, and entrepreneurial skills represent important capabilities that can support this transition by improving operational efficiency, strengthening market engagement, and enhancing the quality of business decision

making. For traditional enterprises, sustainability should therefore not be viewed merely as the ability to remain in operation. It involves maintaining competitiveness, adapting to changing customer and market expectations, managing resources effectively, and creating sufficient capacity for continued development. Traditional products may possess strong cultural identity and established market recognition, but these advantages must be supported by business capabilities that enable enterprises to remain commercially relevant over the long term.

Among these capabilities, entrepreneurial competence provides an essential foundation because entrepreneurs ultimately determine how resources, technologies, market opportunities, and business challenges are managed. Technology can strengthen production and operational processes, while effective marketing can expand visibility and strengthen customer connections. However, their business value depends considerably on the ability of entrepreneurs to make appropriate decisions, control resources, solve problems, recognise opportunities, and respond strategically to change. Sustainable development should consequently involve an integrated approach in which entrepreneurial capability, technological advancement, and market development reinforce one another. Such integration is particularly important for small traditional enterprises where financial and managerial resources are limited and every investment must generate meaningful value. Strengthening these capabilities can enable traditional businesses to become more resilient and competitive without compromising the authenticity and distinctive characteristics that differentiate their products.

The future of traditional food entrepreneurship should therefore not be defined by a choice between tradition and modernisation. The greater opportunity lies in connecting both successfully. Traditional knowledge, cultural identity, and product authenticity can remain at the heart of the enterprise, while technology, contemporary marketing practices, and stronger entrepreneurial capabilities provide the mechanisms required to sustain that heritage commercially. This

perspective transforms sustainability from simply keeping a business alive into building an enterprise capable of adapting, competing, and creating value across generations. Traditional enterprises do not need to abandon what made

them distinctive in order to move forward. Instead, their long term strength may depend on becoming modern in the way they operate, strategic in the way they compete, and authentic in the value they continue to offer.

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