RAW MATERIALS SOURCING AND SUSTAINABLE ENTREPRENEURSHIP AMONG SMALL-SCALE AGRO-PROCESSING COMPANIES IN OSUN STATE, NIGERIA

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ABSTRACT

The agro-processing sector in Nigeria, especially in Osun State, plays an important role in economic growth by reducing post-harvest losses, adding value to agricultural products, and creating jobs. However, the sustainability of small-scale agro-processing firms is often undermined by irregular raw material supply, poor infrastructure, and systemic inefficiencies. This study investigated the role of raw material sourcing in the survival and growth of small-scale agro-processors in Osun State. Specifically, it examined the strategies employed for sourcing, the relationship between sourcing and agro-processing production practices, and the systemic and operational factors influencing the availability of raw materials. The study adopted a descriptive survey design with a sample of 120 respondents drawn from owners, managers, and staff of agro-processing firms across Osun State using stratified random sampling. Data were collected through structured questionnaires and analysed with descriptive statistics and linear regression at a 0.05 significance level. Findings showed that multiple sourcing channels, supplier diversification, farmer partnerships, and seasonal planning were the most effective strategies, with minimal reliance on importation. Regression analysis revealed that sourcing strategies moderately improved raw material availability, and sourcing practices strongly influenced agro-processing production outcomes. Systemic and operational factors such as infrastructure, storage, and staff

competence also had significant but smaller effects. The study concluded that effective sourcing is central to sustainability and recommends diversification, farmer contracts, ICT adoption, and improved rural infrastructure to strengthen agro-processing enterprises.

Introduction

Background to the Study

The agricultural sector remains a cornerstone of economic development in many developing nations, including Nigeria, serving as a source of employment, income, and raw materials for agro-based industries (Zubair et al., 2025). Within this sector, agro-processing plays a pivotal role in transforming raw agricultural products into market-ready goods, thereby enhancing their shelf life, market value, and export potential. This transformation process, however, is heavily reliant on the consistent availability and strategic sourcing of raw materials, which serves as a critical determinant of production efficiency and sustainability in agro-processing operations (Akpan & Edem, 2024).

Raw materials sourcing encompasses all the activities involved in identifying, obtaining, and managing the supply of inputs needed for production. For small-scale agro-processors, this process often includes direct procurement from local farmers, engagement in contract farming, or reliance on intermediaries (Nwafor, 2023). The effectiveness of sourcing strategies not only affects operational continuity but also impacts cost efficiency, product quality, and ultimately, business survival. Inadequate or unreliable access to essential raw materials frequently disrupts production cycles, raises costs, and contributes to business failure, especially for micro and small enterprises (Adenaiye et al., 2021).

In Nigeria, and specifically in Osun State, the agro-processing sub-sector comprises a range of small-scale businesses involved in food processing, such as cassava milling, palm oil production, fruit drying, and grain threshing. These enterprises are vital in reducing post-harvest losses and creating value-added products for local consumption and export. However, they often operate in environments characterized by infrastructural deficits, poor logistics networks, limited access to finance, and seasonal fluctuations in raw material availability (Akinniyi, 2023). These challenges, compounded by weak linkages between processors and raw material suppliers, have significantly hindered the growth of sustainable agro-processing businesses in the region.

Sustainable entrepreneurship in agro-processing refers to the adoption of practices that not only ensure economic profitability but also address environmental and social concerns (Sampene et al., 2023). This involves minimizing resource waste, promoting local sourcing, using eco-friendly technologies, and ensuring equitable treatment of stakeholders. The ability of entrepreneurs to integrate sustainability into their sourcing and production strategies is essential for achieving long-term viability and contributing to broader development goals such as food security, poverty reduction, and rural industrialization (Oshim et al., 2024).

Given the increasing global and national emphasis on sustainable business practices, there is a growing recognition of the need to investigate how raw material sourcing strategies can contribute to entrepreneurial sustainability, particularly in agro-based sectors. Studies such as Oginni et al, (2024) and Achichi et al., (2023) have shown that well-structured supply chains and sourcing strategies significantly improve business resilience and performance in the face of economic and environmental uncertainties.

Moreover, many small-scale processors lack the technical capacity to evaluate or implement efficient raw material sourcing models that align with sustainability goals. Some are constrained by a lack of information on sourcing alternatives, while others are hindered by institutional and policy limitations, such as unclear land tenure systems or insufficient government support (Achichi et al., 2023). These systemic barriers further emphasize the need for a comprehensive study to assess the relationship between raw materials sourcing and sustainable entrepreneurship among these enterprises.

Despite extensive research on agro-processing in Nigeria, most existing studies have tended to generalize findings across multiple states or focus narrowly on production and market constraints, without giving specific attention to the interplay between raw material sourcing strategies, sustainability outcomes, and systemic or operational constraints in Osun State (Oginni et al., 2024; Oluwafemi, 2023). In addition, available empirical work (Adenaiye et al., 2021; Akinniyi, 2023) often treats raw material availability and sustainability as separate issues, thereby overlooking the direct link between sourcing models, sustainable production, and long-term entrepreneurial viability at the local level (Okorie et al., 2024). This lack of localized, integrative evidence limits the ability of policymakers, development agencies, and practitioners to design targeted interventions for small-scale processors in the region.

Therefore, this study becomes necessary as it evaluates how small-scale agro-processors in Osun State source their raw materials and the implications of these sourcing methods on the sustainability of their businesses. By examining the strategies adopted, the challenges encountered, and the systemic factors influencing raw material availability, this research aims to offer policy-relevant insights that can enhance the capacity of small-scale agro-enterprises to operate sustainably.

Statement of the Problem

Small-scale agro-processing enterprises in Osun State play a critical role in adding value to agricultural produce, reducing post-harvest losses, and creating rural employment opportunities. However, these enterprises face persistent challenges related to raw material sourcing, including erratic supplies, seasonal shortages, high procurement costs, and inadequate supply chain coordination (Adenaiye et al., 2021; Akinniyi, 2023). Studies (Oginni et al., 2024; Oluwafemi, 2023) have shown that effective raw material sourcing enhances resilience and sustainability in agro-processing firms, yet the majority of such research is conducted at national or multi-state levels, without capturing the unique operational realities in Osun State.

Existing literature also seldom integrates systemic and operational constraints—such as infrastructure deficits, limited access to finance, and weak institutional support—into empirical models that examine the relationship between sourcing strategies and sustainability outcomes (Ragasa et al., 2024; Okuthe, 2024). Furthermore, while sustainable entrepreneurship emphasizes long-term viability, environmental stewardship, and socio-economic development, little is known about how small-scale processors in Osun State incorporate these considerations into their sourcing practices.

This lack of localized, integrative evidence constitutes a critical research gap. Addressing it is essential for designing interventions that strengthen supply reliability, enhance sustainable production, and improve the competitiveness of small-scale agro-processing enterprises in Osun State.

Despite efforts by stakeholders to promote agro-industrial development, there is still an inadequate understanding of the link between raw material sourcing strategies and

sustainable entrepreneurship outcomes in the agro-processing sub-sector. Many small-scale processors lack access to sustainable sourcing models such as contract farming, cooperative aggregation, and integrated value chains that ensure steady supplies. The absence of data-driven sourcing decisions, limited technical and institutional capacity, and infrastructural weaknesses further hinder the ability of small-scale processors to adopt innovative and sustainable approaches.

Moreover, while sustainable entrepreneurship emphasizes long-term viability, environmental stewardship, and socio-economic development, little is known about how small-scale agro-processing firms in Osun State incorporate sustainability considerations into their raw material sourcing. Existing studies have largely generalized challenges in agro-processing without interrogating the unique interplay between sourcing practices and sustainable outcomes in this specific segment of the industry.

Therefore, there is a pressing need to critically examine the raw material sourcing strategies used by small-scale food processors in Osun State, evaluate their effectiveness, and explore their implications for sustainable entrepreneurship. This study is motivated by the desire to fill this knowledge gap and provide practical insights for enhancing the capacity of small-scale agro-processors to achieve sustainable growth.

Research Questions

The following research questions are raised to guide the study:

i. What is the effect of raw materials sourcing strategies on sustainable agro processing production among small scale agro-processors in Osun State?
ii. What is the effect of raw material sourcing on sustainable agro-processing?
iii. What systemic and operational factors influence the sustainable availability of raw materials for agro-processing in Osun State?

Objectives of the Study

The broad objective of the study is to evaluate the influence of raw material sourcing on sustainable entrepreneurship among small-scale agro-processing companies in Osun State. other objectives are to:

i. examine the effect of raw materials sourcing strategies on sustainable agro-processing practice among small-scale agro-processors in Osun State.
ii. examine the effect of raw material sourcing and sustainable agro-processing.
iii. examine the systemic and operational factors responsible for sustainable raw material availability for agro-processing.

Research Hypotheses

To provide empirical answers to the research questions and test the proposed relationships, the following hypotheses were formulated:

H_{01}: Raw material sourcing strategies have no significant effect on sustainable agro-processing among small-scale agro-processor in Osun State.

H_{02}: Raw material sourcing does not have a significant effect on sustainable agro-processing production.

H_{03}: Systemic and operational factors do not significantly influence the sustainable availability of raw materials for agro-processing production.

Significance of the Study

The study is significant to various stakeholders, including policymakers, agro-processors, researchers, and development partners. The findings offered valuable insights

into the challenges and opportunities within the raw material sourcing framework for small-scale agro-processors, thereby informing evidence-based interventions and support programmes. Small-scale agro-processors benefit from the study's practical recommendations for improving sourcing strategies and enhancing sustainable business practices. Also, this study offered researchers a useful reference for future academic exploration in agro-processing and sustainable entrepreneurship. Furthermore, development agencies and donor organizations seeking to support agricultural industrialization and food security initiatives created critical knowledge that can guide investment and technical assistance in the sector.

Scope of the Study

This study is delimited to small-scale agro-processing companies operating within Osun State, Nigeria. It focuses specifically on food processors involved in transforming raw agricultural products such as cassava, maize, fruits, and vegetables into processed or semi-processed goods. The study examines the strategies employed in sourcing raw materials, the systemic and operational challenges faced, and how this influences sustainable entrepreneurship. Geographically, the study covered selected urban and semi-urban locations where agro-processing activities are concentrated. The research was limited to the relationship between raw material sourcing and sustainability outcomes.

Literature Review

Conceptual Review

Raw Material Sourcing

Raw material sourcing in agro-processing represents a complex and strategically significant function that directly influences production performance, cost efficiency, and the sustainability of operations. It involves the entire spectrum of activities from identifying suitable suppliers and negotiating supply terms to managing logistics, maintaining quality standards, and mitigating risks associated with availability and seasonality (Esiobu, 2019). In small-scale agro-processing enterprises, such as cassava mills, fruit dryers, and palm oil processors in regions like Osun State, sourcing raw materials is not merely an operational concern; it is a strategic determinant of business viability and competitiveness.

In Nigeria, persistent infrastructural bottlenecks continue to undermine the efficiency of raw material sourcing. Poor rural road networks, inadequate storage infrastructure, and a lack of cold chain facilities significantly contribute to post-harvest losses and elevated procurement costs (Obisesan et al., 2025). Indeed, empirical studies (Obisesan et al., 2025; Akinfemi et al., 2025) highlight that up to half of harvested agricultural produce is lost before consumption, largely due to solar exposure, poor handling practices during transit, and inadequate preservation mechanisms. This reality significantly compromises the capacity of small-scale processors to access consistent, high-quality raw inputs, interrupting production schedules, inflating costs, and compromising product quality.

Compounding these challenges, Nigeria's local sourcing rates remain modest. Data from the Raw Materials Research and Development Council (RMRDC) indicates that local procurement averages about 53.5%, which lags behind international benchmarks of 70%–80% found in similar economies (RMRDC, 2024). Such low sourcing ratios highlight systemic inefficiencies, including weak supply chain linkages, limited farmer organization, and inconsistent supply volume and quality. Access to finance is similarly constrained; most small-scale processors lack the necessary capital to invest in procurement infrastructure or

to sustain long-term supply contracts (Jajere et al., 2023). In the absence of these capabilities, processors often rely on informal intermediaries, exposing themselves to price volatility and unpredictable delivery schedules.

Despite these obstacles, several promising strategies and innovations are emerging to strengthen raw material sourcing. Notably, digital procurement platforms such as the mobile application "Sell Harvest" have begun to transform the sourcing landscape by connecting farmers and processors in real time, reducing the influence of intermediaries, improving pricing transparency, and enhancing traceability (Bello et al., 2024). These platforms promise improved efficiency and reliability in sourcing, especially in decentralized or rural settings. Similarly, solar-powered cold storage solutions introduced by cleantech firms like Ecotutu offer off-grid preservation capacity that significantly reduces spoilage in rural collection points. Their 'pay-as-you-chill' model makes cold storage accessible and scalable for small-scale operators (Defraeye et al., 2025).

At the institutional level, the Nigerian government, in collaboration with development partners such as the African Development Bank (AfDB) and the International Fund for Agricultural Development (IFAD), has launched the Special Agro-Industrial Processing Zones (SAPZ) initiative. These zones aim to establish agro-industrial hubs equipped with infrastructure, processing facilities, reliable power, storage capacity, and logistics support in high-potential rural regions (Amungo, 2020). The first phase, supported by approximately US$538 million and covering states including Oyo, Ogun, and Cross River, is intended to reduce post-harvest losses, boost productivity, and generate rural jobs (Steemers et al., 2022). AfDB is further mobilizing US$2.2 billion for the expansion of similar zones across 28 states (Reuters, 2025). The clustering of agribusinesses, logistics, and infrastructure within these zones is poised to transform sourcing dynamics by aggregating raw material supply and enhancing operational efficiency.

Empirical evidence from these interventions is still emerging, yet early insights suggest substantial potential. The clustering approach can reduce logistical inefficiency and transportation costs, improve cold storage access, and support processors in establishing more reliable supply chains. These effects are particularly relevant for small-scale agro-processors in regions like Osun State, which face fragmented sourcing landscapes, the absence of reliable infrastructure, and limited capacity for supply chain coordination.

Sustainable Entrepreneurship

Sustainable entrepreneurship has emerged as an influential paradigm in contemporary business research and practice, representing a shift from purely profit-driven models toward approaches that integrate environmental stewardship, social responsibility, and long-term economic viability. Defined broadly, sustainable entrepreneurship refers to the process of identifying, developing, and exploiting opportunities that simultaneously generate economic returns, address social needs, and conserve environmental resources for future generations (Muñoz-Ulecia et al., 2023). This three-dimensional focus distinguishes it from traditional entrepreneurial models, which historically prioritized short-term financial gains over broader societal and ecological considerations. The concept draws from the triple bottom line framework, which emphasizes the interdependence of people, planet, and profit (Syahruddin & Kalchschmidt, 2012), and situates entrepreneurship within the broader global sustainability agenda, particularly the United Nations Sustainable Development Goals (SDGs).

In agro-processing, sustainable entrepreneurship is increasingly recognized as a critical pathway toward food security, rural development, and climate resilience. Nigeria, as Africa's most populous country, faces pressing challenges related to post-harvest losses, environmental degradation, rural poverty, and unemployment, all of which demand business models that integrate sustainability into their core operations (Muñoz-Ulecia et al., 2023).. Small-scale agro-processors are uniquely positioned to drive sustainable entrepreneurship because they operate close to raw material sources, have intimate knowledge of local market dynamics, and can adapt quickly to emerging environmental and social challenges. However, achieving sustainability in this sector requires not only technical and operational innovations but also enabling institutional and policy frameworks.

In Nigeria's agro-processing sector, sustainable entrepreneurship is particularly relevant for addressing systemic inefficiencies in raw material sourcing, energy use, waste management, and community relations. For example, adopting renewable energy solutions such as solar dryers or biogas digesters not only reduces operating costs but also mitigates environmental impacts associated with fossil fuel consumption (Ayeni, 2025). Similarly, by developing inclusive procurement models that source directly from smallholder farmers at fair prices, processors can foster rural livelihoods, reduce poverty, and build loyalty within their supply chains. Empirical evidence suggests that such approaches yield both social dividends and business resilience, as suppliers become more committed and quality standards improve over time (Ajayi, 2025).

A key component of sustainable entrepreneurship is innovation—not simply in products and services, but in processes, business models, and stakeholder engagement. In Osun State, for instance, innovative models have emerged in which cooperatives jointly invest in shared processing equipment, thereby reducing individual capital burdens and enabling collective marketing of higher-quality goods (Jacob & Umoh, 2025). Elsewhere, processors have adopted circular economy principles by converting agricultural by-products, such as cassava peels or palm kernel shells, into value-added products like animal feed, bio-briquettes, or organic fertilizers. Such innovations not only reduce waste and environmental degradation but also create additional revenue streams, enhancing overall business sustainability.

However, sustainable entrepreneurship in Nigeria's agro-processing sector faces formidable barriers. Limited access to finance remains a persistent constraint, as many lenders perceive small-scale processors as high-risk borrowers due to fluctuating commodity prices, seasonal supply variations, and lack of collateral (Ibrahim & Isichei, 2023). Policy instability, weak enforcement of environmental regulations, and inadequate infrastructure also hinder the adoption of sustainable practices. For instance, while Nigeria's climate policies encourage renewable energy adoption in agriculture, inconsistent implementation and lack of targeted incentives have limited uptake among rural entrepreneurs (Agu et al., 2024). Furthermore, knowledge gaps persist, with many entrepreneurs lacking the technical skills or awareness required to implement sustainability measures effectively.

Despite these constraints, the potential for scaling sustainable entrepreneurship in agro-processing remains high. Recent policy initiatives, such as the Federal Government's Green Imperative Programme and the African Development Bank's SAPZ initiative, are designed to strengthen rural infrastructure, enhance processing capacity, and promote environmentally responsible agricultural practices (Bank, 2017). International development agencies have also invested in capacity-building programs that train agro-processors in sustainable sourcing, waste management, and renewable energy use. The proliferation of

digital platforms—such as Farmcrowdy and Thrive Agric—has further expanded opportunities by linking processors to markets, investors, and suppliers in more transparent and efficient ways.

For Osun State, embedding sustainable entrepreneurship in agro-processing could generate transformative impacts. By adopting sustainable sourcing practices, investing in renewable energy, and engaging local communities, processors can simultaneously reduce operational risks, enhance brand reputation, and contribute to broader socio-economic development goals. Such integration would align with Nigeria's commitments under the Paris Agreement and the SDGs, particularly Goal 2 (Zero Hunger), Goal 8 (Decent Work and Economic Growth), and Goal 12 (Responsible Consumption and Production).

Systemic and Operational Factors Affecting Raw Material Availability in Small-Scale Agro-Processing in Osun State

The operational success and sustainability of small-scale agro-processing enterprises in Osun State are shaped by a combination of systemic and operational factors that influence how raw materials are sourced, stored, and transformed. Systemic factors refer to broad, macro-environmental conditions such as infrastructure, policy frameworks, and environmental dynamics, while operational factors relate to the internal capacities and practices of individual enterprises. These elements are deeply intertwined, often amplifying the challenges of securing consistent, quality raw materials.

One of the most significant systemic barriers is the inadequacy of rural infrastructure. Many agricultural communities in Osun State are linked by poorly maintained feeder roads, making transportation of perishable crops such as cassava, yam, maize, and tomatoes slow and costly. These infrastructural limitations not only increase post-harvest losses but also reduce the bargaining power of processors, who are often forced to accept whatever quality or quantity reaches them (Oladipo et al., 2023). Inadequate electricity supply further compounds the challenge. Frequent power outages disrupt processing schedules, damage stored produce, and force processors to rely on costly diesel-powered generators, eroding profit margins and reducing competitiveness (Roberts, 2025). For processors handling perishable goods, the absence of cold chain facilities, such as refrigerated trucks or storage units, makes timely sourcing and preservation especially difficult.

Policy and institutional frameworks also exert a decisive influence on raw material sourcing in Osun State. While federal and state agricultural support programs exist, such as input subsidy schemes and smallholder credit initiatives, their implementation is often uneven and plagued by bureaucratic delays. Several local processors report that although they are aware of government interventions, access is hindered by complex application procedures, limited awareness campaigns, and preferential treatment for politically connected applicants (Oladipo et al., 2023). Furthermore, fluctuations in agricultural policy, such as sudden changes in commodity pricing guidelines or shifts in import restrictions, create uncertainty in planning sourcing strategies, particularly for processors who depend on predictable market conditions.

Environmental and climatic changes are another pressing systemic factor. Osun State, although located in a relatively fertile agro-ecological zone, is experiencing increased variability in rainfall patterns and occasional flooding, both of which disrupt planting and harvesting schedules. These climate-related shifts contribute to periodic shortages of staple crops, especially cassava and maize, leading to price volatility and supply instability (Abraham & Jankowska, 2025). Soil degradation from continuous cropping without

adequate nutrient replenishment further reduces yields, adding long-term pressure on sourcing channels.

On the operational side, small-scale processors in Osun State often operate with limited financial capital, constraining their ability to bulk-purchase raw materials during peak harvest seasons when prices are lowest. This forces many to buy smaller quantities at higher off-season prices, straining profitability (Aina et al., 2025). In addition, most enterprises use locally fabricated processing equipment, which, while cost-effective, can be less efficient and more prone to breakdowns than modern machinery. These operational inefficiencies slow down processing cycles and may reduce the quality of the final product, indirectly influencing the volume and quality of raw materials required.

Managerial capacity is another critical operational determinant. Many enterprise owners have limited formal training in supply chain management, financial planning, or quality control, which hampers their ability to establish long-term sourcing contracts or adopt inventory management systems. As a result, sourcing often occurs on an ad hoc basis through informal networks, exposing processors to unpredictable price fluctuations and inconsistent quality (Oladipo, 2023). Furthermore, the low adoption of digital technologies such as online supplier directories, mobile-based inventory tracking, or e-payment systems limits operational efficiency and market reach.

While these systemic and operational factors are individually challenging, their combined effect can be especially restrictive for small-scale agro-processors in Osun State. For instance, a processor with limited capital and inefficient machinery operating in a region with poor road access and no cold storage is at a compounded disadvantage when trying to secure quality raw materials consistently. Despite these constraints, there is little localized empirical research that specifically measures the relative impact of each factor in Osun State. Most available studies aggregate data from several southwestern states, making it difficult to draw precise, targeted conclusions for Osun-based enterprises.

Raw Material Sourcing and Sustainable Entrepreneurship

Raw material sourcing and sustainable entrepreneurship are intimately connected in the context of small-scale agro-processing. Raw material sourcing denotes the processes by which processors identify, procure, transport, store, and manage the agricultural inputs required for value-adding activities. Sustainable entrepreneurship, for these firms, means running enterprises that secure economic returns while supporting social welfare and limiting environmental harm. In Osun State, where small mills, palm oil producers, fruit dryers, and cassava processors dominate the local agro-industry, the character of sourcing arrangements directly shapes the capacity of enterprises to pursue sustainable business models. When sourcing is timely, affordable, and of predictable quality, processors can maintain steady production, control costs, invest in improved methods, and offer more stable employment to local communities. Conversely, erratic supplies, high procurement costs, and poor input quality force processors into stop-start production cycles, reduce margins, and limit the ability to adopt environmentally or socially responsible practices.

Economically, efficient sourcing reduces transaction costs and stabilizes enterprises' cash flows. Direct procurement from local farmers, pre-harvest contracts, and cooperative aggregation reduce intermediaries' mark-ups and shorten the supply chain, often producing measurable savings on transport and spoilage. In Osun State, the absence of reliable rural infrastructure, bad feeder roads, and limited storage facilities magnifies the cost of sourcing and increases post-harvest loss, undermining processors' profitability and discouraging investment in quality-improving technologies (Adebayo & Akinbile, 2023). Where processors

can secure predictable supplies (for example, via farmer groups or off-taker agreements), they are more able to plan production runs, meet buyer specifications, and reinvest profits into improved equipment or packaging changes that enhance market access and long-term viability. Thus, sourcing stability becomes a form of operational capital that supports sustainable entrepreneurship by enabling reinvestment and scaling.

From a social sustainability perspective, sourcing relationships constitute an engine for rural livelihood improvement and community resilience. Processors that purchase locally and engage cooperatively with farmer groups help stabilize farmer incomes and generate multiplier effects in local economies. Practices such as advance purchase agreements, price support during lean seasons, and technical assistance for suppliers increase farmers' capacity to produce consistent quality and quantity, while creating dependable purchasing channels for processors. Evidence from Nigerian value-chain projects indicates that such linkages reduce rural-urban migration pressures and enhance local social capital, both of which are essential elements of sustainable entrepreneurship in rural contexts(Oluwafemi, 2023). In Osun State, early reports from processors and farmer groups show that cooperative sourcing arrangements improve supply predictability and foster trust, although systematic measurement of social outcomes (e.g., income stability, employment retention) remains limited.

Environmental sustainability is likewise affected by sourcing choices. When processors prioritize inputs produced with conservation practices crop rotation, reduced chemical inputs, and soil restoration, they help maintain the productivity of upstream landscapes and lower the risk of supply collapse due to land degradation. Small-scale processors that invest in waste-to-value measures (for example, converting cassava peels into animal feed or compost) reduce environmental footprints while creating ancillary revenue streams, aligning day-to-day operations with circular economy principles. In Osun State, pockets of environmentally conscious sourcing have emerged, but widespread adoption is constrained by limited technical support, weak incentives, and the upfront costs associated with sustainable farming transitions (Abubakar, 2024).

Practically, the mechanism by which sourcing affects sustainability operates through three interlinked pathways. First, supply reliability conditions economic resilience: predictable inputs reduce downtime, improve capacity utilization, and make returns more stable, which in turn enables long-horizon investments and the adoption of sustainable practices. Second, value distribution across the supply chain influences social outcomes: fair and transparent pricing, contract enforcement and inclusive procurement build shared prosperity and social legitimacy for processors. Third, sourcing modalities shape environmental outcomes by either incentivizing or disincentivizing regenerative practices at the farm level. In combination, these pathways underline why sourcing is not merely operational logistics but a strategic lever for sustainable entrepreneurship.

Despite the conceptual clarity, important empirical gaps exist in the Osun context. Most available studies aggregate findings across multiple southwestern states or rely on qualitative case evidence; few provide quantitative measures that link specific sourcing models (direct procurement, contract farming, aggregator-mediated purchasing) to concrete sustainability indicators such as profitability trends, employment stability, or soil-health metrics. Similarly, while digital procurement platforms and solar cold-storage solutions show promise in pilot areas (Kapoor et al., 2021), evidence on adoption rates, cost-effectiveness and long-term impacts among Osun's small processors is sparse. There is

also limited understanding of how seasonal credit constraints influence sourcing choices and whether short-term financing instruments could unlock more sustainable procurement arrangements.

Policy and practice implications flow directly from this analysis. First, targeted investments in rural infrastructure (roads, affordable storage, electrification) would lower sourcing costs and reduce post-harvest loss, enabling processors to channel savings towards sustainability measures. Second, supporting the formation and formalization of farmer groups and cooperative procurement systems would improve supply reliability and create platforms for knowledge transfer on sustainable farming practices. Third, subsidised access to appropriate cold-chain and mobile processing technologies, paired with capacity building on waste-to-value approaches, would help processors adopt environmentally positive practices while improving product quality. Fourth, small, flexible finance products calibrated to seasonal agricultural cycles could allow processors to buy in bulk at harvest prices and store inputs, improving margins and reducing dependence on expensive spot purchases.

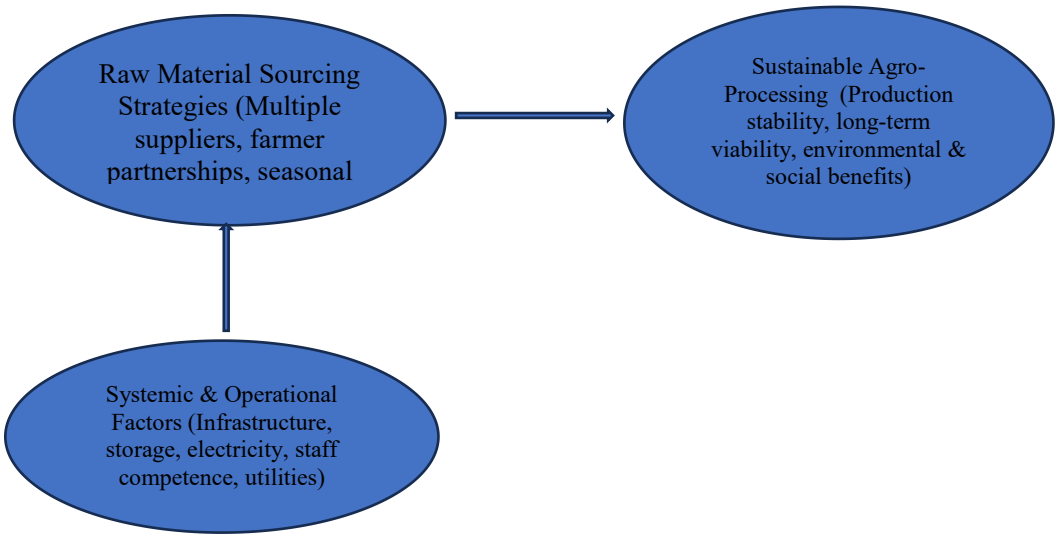
Conceptual Framework

The conceptual framework of this study is built on the understanding that raw material sourcing strategies are central to the sustainability of small-scale agro-processing enterprises. Sourcing practices such as supplier diversification, farmer partnerships, and seasonal planning are expected to directly influence both the availability of raw materials and the ability of agro-processing companies to sustain production.

Systemic and operational factors - including infrastructure, electricity, storage facilities, managerial competence, and access to utilities are considered supporting variables that can either enhance or constrain the effectiveness of sourcing strategies. When these conditions are favorable, sourcing becomes more efficient and reliable, leading to improved production stability, reduced costs, and long-term sustainability. Contrarywise, weak systemic support amplifies sourcing challenges and undermines sustainability.

Thus, the framework positions raw material sourcing strategies as the primary driver, systemic and operational factors as enabling conditions, and sustainable agro-processing as the ultimate outcome.

Figure 2.1: Conceptual Framework



Source: Author's conceptualisation (2025)

METHODOLOGY

Research Design

Population of the Study

The target population of this research consists of all registered small-scale agro-processor enterprises in Osun State. According to the Small and Medium Enterprises Development Agency of Nigeria (SMEDAN, 2025), there are approximately 404 registered enterprises. These include cassava processors, maize millers, palm oil producers, fruit dryers, and other processors engaged in transforming raw agricultural produce into consumable or semi-processed products. The population covers operators in both urban and semi-urban areas across selected Local Government Areas (LGAs) in Osun State where agro-processing activities are concentrated.

Sample Size and Sampling Technique

According to the available record with SMEDAN, (2024) on the activities of SME operators for the past five years, a total of 120 SMEs have been very active, and regularly relate with the office of SMEDAN in Osun State. Thus, because of the relative smallness of these active SME operators, this study purposively adopted the total of 120 operators as sample size. This sample size was chosen, being those operators that are active agro-processors to ensure a meaningful statistical analysis. This number provide adequate coverage of the different categories of small-scale business owners in Osun State who are actively in business of agro-processing.

A multistage sampling technique was adopted for this study. In the first stage, 2 Local Government Areas (LGAs) from each of the three senatorial districts, totalling 6 LGAs were purposively selected with focus on the with high concentrations of agro-processing activity were purposively selected. These included Ede North and Iwo LGAs, from Osun West; Ilesa and Ife Central LGAs from Osun North; and Osogbo and Odo Otin LGAs from the Osun Central. In the second stage, communities within the selected LGAs were randomly chosen. In the third stage, proportionate random sampling was used to select enterprises from each of the chosen communities, selecting those with relative sizes in proportion to the population. This approach ensured fair representation of different categories of processors, minimized sampling bias, and enhanced the generalisability of the findings to the wider population of small-scale agro-processors in Osun State.

Method of Data Collection

Primary data were collected using a structured questionnaire administered to capture variables related to raw materials sourcing method, sustainability practices, and enterprise performance. The questionnaire consists of closed-ended questions using a Likert scale for ease of analysis and response consistency. This method was chosen because

questionnaires are cost-effective tools for collecting standardized information from a large and geographically dispersed sample.

Research Instruments

The primary research instrument used in this study was a structured questionnaire. It was divided into two major sections. The first section captured the demographic characteristics of the respondents, such as gender, age, business ownership, job title, and type of agro-processing business. The second section contained items addressing the research objectives, specifically Raw materials sourcing and sustainable entrepreneurship among small-scale agro-processing companies.

The questionnaire comprised closed-ended questions designed using a four-point Likert scale: Strongly Agree (4), Agree (3), Disagree (2), and Strongly Disagree (1). This format enabled respondents to express the degree of their agreement with each statement, facilitating the quantification of their perceptions.

Validity of Research Instrument

To ensure validity, the questionnaire was subjected to expert review by professionals in Entrepreneurship and agro-processing. These experts assessed the instrument for clarity, relevance, and comprehensiveness. Their constructive feedback led to necessary revisions and refinements, thereby enhancing the validity of the instrument and ensuring that the items accurately reflected the constructs under investigation.

Reliability of the Research Instrument

To ensure reliability, a pilot study was carried out using 20 small-scale agro-processors within the state with similar characteristics to the study population. The data obtained from the pilot test were subjected to statistical reliability testing using Cronbach's Alpha coefficient. A reliability coefficient threshold of 0.70 was considered acceptable, indicating internal consistency of the instrument items. The results showed that the questionnaire achieved Cronbach's alpha values ranging between 0.72 and 0.84 across different sections, confirming that the instrument was reliable for the study.

Administration of research Instrument

The administration of the research instrument was carried out using an online survey method through Google Forms. The link to the questionnaire was shared with respondents through WhatsApp groups used by small-scale agro-processors in Osun State. This method was chosen because it allowed for wider and quicker reach, reduced the cost of printing and distribution, and ensured that responses were automatically recorded for analysis.

To enhance participation, respondents were given clear instructions on how to access and complete the questionnaire. Reminders were sent periodically to encourage completion. Data collection lasted for two weeks, during which a high response rate was achieved, with 120 respondents completing the survey.

Method of Data Analysis

The data collected for this study were analyzed using both descriptive and inferential statistical techniques. Descriptive statistics, such as frequencies and percentages, were used to summarize the demographic characteristics of the respondents and provide an overview of their responses to key variables. For inferential analysis, multiple regression analysis was employed to examine the predictive relationship between the components of Raw materials sourcing and sustainable entrepreneurship. This method enables the researcher to determine which Raw materials sourcing variables significantly contribute to sustainable

entrepreneurship. All analyses were conducted using SPSS version 25, and hypotheses were tested at the 0.05 level of significance.

Ethical Considerations

This study adhered strictly to established ethical standards governing research involving human participants. Informed consent was obtained from all respondents after they were fully informed about the purpose, procedures, and scope of the study. Participation was entirely voluntary, and respondents were assured of the confidentiality and anonymity of their responses. No personally identifiable information was collected, and the data were used solely for academic purposes.

Data Presentation and Analysis

Data Presentation and Analysis

The results of data analysis, along with the discussion of the results. The objective is to provide a thorough understanding of the research findings, allowing for a nuanced exploration of the key variables and their implications within the context of our study.

Socio-Demographical Analysis of the Respondents

Table 1 Characteristics

	Valid	Frequency	Percentage
Sex	Male	71	59.2
	Female	49	40.8
	Total	**120**	**100**
Age of the respondents	Below 30 years	17	14.2
	30 – 39 years	47	39.2
	40 – 49 years	21	17.5
	50 years and above	35	29.2
	Total	**120**	**100**
Business Ownership	Sole Proprietorship	98	81.7
	Partnership	22	18.3
	Total	**120**	**100**
Job Title/ Position	Owner/Founder	94	78.3
	Manager	13	10.8
	Production Staff	5	4.2
	Procurement Staff	6	5.0
	Administrative Staff	2	1.6
	Total	**120**	**100**
Type of Agro-processing business	Cassava Processing	45	37.5
	Palm oil Processing	37	30.8
	Fruit Juice Processing	5	4.2
	Maize Processing	20	16.7
	Yam Processing	13	10.8
	Total	**120**	**100**

Source: Author's computation (2025)

Table 1 shows the distribution of respondents, among the total respondents, 71 (59.2%) were male, while 49 (40.8%) were female, indicating that the sample is slightly

male-dominated and that more men are involved in agro-processing businesses among the respondents. With regard to age, 17 (14.2%) of the respondents were below 30 years, 47 (39.2%) were between 30 and 39 years, 21 (17.5%) were between 40 and 49 years, while 35 (29.2%) were aged 50 years and above, suggesting that the majority of respondents are adults in their productive years, particularly within the 30–39 age group, and that agro-processing is largely driven by relatively young and middle-aged individuals. On business ownership, 98 (81.7%) of the respondents operated as sole proprietors, while 22 (18.3%) indicated they run partnership businesses, showing that agro-processing businesses in the area are predominantly owned and managed by individuals rather than being operated as joint ventures or corporate entities.

Regarding job title or position, 94 (78.3%) of the respondents identified as owners or founders, 13 (10.8%) as managers, 5 (4.2%) as production staff, 6 (5.0%) as procurement staff, and 2 (1.6%) as administrative staff, which indicates that most respondents are top-level decision-makers in their businesses and that the data collected reflects well-informed perspectives on business operations and sourcing practices. In terms of business type, 45 (37.5%) of the respondents were involved in cassava processing, 37 (30.8%) in palm oil processing, 5 (4.2%) in fruit juice processing, 20 (16.7%) in maize processing, and 13 (10.8%) in yam processing, showing that the agro-processing sector represented in this study is largely composed of cassava and palm oil processors, reflecting the dominant agricultural commodities in the region.

Sourcing Strategies Scale

Table 2: Descriptive Analysis of Responses to the Sourcing Strategies
Source: Author's computation (2025)

S/N	Questions	Strongly Agree	Agree	Disagree	Strongly Disagree
1	Our company uses multiple sources to procure raw materials.	72(60%)	36(30%)	12(10%)	-
2	We maintain contracts with local suppliers to secure raw materials.	71(59.2%)	41(34.2%)	2(1.7%)	6(5%)
3	Seasonal planning influences our raw material sourcing strategy.	56(46.7%)	62(51.7%)	2(1.7%)	-
4	We rely on forward contracts for sourcing critical raw materials.	21(17.5%)	80(66.7%)	16(13.3%)	3(2.5%)
5	Importation is a key component of our raw material sourcing.	12(10%)	37(30.8%)	50(41.7%)	21(17.5%)
6	We diversify suppliers to reduce risk in raw material sourcing.	40(33.3%)	72(60%)	8(6.7%)	-
7	We engage in partnerships with farmers for raw material supply.	73(60.8%)	40(33.3%)	4(3.3%)	3(2.5%)

A significant number of respondents, 72 (60%) strongly agree, 36 (30%) agree, and 12 (10%) disagree that their companies use multiple sources to procure raw materials, showing that a majority of companies rely on multiple sourcing strategies to ensure consistent availability. Similarly, 71 (59.2%) strongly agree, 41 (34.2%) agree, 2 (1.7%) disagree, and 6 (5%) strongly disagree that their companies maintain contracts with local suppliers to secure raw materials, implying that supplier contracts, especially with local vendors, are a key method for raw material security. Seasonal planning also plays a vital role in sourcing, as 56 (46.7%) strongly agree, 62 (51.7%) agree, and 2 (1.7%) disagree, indicating that companies actively consider seasonal trends in planning their sourcing activities. Regarding forward contracts, 21 (17.5%) strongly agree, 80 (66.7%) agree, 16 (13.3%) disagree, and 3 (2.5%) strongly disagree that these are used for sourcing critical materials, suggesting that while not dominant, forward contracts are widely accepted for managing essential materials.

On importation, 12 (10%) strongly agree, 37 (30.8%) agree, 50 (41.7%) disagree, and 21 (17.5%) strongly disagree that it is a key sourcing strategy, indicating that most companies do not heavily rely on importation for sourcing raw materials. In terms of diversification, 40 (33.3%) strongly agree, 72 (60%) agree, and 8 (6.7%) disagree that their firms diversify suppliers to reduce risks, reflecting a strong focus on risk management through supplier diversification. Lastly, 73 (60.8%) strongly agree, 40 (33.3%) agree, 4 (3.3%) disagree, and 3 (2.5%) strongly disagree that they engage in partnerships with farmers for supply, showing that collaboration with farmers is a common and valued sourcing approach.

Raw Material Sourcing

Table 3: Raw Material Sourcing Scale

S/N	Questions	Strongly Agree	Agree	Disagree	Strongly Disagree
1	Our sourcing decisions are guided by sustainability principles.	65(54.2%)	55(45.8%)	-	-
2	We prefer sourcing from suppliers that practice eco-friendly farming.	39(32.5%)	78(65.0%)	3(2.5%)	-
3	We consider environmental impact before choosing suppliers.	42(35.0%)	71(59.2%)	7(5.8%)	-
4	Local sourcing helps us reduce carbon emissions.	32(26.7%)	86(71.7%)	2(1.7%)	-
5	Our sourcing policies align with environmental regulations.	53(44.2%)	64(53.3%)	3(2.5%)	-
6	We source from renewable raw material providers.	15(12.5%)	99(82.5%)	3(2.5%)	3(2.5%)
7	Ethical sourcing is part of our supply chain strategy.	27(22.5%)	85(70.8%)	8(6.7%)	-

Source: Author's computation (2025)

A total of 65 (54.2%) respondents strongly agree and 55 (45.8%) agree that sustainability principles guide their sourcing decisions, showing that all respondents agree that sustainability is fundamental to sourcing practices. Likewise, 39 (32.5%) strongly agree and 78 (65.0%) agree that they prefer eco-friendly suppliers, confirming that eco-conscious sourcing is widely prioritized. In terms of environmental considerations, 42 (35.0%) strongly agree and 71 (59.2%) agree that they consider environmental impact before choosing suppliers, indicating that environmental concerns play a major role in decision-making for sourcing.

When asked about local sourcing, 32 (26.7%) strongly agree and 86 (71.7%) agree that it helps reduce carbon emissions, reflecting a strong recognition of the environmental benefits of local procurement. Additionally, 53 (44.2%) strongly agree and 64 (53.3%) agree that their sourcing aligns with environmental regulations, showing that most companies align their procurement policies with regulatory standards. With regard to renewable resources, 15 (12.5%) strongly agree and 99 (82.5%) agree that they source from renewable raw material providers, suggesting that the majority of firms are committed to using renewable materials. Finally, 27 (22.5%) strongly agree and 85 (70.8%) agree that ethical sourcing is part of their supply chain strategy, indicating that ethical considerations are broadly integrated into sourcing decisions.

Table 4 Systemic and Operational Factors affecting agro processing

S/N	Questions	Strongly Agree (%)	Agree (%)	Disagree (%)	Strongly Disagree (%)
1	We are affected by transportation infrastructure in sourcing materials.	35(29.2%)	58(48.3%)	24(20.0%)	3(2.5%)
2	Inflation and exchange rates affect raw material costs.	75(62.5%)	42(35.0%)	3(2.5%)	-
3	Storage facilities impact the efficiency of raw material management.	46(38.3%)	81(67.5%)	8(6.7%)	-
4	Staff competence influences raw material procurement outcomes.	31(25.8%)	81(67.5%)	8(6.7%)	-
5	Electricity and water supply affect the storage of raw materials.	24(20.0%)	66(55.0%)	22(18.3%)	8(6.7%)
6	Internal procurement procedures affect sourcing timelines.	6(5.0%)	92(76.6%)	16(13.3%)	16(5.0%)

7	ICT systems are used to track raw material inventories.	24(20.0)	69(57.5%)	27(22.5%)	-

Source: Author's computation (2025)

In total, 35 (29.2%) strongly agree and 58 (48.3%) agree that transportation infrastructure affects material sourcing, indicating that transport infrastructure is a significant factor impacting sourcing efficiency. Likewise, 75 (62.5%) strongly agree and 42 (35%) agree that inflation and exchange rates influence raw material costs, showing that economic variables are almost unanimously seen as major cost drivers. Regarding storage, 46 (38.3%) strongly agree and 81 (67.5%) agree that storage facilities impact the efficiency of raw material management, confirming that proper storage is essential to maintaining sourcing and supply performance. Also, 31 (25.8%) strongly agree and 81 (67.5%) agree that staff competence influences procurement outcomes, suggesting that human resource capacity is critical to effective procurement. Concerning utilities, 24 (20%) strongly agree and 66 (55%) agree that electricity and water supply affect storage, showing that inadequate utility supply negatively impacts material storage. Additionally, 6 (5%) strongly agree and 92 (76.6%) agree that internal procurement procedures affect sourcing timelines, indicating that internal bureaucracy or efficiency significantly determines procurement speed. Finally, 24 (20%) strongly agree and 69 (57.5%) agree that ICT systems are used to track raw material inventories, which suggests that ICT adoption in inventory management is growing but could be further improved.

Table 5: Availability of Raw Materials Scale

S/N	Questions	Strongly Agree (%)	Agree (%)	Disagree (%)	Strongly Disagree (%)
1	Raw materials are consistently available when needed.	15(12.5%)	70(58.3%)	29(24.2%)	6(5.0%)
2	We rarely experience raw material shortages.	21(17.5%)	44(36.7%)	41(34.2%)	14(11.7%)
3	The quality of available raw materials meets our production standards.	35(29.2%)	70(58.3%)	15(12.5%)	-
4	Delays in raw material supply are uncommon in our operations.	21(17.5%)	68(56.7%)	23(19.2%)	8(6.7%)
5	We can access raw materials at affordable prices.	6(5.0%)	67(55.8%)	39(32.5%)	8(6.7%)

6	Raw material delivery times are predictable and reliable.	21(17.5%)	64(53.3%)	32(26.7%)	3(2.5%)
7	The volume of raw materials available meets production demand.	20(16.7%)	68(56.7%)	29(24.2%)	3(2.5%)

Source: Author's computation (2025)

A total of 15 (12.5%) strongly agree and 70 (58.3%) agree that raw materials are consistently available, indicating that while generally available, some companies still face occasional supply gaps. In the same vein, 21 (17.5%) strongly agree and 44 (36.7%) agree that shortages are rare, while 55 (45.9%) disagree, suggesting that many firms still experience notable shortages in raw material supply. On quality, 35 (29.2%) strongly agree and 70 (58.3%) agree that available materials meet production standards, showing that the quality of raw materials is largely satisfactory among respondents. In terms of delivery delays, 21 (17.5%) strongly agree and 68 (56.7%) agree that delays are uncommon, indicating that although delays are not frequent for most, a considerable number still report them.

Regarding affordability, 6 (5%) strongly agree and 67 (55.8%) agree, while 47 (39.2%) disagree that raw materials are affordable, revealing that affordability remains a concern despite moderate agreement. Concerning delivery reliability, 21 (17.5%) strongly agree and 64 (53.3%) agree that delivery times are predictable, which shows general satisfaction with delivery reliability, though not universal. Lastly, 20 (16.7%) strongly agree and 68 (56.7%) agree that the volume of raw materials available meets production demand, indicating that most firms report adequate supply volumes, though some shortages still occur.

Table 6 Sustainable Agro-Processing Scale

S/N	Questions	Strongly Agree (%)	Agree (%)	Disagree (%)	Strongly Disagree (%)
1	Our production process minimizes waste.	35(29.2%)	83(69.2%)	2(1.7%)	-
2	We use energy-efficient technologies in processing.	29(24.2%)	78(65.0%)	13(10.8)	-
3	We recycle production by-products.	11(9.2%)	80(66.7%)	26(21.7%)	3(2.5%)
4	Our production practices promote long-term resource conservation.	31(25.8%)	84(70.0%)	5(4.2%)	-
5	We comply with environmental sustainability standards.	42(35.0%)	78(65.0%)	-	-

6	Our operations aim to reduce emissions and pollutants.	52(43.3%)	68(56.7%)	-	-
7	We regularly assess the sustainability of our production	48(40.0%)	70(58.3%)	2(1.7%)	-

Source: Author's computation (2025)

A total of 11 (9.2%) strongly agree and 83 (69.2%) agree that their production minimizes waste, indicating that waste reduction is a strong operational priority. Regarding energy usage, 29 (24.2%) strongly agree and 78 (65%) agree that they use energy-efficient technology, showing that energy efficiency is well practiced but could still be improved. Similarly, 11 (9.2%) strongly agree and 80 (66.7%) agree that they recycle production by-products, while 29 (24.2%) disagree, suggesting that recycling is fairly common, though there is room for greater adoption. In terms of conservation, 31 (25.8%) strongly agree and 84 (70%) agree that their practices promote long-term resource conservation, reflecting that sustainability is well integrated into production. Furthermore, 42 (35%) strongly agree and 78 (65%) agree that they comply with sustainability standards, indicating full compliance with environmental standards across the companies. For emissions, 52 (43.3%) strongly agree and 68 (56.7%) agree that their operations aim to reduce pollutants, showing that emission control is a universal goal among respondents. Lastly, 48 (40%) strongly agree and 70 (58.3%) agree that they regularly assess the sustainability of their production, revealing that continuous monitoring of sustainability practices is a common practice.

Testing of Hypothesis

Hypothesis one: H_{01}: Raw material sourcing strategies have no significant effect on sustainable agro- processing among small-scale agro-processor in Osun State.

Table 4.7: A summary of regression analysis of the interaction between sourcing strategies and the sustainable agro-processing

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.393[a]	.154	.147	2.10760	1.688
a. Predictors: (Constant), Sourcing Strategies					
b. Dependent Variable: Sustainable agro- processing					

Source: Author's computation (2025)

Table 7 presents the model summary of the regression analysis between sourcing strategies and the availability of raw materials. The R value of .393 indicates a moderate positive correlation (39.3%) between the two variables. The R Square value of .154 shows that approximately 15.4% of the variability in the availability of raw materials is explained by the sourcing strategies adopted by agro-processing firms. The adjusted R Square value of .147

confirms the consistency of this result when generalized to the wider population. The Durbin-Watson statistic of 1.688, which is close to the benchmark value of 2, indicates that there is no significant autocorrelation in the model's residuals.

Table 8 Regression Showing Significance of Predictors to Sourcing Strategies

Model	Sum of Squares	Df	Mean Square	F	Sig.
1 Regression	95.546	1	95.546	21.510	.000[b]
Residual	524.154	118	4.442		
Total	619.700	119			

Source: Author's computation (2025)

Dependent Variable: Sustainable agro- processing

a. Predictors: (Constant), Sourcing Strategies

Table 4.8 shows the ANOVA results used to test the overall significance of the regression model. The F-statistic value of 21.510 and a significance level (p-value) of .000 suggest that the regression model is statistically significant. Since the p-value is less than 0.05, the null hypothesis is rejected, indicating that sourcing strategies significantly predict the availability of raw materials.

Table 9 Contribution of the Predictor Variable on Sustainable agro- processing

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	13.580	1.922		7.065	.000
	Sourcing Strategies	.401	.087	.393	4.638	.000

Author's computation (2025)

a. Dependent Variable: Sustainable agro- processing

b. Predictors: (Constant), Sourcing Strategies

Table 9 provides the regression coefficients. The unstandardized coefficient (B) of .401 implies that for every one-unit increase in sourcing strategies, the availability of raw materials increases by 0.401 units. The standardized beta coefficient of .393 further confirms the moderate positive influence of sourcing strategies on sustainable agro-processing. The t-value of 4.638 and the significance value of .000 indicate that this contribution is statistically significant. Based on the regression analysis, the null hypothesis is rejected. A significant and positive relationship exists between sourcing

strategies and sustainable agro- processing on small-scale agro-processing companies in Osun State. This implies that effective sourcing strategies contribute meaningfully to ensuring sustainable agro- processing in these firms.

Hypothesis two: H_{o2}: Raw material sourcing does not have a significant impact on sustainable agro-processing production.

Table 10: A summary of regression analysis of the interaction between Raw material sourcing and sustainable agro-processing production.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.723[a]	.523	.519	1.68141	2.052
a. Predictors: (Constant), Raw Material Sourcing					
b. Dependent Variable: Sustainable Agro-Processing Production					

Source: ***Author's computation (2025)***

Table 10 presents the model summary of the regression analysis examining the impact of raw material sourcing on sustainable agro-processing production. The R value of .723 indicates a strong positive relationship (72.3%) between raw material sourcing and sustainable production practices. The R Square value of .523 shows that 52.3% of the variation in sustainable agro-processing production is explained by raw material sourcing strategies. The adjusted R Square of .519 confirms the model's robustness after adjusting for the number of predictors. The Durbin-Watson statistic of 2.052 is close to the ideal value of 2, indicating that there is no significant autocorrelation in the model's residuals.

Table 11 Regression Showing Significance of Distribution Raw Material Sourcing

Model	Sum of Squares	Df	Mean Square	F	Sig.
1 Regression	365.324	1	365.324	127.221	.000[b]
Residual	333.601	118	2.827		
Total	698.925	119			

Source: ***Author's computation (2025)***

Dependent Variable: Sustainable Agro-Processing Production

a. Predictors: (Constant), Raw Material Sourcing

Table 11 provides the ANOVA results, which test the overall significance of the regression model. The F-value of 127.221 and a significance value (p-value) of .000 indicate that the

model is statistically significant. Since the p-value is far below the 0.05 threshold, the null hypothesis is rejected, suggesting that raw material sourcing significantly predicts the level of sustainable agro-processing production.

Table 12 Contribution of the Predictor Variable on Sustainable Agro-Processing Production

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	5.681	1.533		3.705	.000
	Raw Material Sourcing	.785	.069	.723	11.368	.000

Source: ***Author's computation (2025)***

a. Dependent Variable: Sustainable Agro-Processing Production
b. Predictors: (Constant), Raw Material Sourcing

Table 12 shows the regression coefficients. The unstandardized coefficient (B) of .785 indicates that a one-unit increase in raw material sourcing corresponds to an increase of 0.785 units in sustainable agro-processing production. The standardized beta coefficient of .723 confirms a strong positive influence. The t-value of 11.368 and the p-value of .000 further affirm that this relationship is statistically significant. Based on the regression results, the null hypothesis is rejected. There is a significant and strong positive impact of raw material sourcing on sustainable agro-processing production. This suggests that improving sourcing practices plays a crucial role in promoting sustainability within agro-processing operations.

Hypothesis three: H_{03} Systemic and operational factors have no significant influence on the availability of raw materials for agro-processing production.

Table 13: A summary of regression analysis of the interaction between Systemic and operational factors and availability of raw materials

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.261[a]	.068	.060	1.90267	1.927
a. Predictors: (Constant), Systemic and operational factors					
b. Dependent Variable: Availability of Raw Materials					

Source: ***Author's computation (2025)***

Table 13 presents the model summary of the regression analysis examining the influence of systemic and operational factors on the availability of raw materials. The R value of .261 suggests a weak but positive relationship (26.1%) between systemic and operational factors and raw material availability. The R Square value of .068 indicates that 6.8% of the variability in the availability of raw materials can be explained by systemic and operational

factors. The adjusted R Square of .060 confirms that the model retains a small but stable explanatory power after adjusting for predictor count. The Durbin-Watson statistic of 1.927 is close to 2, showing no significant autocorrelation in the residuals of the model.

Table 14 Regression Showing Significance of Systemic and Operational Factors

Model	Sum of Squares	Df	Mean Square	F	Sig.
1 Regression	31.148	1	31.148	8.604	.000[b]
Residual	427.177	118	3.620		
Total	458.325	119			

Source: ***Author's computation (2025)***

a. Dependent Variable: Availability of Raw Materials

b. Predictors: (Constant), Systemic and operational factors

Table 14 presents the ANOVA results, which assess the overall significance of the regression model. The F-statistic value of 8.604 and a significance level of .000 indicate that the model is statistically significant. Since the p-value is less than 0.05, the null hypothesis is rejected. This shows that systemic and operational factors significantly influence the availability of raw materials in agro-processing firms.

Table 15 Contribution of the Predictor Variable on Customer Satisfaction

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	13.861	1.735		7.988	.000
	Systemic and operational factors	.229	.078	.261	2.933	.000

Author's computation (2025)

a. Dependent Variable: Availability of Raw Materials

b. Predictors: (Constant), Systemic and operational factors

Table 15 shows the regression coefficients. The unstandardized coefficient (B) of .229 means that for every one-unit increase in systemic and operational efficiency, the availability of raw materials increases by 0.229 units. The standardized beta coefficient of .261 confirms a modest positive influence. A t-value of 2.933 and a significance level of .000 indicate that the predictor variable is statistically significant. Based on the regression analysis, the null hypothesis is rejected. Systemic and operational factors have a statistically significant but modest influence on the availability of raw materials for agro-processing

production. This suggests that improvements in internal processes, infrastructure, staff competence, and logistics contribute to better material availability outcomes.

Discussion of Findings

This section discusses the findings of the study based on the results of the regression analyses conducted for each of the three hypotheses. Below is a discussion of the key findings from the study.

1. **Sourcing Strategies and Availability of Raw Materials**

The regression results revealed a moderate positive relationship between sourcing strategies and the availability of raw materials in small-scale agro-processing companies in Osun State, with an R value of 0.393 and R^2 of 0.154. This indicates that sourcing strategies account for 15.4% of the variation in raw material availability. The model was statistically significant ($F = 21.510$, $p = .000$), and the predictor variable (sourcing strategies) had a significant positive coefficient ($B = 0.401$, $t = 4.638$, $p = .000$).

This finding implies that businesses that adopt strategic sourcing approaches- such as multiple suppliers, supplier diversification, partnerships with farmers, and local sourcing- tend to have better access to raw materials. This aligns with Obisesan et al. (2025), who found that processors with multiple suppliers and farmer partnerships reduced risks of shortages and improved production schedules. Similarly, Achichi et al. (2023) highlighted that farmer access to information and partnerships strengthens supply consistency. However, Adenaiye et al. (2021) noted that in some agro-ecological zones, even with good strategies, poor infrastructure and climate factors limited availability - showing that strategies alone may not always guarantee results without systemic support.

Raw Material Sourcing and Sustainable Agro-Processing Production

The relationship between raw material sourcing and sustainable agro-processing production was found to be strong and statistically significant, with an R value of 0.723 and R^2 of 0.523. This means that 52.3% of the variation in sustainable production is explained by the raw material sourcing practices of the firms. The F-statistic was high ($F = 127.221$, $p = .000$), and the beta coefficient ($B = 0.785$, $t = 11.368$, $p = .000$) shows a strong positive impact.

This suggests that firms that incorporate environmental considerations into their sourcing -such as sourcing from eco-friendly suppliers, complying with regulations, and prioritizing renewable materials, are more likely to achieve sustainable production outcomes. This agrees with Reuther et al. (2023) who argued that sustainable sourcing is a key driver of long-term entrepreneurial success. In the contrary, Oladipo (2023) observed that in maize production, sustainability was constrained by climate and policy issues despite good sourcing practices, suggesting external conditions can still undermine sustainability.

Systemic and Operational Factors and Availability of Raw Materials

Systemic and operational factors were also found to have a significant influence on the availability of raw materials, although the strength of the relationship was weaker. The R value was 0.261 and R^2 was 0.068, indicating that only 6.8% of the variation in availability was explained by these factors. The model was statistically significant ($F = 8.604$, $p = .000$), and the predictor variable had a positive coefficient ($B = 0.229$, $t = 2.933$, $p = .000$).

These findings suggest that while all three variables contribute meaningfully to the performance of agro-processing businesses, the most impactful drivers are effective sourcing strategies and sustainability-oriented sourcing practices. Operational and systemic

conditions still matter, but their effects are more supportive in nature. This is consistent with Aina et al. (2025) who found that infrastructural improvements (roads, utilities, storage) reduce post-harvest losses and strengthen sourcing efficiency. On the other hand, Ibrahim & Isichei (2023) argued that financial access (an operational factor) often has a stronger influence than infrastructure, meaning the weight of factors may differ across contexts.

Conclusion and Recommendations

Conclusion

The results of this study demonstrate that raw material sourcing is not merely a logistical or operational concern, but a strategic function that has direct implications for business sustainability in small-scale agro-processing. Enterprises that proactively adopt diversified sourcing strategies, cultivate long-term relationships with suppliers, and engage in partnerships with farmers are better positioned to secure reliable and timely access to raw materials. This, in turn, reduces the risks associated with supply disruptions, seasonal variability, and market volatility.

Sustainability-oriented sourcing practices emerged as a particularly powerful driver of long-term performance. Firms that integrate environmental considerations into procurement decisions, such as preferring suppliers who practice eco-friendly farming, aligning sourcing with environmental regulations, and opting for renewable resources, are more likely to operate in ways that conserve natural resources, reduce emissions, and minimise waste. This approach not only benefits the environment but also strengthens the public image and market competitiveness of these enterprises.

While systemic and operational factors such as transportation infrastructure, storage capacity, staff competence, and utility supply were found to have a smaller statistical effect, they still play a critical enabling role. Weak infrastructure, inadequate storage facilities, and unreliable utilities can undermine even the most robust sourcing strategies. Thus, achieving consistent raw material availability and sustainable production requires both sound sourcing practices and a supportive operational environment.

The overall conclusion is that small-scale agro-processing businesses in Osun State must treat raw material sourcing as a strategic priority, integrate sustainability principles into procurement, and work collaboratively with stakeholders to address systemic bottlenecks. This combination will enhance both operational resilience and long-term sustainability, ultimately contributing to the broader goals of sustainable entrepreneurship and rural economic development.

Recommendations

Based on the findings of this study, the following recommendations are proposed:

1. Strengthen Supplier Diversification and Partnerships: The study revealed that most small-scale agro-processing companies rely on a limited number of suppliers, making them vulnerable to shortages and price fluctuations. Firms should diversify their supplier base and establish long-term partnerships with multiple local farmers and suppliers to ensure consistent raw material availability and stable production.
2. Institutionalize Sustainability in Sourcing: Findings showed that formal sustainability practices are largely absent among agro-processors in Osun State. Adopting procurement policies that prioritize eco-friendly and renewable resource suppliers will enhance long-term performance, improve competitiveness, and align them with global trends in sustainable agro-processing.

3. Improve Infrastructure and Utilities: The analysis indicated that poor roads, unreliable electricity, and limited water supply increase operational costs and delays. Investment in rural infrastructure by government and industry partners will create an enabling environment for agro-processing companies to operate efficiently and expand their market reach.
4. Upgrade Storage and Inventory Systems: A significant number of agro-processors experience post-harvest losses due to inadequate storage and inventory management. Modern storage facilities and ICT-based inventory systems will reduce spoilage, improve demand forecasting, and facilitate better supplier coordination, enhancing overall operational efficiency.
5. Leverage Cooperative Action for Cost Efficiency: The study found that individual agro-processor face high raw material costs due to limited bargaining power. Forming cooperatives for bulk purchasing and collective negotiation with suppliers will cushion them against inflation, currency fluctuations, and other external shocks, strengthening financial sustainability.

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