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Impact of Success Factors associated with Frugal Business Modelling on Agribusiness Sustainability

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ABSTRACT : *The research aimed to determine the impact of success factors associated with frugal business modeling on the sustainability of agribusinesses. The study employed a cross-sectional survey design, targeting managers and operational staff working in agribusinesses affiliated with the National Association of Seed Traders of Ghana (NASTAG). The collected data underwent a series of statistical analyses, including the Partial Least Square – Structural Equation Model (PLS-SEM) method using the SmartPLS 4.0 application. These analyses were performed on questionnaires that contained variables assessing the success factors associated with frugal business modeling and the determinants of agribusiness sustainability. The results revealed that the exogenous variables of the model are highly capable of explaining the endogenous variables, with a medium degree of explanatory effect value. Therefore, the model in this study explains the latent variables of success factors and has a moderate degree of explanatory power on agribusiness sustainability. The research findings show that agribusiness sustainability is being positively impacted by a number of factors, indicating that measures need to be developed theoretically, practically, and in policy to enhance the impact of these identified success factors. However, the study recommended the exploration of longitudinal studies to gain a deeper understanding of the enduring impact of frugal business modeling on agribusiness sustainability. By examining agribusinesses over an extended period, researchers can gain insights into the dynamics and long-term effects of frugal practices on sustainability outcomes.*

KEYWORDS - *Action regulation theory, agribusiness sustainability, frugal business modelling, frugal innovation, theory of sustainability*

I. INTRODUCTION

In the middle of the 20th century, Davis and Goldberg (1957 [1]) developed the idea of agribusiness, which was a combination of agriculture and commerce. The term "agribusiness" describes the business ventures that include the cultivation, processing, and marketing of agricultural products. It includes every link in the agricultural value chain, which links consumers of crops, livestock, and natural resources with input suppliers, producers, processors, and other service providers (Lip, 2023 [2]). Diverse operations, such as farming, food processing, distribution, and marketing, are involved in this industry (Chen, 2023 [3]).

Musona (2021 [4]) asserts that the application of thrifty business strategies is a basic component of agribusiness. Since inexpensive business models can enable profitable agriculture, there is a connection between agribusiness and frugal business modelling. Extant research on frugal innovation has underlined the importance of a feasible financial framework to enable effective innovation delivery. Additionally, these studies have highlighted the crucial role that businesses play in aligning their value proposition with the upstream and downstream activities across the value chain. Given the inherent resource constraints that characterize business practices within emerging markets and economically disadvantaged contexts, the concept of frugality represents a distinct aspect of evolving business practices. These frugal approaches leverage human capabilities through the deployment of specific tools and techniques, tailored to the unique agro-ecological conditions of the operating environment (Vellema *et al.*, 2023 [5]).

In recent years, frugal business modelling has become increasingly popular, especially in developing nations like Africa. Frugal business modelling aims to produce more value with fewer resources, increasing the affordability and accessibility of goods and services for underserved and low-income markets (Osongo *et al.*, 2023 [6]). Osongo *et al.* (2023 [6]) claim that frugal business modelling has brought several advantages to African businesses. First off, Africa is a great place for innovative enterprises to operate due to its fast-expanding market and youthful, urbanising populace. Frugal innovation helps businesses cut costs and run more smoothly, which is especially helpful in the agriculture sector, where smallholder farmers are frequently impacted by resource constraints. Furthermore, by cutting down on waste, preserving resources, and lessening its negative effects on the environment, frugal innovation supports sustainable practices. Frugal innovation also pushes companies to use their imaginations and create novel products that are specifically designed to meet the

needs of low-income customers. Frugal innovation helps African businesses reach new markets and grow their client bases by producing more value with less resources (Investing in Africa is Sound Business and a Sustainable Corporate, 2020 [7]).

Additionally, businesses who operate in Africa have the chance to significantly impact the social and economic advancement of the continent. But putting thrifty business ideas into practice could be difficult due to things like the need for a mental adjustment and possible reluctance to change (Osongo *et al.*, 2023 [6]). Africa remains a desirable place for firms looking to expand operations and take advantage of the continent's growth potential, even with these problems because the potential benefits are greater than the dangers. Conclusively, thrifty business modelling has a plethora of advantages for African businesses and ought to be adopted to propel enduring economic expansion and advancement throughout the continent. In order to improve the sustainability of Ghanaian agribusiness, this study intends to investigate the success determinants of frugal business modelling. The findings will be insightful for both practitioners and policymakers. This research aims to answer the research question: What is the relationship of success factors associated with frugal business modelling on agribusiness sustainability in Ghana?

II. REVIEW OF RELATED LITERATURE

Frugal business modelling as being noted to be one of the sustainable means of business operations mostly in a constrained environment. We discuss here the theories underpinning frugal innovation, business modelling, and sustainability as follows:

2.1 Frugal Innovation Theory

The concept of frugal innovation has gained significant traction in recent times, particularly in developing nations like those in Africa. According to Onsongo *et al.* (2023 [6]), frugal innovation is defined as the (re)shaping of goods, services, systems, and business models with the aim of reducing complexity and overall lifecycle costs, while still retaining key functionalities and achieving optimal performance. The core premise of frugal innovation is to provide greater value with fewer resources, thereby making goods and services more affordable and accessible to underserved and low-income markets (Hossain *et al.*, 2022 [8]). In contrast to the traditional "more for more" models prevalent in Western countries, this strategy frequently opens the door for the development of new and more innovative business models based on the principle of achieving "more with less" (Cuofano & Cuofano, 2023 [9]). As a dynamic concept, frugal innovation offers numerous advantages for companies operating in developing economies. By adopting frugal innovation, businesses can maximise resource utilisation, improve affordability, and support sustainable development while addressing urgent societal needs.

2.2 Action Regulation Model

The theory of action regulation has a long history in the field of German work and organisational psychology (Volpert, 2003 [10]). This theoretical approach, which focuses on the cognitive management of actions, essentially says that goals are what drive effort. The most current cognitive models of human behaviour align well with action regulation theory, which integrates several theoretical streams (Hacker, 2003 [11]).

The action-regulation perspective falls within the broader ecological-evolutionary perspective. It was developed in response to perceived deficiencies in current theories of action, motivation, and goals. The central defining characteristic of the action regulation approach is the focus on dynamic, feedback-driven action that leads individuals to an active (rather than passive) relationship with their environment. Humans are not just reacting to environmental forces or input from others, nor are they merely maximizing utility in rational actor sense. Instead, individuals 'construct' their own environment by setting targets and comparing the present situation with these internal standards (Hörisch, *et al.*, 2020 [12]). Motivation arises from 'discrepancy production'. Furthermore, goals, in this perspective, are not only end states that individuals strive to achieve, but mainly provide direction to behaviour. For this reason, goals are best understood as 'control function' defining how individuals allocate energy and aim for target levels incrementally (Gerdenitsch *et al.*, 2022 [13]).

Action regulation theory, as proposed by Ducki (2000 [14]), provides a valuable framework for analysing the independent, yet interconnected, elements that shape the regulatory landscape. The theory also acknowledges the interaction between subjective feelings and experiences and the objective environment. Action regulation theory is therefore especially well-suited to researching how people interact with their surroundings.

Action regulation theory is a meta-theory that explains how goal-directed behaviour is controlled. It explains how employees use cognitive processes, including as planning, goal-setting and selection, execution monitoring, feedback processing, and external and internal direction, to regulate their behaviour. The theory emphasises the interconnection between cognitive processes, behaviour, the external environment, and measurable outcomes. The action control process encompasses multiple stages, ranging from the sensorimotor or skill-based level, to the level of flexible action patterns, the cognitive or conscious level, and the meta-cognitive heuristic level. These phases span from unconscious and automatic regulation of actions to conscious

mental processes, involving both physical movement and cerebral cognition. Lower-level regulation is more context-dependent and requires less cognitive effort compared to regulation at higher levels (Zacher & Frese, 2018 [15]).

2.3 Success factors associated with Frugal Business Modelling

The term "frugal agribusiness modelling" describes the application of economical and resource-efficient techniques meant to raise agricultural output. The success criteria that are linked to frugal agribusiness modelling include a range of elements, including organisational and spatial characteristics, logistical and technological factors, financial, economic, and marketing factors, and so on (Donner *et al.*, 2021 [16]).

The technical and logistical components involve the application of suitable technology and effective logistics to reduce expenses and improve efficiency. Finding lucrative markets and putting creative finance models into place to cut expenses and boost income are examples of economic, financial, and marketing aspects. Organisational and geographical variables include the establishment of efficient networks and partnerships as well as the application of appropriate spatial planning techniques to maximise resource utilisation (FAO, 2012 [17]).

A study on circular business models that generate profit from agricultural waste and by-products identified success and risk factor categories corresponding to technical, logistical, economic, financial, marketing, organizational, and spatial aspects (Donner *et al.*, 2021 [16]). Comparably, a different study looking into smallholder business models for agribusiness-led development found success elements such policy recommendations for improving smallholder-buyer business that were meant to boost smallholder organisational structures (FAO, 2012 [17]).

2.4 Theory of Sustainability

According to Jenkins (2010 [18]), sustainability refers to the capability to maintain an entity, outcome, or process over an extended time period. Activities like agriculture, forestry, and finance are examples of sustainable practices that do not deplete the material resources they rely on. Sustainability can also be understood in terms of interdependent social contexts, where a cultural practice, economic policy, or peace treaty might be considered sustainable if it does not weaken the support of the political community. The concept of sustainability is becoming increasingly popular as a way to explain how environmental problems endanger the favourable conditions of macroeconomic, ecological, and social systems. The political challenge of sustainability involves both broad goals and core issues, emphasising the ecological interdependence of economic and social systems. This highlights the reciprocal effects of environmental degradation caused by human activity and the threats that global environmental concerns pose to human systems.

Lüdeke-Freund (2020 [19]) posits that, this broad stakeholder concern about the impact of the firm's activities has refocused attention on the goals of the business and the way those goals are pursued. The question is no longer whether a business should consider goals other than maximising profit, but rather how the business can be organized to achieve goals of sustainability in addition to economic success. While many companies have introduced elements of sustainability into their business models, there is still a lack of clarity about how to integrate the principles of sustainability into the design of a business model, and the extent to which frugal business modelling success factors contribute to the sustainability of a business, in particular an agribusiness (Awan & Sroufe, 2022 [20])

Sustainability encompasses addressing our current needs without compromising the ability of future generations to meet their own needs. In addition to environmental resources, we require social and economic resources. Sustainability is more than just environmentalism; most definitions also take social justice and economic growth into account (Mead, 2012 [21]).

III. EMPIRICAL REVIEW

In this section, some literature for frugal innovation and business modelling, frugal business modelling in agribusinesses and its impact on agribusiness sustainability are discussed as follows:

3.1 Frugal Innovation and Business Modelling

The success of a firm is associated with continuous innovation in the business model. Innovation in the business model has the power to convert radical ideas into fully-fledged business solutions with the power to shape a new industry. Traditional innovation is accompanied by features that are high performing and often over-engineered products. Such products are normally quite expensive and less accessible (Hossain, 2021 [22]). Frugal innovation, on the other hand, provides no-frills, simplified, affordable, good-enough products, services, and business models for consumers at the 'bottom of the pyramid' as well as for those in the higher income segments with the intent to save Earth's scarce resources. Frugal innovation is, in essence, not just about cutting costs; it is a concept that includes many dimensions. Its main focus is on simplicity and inherent quality which

fulfils the needs and wants of the users. This type of innovation is considered as 'doing more (and better) with fewer resources'. With origins in emerging markets, frugal innovation is a hopeful concept that has emerged to address sustainability issues (Hindocha, *et al*., 2021 [23]).

3.2 Frugal Business Modelling in Agribusiness

Four primary pathways of sufficiency have been identified: providing just-for-me products; enabling self-expression; embracing single-use; and bundling products and services. Sufficiency entails designing products that meet unique needs, enabling space for customer creativity, designing for single use, and combining products or services into solutions (Newsham & Rowe, 2022 [24]). Unlike sufficiency, which is about addressing needs while avoiding excess, deceleration is about slowing down consumption and use. Three main pathways of deceleration have been identified: enabling sequential upgrades; employing usage control; and scheduling consumption (Beyeler & Jaeger-Erben, 2022 [25])

Drawing on the emergent concept of frugal business modelling, this paper develops a theoretical model that links the three identified success factors of frugal business modelling (efficiency, sufficiency, and deceleration) with their implications for agribusiness sustainability, thereby contributing to both the frugal innovation and the agribusiness sustainability literatures. The proposed model suggests that while efficiency enhances economic sustainability, sufficiency and deceleration are the factors that have a positive impact on all three dimensions of agribusiness sustainability—economic, social, and environmental—which in turn support the enduring success of frugal innovations (Freudenreich & Schaltegger, 2020 [26]).

3.3 Impact of Frugal Business Modelling on Agribusiness Sustainability

Frugal is not only aimed at serving low-income customers, but its logic can trigger the innovation that helps to create a more sustainable chain value. One of the unique properties of frugal innovation is its affordability. Success in achieving sustainability is still a challenge for agribusiness companies due to their dependence on natural resources, the high impact of climate change, their relationship with sometimes poorly developed rural areas, and the high damage risk of their products on the health of consumers (Musona, 2021 [30]). Through the frugal logic, companies can encompass these three dimensions of the impact and transform it into a positive one, creating sustainability competitiveness. Because the success factors associated with frugal business modelling have never been examined in the context of agribusiness companies, this study has an exploratory character based on qualitative research. The sample involves ten Brazilian agribusiness companies that have a frugal approach (Donner *et al.*, 2021 [16]).

Sustainability is a core topic in both developed and developing economies. Humankind must determine how to collaborate and enhance the planet, besides simply avoiding and reducing damage. Agribusiness companies that use frugal business models with success increasingly contribute (Donner *et al.*, 2021 [16]). A study by Lange *et al*. (2023 [27]) is the first to suggest a group of success factors associated with frugal business modelling and to show a relationship with agribusiness sustainability performance. The group of success factors with a significant positive impact emerged, comprising internal stakeholders focus, customer value focus, process excellence, innovation culture, strategic alignment, and digital business, and to influence, while overall success is moderated by innovation risk level.

IV. METHODOLOGY

Using a cross-sectional survey approach, data from management and operational staff at 58 agribusinesses connected with the National Association of Seed Traders of Ghana (NASTAG) were gathered for this study. Examining the correlations between the relevant variables was the survey's main goal. It was appropriate to use a cross-sectional survey methodology for this study because it took a quantitative approach that called for variable measurement. In order to choose participants, the researchers used the Purposive Sampling Technique, concentrating on managers, administrators, and operational personnel from agribusinesses that were registered with NASTAG. By including top-level managers as subjects, the writers were able to learn about their viewpoints on the difficulties, key success elements, and sustainability of agribusinesses. With 289 people in the NASTAG population overall, the sample size was calculated using the Slovin (1960 [28]) formula. Using Slovin's technique, which takes the desired confidence level into account, the researchers arrived at a sample size of 205 with a 95 percent confidence level. Using an online Google Form, the researchers gave out surveys to participants, and they got 205 answers. The Statistical Package for Social Scientists (SPSS) was then used to evaluate the collected data using descriptive statistics and exploratory factor analysis.

V. RESULTS AND FINDINGS

5.1 Reliability and Viability

The construct was evaluated for this section of the study using the retrieved variables success factors connected to FBM on agribusiness sustainability. Cronbach's Alpha, Composite Reliability, Average Variance

Extracted (AVE), and Heterotrait-Monotrait Ratio (HTMT) were used to assess reliability and validity, same like in the preceding analysis. Cronbach's Alpha (0.70), Composite Reliability (0.70), AVE (0.50), and HTMT (0.85) are the numbers Vinzi *et al.* (2010 [29]) advocate using to demonstrate model appropriateness. The variables met the threshold of the test, as shown in Tables 1 and 2, proving that there is strong support for the reliability and validity of the constructs utilised in the study's proposed model.

Table 1: Convergent Validity for Variables of Success Factors associated with FMB and Sustainability of Agribusinesses

Latent Variables	Item	Loading (≥0.70)	CA (≥0.70)	rho_a (≥0.70)	rho_c (≥0.70)	AVE (≥0.50)
Success Factors of FBM	Market Strategy	0.867	0.889	0.896	0.919	0.694
	Customer/Brand Loyalty	0.876				
	Competitive Advantage	0.762				
	Company Resources	0.821				
	Portfolio Management	0.833				
Sustainability	Social_Sust	0.856	0.778	0.780	0.871	0.693
	Econ_Sust	0.798				
	Envt_Sust	0.842				

Source: Field Data (2023) | CA = Cronbach's alpha; rho_a = Composite reliability; rho_c = Composite reliability; AVE = Average Variance Extracted

Table 2: Discriminant Validity for Variable of Success Factors associated with FMB and Sustainability of Agribusinesses

	HTMT	Threshold
Sustainability <-> Success Factors	0.893	**≤ 0.85**

Source: Field Data (2023) | HTMT = Heterotrait-monotrait ratio

5.2 Path Analysis

The path diagram can be seen in Figure 1 below. The study of the path diagram's path coefficients is shown in Tables 3 and 4. In the conceptual model, all directed arrow pathways (Figure 1) denote causal relationships.

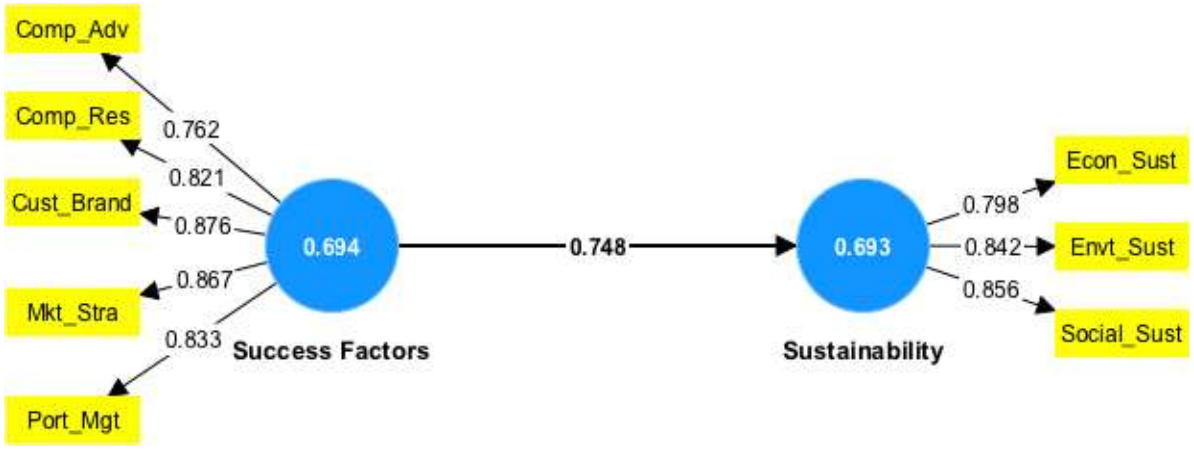

Figure 1: Path Diagram for Success Factors associated FBM and Sustainability of Agribusinesses
Source: Field data (2023)

Table 3 demonstrates the positive coefficient and statistically significant influence that the FBM success variables have on the long-term viability of agribusinesses. 0.762, 0.821, 0.876, 0.867, and 0.833 are the respective path coefficients for competitive advantage (Comp_Adv), corporate resources (Comp_Res), customer/brand loyalty (Cust_Brand), marketing strategy (Mkt_Stra), and portfolio management (Port_Mgt). All of the variables had p-values that were highly significant and below 0.05. In other words, the research question that was used to frame the fifth objective's null hypothesis is disproven. Therefore, it can be said that these FBM success criteria had a very good impact on the long-term viability of Ghanaian agribusinesses.

The R^2 value from Table 4 of the model is 0.560 who shows the model has a medium degree of explanatory power. The R^2 value shows that the explanatory power of sustainability contributed by success factors associated with FBM moderated by capacity building is 56%. Effect size is the effect of exogenous variables on endogenous variables using the explanatory effect value f^2 of environmental munificence and challenges to sustainability as shown by Table 5 is 1.272. This displays a large-effect explanatory ability because when $f^2 > 0.35$. This represents that exogenous variables that are very capable of explaining endogenous variables, with a large degree of explanatory effect value. Therefore, the model in this study explains the latent variables well and it has a large degree of explanatory power.

Table 3: Path Coefficient of Success Factors associated with FMB and Sustainability of Agribusinesses

Path Analysis	Path coefficient	P Values
Success Factors -> Sustainability	-0.400	0.000

Source: Field Data (2023)

Table 4: Path Coefficient of the Variables of Success Factors associated with FMB and Sustainability of Agribusinesses

Path Analysis	Path Coefficients	P Values	Description
Comp_Adv <- Success Factors	0.762	0.000	Accepted
Comp_Res <- Success Factors	0.821	0.000	Accepted
Cust_Brand <- Success Factors	0.876	0.000	Accepted
Mkt_Stra <- Success Factors	0.867	0.000	Accepted
Port_Mgt <- Success Factors	0.833	0.000	Accepted

Source: Field Data (2023)

Table 5: R^2 Value and f^2 Value

Path Analysis	R^2	R^2 Adjusted	f^2
Success Factors -> Sustainability	-0.400	0.558	1.272

Source: Field Data (2023)

5.3 Model Fit

Table 6 shows a model without a multicollinearity problem because all of the variables' VIF values were below the threshold of 3, indicating that there is no multicollinearity problem and that the model fit is satisfactory. The model evaluation verification's SRMR value was 0.082 and its NFI value was 0.795, as shown in Table 7. The range of the SRMR value is from 0 to 1 (Hu & Bentler, 1998 [30]). The NFI value spans from 0 to 1, and according to Bentler and Bentler (1980 [31]), the higher the number, the better performance is obtained. Therefore, although being on the outer edges of the allowed value ranges, the SRMR and NFI values can still be considered to be generally acceptable. As a result, the model can be said to be generally reasonably fitted.

Table 6: Collinearity Statistics for Success Factors associated with FBM and Sustainability of Agribusinesses (VIF)

Variables	VIF
Outer Model List	
Market Strategy	3.141
Customer/Brand Loyalty	3.238
Competitive Advantage	2.049
Company Resources	2.456
Portfolio Management	2.684
Social Sustainability	1.787
Economic Sustainability	1.487
Inner Model List	
Success Factors -> Sustainability	1.000

Source: Field Data (2023)

Table 7: Model Fit for Success Factors associated with FBM and Sustainability of Agribusinesses

Model Evaluation	Value
SRMR	0.082
NFI	0.795

Source: Field Data (2023)

VI. CONCLUSIONS

The results indicate that agricultural sustainability was positively correlated and statistically significant with competitive advantage, firm resources, customer and brand loyalty, market strategy, and portfolio management as success factors.

These findings have significant practical ramifications for stakeholders in the agribusiness sector, policymakers, and practitioners. These results can be used by agribusiness practitioners to prioritise and fund the success factors that have been discovered for their businesses. Agribusinesses can increase their sustainability and long-term profitability by concentrating on developing a competitive advantage, optimising resource allocation, fostering customer loyalty, putting into practice successful market strategies, managing portfolios, and embracing thrifty business methods. These results can be used by policymakers to create programmes and policies that encourage the growth and sustainability of agribusinesses. Initiatives to improve resource accessibility, offer chances for training and capacity building, support market development, and promote the use of sustainable farming methods are a few examples of what this may entail. Agribusiness sustainability can be supported by industry players like development agencies, investors, and agricultural groups. Through the provision of financial backing, knowledge-sharing forums, technical support, and market connections, stakeholders may facilitate the growth of agribusinesses that are both resilient and sustainable.

In conclusion, there are theoretical and practical implications for agribusiness sustainability from the identified success factors of competitive advantage, company resources, customer and brand loyalty, market strategy, and portfolio management, in addition to the beneficial impact of frugal business modelling. Agribusinesses can increase their long-term sustainability and profitability by identifying and prioritising these elements and funding capacity-building programmes. Stakeholders in the industry and policymakers can help agribusiness sustainability by creating and implementing cooperative policies, programmes, and initiatives.

VII. RECOMMENDATIONS

According to the recent finding, key success factors were identified to drive agribusiness sustainability. From a theoretical standpoint, these findings extend our understanding of the underlying mechanisms that enable agribusinesses to achieve sustained competitive performance. By empirically validating the interplay between these success factors and agribusiness sustainability, the study advances the scholarly discourse on the drivers of sustainability in this crucial industry.

In terms of practical implications, the research offers valuable insights for agribusiness practitioners, policymakers, and other stakeholders. Agribusiness leaders can use these findings to prioritise and allocate resources towards developing a strong competitive advantage, optimising their resource portfolio, fostering customer loyalty, and implementing effective market strategies. By focusing on these key success factors, agribusinesses can enhance their long-term sustainability and profitability.

Policymakers can also leverage the research to develop targeted initiatives that support the growth and sustainability of agribusinesses. Collaboration between industry stakeholders, such as development agencies, investors, and agricultural groups, can further strengthen these efforts through the provision of financial support, knowledge-sharing, and market connections.

While the study provides a robust foundation, there are opportunities for future research to build upon these findings. Examining the generalisability of the success factors across different geographic regions, farm sizes, or product categories could shed light on the contextual factors influencing agribusiness sustainability. Additionally, exploring the potential moderating or mediating variables that shape the relationships between the identified success factors and sustainability outcomes would deepen our understanding of the underlying dynamics.

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