UNIVERSITY OF CAPE COAST

SUPPLIER DEVELOPMENT AND SUSTAINABLE PERFORMANCE OF COCOA BEAN SUPPLIERS IN GHANA: THE ROLE OF OPERATIONAL EFFICIENCY, FIRM AMBIDEXTERITY AND BUYER-SUPPLIER RELATIONSHIP QUALITY

LAWRENCE YAW KUSI

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BY

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JUNE, 2024

DECLARATION

Candidate's Declaration

I hereby declare that this thesis is the result of my own original research and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's Signature ……………………………. Date……………………

Name: Lawrence Yaw Kusi

Supervisor's Declaration

I hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast.

Supervisor's signature ……………………………. Date ………………….

Name: Prof. (Dr.) Daniel Agyapong

Co-supervisor's signature ………………………… Date ……………………

Name: Dr. Edmond Yeboah Nyamah

ABSTRACT

Despite the enormous supplier development initiatives given to cocoa bean suppliers in Ghana by key stakeholders in the cocoa industry, especially from the License-buying companies [LBCs], cocoa bean suppliers continue to perform abysmally regarding sustainability performance and operational efficiency. Furthermore, it is difficult for cocoa bean suppliers to change their operations to take advantage of opportunities embedded in supplier development initiatives. The study examined the effect of supplier development on the sustainable performance of cocoa bean suppliers in the Western North region of Ghana. It analysed the intervening roles of operational efficiency, firm ambidexterity, buyer-supplier relationship quality and firm characteristics. It employed an explanatory research design and quantitative approach, collecting primary data through a structured questionnaire in a cross-sectional survey. Multi-stage sampling was employed to select the participants. Caretakers and owners served as proxies for the cocoa supply farms. Out of 450 cocoa bean suppliers, 424 completed the questionnaires leading to 94.22% response rate. SMART PLS software was utilised to analyze the data via the two-stage embedded approach of model configuration. Supplier development and operational efficiency account for a moderate variance in sustainable performance. Buyer-supplier relationship quality and firm ambidexterity amplify supplier development's influence on operational efficiency. Ghana Cocoa Authority should continue and intensify its policy on non-price incentives for cocoa farmers. Cocoa bean suppliers should increase their technical efficiency to transfer the advantages in supplier development into sustained performance.

KEYWORDS

Supplier development

Firm ambidexterity

Operational efficiency

Sustainable performance

Buyer-supplier relationship quality

Licensed-buying companies

Cocoa bean suppliers

Ghana

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DEDICATION

To my father, Mr. Stephen Kyeremeh and mother, Augustina Ama Gyabea

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LIST OF ACRONYMS

LBCs	Licensed-buying companies
ICCO	International Cocoa organisation
DCT	Dynamic capability theory
RDT	Resource dependence theory
SDGs	Sustainable development goals
VSS's	Voluntary sustainability standards
VIF	Variance inflation factor
CMB	Common method bias
AVE	Average variance extracted
HTMT	Heterotrait-Monotrait
PLS-SEM	Partial least square-structural equation modelling
RMSE	Root mean squared error
MAE	Mean absolute error
IPMA	Importance-performance map analysis

CHAPTER ONE

INTRODUCTION

The contributions of the cocoa sector to the development of Ghana are enormous in the areas of employment generation, climate change adaptation, income to farmers, foreign exchange to the state and gross domestic product. However, given the many challenges confronting cocoa farms or cocoa bean suppliers in terms of limited financial resources, lack of technical know-how, outbreak of diseases and pests, high operational costs, low prices of cocoa on the world market and unfair treatment of some licensed-buying companies [LBCs], the operational efficiency and sustainable performance of the cocoa farms or suppliers continue to dwindle.

To help position the cocoa bean suppliers to meet their performance expectations and attain sustainable supply in the cocoa bean market, the LBCs undertake supplier development initiatives for their cocoa bean suppliers in the upstream cocoa sector in Ghana. This study therefore focuses on examining how the supplier development initiatives affect, if any, the operational efficiency and sustainable performance of the cocoa bean suppliers of the LBCs amid the intervening roles of buyer-supplier relationship quality, organisational ambidexterity and firm characteristics of age and size.

Background of the Study

Globally, demand for food continues to pressure national governments to design policies alongside private sector engagement to grow agricultural production, which in turn, dramatically poses a toll on land and people (Carodenuto & Buluran, 2021). Interestingly, worldwide demand for cocoa beans has surpassed supply by 1 million metric tons (Bryant & Mitchell, 2021) thereby prompting African governments to seek private sector participation to support the implementation of supplier development projects to enable cocoa bean suppliers or farms to satisfy such demand.

Africa produces around 70% of the world's cocoa, followed by Asia (17%) and Central and South America (13%) (Arhin & Santuoh, 2018). In 2019 alone, Ghana and Cote d'Ivoire accounted for 65% of the world's cocoa beans production (Wibowo, Widyarini & Pradana, 2021) but Cote d'Ivoire produced more than twice what Ghana produced in 2022. However, the International Cocoa Organisation [ICO] (2022) estimates a 6.8% reduction in worldwide cocoa production, which culminates into about 4.890 million metric tons, mostly due to a projected fall of nearly 10% in Africa. Ghana's output in cocoa productivity is poor compared to other cocoa-producing countries as Cote d'Ivoire and Brazil (ICO, 2017). Recent productivity data reveal a consecutive fall in Ghana's cocoa production from 969,000 tones (2016/2017), to 905,000 tones (2017/2018) down to 830,000 tones (2018/2019) season (Wibowo, et al., 2021).

This unfortunate situation is partly attributed to challenges such as incidence of pests and diseases, planting materials with low-yielding potential, loss of soil fertility, planting density issues (Asante et al., 2021), heavy reliance on rain-fed farming, inadequate extension services (Wongnaa et al., 2022; Asante et al., 2022), inadequate financial capital, weak institutions and poor access to information on good cocoa farming practices (Danso-Abbeam, Baiyegunhi & Ojo, 2020). Quartey-Papafio, Javed and Liu, (2021) were however hopeful about the future of Ghana's cocoa production and so anticipated a 2.49% growth rate in cocoa production in Ghana by 2030.

In contrast to this hopeful attitude, the cocoa farming industry looks to be unattractive to the youth amid the usage of cocoa farmlands for "Galamsey" which is unlawful artisanal mining activities in most cocoa-growing areas in Ghana (Bryant & Mitchell, 2021). Buor (2022) claimed that there is a paucity of virgin land for cocoa production in Ghana, hence, the necessity for the intensification of production on existing farms through major capital investments in supplier development projects and initiatives. The first step in producing quality products hinges on the ability to use quality materials, hence, the need for buying firms to provide appropriate supplier development interventions including training and educating suppliers to fix the problems that are hurting suppliers' performance (Arroyo-Lopez, Holmen & de Boer, 2012).

In the cocoa sector of Ghana, licensed purchasing companies [LBCs] compete on non-price incentives (Bakang et al., 2021), mainly in the form of supplier development efforts. The LBCs are firmly rooted in cocoa-growing communities (Bymolt, Laven & Tyszler, 2018), which gives them first-hand awareness of the suffering of cocoa farmers. To this aim, LBCs give several supplier development activities with the view to competing and capturing suppliers that can match their specification needs (Amfo, Shafiwu & Tanko, 2024).

Supplier development captures "any efforts of the buying firm to improve the performance and/or the capabilities of their suppliers with the purpose to attain the short and long-term objectives of the buying firm" (Krause & Ellram, 1997, p. 21). From the standpoint of Ballard and Elfving, (2020) supplier development refers to the numerous efforts that buyers undertake to improve the performance of suppliers and or their capacities to meet the buyers' short-term and long-term supply needs. The government of Ghana, combined with its developmental partners, has over the years made some supplier development projects to cocoa farmers through its extensive reforms processes that began in the 1984-1985 seasons (Astrid Fenger et al., 2017).

Astrid Fenger et al., (2017) further indicated that supplier development interventions in such reform processes include replacing old cocoa trees with hybrid-yielding varieties via rehabilitation projects, extension services, offering fertilizers subsidies, making improvements to road networks, shifting responsibility for cocoa procurement from the government-controlled Ghana Cocoa Board (COCOBOD) to privately licensed buying companies [LBCs] and mass spraying programmes. Conceptually, supplier development is regarded as having two fundamental dimensions comprising direct supplier development and indirect supplier development (Krause & Ellram, 1997).

Direct supplier development relies strongly on the usage or commitment of resources of the buying firm (Yawar & Seuring, 2020). Wagner, (2006) found that direct supplier development had two main subconstructs including the transfer of capital resources and human resources. Contextually, the key direct supplier development initiatives considered include artificial pollination, cocoa rehabilitation, mass spraying and massing pruning. Indirect supplier development on the other hand requires limited or in some instances no resources from the buying organisation. Changalima, Ismail and Mchopa (2021) identified certification, incentives, setting suppliers' targets, penalties and communication as key indirect supplier development activities. In the cocoa production industry, some of the key indirect supplier development initiatives are input supply, training and extension service, certification and financing schemes.

Glavee-Geo, Burki and Buvik, (2020) averred that the cocoa industry of Ghana is regulated and supported by agents of the government of Ghana through relevant state institutions such as the Ministry of Agriculture, and Cocoa Research Institute, and Ghana Cocoa Authority. COCOBOD maintains a monopoly on the export of cocoa beans in Ghana which translates to about 70% (Hess, 2022). Ghana Cocoa Authority sets prices and allocates supplies among other functions. Cocoa Marketing Company and private LBCs are responsible for purchasing cocoa beans from cocoa bean suppliers on behalf of the COCOBOD.

The attainment of the sustainable development goals [SDGs] put out by the United Nations, scheduled for 2030, by both national governments and private corporate organisations involves proactively advancing the goals for sustainability in company operations including cocoa cultivation (Hess, 2022). Cocoa producers are urged to subscribe to quality certification such as organic and fair trade with the objective to increasing traceability in the cocoa supply chain globally to maintain sustainable practices in the cocoa business (Villacis, Alwang & Barrera, 2022). Empirically, Bravo, Villacrés and Silva, (2021) showed that supplier development is attracting attention from supply chain managers since it has consequences for sustainability, especially from suppliers in underdeveloped nations.

Practically, sustainability concerns seem to be systematic and hence fixing such problems requires collective efforts (Kimpimaki, Malacina &

Lahdeaho, 2022). Guided by the systems approach to thinking, it is necessary to accept the integration of social, economic and environmental components in sustainability (Nguyen & Bosch, 2013) hence the conceptualization of sustainable performance of cocoa plantations in Ghana in this perspective.

On the social side, it is believed that sustainability is crucial to decreasing the poverty that has swallowed most smallholders in an agrarian economy like Ghana (Glavee-Geo et al., 2020). Certification schemes embedded in cocoa supplier development projects are tied to eliminating child labour in the cocoa sector, a problem recognized in the upstream cocoa industry in Ghana (Sostizzo, 2017). Training and extension services for cocoa farm operators are to ensure the creation of safe working conditions for farm labours which improves their social conditions (Biswas et al., 2021).

Again, by enhancing the sustainable performance of cocoa bean supplier through supplier development programmes by LBCs, concerns affecting social protection for cocoa farming communities might be remedied, a push especially supported by SDG1. SDG1 is concentrated on admonishing nations to establish domestically adequate social protection systems and measures for all (Mabe, Konja, Addo & Awuni, 2022). Busquet, Bosma and Hummels (2021) observed that with suitable policy interventions in the cocoa sector in West Africa, children can develop marketable skills through rural upbringing and learning, a step that can help in remedying the negative repercussions that come with child work.

Supplier development measures in the cocoa-growing sector of Ghana can help to overcome the ecological challenges such as abuse of pesticides and weedicides, soil infertility, and deforestation that are militating against the value-creation efforts of the cocoa farmers (Bandanaa et al., 2021). Furthermore, Busse, Schleper, Niu and Wagner, (2016) revealed that supplier development can enable enterprises to improve their economic performance a typical case noted among cocoa bean suppliers in underdeveloped nations like Ghana.

For instance, Aboah, Wilson, Bicknell and Rich, (2021) discovered that mass cocoa spraying activities and extension services supplied by cocoa-buying corporations to cocoa farmers in Ghana led to an exponential improvement in cocoa productivity. Also found financing scheme for cocoa farmers helps the farmers to adequately finance their farming operations efficiently (Vukey et al., 2022), a drive that helps the farmers to increase their crop yields, and hence selling more cocoa beans for secured income in such agribusinesses. Furthermore, training extension services for cocoa bean suppliers improve their operational capability and eventually improve in quality of cocoa beans and productivity (Owiredu et al., 2022). Supply of viable seedlings such as hybrid seedlings to cocoa bean suppliers can help them improve harvest volume, quality and attract premium prices for their produce (Asare et al., 2018).

The focus of supplier development initiatives by the LBCs on cocoa bean suppliers or farms is to improve the operational efficiency of the cocoa bean suppliers and subsequent productivity (Onumah, Al-Hassan & Onumah, 2013). In essence, operational efficiency becomes a mechanism for transferring the effect of supplier development initiatives on the sustainable performance of cocoa bean suppliers, hence contextualized as a mediating variable. Operational efficiency reflects the quality of microeconomic activities, which is centred on the overall effort of the enterprise management (Xue, Zhou & Liu, 2022). Empirically, it has been recognized that the combination of resources from both the buying firms and the cocoa bean suppliers affects both the technical and scale efficiencies of production, thereby invariably affecting crop productivity and profit potential of cocoa bean suppliers or farms (Eyitayo et al., 2011). Confirming this point, Ahamefule et al., (2017) disclosed that the massive government support for cocoa bean suppliers amid private sector participation is tilted at promoting the operational efficiency of cocoa bean suppliers which eventually translates to improve sustainable performance.

The potential for supplier development to increase supplier operational efficiency is based on the degree of the sufficiency of suppliers' absorptive capacity and the presence of an acceptable collaborative and relational learning framework (Arroyo-Lopez et al., 2012). This assumption comes into play because it is understood that company ambidexterity plays an important role in influencing the adaptive behaviour of suppliers that are under supplier development programmes (Clampit et al., 2022). Supplier development efforts come with a desire for change in the operational capabilities of suppliers to suit the expectations of such initiatives.

If the cocoa bean suppliers or farms put in place the correct ambidextrous strategies, then they may alter their operational plans to take advantage of the opportunities that come with supplier development programmes that can convert into better operational efficiency. On the other hand, if cocoa bean suppliers (farms) lack such strategic competencies, then they may lose the gains that come with supplier development initiatives.

Hence, suppliers should be in the position to trigger their exploitative and exploratory dynamic skills to accept the changes that come with supplier development programmes (Clampit et al., 2022).

From the dynamic capability theory, firms can adapt their resource base in the operational processes to respond to changes that happen with interventions like supplier development programmes. The dynamic capability theory (DCT) posits that organisations should establish firm-specific skills and update their competencies to respond to changes in the business environment (Su et al., 2022). Ambidextrous enterprises display dynamic capability by integrating, growing and reconfiguring their internal and external skills to respond to a fast-changing environment (van Lieshout et al., 2021).

Therefore, supplier development programmes undertaken by the LBCs need to be replied to by the cocoa bean suppliers based on the level of the dynamic capacities of the cocoa farms in this regard. It is accepted that a dynamic environment frequently promotes supplier participation in supplier development activities (Nagati & Rebolledo, 2013). Supplier development efforts are change-based projects, hence failing to respond to such changes by the qualified cocoa bean suppliers could potentially diminish the supposed benefits of such activities. Dynamic capability not only stimulates ambidextrous innovation but also orchestrates ambidextrous company behaviour (He et al., 2022) thereby providing credibility to the dynamic capability idea.

The dynamic capability theory eliminates the static limitation associated with the resource-based perspective theory (Muneeb et al., 2023). Since the enterprises depend on each other for their survival and growth, it is crucial they collaboratively construct a profitable quality buyer-supplier connection to govern their adaptive behaviour in the supplier development environment (Glavee-Geo et al., 2020). Unprofitable company operations are undesirable for both buying organisations and suppliers, under some situations, both buyers and suppliers co-finance supplier development programmes based on the ideology of sharing of cost and benefits thereof (Rogers, Carter & Kwan, 2019). This sharing model creates the necessity for a joint organisation established on trustworthy buyer-supplier connections.

Contextually, Shukla et al., (2022) averred that with the continuing fall in cocoa production, LBCs have heightened supplier development initiatives for cocoa farmers with the objective to develop a quality buyer-supply relationship for the sake of competitiveness. Those LBCs that fail to help cocoa bean suppliers are doomed as they may not obtain access to a steady supply of cocoa beans from the suppliers they rejected in time of need. Those LBCs that support the cocoa bean suppliers may win at the end of it all.

The potential to support supplier development and sustainable performance in Ghana's cocoa sector is greatly influenced by developing trustworthy connections among actors in the cocoa supply chain (Glavee-Geo et al., 2020). This is true since the agri-business supply chain interaction is generally informal, therefore heavily relies on trust among actors (Owot et al., 2022). The buyer-supplier relationship is contextualized as playing a mediating role in the relationship between supplier development and operational efficiency, a conclusion influenced by theoretical and empirical literature (Glavee-Geo et al., 2020).

For instance, Shahzad, Sillanää and Imeri, (2016) observed a strong correlation between supplier development and buyer-supplier relationship building. To this effect, Nagati and Rebolledo, (2013) in their empirical investigation confirmed that trust and preferred customer status are critical antecedents for supplier participation in supplier development initiatives. Specifically, supplier incentives and direct involvement were revealed as important significant indicators of buyer-supplier relationships (Shahzad, Sillanää & Imeri, 2016). LBCs in Ghana have thus launched on measures such as mass spraying for disease and insect control and free fertilizer distribution to boost soil quality in cocoa-producing areas (Yusif et al., 2021). These supplier development programmes are also targeted at developing a value-drive relationship between buyers and suppliers. This is the position of the resource-dependency theory.

The resource dependence theory [RDT] suggests that dependence on resources relates to the focus firm's actions, network exchanges and consequences (Aldrich & Pfeffer, 1976). The RDT also posits organisational behaviour, structure and outcomes are partly explained by their contexts or settings, that supply crucial resources to companies (Pfeffer & Salancik, 1978). Power maximization was regarded to be the overarching pillar for the success of enterprises that rely on the RDT to compete (Pfeffer, 1981). Firms missing some strategic resources consequently aim to create ties with firms that possess such resources with the view of acquiring access to such resources via such inter-firm relationships. This condition makes the quality of buyer-supplier connection a critical component in supplier development in the cocoa production and marketing industry.

Historically, smallholders are regarded as being risk-averse mainly due to their vulnerability to adverse shocks (McKinley, et al., 2016). Smallholders, compared to their counterparts, large-scale farmers, are unable to access cocoa financing schemes to assist their agricultural operations because of high-interest rate charges and the necessity for collateral facilities for such loans (McKinley et al., 2016). Again, somewhere in Malaysia, Wibowo, et al., (2021) observed that there is less attention among smallholder farmers when it comes to the quality of cocoa beans. In Ghana, Ehiakpor et al., (2016) discovered that farm size and farm age affect climate adaptation techniques in the cocoa sector.

From the contingency theory's standpoint, universalistic thinking and approach to doing things are not appropriate since methods are made more effective only when they are effectively integrated with a specific organisational and environmental situation. Hence, the contingency theory suggests interaction rather than a simple linear link involved in the universalistic approach. A spectrum of empirical studies has handled business size and firm age (Valtakoski & Witell, 2018) as contingent variables given the respective settings of study.

The interacting involvement of contingent variables produces some form of synergistic effects (Oyewo et al., 2022). Thus, neglecting firm age and firm size as structural determinants in supplier development-operational efficiency context could potentially diminish the genuine influence of supplier development on operational efficiency. The configurational approach of the contingency theory encourages the analysis of how features and their combination affect economic performance (Grandori & Fumari, 2013). The inclusion of the firm age (farm age) and firm size (Farm size) in the framework of the study was supported by the configurational perspective of the contingency theory (Feizabadi & Alibakhshi, 2021).

From a contingency point of view, firm size [measured in number of hectares] and firm age [Measured in number of years of cocoa trees] play an imperative role in moderating between the operational efficiency of Ghanaian cocoa bean suppliers and its development due to various reasons. For instance, large firms have more resources, which facilitate access to complex technologies and facilities, which in return play a supporting role in operational efficiency. With such a provision of facilities, it is convenient for large firms to adopt such practices for their development, which leads to improved performances. Small firms, however, may have a barrier in such facilities, which makes it difficult for them to maximise such practices. For instance, a study on sustainable supply chain management practices found that firm size positively moderates the effect of these practices on economic performance, with larger firms experiencing more significant benefits (Gimenez & Tachizawa, 2012).

Secondly, the age of a firm can assist in its operational habits and its adaptability in adopting new practices. The older firms can have static operation habits and be conservative in adopting new practices, which can inhibit new practices of establishing new suppliers. The younger firms, however, can be flexible and accepting in adopting new practices, and this can enhance their operational efficiency. In a strategic firm-age study, it is found that younger firms have a higher chance of being flexible, which can assist in enhancing new operation strategies in an effective process (Doz & Kosonen, 2008). Therefore, both firm size and age play pivotal roles in determining how supplier development initiatives affect the operational efficiency of cocoa bean suppliers in Ghana.

In Ghana, cocoa production is largely concentrated in the forest areas comprising Eastern, Western, Ashanti, Volta, Brong-Ahafo and Central regions because of the existence of ideal weather, notably the high amounts of rainfall, given its bi-modal nature (Ehiakpor, Danso-Abbeam & Baah, 2016). Cocoa growing in Ghana is generally characterized by tiny farms, with its attendant issues including limited access to land due to the land tenure system, encroachment on forested land and low incomes for cocoa producers (Buor, 2022).

Historically, *Theobroma cacao,* cocoa is claimed to have originated in the Amazon region about 5000 years ago (Bravo, et al., 2021). The three main varieties of cocoa beans are Forastero, Trinitario and Criollo are grown in a limited geographical zone within approximately 100 on either side of the Equator which includes Africa, South America, Central America, and West Indian Islands (Perez, Lopez-Yerena & Vallverdu-Queralt, 2021). Commercial cultivation of cocoa tree began with a Ghanaian, Tetteh Quarshie, who journeyed to Fernando Po, now Bioko, Equatorial Guinea and shipped pods of Amelonado cocoa in 1879 (Canatus Anthonio & Darkoa Aikins, 2009). Commercially, in the instance of Ghana, the country's association with cocoa is claimed to have been acknowledged when it shipped two bags of cocoa beans in 1891 (Williams, 2009). Ghana's cocoa still tops on a worldwide quality standard that other nations aim to reach, hence, the command for premium prices (Teye & Nikoi, 2021).

In Ghana, cocoa marketing is completely regulated by the COCOBOD. COCOBOD ensures that all contractual parties in the cocoa value chain adhere to trade rules to safeguard consumers and producers (Adams & Carodenuto, 2023). The purchasing of cocoa from farmers and smallholders is in the hands of LBCs and these buying firms have been registered with the COCOBOD. LBCs in turn sell cocoa to Cocoa Marketing Company, giving a cocoa takeover receipt to the LBCs for payment by COCOBOD based on margins set by the producer price review committee (Adams & Carodenuto, 2023). The seasonality of cocoa makes purchasing cocoa beans in Ghana more predominant from around October to December but light season sales around April and May (Bymolt, Laven & Tyszler, 2018).

For most African countries, especially those within the West African sub-region, agriculture continues to dominate in terms of contribution to their economic growth (Yusif et al., 2021; Bese, Zwane & Cheteni, 2021). Agriculture in Africa employs 65% of labour and contributes 32% of the continent's GDP (Bessah et al., 2021). The cocoa industry contributes immensely to the GDP of the Ghanaian economy with its stream of foreign exchange into the economy (Yusif et al., 2022). In 2018 the cocoa production sector accounted for 1.8% of Ghana’s GDP and 7.8% of its agricultural GDP with a real growth rate of 3.7% (Bannor et al., 2022). In revenue terms, Ghana earned $2.2 billion in 2019, $2.3 billion in 2020, $2.8 billion in 2021, $2.3 billion in 2022 and as of the end of June 2023, $1.5 billion had been realized.

Cocoa bean suppliers or farms also contribute to and support the livelihood of approximately 4 million households in Ghana (Ghana Statistical Service, 2015). Furthermore, Teye and Nikoi, (2021) disclosed that Ghana’s cocoa industry is manned by approximately 800,000 smallholder farmers. The sector also employs about 794,129 farm households (Mabe et al., 2021). Several products are manufactured from the use of cocoa-related materials including chocolate, pomade, oil, soap and so forth (Villacis, Alwang & Barrera, 2022). Villacis et al., further provided that, globally, it is estimated that production and commercialization of chocolate will grow by $41.15 billion from 2020 to 2024.

The study is strongly linked with some of the sustainable development goals [SDGs]. Specifically, the study traces its pivotal impetus from SDG1 [No poverty], SDG2 [Zero hunger] (Shukla et al., 2022), SDG3 [Good health and wellbeing], SDG8 [Decent work and economic growth] and SDG12 [Responsible consumption and production]. By relying on the findings of this empirical study, pro-poverty alleviation policies could be proposed based on the relative impact of the various dimensions of supplier development on sustainable performance, which would eventually help the LBCs and other developmental partners prioritize their investments viably.

Statement of the Problem

Cocoa growing in Ghana is endangered by climate unpredictability and different weather that calls for stakeholder support for cocoa bean suppliers in Ghana since the sustainability of the cocoa production system may be challenged (Akrong et al., 2023). In addition, the cocoa bean suppliers [Farmers] in Ghana were found to be less technically efficient in their farming operations, especially female cocoa farm managers (Danso-Abbeam al., 2020) with the expansion in cocoa productivity attributed to farming on new farmlands instead of maximization of efficiency of existing lands. Despite the supplier development support for the actors in the cocoa bean suppliers, the actors still face technical challenges such as misapplication of chemicals, unproductive farming practices, use of substandard inputs, poor working conditions for laborers and others, a situation that has affected the sustainability of cocoa bean suppliers (Kos, Lensink & Meuwissen, 2023).

Cocoa bean suppliers in Ghana still face technical efficiency challenges due to factors such as small farm size, poor educational background, engagement in non-farm activities (Danso-Abbeam et al., 2020), psychological costs of changing habits, lack of liquidity, especially due to lack of access to credit and resistance to technology acceptance (Kos et al., 2023). Inherently, these challenges are raising the production cost and loss of cost advantage via cocoa export (Effendy et al., 2019). Jebuni-Dotsey and Senadza (2023) also revealed that due to the under-utilization of technology and technical inefficiencies among cocoa bean suppliers in Ghana, the sector is losing between 36.5% of its output potential consequently significantly affecting the sustainable economic performance of cocoa bean suppliers.

Again, the recent expansion of cocoa production in Ghana has been attributed to land expansion and not by land productivity, a trend that rather cost more investment than the gains that would have been obtained if the operational efficiency of the same farmland is maximized (Obeng & Adu, 2016; Dzene 2010). Expansion of farmlands, including virgin forests for cocoa cultivation, has also triggered the exploitation of slave and child labour in Ghana, consequently compromising the social sustainability of cocoa production in Ghana (Stringer & Michailova, 2018).

Furthermore, whereas government subsidies aim at encouraging the use of improved inputs, there is no evidence on how such supports increase the operational efficiency of cocoa bean suppliers or farms in Ghana (Kos et al., 2023). Also, the study by Jebuni-Dotsey and Senaza (2023) proves that compared to the Ashanti, Bono-Ahafo, Eastern Region and Volta regions of Ghana, Western-North Region performs the least in terms of the impact of supply-side interventions on technical efficiency, hence recording lower output after such interventions. This supports the choice of the study area.

Adoption of modern inputs by cocoa farmers in Ghana looks to be exceedingly low mainly due to the delayed provision of subsidized inputs, hence hindering the dissemination of technology across cocoa bean suppliers (Kos, Lensink & Meuwissen, 2023). For instance, the adoption of pruning in West Africa, of which Ghana is part, is rated low (Adomaa, Vellema, Slingerland & Asare, 2022). Similarly, Jebuni-Dotsey and Senadzo, (2023) found that apart from fertilizer application which improved the efficiency of cocoa bean suppliers in Ghana, supplier development initiatives, including extension services, free spraying of fungicides and insecticides and hand pollination, failed to improve the production efficiency of the cocoa bean suppliers.

The introduction of LBCs in Ghana's cocoa marketing has generated competitiveness in the cocoa market with competition increasing with the number of LBCs which stands at 55 registered LBCs (Kpabitey, Chitose & Kusadokoro, 2024). Owusu Ansah, Antwi and Siaw, (2017) emphasised that issues of unfair influence by LBCs and breach of agreements between LBCs and cocoa farmers are occasioned by such unhealthy competition in the business. Global demand for cocoa beans has surpassed the global supply by as much as 1 million metric tons (Bryant & Mitchell, 2021). Aside from this, there has been a dramatic fall in profit from 15% to 4-6% over the previous 25 years for cocoa farmers in the West Africa sub-region, a scenario that has caused in much hesitation among the youth to engage into cocoa farming unlike their ancestors (Bryant & Mitchell, 2021). The reduction in Ghana's cocoa production over the most recent years also implies inefficiencies in cocoa cultivation (Wibowo et al., 2021) despite the investments made in that sector.

Many cocoa bean suppliers or firms are faced with landscape issues owing to the climate change menace that has made it difficult for cocoa producers to foresee seasonal fluctuations for efficient cocoa farming activities (Kyere, 2018). Obeng and Adu, (2016) observed that most cocoa bean suppliers operate in the illogical zone of cocoa production, consequently exacerbating the inefficiency in cocoa production. To make matters worse, illicit mining, often called "galamsey" has wrecked havoc on Ghana's forest cover, with an estimated recovery cost of US$29 bn (Kombat & Chen, 2022; Buor, 2022). This predicament is partly due to an increasing population and lack of soil fertility that have led cocoa growers to convert wooded areas, including their farms, into mining land, to earn more cash to support their livelihood (Buor, 2022).

Cocoa farmers in Ghana face the difficulty of lack of access to improved planting materials (Asare, et al., 2018) and inadequate maintenance techniques (Tosto et al., 2022), which has limited productivity development (Asare et al., 2018). With high interest on loans, ranging between 25%-40%

per annum, despite rigorous collateral conditions for loans, smallholders are unable to access financial credit to sustain their farming operations (McKinley et al., 2016). No wonder debt is consuming farmers in developing economies including Ghana (Shukla et al., 2022). Again, the financial woe of cocoa farmers is aggravated by the continuous rejection of banks to grant cocoa farmers appropriate credit due to the significant risk associated with long-term agricultural financing (Asaleye et al., 2020).

Bannor et al., (2022) also acknowledged poverty among cocoa growers in Ghana. Kpabitey, Chitose and Kusadokoro, (2024) also observed that the non-price competition does not inspire LBCs to give loans and credit to cocoa producers in Ghana. No wonder the farmers do not consider agriculture as a viable economic alternative anymore (Bhoi & Dadhich, 2019). Besides, farmers' supply chain is generally ineffective from seed to sell (Bhoi & Dadhich, 2019). The cocoa sector is still befuddled with challenges including high pest and disease infestation which eventually limit the productivity of cocoa trees and their life span (Bello-Bravo et al., 2022) despite the support they receive from the government of Ghana and LBCs in cocoa growing and marketing sector.

Recently, the restrictions in reaction to the COVID-19 epidemic have also generated shortages of supplies, materials and labour supply, especially agrochemicals and fertilizers which have resulted in lower salaries for farm labour (Teye & Nikoi, 2021). Teye and Nikoi also highlighted that the COVID-19 lockdown also presented a threat to the movement of cocoa beans to warehouses even if certain warehouses were full because of the pileup. Again, slave work and child exploitation are perversive in the agricultural sector (Stringer & Michailova, 2018) and in particular the cocoa business in West Africa (Christ, Burritt & Schaltegger, 2020). To make matters worse, a reduction in cocoa prices frequently drives farmers to escalate the use of slave work and child labour as alternate means of cutting the costs of cocoa farm operations, notably among smallholders in Ghana (Christ et al., 2020).

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Moreover, it is challenging to sustain supplier development over time, because such programmes need major changes in terms of capabilities and practice (Jørgensen, Ellegaard & Kragh, 2022). Achieving sustainability in supplier development initiatives, at the lower-tier suppliers is challenging especially where there are complex networks characterised by no direct control, limited public scrutiny and information asymmetry which eventually makes it difficult to scrutinise lower-tier suppliers where most sustainability violations occur (Jia, Stevenson & Hendry, 2021). However, external stakeholders often hold focal enterprises accountable for sustainability challenges in supply chains (Jia et al., 2021).

Some farmers complain of unfair treatment when it comes to agricultural policy implementation (Ali, Awuni & Danso-Abbeam, 2018) which is mainly owing to the knowledge asymmetry between LBCs and cocoa farmers in Ghana (Quarmine et al., 2012). Dadzie, Dadzie and Williams (2018) also revealed that LBCs in Ghana underperform on emotional/effective components of interpersonal trust, which threatens the quality of supplier-buyer relationships. In Ghana, most cocoa farmers, are at the 'bottom of the pyramid [BOP] because their average per capita income is below $2 per day (Glavee-Geo et al., 2020), a scenario leading to extreme poverty with its accompanying limited access to goods and services (Peterson & Zehra, 2018).

Bannor et al., (2019) also identified some marketing challenges that are limiting the growth and development of cocoa farmers in the Western North Region cocoa region in Ghana including inadequate credit support, low prices of cocoa beans, adjustment of weighing scales, and lack of incentives to farmers and poor access to market information. Arhin and Santuoh (2018) showed that cocoa farmers in Ghana are complaining contentious measuring scales that are employed by LBCs which siphon farmers' profit margin on the selling of cocoa beans. No wonder the cocoa supply chain has been identified as a key source of modern slavery (Lalwani et al., 2018).

Supplier development activities in the chocolate industry seemed not to ensure minimum pricing for cocoa farming actors, notably suppliers of cocoa beans to LBCs thereby exacerbating the social inequality and prolonging the vicious poverty cycle among cocoa farmers (Richard, 2021). Building trust in buyer-supplier interactions in the cocoa sector of an emerging nation like Ghana could be significantly more challenging than stated in existent literature (Dadzie et al., 2018). Furthermore, anecdotal research reveals a link between suppliers and cocoa marketing businesses otherwise LBCs in Ghana are defined by turmoil and conflict with swings of trust (Dadzie et al., 2018).

Firms, especially SMEs are challenged with several constraints that inhibit innovations in their business operations (Rojas-Cordova et al., 2022). Given the heavy regulation of the cocoa bean supply market in Ghana, smallholder entrepreneurship is limited, hence stifling innovative behaviour among smallholders (Bello-Bravo et al., 2022). The implementation of both exploration and exploitation approaches to ambidexterity is prone to result traps (Clauss et al., 2021). The ambidextrous orientation of enterprises inherently causes large marginal challenges which in turn have been accused for having negative implications on organisational performance (Clauss et al., 2021).

Although Ghana ambitiously continues to use its natural resources to stimulate economic expansion and growth (Hess, 2022), unfortunately, commitment to conserving the environment is not matched with comparable desire (Aboagye, 2017). Many companies regard the pursuit of sustainability as cosmetic (Hess, 2022). Cocoa plantations are finding it difficult and demanding to respond to pressures from stakeholders in their effort to encourage efficient answers to achieve the balance between commercial advantages and environmental image (Abdallah & Al-Ghwayeen, 2019). The cocoa sector of Ghana is again condemned for the exploitation of child labour in its operations which brings the issues of sustainability in the cocoa supply chain into contempt (Sostizzo, 2017).

Smallholder farmers are unable to produce excellent cocoa beans compared to major cocoa growers (Wibowo et al., 2021). The power imbalance in the cocoa sector often favours MNCs (buyers) at the expense of the suppliers who are often smallholders (Christ et al., 2020). About 25% of cocoa trees in Ghana are now around 30 years old and their yield is falling steadily (Kongor, et al., 2018). Old firms are thought to be more innovative than new enterprises but perform poorly in terms of quality (Erlany et al., 2023).

On the side of research gaps, there seem to be few empirical studies on the technical efficiency of cocoa bean suppliers in Ghana but more emphasis on cocoa productivity (Obeng & Adu, 2016). This could limit evidence on which operational efficiency component can be manipulated and which component can result in sustainable performances of cocoa bean suppliers in Ghana's upstream cocoa industry. Empirical evidence can be developed in this study in a direction of redesigning among stakeholders like LBCs in Ghana's upstream cocoa industry and cocoa bean farmers or farms in a direction of maximum benefit in operational efficiency, in supplier development and in sustainable performances.

Also, the findings of the limited studies conducted are not generalizable to all cocoa growing areas due to differences in agroecological zones with varied socio-economic backgrounds and resource endowments (Obeng & Adu, 2016). Some studies have assessed the effect of mass cocoa spraying, cocoa sector strategy and cocoa high technology policies on cocoa production (Yusif et al., 2021). However, such studies seem to skew toward supplier development and cocoa productivity with less emphasis on the sustainable performance of cocoa bean suppliers. Additionally, other critical supplier development initiatives of mass pruning, certification, rehabilitation, extension services and artificial pollination have been trailed for time in memoriam for LBCs for the supplies of cocoa beans, though there is no evidence of an empirical study examining its combined impact on operational efficiency and sustainable performance of supplies of cocoa beans, which is a vacancy this study attempts to address.

Again, there appear to be some little studies on supplier development with an emphasis on collaborative relationships (Sikombe & Phiri, 2021), particularly from the standpoint of the suppliers (Nagati & Rebolledo, 2013). Other studies point toward relationship quality between buyer and supplier as an active contextual driver in impacting and strengthening attempts in supplier development (Shukla et al., 2022; Glavee-Geo et al., 2020). The buyer-supplier relationship can potentially suppress the vibrancy of options, which can be eliminated in this study.

Wagner and Krause (2009) further hinted that the relationship between supplier development goals in general and their relationship with supplier development activities has received little research attention, a gap that needs to be exploited by this study. A meta-analysis conducted by Dalvi and Kant, (2015) further proves the trade-off between risks and benefits of supplier development activities is seldom available, hence the need to examine how various aspects of supplier development affect the performance of buyers and suppliers alike.

Studies on the theoretical and conceptual development of supplier development have remained abstract (Yawar & Seuring, 2020) although studies seem to focus on literature review (Dalvi & Kant, 2015; Noshad & Awasthi, 2015). Dalvi and Kant, (2015) also recommend the need to examine how the buyer-supplier relationship affects supplier development activities and supplier development outcomes for both buying firms and supplying firms. This study attempts such a call by examining the purported mediating role of relationship quality between supplier development and operational efficiency of cocoa bean suppliers. In the cocoa industry of Ghana, Carodenuto and Buluran, (2021) also advised that further studies should be conducted to examine the outcomes and process decisions initiated by lead firms and their relationship with suppliers and sub-suppliers. Most studies on the buyer-supplier relationship usually use a single-case organisation rather than an industry (Mallet, Owusu Kwateng & Nuertey, 2021) therefore this study also targeted suppliers of cocoa beans on industrial scope.

The concept of ambidexterity is underdeveloped even though numerous studies have been conducted on the concept (Raisch & Birkinshaw, 2008). However, there appears to be little attention on the impact of firm ambidexterity on firm results even with variations across different research areas (Jurksiene & Pundziene, 2016). Clauss et al., (2021) further disclosed that studies on firm ambidexterity often produce results that significantly vary in size and direction which questions the capacity of firm ambidexterity to improve firm performance or not. Su et al., (2022) also found that firm ambidexterity related negatively with firm performance, especially in the area of adaptive marketing capability.

Since combined innovation or balanced innovation demands different requirements in terms of structure, process, strategy and ability, it is rather challenging and demanding for SMEs including smallholder cocoa farms, to engage simultaneously in these two innovations due to their lack of resources and operational experiences (He et al., 2021). Bravo, Villacrés and Silva, (2021) further advised more practice-based research to be carried out about the sustainability logic, particularly in supplier management contexts (Silva & Figueiredo, 2020). Stange, Schiele and Henseler, (2022) asserted that although studies in SCM are rigorous, however, there seems to still exist an academic-practitioner gap.

Attention to sustainability in Ghana's cocoa sector is a priority although the sustainability of cocoa growth has, historically, not been given much attention (Hess, 2022). Therefore, calls on the need for studies on separate environmental and social performance outcomes of supplier development is a step in the right direction (Dalvi & Kant, 2015). Although many multinational corporations have pushed the agenda for the implementation of social and environmental sustainability issues in supply chains, there still appear to exist some gaps in the theory and practice of sustainability (Gimenez & Tachizawa, 2012).

Sustainability is often approached in a biased way, with less emphasis on social and economic sustainability but more emphasis on environmental sustainability (Souto, 2022). There is a research gap concerning the understanding of how to integrate the achievement of financial, environmental and social benefits simultaneously (Sroufe, 2017). This situation calls for the re-orientation of firms on how to approach sustainability challenges (Souto, 2022). Pedroso, Tate, da Silva and Carpinetti, (2021) found that supplier development for triple bottom-line outcomes is a relatively new topic in the literature and lacks both academic and managerial expertise on the subject. Integrating sustainability elements into firms' strategic positioning comes with challenges as firms struggle to meet these sustainable demands whilst ensuring economic viability and increasing shareholder returns (Pedroso et al., 2021). This comes because buying firms have little control over suppliers located further upstream in the supply chain (Yang & Zhang, 2017).

Studies on the influence of firm age and firm size have produced contradictory results (Ngatno & Dewi, 2019) whilst others consider these characteristics as relevant antecedents for better performance (Jääskeläinen, 2021; Ngatno & Dewi, 2019), others (Farooq, Noor & Ali, 2021; Shehata, Salhin & El-Helaly, 2017) hold just the opposite view, thereby further deepening the debate among practitioners and academia alike as to the extent of the effectiveness of firm size and firm age in determining organisational success. Moreover, there appears to be a limited number of studies on moderating effects of firm age and size in an adaptive environmental context on firm performance (Ngatno & Dewi, 2019) and their impact seems to be very rare, even non-existent in the cocoa-producing sector in developing country context.

Besides, investors in cocoa industries in an emerging market often rely on statistics and historical information to estimate potential investment opportunities. However, the use of these composite indices is sometimes problematic as they fail to enable deeper differentiation of the market because they cannot display warning signals in the environment and thus conceal more than they reveal (Hess, Moser & Narayanamurthy, 2017). These challenges could perhaps to resolved by a primary study of this nature, where detailed and contextual issues are considered. Also, there seems to be a lack of clear consensus on the definition of operational efficiency (Mantje, Rambe & Ndofirepi, 2023) which makes it context-bound. Insufficient research on complex plant-pollinator interaction has hampered the possibility of recommending appropriate strategies that can enhance natural pollinators and their services (Gill et al., 2016).

It is based on these backgrounds that this empirical study was carried out to examine how changes in supplier development affect if any, changes in the operational efficiency of cocoa bean suppliers in the Western North Region of Ghana given the purported mediating roles of firm ambidexterity and buyer-supplier relationship quality in the relationship between supplier development and operational efficiency. The study further examines the purported moderating roles of firm age and firm size in the supposedly predictive relationship between supplier development and operational performance. It also seeks to examine the impact of supplier development initiatives on the sustainability performance of cocoa bean suppliers.

Purpose of the Study

The study seeks to examine how changes in supplier development influence changes in the operational efficiency of cocoa bean suppliers in the Western North Region of Ghana alongside the consideration of the purported mediating roles of firm ambidexterity and relationship quality in the supplier development-operational efficiency predictive relationship. It also examined the effect of supplier development on the sustainable performance of the cocoa bean suppliers that have been supported by the LBCs. To achieve this purpose, these specific research objectives were subsequently formulated for testing.

1. To analyse the effect of supplier development on operational efficiency.
2. To examine the mediating effect of firm ambidexterity in the predictive relationship between supplier development and operational efficiency.
3. To assess the mediating role of buyer-supplier relationship quality in the supplier development-operational efficiency relation.
4. To examine the mediating effect of operational efficiency in the supplier development-sustainable performance relationship.
5. To assess the moderating role of firm size and firm age in the relationship between supplier development and operational efficiency.
6. To examine the influence of supplier development on sustainable performance.

Research Hypotheses

The following hypotheses were formulated and tested to achieve the specific research objectives.

H_1: Supplier development positively and significantly predicts operational efficiency

H_2: Organisational ambidexterity positively and significantly mediates the predictive relationship between supplier development and operational efficiency

H_3: Buyer-supplier relationship quality positively and significantly mediates the predictive relationship between supplier development and operational efficiency

H_4: Operational efficiency positively and significantly mediates the predictive relationship between supplier development and operational efficiency

H_{5a}: Firm size positively and significantly moderates the predictive relationship between supplier development and operational efficiency

H_{5b}: Firm age positively and significantly moderates the predictive relationship between supplier development and operational efficiency

H_6: Supplier development positively and significantly predicts sustainable performance

Significance of the Study

The study would be of tremendous benefit to various stakeholders given the nature of their need for the insights that would be provided via this empirical investigation. The study would provide insight into how cocoa farm managers or caretakers and owners may alter their operations to suit the numerous supplier development programmes carried out by the LBCs for their mutual benefit. The study would provide insights into the different aspects of supplier development practices that significantly influence the various dimensions of sustainable performance, hence, directing resource allocation of LBCs into areas of priority in terms of the developmental needs of the cocoa bean suppliers in Ghana.

Cocoa farmers would be able to detect how the supplier development initiatives they receive from the LBCs affect, if any, the operational efficiency of their farming operations and this would provide insights into which aspects of the supplier development initiatives to concentrate to enhance operational efficiency. Furthermore, LBCs would be able to determine how their various supplier development activities affect the operational efficiency of the cocoa bean suppliers, an information that would guide resource allocation and budgeting for such interventions.

The inclusion of the mediating variables may provide room for testing the direct and indirect effect of the predictor and together with the mediators provide proof of the potency of supplier development alone in affecting the sustainable performance of cocoa bean suppliers in Ghana and also provide insights on how supplier development mingles with the purported mediating constructs to predicting changes in sustainable performance among the cocoa bean suppliers or farms. The project would also provide empirical evidence as to how business size and age interact with the relationship between supplier development and sustainable performance of cocoa plantations in an emergent developing country context in sub-Saharan Africa.

Consideration of contextual considerations such as firm age and firm size should affect the choice of cocoa bean suppliers for supplier development efforts given the nature of interaction between supplier development and sustainable operational efficiency of cocoa bean suppliers in Ghana. Knowing how the buyer-supplier relationship relates to the predictive relationship between supplier development and operational efficiency of cocoa bean suppliers in Ghana can inform how training programmes could be fashioned for LBCs and cocoa farm managers/owners to induce desirable behaviour in the cocoa industry.

The analysis of firm ambidexterity in the context of this study could aid in understanding how cocoa farmers can modify their farming practices to meet the changes generated by supplier development activities by LBCs in Ghana. The findings could enable cocoa farm managers/owners to recognise the various tactics needed to be more adaptable to changes dictated by supplier development initiatives in the cocoa sector. The study could also provide insights into the formulation and implementation of appropriate corporate policies to be applied when it comes to supplier development initiatives in Ghana through the intervention of the Ministry of Agriculture and its development partners in the cocoa supply chain in Ghana.

The supplier development actions of Ghana Cocoa Authority and other LBCs might be driven by the insights that would be obtained from this study even as the findings give the direction for the design of supplier development policies in the cocoa industry. The insights from the performance of the cocoa bean suppliers on the sustainability dimensions could provide means to identifying areas of consideration for policy formulation from the perspectives of both LBCs and cocoa farm managers/owners based on first-hand empirical data at the micro-level of the cocoa industry of Ghana.

Also, the study may provide the foundations for evaluating current theories as characterised by the nature of supposed links among the constructs in an emerging market; a contribution that looks to be unusual contextually. The theoretical contributions of this study could provide means to interconnect the variables/constructs based on scientific evidence inherent in the empirical findings of this study, hence directing practice and policy direction in terms of the interplay among supplier development, sustainable procurement, buyer-supplier relationship quality, firm ambidexterity, firm characteristics (Firm age and firm size) and sustainable supplier performance.

Delimitation

The study focusses on examining the influence of supplier development initiatives, both direct and indirect, on the operational efficiency and sustainability performance of cocoa bean suppliers in Ghana, to be precise those located in the Western North Region of Ghana. Other contextual elements including buyer-supplier relationship, firm ambidexterity and firm characteristics (firm size and firm age) were also incorporated in the calculated model. Ghana spans a total land area of 238,535 square kilometers and is located along the Gulf of Guinea and the Atlantic Ocean in the sub-region of West Africa (Ghana Statistical Service as referenced by Mabe et al., 2022). Ghana has an estimated population of 30.8 million (Mabe et al., 2022).

Cocoa farmers in the Western North Region have received substantial help from the government of Ghana and its developmental partners in the cocoa business such as private LBCs, NGOs and so forth. However, cocoa farmers bemoan issues of unethical procurement practices in the area including breaching of agreements between LBCs and cocoa bean suppliers (Owusu Ansah et al., 2017) and decry the numerous social, economic and environmental challenges in the area, which threatens the sustainability of the farming businesses. Besides, certain cocoa bean suppliers in Ghana are unable to alter the operations to match some of the supplier activities done by LBCs, thereby reducing the actual impact of such initiatives on the performance of the farms (Buor, 2022).

Limitations

Since the study was conducted at the micro-level perspective, the assessment of the data may be characterized by biases in the data collection. Furthermore, the personalized individual experiences of the participants given the contextual elements considered in this study could not be captured. Furthermore, the generalization of the study is limited since the study did not target suppliers of any specific LBC within any specific supplier development programme.

Definition of Terms

Supplier Development: Any effort of a buying firm to increase the performance and/or capabilities of the supplier and meet the buying firm's short-term and long-term supply needs (Krause & Ellram, 1997**)**

Sustainable Performance: Sustainable performance ensures the holistic approach that ensures the balance among economic, social and environmental firm-level goals (Afum, et al., 2020).

Operational Efficiency: Operational efficiency reflects the quality of microeconomic activities, which is centred on the overall effort of the enterprise management (Xue, et al., 2022).

Farm Ambidexterity: Encapsulates the blend of both incremental, more efficiency-based innovation and radical, novelty-oriented innovative practices for short-term success and long-term survival (Clauss, et al., 2021)

Buyer-Supplier Relationship Quality: Refers to the mutually beneficial inter-firm relationship built on trust between suppliers and buyers in collaborative and learning context (Arroyo-Lopez, Holmen & de Boer, 2012).

Firm Characteristics

Firm Size: Represents the hectare of cocoa farm(s) operated by the cocoa bean supplier or farmer

Farm Age: Captures the number of years elapsed since the year of inception of planting of cocoa trees on the registered cocoa farm.

Organisation of the Study

The study is organised into seven main chapters. Chapter One deals with the introductory aspect of this empirical study. It essentially presents information concerning the background of the study, the statement of the problem, the purpose of the study and other vital subsections required by the University of Cape Coast. Chapter Two of the study focuses on the literature review and essentially covers the theoretical review and conceptual review. Chapter Three is dedicated to presenting information about the empirical review, lessons learnt and conceptual framework.

Chapter Four of the study is dedicated to providing information concerning the research methods employed in conducting this empirical study. Chapter Four presents information concerning findings in respect of research objective one which measures the influence of supplier development on the sustainable performance of cocoa bean suppliers in the context of the study. Chapter Five focuses on the results concerning findings concerning objectives.

Chapter Six focuses on the discussion of the results whilst Chapter Seven focuses on the summary, conclusions and recommendations.

CHAPTER TWO

THEORETICAL AND CONCEPTUAL REVIEW

Introduction

The literature review was carried out to point out popular streams of research contextually, with the view to aiding the synthesis of research results that guide the assessment of the knowledge base in this field of study thereby identifying future research opportunities (Glock, Grosse & Ries, 2017). It focuses on reviewing the theories that underpin the purported relationships between or among the constructs. It also provides information concerning the definition, explanation, conceptualization and contextualization of the concepts forming the research phenomenon.

Theoretical Review

Empirical studies require theory or theories to justify the purported relationship existing among constructs under investigation. With this position, the use of theories in empirical studies provides more explanatory power and also leads to important managerial conclusions (Zorzini et al., 2015). Therefore, the choice of theory can make a difference in the conclusions to be drawn. From the perspective of Yawar and Seuring, (2020) supplier development is complex and studies on it should use theories that are beyond operations and SC management hence the inclusion of the contingency theory. The major theories considered in this section are resource dependence theory, dynamic capability theory and contingency theory.

Resource Dependence Theory

The resource dependence theory [RDT] was propounded by Aldrich and Pfeffer, (1976). RDT claims enterprises are fundamentally not selfsustainable since they have limited access to resources and hence, need to link up with the external environment to develop (Pfeffer & Salancik, 2003). The RDT builds on the preceding power-and-exchange-based theories of organising and on the open system viewpoint that highlights the organisation-environment interface (Roundy & Bayer, 2019). Distinctively, the RDT presents the idea of difference rather than homogeneity in organising. The essence of RDT is founded on the premise that dependence on resources relates to the focus firm's actions, network exchanges and consequences.

RDT is anchored in the idea from economic sociology that enterprises are immersed in networks of economic interdependencies and social ties (Pfeffer & Salancik, 1978). In this respect, organisations get resources from their networks of entities including suppliers, creditors, customers, competitors and government. Inferring from this, to access resources, firms create ties within their network to acquire and manage their dependence in situations where resources are not equally given by such enterprises (Pfeffer, 1981). Not only do the companies gain resources from such exchange-oriented inter-firm connections but they also design and implement the right strategies to acquire and manage resources in such dependent-based relationships.

The RDT also posits organisational behaviour, structure and outcomes are partly explained by their contexts or settings, that supply crucial resources to companies (Pfeffer & Salancik, 1978). Power maximization is the overarching pillar for the success of enterprises that rely on the resource dependence hypothesis to compete (Pfeffer, 1981). Firms missing some strategic resources consequently aim to create ties with firms that possess such resources with the view of acquiring access to such resources via such inter-firm relationships.

Firms aim to reduce uncertainty and manage their dependency by purposefully structuring their exchange connection, through the formation of formal and semi-formal linkages with other firms (Roundy & Bayer, 2019). The essence is to maintain a social tie with interdependent persons so that they can create trust-based partnerships (Pfeffer & Salancik, 1978). Thus, enterprises create collaborative partnerships with external stakeholders (Nodes) to manage their dependency on vital resources (Prasad, Zakaria & Altay, 2018).

In managing their dependencies, corporations normally adopt two major tactics including buffering and bridging. Buffering refers to the act of shutting off core operations from outside influences and executing internal actions to manage resources (Roundy & Bayer, 2019). Decreasing the volume of production, storing resources, diversifying technologies, predicting environmental changes and decreasing volatility in input or output through contracting and advertising are typical buffering tactics. Buffering solutions are essentially internal mechanisms to shield a firm from external dependencies yet optimizing internal dependencies (Roundy & Bayer, 2019).

Bridging strategies are those tactics that are utilised to manage and control external dependencies. It involves the attempts to obtain resources by constructing inter-dependencies that evade or minimise the control that external resource providers possess or execute (Pfeffer & Salancik, 1978). In this context, bridging strategies are focused on developing many interwoven business engagements in cooperation to ensure that all parties involved have the resources necessary under the correct conditions to produce a win-win scenario. The primary goal of bridging methods is to minimize risks associated with resource dependency. Typical bridging techniques include negotiating, contracting, co-optation, alliances, board interlocks, mergers, vertical integration and governmental links (Roundy & Bayer, 2019).

The actions of LBCs depend on the outcomes of the first-tier cocoa bean suppliers since they must gain access to a steady supply of cocoa beans to operate as buying groups. The first-tier cocoa farms or suppliers also depend on the resources, mainly supplier development initiatives and sales they get from the LBCs to finance their operational activities. Therefore, power and influence characterize the interactions that ensue between first-tier cocoa producers and LBCs in the context of the study. The open system view of the RDT argues the cocoa bean suppliers' social network is made up of varied players and so resource deficiency forces the establishment of inter-dependencies (Pfeffer, 1987).

The possession of vital resources by both cocoa bean suppliers (Cocoa beans) and LBCs (Supplier development initiatives) enables each nodal player to exercise power to impact the operational efficiency of cocoa bean suppliers and LBCs respectively. This means cooperating players in exchange relationships can exert pressure on others to behave in ways they want through the transmission of information. The character of the resource dependency and organisational outcome contextually is collaborative, however, there is a risk of competitiveness ensuing.

The degree of interconnection can modify the operations of focal enterprises (Cocoa bean suppliers) to achieve the targeted outcomes-sustainable performance measured along the economic, social and environmental perspectives. The formation of inter-firm collaborative relationships via supplier development initiatives has the potential to help the cocoa bean suppliers ameliorate operational inefficiencies, thereby providing the means to improve the operational efficiency of the cocoa bean suppliers, which in turn translates into improved sustainable cocoa farm performance. The explanation is that supplier development programmes serve to position cocoa bean suppliers to obtain access to resources and capabilities that they were unable to possess or acquire on their own, the application of which aids the cocoa bean suppliers to become efficient in their farming operations. This in turn delivers sustainable operational outcomes which allows both the cocoa bean suppliers to benefit and the buying organisations.

In conclusion, it is claimed in RDT that firms must coordinate in their supply chains and build networks with stakeholders in an attempt of accessing critical sources, which enhances stability and functionality. In Ghana, in the case of the cocoa industry, LBC is in a process of establishing its sources of cocoa beans, reducing uncertainty of supply and enhancing functionality. Through finance, training and provision of technology, LBC enables its sources in adopting best practices in farming, resulting in enhanced yields and enhanced-quality cocoa. The essence is to reduce transaction cost, reduce disruptions and support long-run relations, assuring a constant supply of cocoa beans.

Additionally, these supplier development programmes increase environmental and social sustainability since they promote sustainable farm production practices including agroforestry and reduction of use of unapproved chemicals. Ultimately, by minimising dependencies on materials and maximising the capacity of suppliers, LBC-led supplier development programmes increase operational efficiency and sustainable performance of cocoa bean suppliers, which positively impact Ghana's whole cocoa supply chain performance.

Dynamic Capability Theory

The dynamic capability theory [DCT] was propounded by Teece, (1997). The DCT came as an extension to the resource-based view theory and addresses the problem of lack of proper delineation of capabilities when changes occur in an uncertain environment (Chowdhury & Quaddus, 2017). The RBV theory fails to explain why many firms, despite having abundant resources and capabilities at their disposal, are bewildered by teething economic and financial challenges (Oduro & Haylemariam 2019). To this effect, Liu, Eng and Takeda, (2015) opined that the possession of abundant resources and capabilities alone is not enough to lead to superior performance as resources and capabilities are not end or productive in themselves, hence the need for such resources and capabilities to dynamic in nature.

Firms should have the capability to assemble, integrate and manage such resources efficiently to produce superior performance. Therefore, the DCVT plans appropriately in terms of resource acquisition and access, and possession of the right capabilities to respond to situation-specific changes therefore addressing the idiosyncrasies of contingencies (Chowdhury & Quaddus, 2017; Su, et al., 2022). Supplier development initiatives are aimed at responding to the ever-increasing complexity and accelerating velocity of the change in the cocoa industry due to the massive sustainability-oriented standards.

Cocoa bean suppliers that exhibit a high level of ambidexterity possess astute dynamic capabilities that aid them in responding to changes occasioned by supplier development initiatives and activities. LBCs do exert significant organisational change through their investment decisions, after they have assessed the market, product and technological developments (van Lieshout et al., 2021). Dynamic firms reconfigure new knowledge which helps them to serve their markets well hence the attainment of competitive advantage (Teixeira et al., 2021). Here comes the interaction of such innovations with operational complexities in creating value in the form of operational efficiency among the firms that were supported via the supplier development initiatives.

Ambidextrous firms can achieve congruence with changing business environment (Kuuluvainen, 2012) by adjusting the operational tactics to meet the changes occasioned by the acceptance of the supplier development project from the LBCs. Organisational ambidexterity ensures capability to learn, optimize and balance. Dynamic capability embedded in organisational ambidexterity is operationalized as firms’ ability to address the rapidly evolving sustainability expectation of stakeholders by purposefully modifying functional capabilities for the concurrent pursuit of environmental, economic and social competences (Karman & Savaneviciene, 2021).

The mediating role of firm ambidexterity is grounded on the logic that start of supplier development generates change in the operational tactics of first-tier cocoa bean suppliers because of the innovation that the LBCs desire the farms to gain via such initiatives. The cocoa farmers have two primary alternatives to make. The first occurrence is what is termed the exploratory ambidexterity. In this example, cocoa bean suppliers operate to fulfil the needs of new clients and markets by way of breaking away from present technologies to innovate wholly new products or services. For example, first-tier cocoa farms or suppliers may accept viable cocoa seedlings that are supplied by LBCs to meet the quality standards for the cocoa bean providers supply to the LBCs.

The second occurrence is the exploitative ambidexterity. In this situation, the first-tier cocoa farms adapt their operational plans to match the needs of current clients by way of employing and perfecting current accessible knowledge and skills, upgrading current products or services to make the existing production process more effective. For example, to increase productivity on the same cocoa plantation, cocoa bean suppliers may add fertilizers and practice novel farming techniques they have obtained from training and extension programmes. This would in turn improve their operational efficiency consequently translating into greater sustainable performance. In each scenario, supplier development plays an essential function in affecting the degree of operational efficiency of the cocoa plantations. Thus, firm ambidexterity helps to better explain the influence of supplier development on operational efficiency.

In summary, dynamic capability theory emphasises a firm's internal and external competency integration capacity, internal and external competency capacity, and internal and external reconfiguring in an attempt to adjust in a constantly changing situation. In supplier development by LBC, firm ambidexterity, which is balancing exploring (novelty, learning) and exploiting (optimising, efficiency), is an intermediary in operational efficiency. LBCs engage in such practices of supplier development as training, materials provision, and guaranteeing quality, which entail such exploitative activities of streamlining current practices as well as exploratory attempts in supply chain practices.

By fostering ambidexterity, cocoa bean suppliers can absorb new learning, reduce procurement and logistical costs and increase procurement performance, which translates into enhanced operational efficiency. The dynamic capability school of thought posits that in its absence, cocoa bean suppliers can fail to make maximum utilisation of supplier development programmes, whose contribution to streamlining Ghana's cocoa industry operations is henceforth restricted.

Contingency Theory

The contingency theory was proposed by Fiedler in 1964. The contingency theory is based on the idea that there is no universal organisational model (Ahmad, Zabri & Atan, 2022) and asserts that a coherent collection of qualities must align with contextual variables. The contingency theory suggests interaction instead of a just linear link inherent in the universalistic perspective. The contingency theory posits that the relationship between independent and dependent variables alters with the inclusion of a contingency variable, thereby facilitating the examination of internal and external fit in relation to contextual factors (April Chang & Chun Huang, 2005). Contingent variables, as defined by Netland (2016), are the characteristics of a certain environment that differentiate one situation from another. This reinforces the complementarity and configurational aspects of contingency theory (Feizabadi & Alibakhshi, 2022).

The configurational perspective promotes the analysis of how attributes and their combinations influence economic performance. The incorporation of firm age and firm size in the study was substantiated by the configurational perspective of contingency theory (Feizabadi & Alibakhshi, 2021). Diverse farms, varying in operating age and size, may necessitate distinct supplier development and exhibit differing responses to these initiatives. A spectrum of empirical investigations has handled business size and firm age (Valtakoski & Witell, 2018) as moderating variables. The interacting role of contingence variables produces some form of synergistic advantages (Oyewo et al., 2022).

The complementarity perspective of the contingency theory conceptualizes attributes as practices and has identified complementary practices, thus practices that if one of them increases, the marginal benefits of the other practices also rise, as key to success factors of achieving fit (Feizabadi & Alibakhshi, 2021). The complementarity recognizes that the complimentary association could come from various traits (Feizabadi & Alibakhshi, 2021). In this approach, several contextual practices such as firm or organisational ambidexterity and supplier-buyer relationship quality are integrated as elements that intensify the impact of supplier development on operational efficiency of the cocoa farms (Naidu, Singh & Narayan, 2023).

Holistically, the contingency theory depicts the environment-structure-performance relationship for the organisations concerned contextually; a feat recognized in some previous empirical studies (Williams, Ashill & Naumann, 2017; Netland, 2016). In this scenario, firms achieve enhanced efficiency by improving fitness and alignment using their defined set of contingent variables (Netland, 2016). Such fit process is perceived as dynamic and ongoing, particularly in fast-moving business environments.

Summarising, the contingency theory posits there is not a universal, in fact, a one-size-fits-all style of managing an organisation; rather, structure and strategy are a matter of circumstance. In reference to supplier development led by LBC in Ghana's cocoa industry, buyer-supplier relationship quality is a mediating mechanism for operational efficiency. LBCs invest in buyer-supplier relationship programmes such as capacity-building, financing and infrastructure in an attempt to increase capacity in its suppliers. The success of these programmes, however, is heavily dependent on buyer-supplier relationship quality. Relationship intensity, on grounds of trust, relationship-specific investment and openness, results in mutual understanding, resulting in enhanced understanding between parties, ultimately resulting in improved operation efficiency.

Furthermore, firm age is a moderating variable in this relationship (Supplier development and operational efficiency) as mature firms have greater bases of experience in relationships, industry, and networks, which can moderate the relationship between supplier development and operational efficiency. Contingency theory dictates firms must adapt strategies about internal factors for maximum impact. The old firms, which have well-established bases of relationships, can make it easier to succeed in supply chain improvements based on their experience in the industry. The younger firms can make it difficult to establish trust and make long-run commitments, which can dampen the impact of supplier development on operational efficiency.

Similarly, firm size is a contingency of operational efficiency and supplier development initiatives relationship. Larger firms enjoy more finance, organised supply chain systems and negotiation power, which can enhance supplier development programmes. Contingency theory assumes firms have a necessity of adaptation of strategies to structural capability; hence, large firms can spend more on supplier development, which leads to improved operational efficiency. Small firms, which enjoy finance and managerial constraints, can have a constraint in being able to fully enact supplier development initiatives, hence limiting the amount of operational efficiency. Buyer-supplier relationship quality, firm size and firm age interplay, hence it is an influence on supplier development initiatives' success in Ghana's cocoa industry; hence, contingency theory is a valid tool for understanding these interrelationships.

Conceptual Review

This section provides information concerning the concepts that were focused on in this empirical study. The section focuses on explaining the concepts, their definitions, forms and dimensions. It also focuses on contextualizing the concepts by referring to the industry-specific dynamics of the phenomenon.

Supplier Development

Buying organisations are currently pursuing strategies of developing sustainable supply chains with strong and profitable suppliers through supplier development (Tran, Gorton & Lemke, 2021). Supplier development operations are carried out by buyers to strengthen the capabilities of suppliers (Yawar &

Seuring, 2020; Dalvi & Kant, 2018). Supplier development has been defined as any endeavour of a buying firm to raise the supplier's performance and/or capabilities and suit the buying firm’s short-term and long-term supply needs (Krause & Ellram, 1997).

Watts and Hahn (as cited in Glavee-Geo (2019) also provided that supplier development is focused on long-term corporative dealings between buying firms and their suppliers that seeks to upgrade the capacities of the suppliers in terms of quality, technical, delivery and cost and to promote ongoing improvement in the exchange relationship for their mutual benefits. Resource mobilization is at the centre stage of any supplier development plan since implementation of such programmes is largely dependent of access to and interchange of needed resources.

Initially, supplier development was introduced in the manufacturing sector which essentially focused close working with suppliers, transfer of information and corporation between buyers and suppliers (Changalima et al., 2021). However, Changalima, et al., claimed once supplier development was conceived as being more strategic in nature by occupying top-managerial decision instead of a mere purchasing domain, it became more pronounced and applicable in different industries including the agriculture sector.

The conceptualization of supplier development has been done in different contexts. For instance, supplier development has been conceptualized as either direct or indirect (Krause & Ellram, 1997). Direct supplier development relies strongly on the usage or commitment of resources of the buying firm. Informed by survey-based studies, notable direct supplier development strategies recognized include investment in terms of logistical, financial and technical, knowledge transfer and supplier monitoring (Yawar & Seuring, 2020). Wagner, (2006) found that direct supplier development had two main sub-constructs including the transfer of capital resources and human resources.

Indirect supplier development, on the other hand, requires limited or in some instances no resources from the buying organisation. Changalima et al., (2021) identified certification, incentives, setting suppliers' targets, penalties and communication as key indirect supplier development activities. Yawar and Seuring's (2020) conceptualized model classified supplier evaluation, supplier rewards, field visits, supplier auditing and supplier certification as some indirect supplier development strategies. Direct supplier development and indirect supplier development need to be built on reliable and trusting stable buyer-seller relationships, especially, long-term relationships. However, it was found that buyers were hesitant to engaging in direct supplier development compared with indirect supplier development (Wagner, 2006).

Bai and Sarkis (2016) in their study conceptualized supplier development into tangible investment and intangible investment initiatives. Tangible supplier development investment include investment in the operations of suppliers in terms of capital resources, human investment and equipment whilst intangible investment supplier development in terms of knowledge and expert sharing. For instance, tangible supplier development investments may manifest in situations where buyers may finance the purchase of equipment that can foster the efficient operations of the suppliers, and transfer their employees who are experts in some fields in which the supplier lacks such skills.

The choice of the form of investment for the conceptualization is anchored on the idea that buying firms can vary the quantities of investment they make in supplier development in situations where limitations on supplier performance are unavoidable. Training of suppliers, setting performance targets, providing technical assistance, and joint problem-solving programmes are key instances of intangible supplier development investment. Empirical evidence proves supplier involvement and collaboration are critical enabling factors that need to support the implementation of investment-based supplier development hence the need for joint actions between buyers and suppliers (Bai & Sarkis, 2016). Although there are some overlap complexities regarding the classification of supplier development based on investment, this conceptualization could be a starting point for understanding the various supplier development strategies focal buying firms may undertake and how they can work jointly with their suppliers in managing such relationships.

Furthermore, supplier development is also conceptualized as including either reactive supplier development or proactive supplier development (Krause et al., 1998). Reactive supplier development projects are implemented to solve encountered problems, thus reactive supplier development starts after production after there is a discovery of gaps in supplier performance (Lawson et al., 2015). Lawson, et al., further indicated that proactive supplier development involves those strategies put in place well in advance before the start of the operations. It requires proactive evaluation of suppliers before the choice of a particular intervention for a supplier. Proactive supplier development strategies, especially during product development offer the opportunity to prevent quality defects that occur in the supply chain before the launching of the new product.

Sánchez-Rodríguez, Hemsworth and Martínez-Lorente (2005) also indicated that supplier development practices can be conceptualized as comprising three categories which include basic, moderate and advanced supplier developments. Basic supplier development includes activities that impose the limited necessity of firm engagement and less investment from the buyer's resources such as time, personnel and capital. Typical basic supplier development includes supplier evaluation, performance measurement and feedback, limited sourcing, standardization of parts and supplier qualification. Moderate supplier development activities include activities that require some relatively immediate level of buyer involvement and resources.

Comparative to basic supplier development, more resources are allocated for moderate supplier development activities such as visiting the supplier's plant, awarding and approving the supplier's performance, certifying suppliers as well as collaborating with suppliers in material improvement programmes. Advanced supplier development includes a higher level of buyer involvement and usage of buyer's resource utilization which required a high level of cooperation between the supplier and the buyer. Advanced supplier development activities include training of suppliers, the collaboration between buyers and suppliers, involvement in suppliers' new product development and intensive information exchange with suppliers (El Bouassami, Ahmed & Tizro, 2014).

Contextually, supplier development is operationalized as higher-order construct with direct supplier development practices and indirect supplier development practices or initiatives. Supplier development activities in Ghana's upstream supply chain in cocoa, particularly those that are carried out by LBCs with its cocoa bean growers (farmers), are in direct form in the form of mass pruning, mass spraying, and cocoa replanting, as well as artificial pollination, and in indirect forms in input supply, certification, finance schemes and training and extension due to a myriad of underlying drivers.

Ghana’s cocoa sector is affected by chronic challenges that entail old-age cocoa trees, lowered production, pests, as well as sickness, alongside poor farming. The challenges are addressed by LBCs in a bid to have a consistent supply, high quality beans and sustainable farming operations. Direct development activities towards short-term, observable outputs in terms of enhanced production and improved farm operations making cocoa bean providers or farms produce more cocoa. Direct development activities are in turn targeted towards systematic as well as knowledge-based challenges that enable extended firm sustainability as well as improved livelihoods for farmers.

LBCs engage in direct supplier development activities because these have a direct impact on cocoa production and the quality of beans. Some activities involved are rehabilitation of cocoa [replacing old and affected trees ensures a steady supply], mass pruning [removal of excess branches helps in the development of pods], mass spraying [management of pests and diseases that cause production loss], and artificial pollinating [pod formation is enhanced, improving productivity]. The above activities are essential because the majority of cocoa growers in Ghana do not have the resources, skills and finance necessary to conduct these activities on their own. The activities are taken over by LBCs as a form of supplier development.

Indirect supplier development ensures that cocoa farmers have resources and finance and technical knowledge, to manage their farms sustainably in the long term. Such interventions include input supply [Farmers require fertilisers and insecticides and improved seedlings, to boost production], certification programme [Promote compliance with sustainability and sustainable farming, enhancing farmer income in terms of premium prices], financing scheme [Avail finance towards investing in farms, considering that farming is a cyclical activity] and training and extension [Impart best farming management practices, as well as post-harvest care and climate-resistant farming on cocoa]. In making these facilitative measures available, LBCs not only keep farmers productive in the short term but also independent in terms of finance and resistant to climatic and market vagaries.

In summary, operationalization of supply development activities as direct (farm inputs) and indirect (capacity development as well as measures of support) is a strategy towards short-run farm production and longer-run sustainability. Direct supplier development measures tackle key agronomic constraining factors, while indirect activities contribute farmer capacity and awareness towards resilience and regular high-quality production in the long run. The two strategies are mutually appropriate both to farmers as well as LBCs in that they promote a stable and sustainable supply chain in Ghana.

Steps in Supplier Development

Supplier development follows to some logical build-up steps as part of strategic supply chain management process (Leenders, 1966). The steps include these three main steps. Firstly, buying organisations prepare supplier development. Thus, supplier evaluation is done to ascertain prudent evidence on whether indeed suppliers are in need of supplier development initiatives or not. It also establishes the kind of supplier development needs that should be provided after suppliers have been grouped based on those that need support and those that do not need such support. Before embarking on a formal supplier development programme, the purchasing organisation must critically review those aspects of its own operations that affect supplier performance (Lascelles & Dale, 1990).

However, it is important to understand that the choice of kind of supplier development initiative to undertake is also determined by the needs of the initiating buying firm(s). Hence the buying organisation needs to select appropriate supplier development measures in terms of direct and indirect projects (Alawi, Al Mubarak & Hamdan, 2022). It should focus on establishing and articulating the objectives, setting priorities for actions, communicating the programme objectives and methodology to key suppliers and exchanging information freely with suppliers (Lascelles & Dale, 1990).

This phase requires extensive consultation and communication processes to ascertain the exact support(s) that suppliers are lacking as independent actors in the supply chain, the cost involve in carrying out such support(s), what should be done to resolve the challenges identified and how the supplier development activities should be carried out. Decision-support systems for supplier development are required at this phase. Therefore, consideration of the appropriate supplier development models which include optimization models, heuristics models and multi-criteria decision-making models as well as the solution techniques embedded in such models is integrated at this phase of supplier development evaluation (Glock et al., 2017).

The second phase of the supplier development is the actual development of the selected supplier(s). Thus, execution of the selected supplier development is at this phase. Appropriate resources are allocated through budgeting, contracts are formed with selected suppliers and contractors or the buying organisation, as the case may be, is given the mandate to carry on the agreed supplier development which could be either direct supplier development or indirect supplier development or their combination (Glock et al., 2017). A higher level of collaboration and support from the selected supplier(s) are required to promote the efficiency of the implementation of the supplier development projects.

The third phase of supplier development is the monitoring and controlling stage where executed supplier development practices are checked, measured and compared to those planned in the first phase to ensure compliance and effectiveness of the attainment of the supplier development objectives. In situations where supplier development outcomes are met, such activities are encouraged and continued (Glock et al., 2017). Glock, et al., further indicated that in situations where the outcomes of the supplier development are not met, there may be modifications or even outright cancellation of the supplier development or another supplier may be selected for developmental purposes.

Supplier development is therefore considered an ongoing process, the need for buying firms to form trusting long-term partnership arrangements with their supplying partners. Such relationhsip moves from traditional adversarial buyer-supplier realtionship to co-makership (Lascelles & Dale, 1990). This confirms the integral role of buyer-supplier relationship quality in the context of supplier development. Figure 1 illustrates the steps in supplier development.

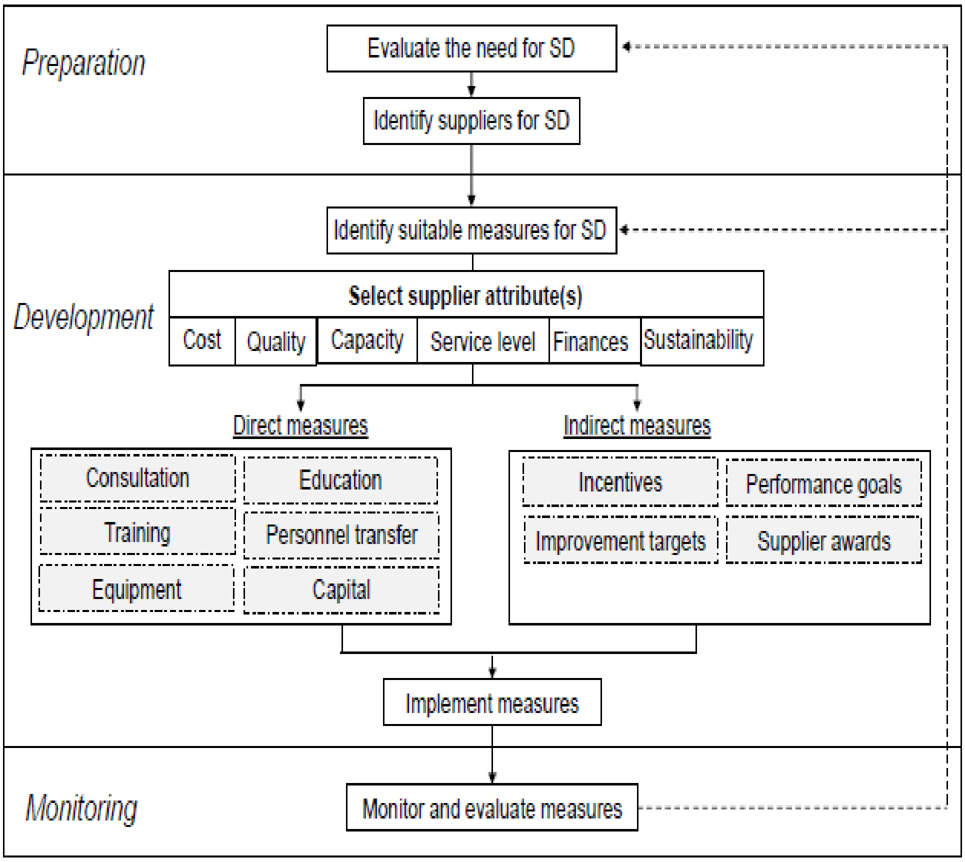

Figure 1: Steps in Supplier Development
Source: Adapted from Glock, et al., (2017)

Supplier Development in Ghana's Cocoa Sector

The LBCs have adopted non-price competitive strategies [Supplier development initiatives] to capture market share from the cocoa bean suppliers (Kpabitey, Chitose & Kusadokoro, 2024). Also, the COCOBOD, through the Cocoa Marketing Company, has undertaken various supplier development programmes in the cocoa industry to enable cocoa bean suppliers to be more productive even as it seeks sustainability as its major goal (Hess, 2022). A representative of such projects is the High Tech [Ht] and the Cocoa Disease and Pest Control [CODAPEC] which intended to generate a turnaround in land productivity instead of a land expansion approach. Sustainability efforts in the cocoa business in Ghana somewhat are buyer-driven (Carodenuto & Buluran, 2021) albeit not as robust as the case of aquaculture (van der Ven, 2018) and coffee (Grabs & Ponte, 2019). The following paragraph discusses the various direct and indirect supplier development programmes in the cocoa business in Ghana.

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Direct Supplier Development Initiatives

COCOBOD in collaboration with National Cocoa Rehabilitation Programme have planted twenty million viable cocoa seedlings which replenish older less productive cocoa trees in the country (O'Sullivan et al., 2018). This programme was initiated because about 20% of Ghana's cocoa farms are less productive. The COCOBOD partnered with the United Nations and jointly developed institutional policies, systems and tools with the view to rehabilitating cocoa landscape, conserving and expanding forests as well as incentivizing farmers in the quest to influence the adoption of environmentally friendly best farming practices (Boadi et al., 2023).

The hybrid cocoa seedlings programmes help in overcoming the onset of cocoa swollen shoot disease in the cocoa business (Jebuni-Dotsey & Senadzi, 2023). The campaign, from the standpoint of Jebuni-Dotsey and Senadzi, focusses at distributing suggested seedlings free of charge to cocoa producers in all cocoa regions in Ghana. This free supply of disease-resistant and high-yielding cocoa seedlings commenced in 2013/2014 cocoa planting season. It should, however, be recalled that, Jebuni-Dotsey and Senadzi, hinted that, at the beginning, the seedlings were delivered to cocoa producers that had trouble with infection at subsidized cost. Such cocoa producers were compelled to pay 20 peswes for nursing and transplanting. Such advised seedlings are to protect against CSSVD and black pod diseases thereby providing the means to decreasing farm maintenance expenditures.

Rehabilitation practices extend from complete replanting of the orchard, replanting in stages, selective replanting of trees, planting new cocoa under old cocoa used as temporary shade, reconstruction cocoa crowns using basal suckers, with or without grafting them, various types of pruning and pollarding to regulate cocoa crown's shape and size, replanting, stumping, propagating elite trees, shade regulation, early intercropping and so forth (Somarriba et al., 2021). The rehabilitation strategy focuses on employing new and improved hybrid cocoa planting materials to replace old or current cocoa tree stocks that are frequently planted to local landraces with associated poor cocoa yield (Asare, Afari-Sefa & Muilerman, 2018).

The decision to undertake rehabilitation, from the perspective of Somarriba et al., (2021) is impacted by three important things including cocoa yields (less than 500 kg ha-1 year-1), planting density (less than 800 plants ha-1) and age of the cocoa farm (More than 40 years). Cocoa rehabilitation also use hybrid cocoa seedlings that are created through the breeding plan of the Cocoa Research Institute of Ghana (Vigneri & Kolavalli, 2017). Usually, seedlings that are created using CRIs are employed in rehabilitation projects because they are early-bearing plants, high yielding, resistant to major pests and diseases and maybe, most importantly, extremely adaptable to cocoa ecologies (Adebayo et al., 2022).

A hand/artificial pollination training initiative has been begun to provide job creation particularly for the youth to improve the livelihood of the youth (Cocoa & Forests Initiative Annual Report, Ghana, 2020). Hand pollination is an artificial technique whereby pollen is collected from blooms on a tree or surrounding ones and dropped on the stigma of the targeted tree. The idea is to increase pod per cocoa tree using artificial means. 192,252 farmers benefited from hand pollination (Cocoa & Forests Initiative Annual Report, Ghana, 2020). Through the CODAPEC programme, the Seed Production Units [SPU] located in the cocoa growing regions were supported by the hand pollination effort. This experiment revealed that the SPU hybrids in the cocoa farms were four time as productive as local unimproved materials (Vigneri & Kolavalli, 2017).

Pest and disease control practices have been begun which involved the introduction of viable hybrid seeds and delivery of appropriate pesticides and weedicides (Boateng et al., 2023). According to Jebuni-Dotsey and Senadza, (2023) the first pest and disease management programme in the cocoa sector of Ghana took place in 1938, under the Gold Coast Department of Agriculture in Tafo in the Eastern Region. Through the Cocoa study Institute, a large investment was made to support scientific study into disease prevention in the cocoa production industry. The Cocoa Health and Extension Division provides extension services ensuring cocoa bean suppliers implement advancements in cocoa production. The COCOB (As cited in Jebuni-Dotsey & Senadza, 2023) asserts all the 62 cocoa districts are reclassified into two divisions: Black pod areas (Districts in Volta, Brong-Ahafo and some parts of Eastern Region) and capsid areas (Some districts in Western and Ashanti and all districts in Central and Eastern regions).

The first mass spraying exercise was carried out in 1960s to control the incidence of pests and illnesses in the cocoa production system (Jebuni-Dotsey & Senadza, 2023). As of today, the manner of the mass spraying is that the board sprays half of the recommended number of applications for black pod and capsid control in 3 and 2 applications respectively. The respect of the recommended spraying rounds is done by the cocoa farmer in another 3 and 2 applications accordingly. Pest and disease control practices are carried out to attack mirids and other insects using the permitted insecticides. However, some farmers also use unauthorised insecticides which significantly harm the biodiversity quality. Apart from this, the use of dangerous pesticides, insecticides and weedicides have a disastrous influence on human health.

Among the active substances allowed for cocoa growing in Ghana include thiamethoxam, imidacloprid and acetamiprid (Boateng et al., 2023).

Unprofessional use of pesticides has disastrous effect on the environment by damaging non-target creatures, particularly pollinators which eventually affects harvests (Boateng et al., 2023). Notable pollinators that are destroyed by usage of unapproved pesticides include bees, birds, bats, moths, butterflies, wasps and other non-flying mammals (Boateng et al., 2023). To avert this unfortunate situation among cocoa farmers in Ghana, LBCs assist cocoa bean suppliers, especially smallholders in their pest and disease control projects by providing them with the approved pesticides, sponsoring the cost of spraying and training the farmers about how to efficiently spray their cocoa farms (Biswas et al., 2021). The benefits of the correct application of insecticides to insects in general and pollinators in particular is recognized (Boateng et al., 2023).

LBCs undertake pruning to support cocoa bean suppliers in Ghana (Astrid Fenger et al., 2017) because farmers often lack knowledge about how to undertake pruning, do not have the right equipment to undertake pruning as well as the workforce for such exercise (Niether et al., 2018). Jebuni-Dotsey and Senadza (2023) argued that the high cost of carrying out pruning also deters the cocoa plantations from taking up such exercise. The COCOBOD via its cocoa high technology initiative incorporated mass pruning as part of supply-side intervention in the 2017/2018 harvest year (Jebuni-Dotsey & Senadza, 2023).

Such project is a mean to rewarding cocoa farmers to ensure production and yielding of quality cocoa beans and productivity of the cocoa plants (Kodom et al., 2022). Pruning is a contextual and dynamic activity for varied results which require context-specific diagnosis (Obeng Adomaa et al., 2022). Jebuni-Dotsey and Senadza (2023) also described pruning as the activity of cutting down the superfluous branches of a tree.

Pruning consequently entails the selective removal of branches from cocoa trees with the objective of enhancing the trees' structure and direct fresh, healthy growth. Due to variances in production techniques in cocoa farming, be it full-sun monoculture or multi-strata agroforestry systems, it is important for pruning to be carried out to increase shadow quality and soil quality. Shade quality represents the proportion of cover. Pruning is carried out to guarantee that cocoa trees stay stable and enjoy the correct humid climate (Niether et al., 2018). Therefore, pruning provides methods to keeping the proper temperature (not fall below 15 ^{0}C and not exceed 23 ^{0}C).

Pruning time and intensity are crucial for balancing light and water availability under seasonally fluctuating environmental circumstances to conserve micro-environments for cocoa production with less exposure to unfavourable climate (Niether et al., 2018). There is vertically coordinated travel pruning which starts from the research site, through manuals to the extension site and extension delivery activities to the cocoa-producing site (Obeng Adomaa et al., 2022). Formation pruning is done on young cocoa trees with the sole objective of modifying the height of the initial jorquette and generating a suitable form during establishment. Sanitation pruning refers to the removal of sick and unneeded branches, epiphytes, mummified pods, chupons and mistletoes. Structural pruning is carried out to form the canopy of grown cocoa trees to a desired size and architecture (Obeng Adomaa et al., 2022).

Indirect Supplier Development Initiatives

Training and extension services for cocoa producers are on the rise. Extension service is consulting offered by agricultural extension agents to promote productivity and agrarian ideas, knowledge, techniques and application of current supported technology (Biswas et al., 2021). Extension services are supposed to help convey information and enable cocoa farmers' access to input support from the LBCs. The extension service is separated into two primary components. The first one is on agronomic/cultural techniques of cocoa farming. The second classification focuses on disease control in the cocoa production sector (Jebuni-Dotsey & Senadzi, 2023).

Training involves the action of informing or instructing cocoa farmers on various duties to help them enhance their performance or knowledge. The farmer business school created for cocoa farmers by the COCOBOD, has had an enormous impact on the productivity of cocoa farmers who participate in such training programmes (Owiredu et al., 2022). It is aimed at providing knowledge to cocoa farmers about how to diversify their production and other activities to improve access to inputs, markets, technical services, and financial services which in turn improve the living standard of cocoa farmers via access to income from such economic ventures.

Through the Cocoa and Forest Initiative [CFI] initiative, 10,000 cocoa farmers have been trained in landscape management covering smart agriculture which eventually supports tree registration and agroforestry (Carodenuto & Buluran, 2021). Good agriculture practices training mixed with sustainability and certification programmes helps to transfer technology that involves the notion of adoption, dissemination and scaling (Obeng Adomaa et al., 2022). Crop diversification instruction is also provided for cocoa farmers which finally improves their sustainable living (Acheampong et al., 2023).

LBCs also supply input supplies to cocoa bean suppliers in Ghana (Vigneri & Kolavalli, 2017). Through the CODAPEC scheme, cocoa bean suppliers were helped with the delivery of subsidized fertilizers and the mass spraying of subsidized agrochemicals. For instance, US$344 average was spent on pesticides and fertilizers in the 2010 and 2011 cocoa seasons (Vigneri & Kolavalli, 2017). The LBCs also compete in delivering fertilizers on credit to cocoa farms with a relation to the sale of cocoa farmers' beans (Bhattacharjee et al., 2012). Access to agrochemicals and fertilizers has tremendously enhanced cocoa production. Farming supplies including cutlasses, seedlings and farm implements are also distributed to cocoa growers. The essence is to enable cocoa farmers to increase their operational efficiency in cocoa bean production.

Also, since soil nutrients are depleted (Wessel & Quist-Wessel, 2015) because of unproductive agricultural practices, fertilisers have been subsidised and supplied to these farmers to promote the productivity of cocoa bean suppliers or farms in Ghana (Hess, 2022). The provision of 88 million hybrid cocoa seedlings in addition to roughly 2.5 million economic permanent plants through the CFI since 2018 is intended to strengthen the livelihood of cocoa farmers in the Western North Region of Ghana (Cocoa & Forests Initiative Annual Report, Ghana, 2020).

Also, 4,793,926 multi-purpose trees were supplied to cocoa producers (Cocoa & Forests Initiative Annual Report, Ghana, 2020). With increased quality cocoa seedlings, enhanced yield is promised paired with enhanced forest governance, there is a chance of lessening pressures on forests and so controlling unsustainable agriculture expansion. For proof, the Cocoa and Forests Initiative Annual Report, Ghana, (2020) reveals average yield of cocoa increased from 450kg/ha to 500kg/ha. In-kind contributions comprising farming tools and labour are supporting the cocoa bean suppliers in their diversification push and restoration of devastated forests.

Encouraging certification for cocoa bean suppliers is a strategy that promotes the sustainability drive of the cocoa farming sector. At the international level, 22% of cocoa growers are stated to have been accredited with the FairTrade (Wibowo et al., 2021). Certification refers to the act of a written assurance given by an independent authority assenting that a product, service or system in question meets particular requirements (Lalwani, et al., 2018). Certification gives an assurance that the cocoa supplied under the seal of the standard organisation derives from farm operations that produce according to the relevant requirements.

The COCOBOD as of 2020 had mapped over 250,000 farms, with 82% traceability achieved (Cocoa & Forests Initiative Annual Report, Ghana, 2020). Certification methods authorised by the COCOBOD compel cocoa plantations to perform pruning as an obligatory practice (Obeng Adomaa et al., 2022). Certification provides checklists for auditing purposes hence improving standardization and implementation of good agriculture practices

(Obeng Adomaa et al., 2022). Inspection is a rigorous control technique for assuring compliance with certification provisions.

Sometimes, LBCs pre-finance the operating activities of cocoa bean suppliers in exchange for a delivery of cocoa beans within the agreed production season under a contractual arrangement. Supporting cocoa farmers through mutual labour assistance practices helps cocoa bean suppliers to access labour in a cost-effective manner (Cobbinah, Danso-Abbeam & Ogundeji, 2023). Mutual labour support is advantageous to large cocoa plantations because of the accompanying greater labour and capital requirements. This alternative of labour finance allows cocoa farmers to run their farming operations cost-effectively, therefore the relief of financial load on cocoa bean suppliers.

Financial support from LBCs to cocoa farmers assists in lifting the financial limitations which subsequently leads to an increase in demand for crop inputs (Kos, et al., 2023). This financial help gives an alternative to alleviate the financial constraints farmers have due of limited access to banks finance or credit in Ghana (Sekyi, Abu & Nkegbe, 2017). Sekyi et al., further noted that although the Agricultural Development Bank was set up in 1965 in Ghana to provide lending to farmers, the bulk of farmers, especially smallholders, are still in credit constraints. No wonder these cocoa farmers are increasingly resorting to purchasing firms or LBCs to acquire access to loans and credit under flexible conditions (Kpabitey, Chitose & Kusadokoro, 2024).

To improve the livelihood of cocoa farmers, Income income-generating activities [IGAs] have been established and implemented by the COCOBOD in Ghana. The essence is to facilitate financial inclusion with the objective to extending farmers' access to operating cash and investment funds. This effort has benefited 191,962 farmers by offering financial products and services like credit and savings accounts, insurance and new products. Village Savings and Loans Association [VSLA] was created to foster entrepreneurship and farm diversification and in 2020, corporations have backed 2,615 VSLA groups that comprise of 61,573 members (Cocoa & Forests Initiative Annual Report, Ghana, 2020). Cocoa price stabilization policy in the cocoa sector equally increases the economic viability of the cocoa farmers in Ghana (Vigneri & Kolavalli, 2017).

The Rationale of Supplier Development

Several causes account for the prospering of supplier development activities in supply chains. From the standpoint of Changalima et al., (2021) supplier development methods are focused on ensuring that suppliers are positioned in a way they can perform to satisfy the expectations of the buyers. Supplier development outcomes are empirically proved to have ramifications for both the buying firms and the supplying firms (Arroyo-Lopez et al., 2012). Engagement in supplier development programmes allows organisations to build a dedicated supplier base in their supply chains which finally results into increased firm performance (Yawar & Seuring, 2020).

Supplier development helps in reducing defects, builds mutually beneficial relationships, improves supply base capabilities, aids in assessing supplier attitude, enhances product availability, supports fast delivery of products, reduces transaction costs, improves financial capability and reduces cost (Dalvi & Kant, 2015). Furthermore, Zhou et al., (2022) highlighted that supplier development activities are carried out to decrease supplier risks and to improve supplier performance. Supplier development is also accredited with aiding enterprises to increase product reliability, design, and production of new items (Changalima et al., 2021).

Supplier development promotes the attainment of the triple bottom line in sustainability including economic, social and environmental (Etse, McMurray & Muenjohn, 2021). Socioeconomic issues such as child slavery, slave labour, and poor working conditions for workers are controlled when supplier development plans are introduced. Supplier development is assigned as giving a way for attaining competitive advantage in the vertical connection in supply chains (Glock et al., 2017).

Supplier Development in the Cocoa Sector

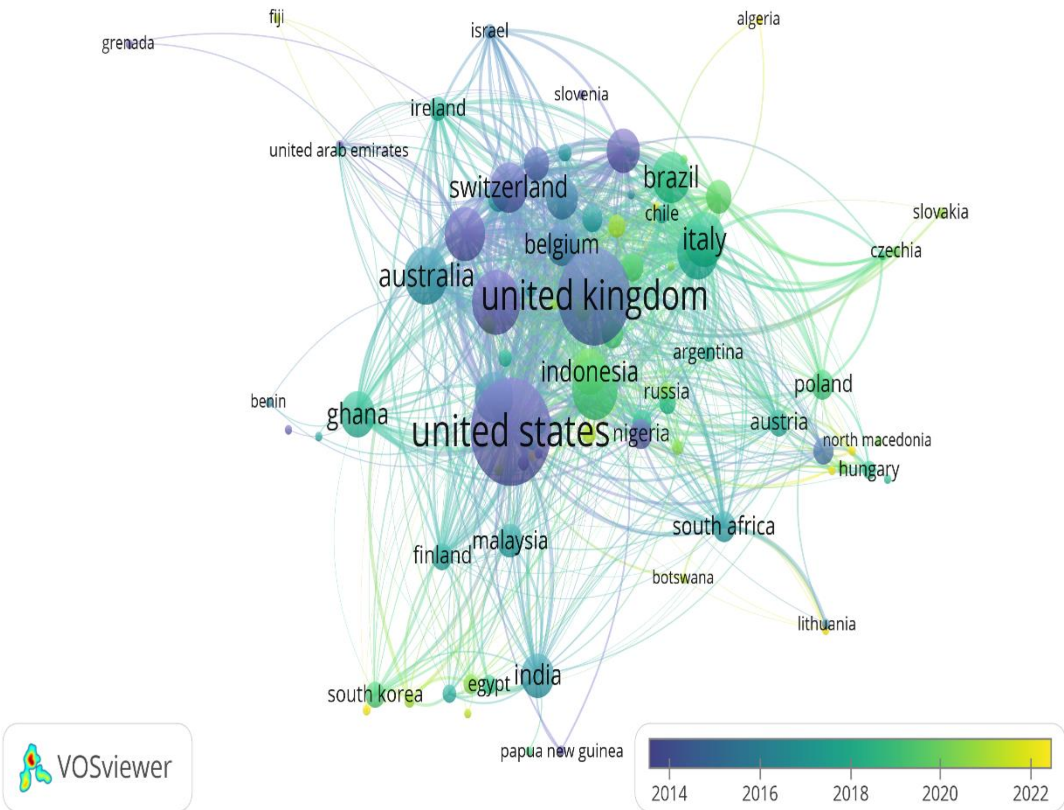

Figure 2: Network Analysis of Studies on Supplier Development in Cocoa Sector
Source: Author's Construction (2024)

Meta-analysis was carried out via the VOSviewer application provides a detailed account of the currency of literature on the implementation of supplier development in the global supply chain sector. It was based on Bibliographic coupling [Type of analysis] and countries [Unit of Analysis] based on 92 countries. A close observation demonstrates such studies are mostly carried out in the United States (303 documents), and the United Kingdom (248 documents) but were much concentrated around 2014-2016. Ghana (56 documents) has also witnessed many studies on supplier development in the cocoa industry between somewhere 2017 to 2020. Most current but fewer studies on supplier development are done in Fiji, Algeria, Lithuania and Chile.

Supply Chain Disruptions in the Global Cocoa Industry

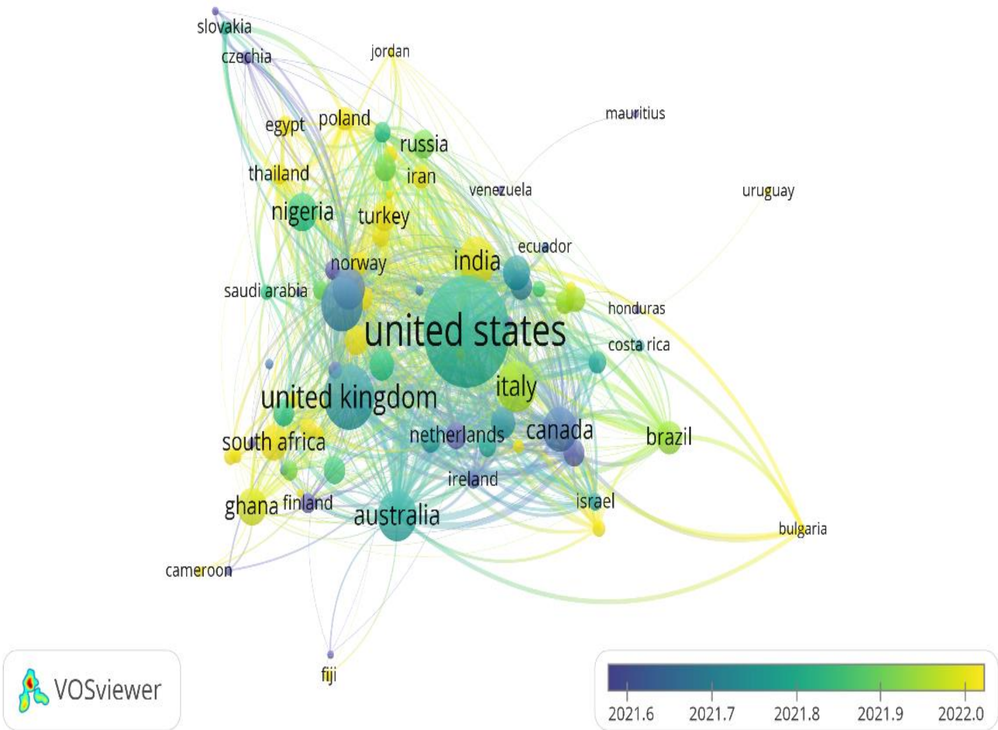

Figure 3: Network Analysis of SC Disruptions Global SC of Cocoa Sector
Source: Author’s Construction (2024)

Observation of the overlay visualization of supply chain disruptions in the global SC of the cocoa sector shows Ghana’s cocoa industry has been disrupted by the COVID-19 pandemic especially getting to the end of the 2022 period. This confirms the call for the implementation of supplier development projects in the cocoa industry to build the operational capabilities of the cocoa bean suppliers. Also, it echoes the woes of cocoa farms in terms of limited access to fertilizers and farming chemicals during the Covid19 pandemic as stated in the statement of the problem section.

Operational Efficiency

The concept of efficiency is crucial in the field of agriculture due to its role in determining how the resources are utilized by the farms which essentially points out how well the agri-enterprise is fairing. The focus of supplier development projects should be on improving the operational efficiency of the cocoa bean suppliers, a type of which is technical efficiency in farming. The combination of resources from both the buying firms and the cocoa bean suppliers affects both the technical and scale efficiencies of production thereby invariably affecting crop productivity and profit potential of cocoa farms (Eyitayo et al., 2011). Massive government support for cocoa bean suppliers amid private sector participation is aimed at promoting the operational efficiency of cocoa farms to improve sustainable performance (Ahamefule et al., 2017).

Efficiency is all about doing more for less, in that it essentially captures the maximizing output by minimizing inputs without compromising quality. Operational efficiency refers to the operational excellence of a management system that is made up of a set of rules that guide a firm in its operations to achieve operational competence (Mantje et al., 2023). From another perspective, Mantje, et al., opined that operational efficiency represents the ratio of actual input as measured against the maximum output and behaves like financial leverage. In the case of Folayan, Oguntade and Ogundari, (2007) operational efficiency refers to the measure of comparison of the least operation cost incurred by a firm in an industry for the operation cost incurred by each of the firms whose performance is being rated in the industry.

Operational efficiency reflects the quality of microeconomic activities, which is centred on the overall effort of the enterprise management (Xue et al., 2022). Operational efficiency measures the optimal use of a firm's resources (Mugoni, Nyagadza & Hove, 2023). Operational efficiency is about how the inputs are transformed into output; the major aim is to increase the output per input utilized. Operational efficiency reflects the technical efficiency of the production unit, which deals with outputs maximized and from inputs, minimization is achieved. From the allocative point of view, operational efficiency ensures optimal utilization of inputs, given their prices. From the standpoint of economics, the multiplication of technical and allocative efficiency gives economic efficiency (Fawole & Ozkan, 2018).

Operational efficiency indicates time and cost savings to maximize the ratio of output to input (Shou et al., 2018). From the perspective of the productive process, operational efficiency is conceived into two main dimensions including cost-based efficiency and time-based efficiency (Xue et al., 2022). From the cost perspective, operational efficiency relates to the direct labour cost 'shock' on firms. Cost of quality, cost of engineering and cost of manufacturing are typical examples. Inefficiency in operations escalates production costs which negatively relates to operational resilience negatively. Time-based efficiency measures the delivery speed, reliability of the production system, lead time and inventory turnover rate (Xue, et al., 2022). The lesser the operation cost, the more efficient the operations are when compared with other cocoa farms in the industry.

The operational efficiency of a production unit measures how well it employs resources or production input to optimize output, compared with its minimum potential indicated by the production possibility frontier (Danso-Abbeam et al., 2020). It also involves the ability to minimize inputs utilized in the production of a given level of output (Effendy, et al., 2019). Technical efficiency represents a performance measure for operational success on which production units are evaluated.

Contextually, operational efficiency represents the ability to transform multiple inputs into the output of any cocoa-managed plot (Danso-Abbeam et al., 2020). Measurement of operational efficiency centres on inputs that are controllable, hence it is perceived that cocoa farmers/farm managers have more control over inputs-as supported by buying firms-more than output, an approach recognized as an input-oriented approach of non-parametric DEA approach which is different from the parametric stochastic production frontier approach (Danso-Abbeam et al., 2020). Firms that are efficient in operations can overcome limitations and constraints, which eventually maximizes their productivity.

Key inputs considered by Danso-Abbeam et al., (2020) to measure the technical efficiency of cocoa farms included labour, fertilizer application and pesticide application. Another yardstick for assessing operational efficiency is the unit cost of production. Firms that are efficient reduce total operational costs by maximizing utility in resource usage, thereby increasing output at minimized per unit cost (Folayan et al., 2007). Operational efficiency also depends on the ability to identify and eliminate wasteful operational processes whilst facilitating the remedial design of new work processes that eventually enhance work quality and the productivity of the firm (Mantje et al., 2023).

Operational efficiency is influenced by resource availability and utilization, drivers that are an integral part of improving competitive advantage, lowering costs and improving productivity (Mantje et al., 2023). Operational efficiency also relies heavily on firms' routines and capabilities (Shou et al., 2018). Inferring from the above, consistent exposure to supplier development projects to the cocoa bean suppliers could potentially create a learning curve experience that can in the long run, position these cocoa farms to avoid production inefficiencies and eventual development of competencies in their routine operations and capability. Biswas, et al., (2021) also found that access to supplier development initiatives such as extension services to agriculture businesses improves technical efficiency, which eventually improves their productivity.

Conceptualising operational efficiency as activity quality at a microscopic level concerning overall firm management effort (Xue et al., 2022) is important in determining its mediating role between supplier development by LBCs and sustainability performance of cocoa bean suppliers in Ghana's upstream cocoa sector. Supply development activities, i.e., the development of capacities and the supply of resources, as well as technical assistance, are intended to boost capacities in LBCs, but whether these activities are effective in improving sustainability is a question that relies on whether these cocoa bean-supplying businesses are efficiently tackling internal activities.

Operational efficiency captures the ability of cocoa bean suppliers to minimise waste, eliminate non-value activities, and achieve maximal utilisation of resources—the drivers that are key in realising sustainable performance. In assuming operational efficiency as a mediating variable, it is acknowledged that although supplier development inputs are made available towards improvement, whether these inputs are achieved as outputs in terms of sustainability is a matter that is dependent on quality internal enterprise management. The approach is in conformity with principles of microeconomic efficiency, whereby quality managerial effort makes a difference in whether external aid is utilised efficiently towards sustainability in terms of the context in which the cocoa economy operates.

A visual presentation of supplier development and operational efficiency in the cocoa industry is presented in Figure 4. The meta-analysis via the VOSviewer application provides concise pictorial clues to the confirmation of the effect of supplier development on operational efficiency. Studies confirming how supplier development induces operational efficiency are concentrated in the United States (2017-2018), United Kingdom (2017), Spain (2019-2020) and India (2019-2020). Studies in Ghana (2021-2020) also confirm this conceptualized relationship. Therefore, the conceptualization of the predictive relationship between supplier development and operational efficiency is supported by this analysis.

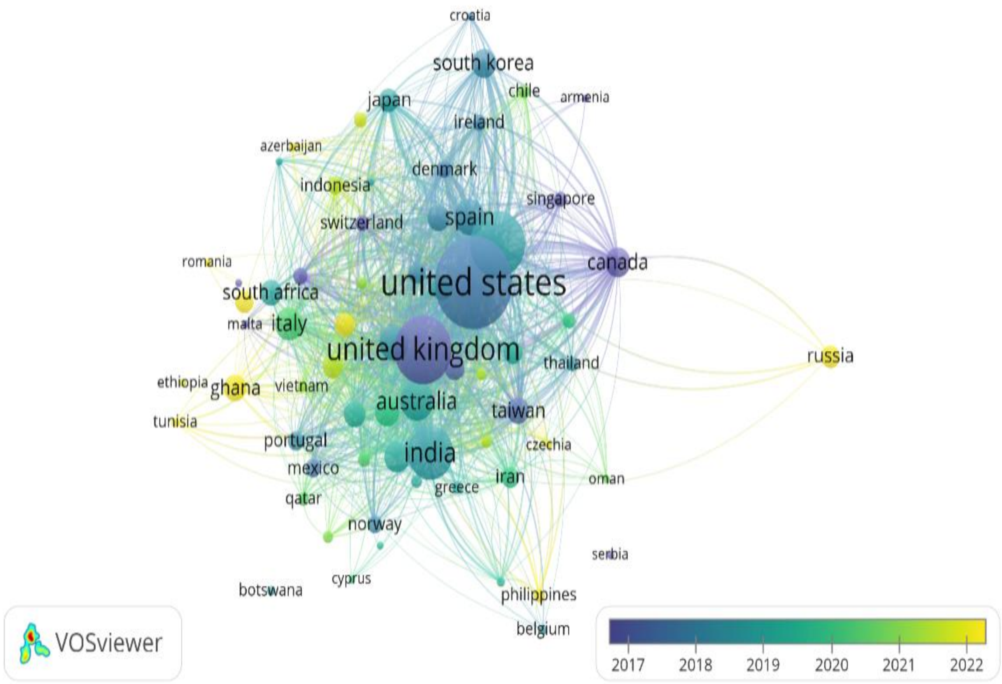

Figure 4: Network Analysis of Supplier Development and Operational Efficiency
Source: Author's Construction (2024)

Firm Ambidexterity

The ability of supplier development to improve supplier operational efficiency is strongly anchored on the degree of the sufficiency of suppliers' absorptive capacity and the presence of adequate collaborative relationships (Arroyo-Lopez et al., 2012). Cocoa bean suppliers should possess the capability and resources that help them to learn and integrate changes that are brought by supplier development in their operations, hence improving their operational efficiency. Firm ambidexterity helps in managing environmental changes in terms of responding rapidly to environmental changes (Jurksiene & Pundziene, 2016).

Firm ambidexterity encapsulates firms' capability for exploring and exploiting to compete in mature technologies and markets where performance, control and improvement are valuable and compete in new technologies and markets with autonomy, flexibility and testing (Nobakht et al., 2021). Clauss et al., (2021) defined ambidexterity as the blend of both incremental, more efficiency-based innovation and radical, novelty-oriented innovative practices for short-term success and long-term survival. Firm ambidexterity manifests in situations where firms can deal with or harness institutional complexities and multiplicity and turn threats posed by such complexities into benefits that eventually contribute to achieving objectives efficiently and effectively (Diab & Metwally, 2019).

Firms need ambidexterity capability to respond to environmental dynamics with both exploratory and exploitation orientations (Garousi Mokhtarzadedeh, Jafarpanah & Babgohari, 2022). The goal of exploratory ambidexterity is to meet the needs of new customers and the market by way of breaking away from current technology to innovate completely new products or services (He et al., 2021). On the other hand, firms pursuing exploitative ambidexterity aim to meet the needs of current customers by way of using and perfecting current available knowledge and techniques, improving current products or services to make the current production process more effective (He et al., 2021).

There is a balanced dimension and combined dimension of ambidextrous innovation. In the balanced dimension, the relative balance of the two is pursued at the same time whilst, in combined ambidexterity, exploratory innovation and exploitation innovation mutually supplement and promote each other to make up for the deficiencies of each other and to amplify the value created by each one (He et al., 2021). Since combined innovation or balanced innovation demands different requirements in terms of structure, process, strategy and ability, it is rather challenging and demanding for smallholder cocoa bean suppliers, to engage simultaneously in these two innovations due to their lack of resources and operational experiences (He et al., 2021).

Therefore, it is probable that those cocoa bean suppliers are likely to attain combined as well as balanced dimensions of ambidextrous innovation. In a holistic sense, those cocoa bean suppliers that are seeking competitiveness in that field pursue mutually conflicting strategies simultaneously (Clauss et al., 2021). In that sense, those cocoa bean suppliers that are seeking competitiveness in that field pursue strategies that are regarded as competitive by those cocoa bean suppliers in terms of countering varied opportunities that are involved in aligning activities with demands from development projects that are promoted by buyers. The activities of those cocoa bean suppliers have to be directed towards countering environmental dynamism in terms of countering climatic change, countering pests and diseases, as well as practicing ideal farming methods.

The firm's structure, both internal and external, also contributes to defining the level at which they exhibit ambidexterity in activities (Adusei, Mensah, & Demah, 2022). Thus, the size, age, organisational structure, human resources, quality and quantity of inputs, technology, land, premises, leadership and managerial competency and a host of other resources have implications for how ambidextrous a firm can be. Therefore, cocoa farm size, signifying access to resources and capabilities has implications for ambidexterity capabilities.

The nature of a firm's relationship with supply chain partners also has a bearing on the ability to conduct exploration and exploitation of ambidextrous activities. With the support of supply chain partners, contextually LBCs, cocoa bean suppliers are better positioned in terms of their operational capacities due to access to supplier development support from such buying companies. Organisational ambidexterity is a force to reckon with when it comes to its capacity to drive organisational outcomes including firm performance (Adusei et al., 2022) and sustained competitive advantage (He & Wong, 2004).

Operationalising firm ambidexterity in both exploitative and explorative strategies is critical in understanding ways in which cocoa bean suppliers can promote sustainable performance through supplier development. Exploitative strategies that involve improving on established processes and improving on efficiencies align with attempts at enhancing operational efficiency as well as improving on buyer-supplier relationships. Explorative strategies promote innovation and flexibility, which allows suppliers to address dynamic market conditions as well as challenges in sustainability. Studies have established that firms that adopt an ambidextrous strategy that combines both exploitation and exploration are in a position to attain sustainable production outcomes.

For instance, Gomes et al., (2020) confirmed that quality ambidexterity supports environmentally sound production both with available means as well as new possibilities. A research study conducted by Annosi et al., (2024) also outlines that ambidextrous activities are important in balancing opposite objectives, for example, profit and sustainability, in organisations. Balancing exploitative and explorative means, suppliers of cocoa beans can effectively mediate between supplier development activities and sustainable performance in a way that ensures that they meet contemporary operational demands and innovate towards a more sustainable future.

Supplier development and firm ambidexterity visual presentation is presented in Figure 5 The meta-analysis via the VOSviewer application provides concise pictorial clues to the confirmation of the effect of supplier development on firm ambidexterity. Studies confirming how supplier development induces firm ambidexterity are concentrated in the United States (2020-2021), China (2019-2021), the United Kingdom (2019) and Ghana (Mid-2021-2022). Therefore, the conceptualization of the predictive relationship between supplier development and firm ambidexterity is supported by this analysis.

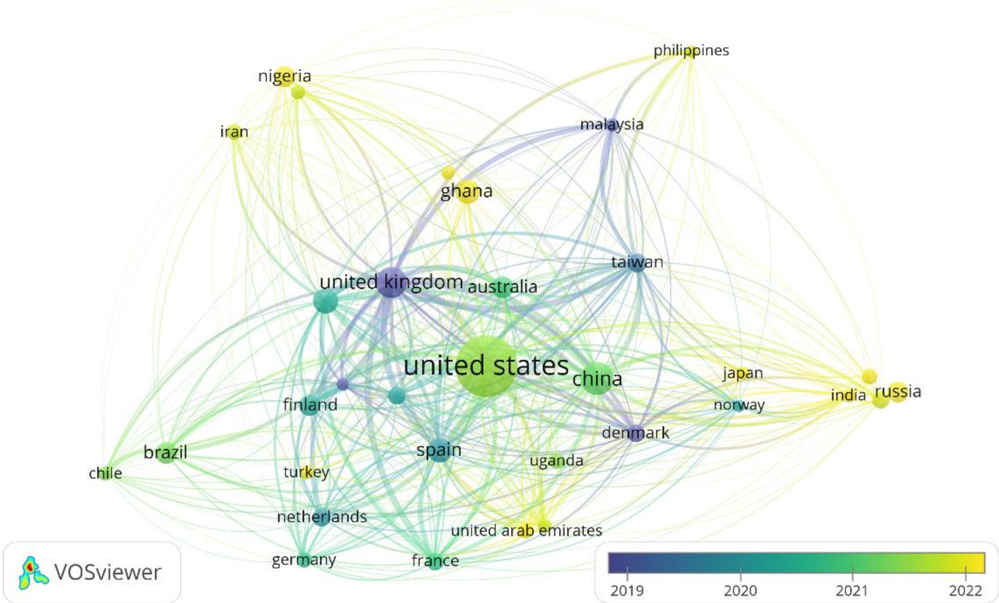

Figure 5: Network Analysis of Supplier Development and Firm Ambidexterity
Source: Author's Construction (2024)

Buyer-Supplier Relationship Quality

The capacity for supplier development to improve supplier performance via improved operational efficiency is strongly anchored on the degree of the sufficiency of the presence of an adequate collaborative and relational learning context (Arroyo-Lopez, Holmen & de Boer, 2012). Buyer-supplier relationship quality refers to the mutually beneficial inter-firm relationship built on trust between suppliers and buyers in collaborative and learning context (Arroyo-Lopez, Holmen & de Boer, 2012). In emerging market economies, the two main issues contributing to the complexities of trust in cocoa supply chain, particularly buyer-supplier relationship, are the implicit assumption that buyers and seller enjoy free choices and reasonable bargaining power in free markets and the increasing liberalization of these economies with large multi-national firms and state agencies now seeking market growth opportunities (Dadzie et al., 2018).

In the case of the first assumption, however, this may not hold contextually because the context is characterized by fragmented, small businesses that operate individually whose market structure reflects pre-industrial type and relatedly, firms operate on shoestring budgets (Sheth, 2011). With such market structure, building profitable business relationship, especially among powerless partners such as smallholder farms becomes necessary. This is due to that fact that competition is heightened via the entry of new powerful private firms in the cocoa marketing industry which gives suppliers the opportunity to switch buyers given the appropriate service conditions (Dadzie et al., 2018).

Ghana's cocoa export distribution system is managed by the cocoa marketing board. Initially, Ghana's export distribution was vastly expanded in 1981 via the integration of the formal financial institutions into the distribution channel and the placement of state agencies particularly the cocoa marketing board as the primary agent charged with the responsibility of building inter-personal relationships with cocoa suppliers throughout the cocoa producing regions of Ghana (Dadzie et al., 2018). Realizing the value of good buyer-supplier relationship in the cocoa supply chain, the purchasing officials or agents live in the cocoa producing communities, speak the local dialect and enjoy trusting relationships with such communities and the farming entrepreneurs (Dadzie et al., 2018).

The 1999 cocoa sector reform made is imperative for more private produce-buying companies to be absorbed in the marketing industry, a policy initiative that drove global marketing of cocoa beans for Ghana. Commitment from both buying firms and supplying firms is required in terms of investment of financial and non-financial resources in relevant activities for the successful implementation of supplier development. Since supplier development practices create outcome expectations, it becomes necessary to put in place appropriate controls to ensure appropriate benefits are achieved (Krause, 2007). One such control is buyer-supplier relationship.

Supplier development shifts the traditional adversarial or transactional inter-firm relationship to co-makership relationship. Thus, the thrust of inter-firm relationships is to promote collaboration in business operations for the mutual benefit of both the buying organisation and the selling organisation (Lascelles & Dale, 1990). The quality of buyer-supplier relationship is judged by the assumed responsibilities placed on the partners to the supplier development initiative to continuously improve production process and the product, thereby justifying the crave for improved operational efficiency as prime mechanism for transmitting the effect of supplier development on sustainable performance of the cocoa bean suppliers. Comparatively, Lascelles and Dale, established that, firms that develop co-makership relationship outperformed firms that relied only on traditional adversarial relationship.

With higher inter-dependence among firms, collaborating and building meaningful relationships in supply chains is a strong pillar for supply chain resilience, flexibility and sustainable performance (Agyei-Owusu et al., 2022). Leading firms through supply chain integration built on quality buyer-supplier relationships can aid supply chain partners in providing needed resources that could improve the operational capabilities of such partners. The cocoa industry is characterized by extreme power relations (Christ et al., 2020). For instance, the relationship between producers, who are often poor smallholders, and buyer, that are represented by large multi-nationals demonstrates the power imbalances that could ensue in supplier development context.

It is emphatically established that drop is cocoa prices often leads to increased incidence of slave labour in an attempt by farmers to reduce labour costs (Christ et al., 2020). This could also limit operational efficiency since such labour may turn out to be counter-productive. Leading firms are seemed to possess more ‘captive’ power relationships over their suppliers in the cocoa industry. Besides, previous programmes including the Cocoa Action which preceded the CFI programme ended up creating higher smallholder dependency on multinational because of its capacity to disincentivised smallholders to diversify into non-cocoa crops that are considered as more suitable solution to farming landscaping (Odijie, 2018).

With respect of supplier development programmes, Tran, Gorton and Lemke, (2021) identified opportunism as a potential threat to buyer-supplier relationships. This may manifest in situations where a party to the supplier development become dishonest in terms of discharging their obligations in the supplier development context and seeks self-interest instead of the collective good of all parties to the supplier development initiative (Dadzie et al., 2018). Building a trustworthy relationship between buying firms and supplying firms could act as a buffer to defending against the manifestation of opportunistic behaviour from both parties to supplier development projects.

Conceptualizing buyer-supplier quality as a supportive inter-firm relation on mutual trust between buyers' suppliers in a cooperative learning situation (Arroyo-Lopez et al., 2012) is greatly relevant in production in cocoa in Ghana, whose development by local established LBCs is central in enhancing operational efficacy of the cocoa bean suppliers. Improvement in suppliers of cocoa beans’ operational efficiency is not merely a question of technical aid and finance, but quality in interpersonal relations between buyers' cocoa and buyers' cocoa beans.

A relationship that is established on partnership, partnership quality, and continuous learning is a source of supply development activities, commitment, and persistent participation that is essential in improving supply chain efficiency and coordination. Relationship quality between LBCs and suppliers is conceived as a mediating variable that is a means through which supplier development activities are tied with operational efficiency is a driver of improved productivity, waste minimization and supply reliability. Partnership and trust in supplier development activities can be a source of supply chain challenges alleviation and supply chain resiliency, as well as improving efficiency in Ghana's cocoa supply chain.

Supplier development and buyer-supplier relationship quality visual presentation is presented in Figure 6. The meta-analysis via the VOSviewer application provides concise pictorial clues to the confirmation of the effect of supplier development on buyer-supplier relationship quality. Studies confirming how supplier development induce buyer-supplier relationship quality are concentrated in the United States (2016-2017), China (2014-2015),

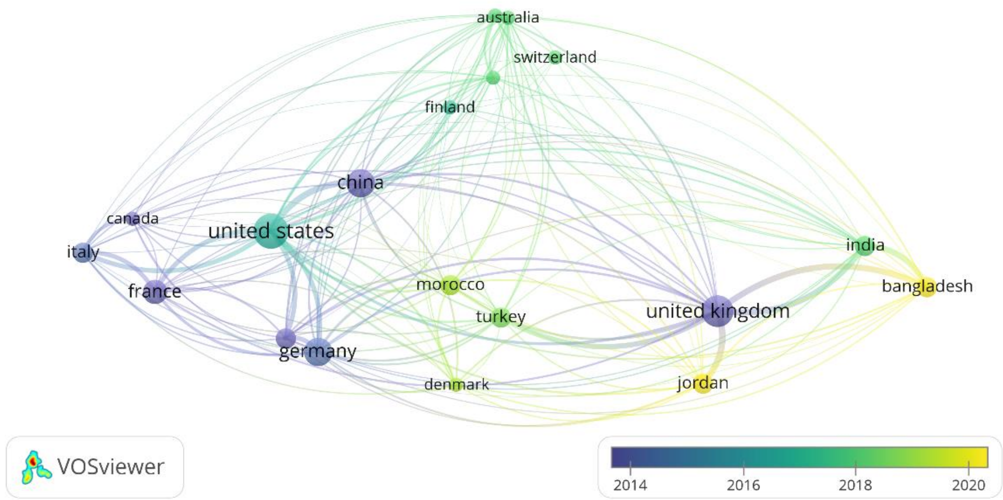

Figure 6: Network Analysis of Supplier Development and Buyer-Supplier Relationship Quality
Source: Author’s Construction (2024)

Firm Characteristics

Firm Size

Firm size is a typical control variable as advanced in dynamic capability literature, hence, its operationalization in most studies (Parente et al., 2020). This statement suggests it is vital to consider the typical role that the size of the farm can play to foster the effect of supplier development on the sustainable performance amid the intervening effect of operational efficiency. Consideration of firm size has implications for operations, resource needs and adaptability (Hashem & Aboelmaged, 2023). Firm size is a key contextual factor that adds to the underlying complexities of the pursuance of innovations in organisations with different sizes (Farooq, Vij & Kaur, 2021).

The measurement of firm size is context-bound. Dang and Yang, (2018) measured based on a combination of three criteria including the number of employees, total assets and total sales. Farooq et al., (2021) also used number of employees and threshold of investment in measuring firm size. Lwango, Coeurderoy and Roche (2017) also used sales levels to classify the firm size although the study also recognized number of employees as an equally apt based for measuring firm size. Therefore, firm size is a carrier of firm production and business activities and has been defined as “employee per establishment, sales per firm, employee per firm and value added per firm” (Rahman & Yilun, 2021, pp. 103).

Firm size, in this context is measured by the size of the cocoa farm measured in hectare [ha]. Cocoa farms with 0-1 ha are considered small cocoa farms, cocoa farms with 1-2 ha are classified as medium cocoa farms and cocoa farms with more than 2 ha are considered as large cocoa farms (Asare et al., 2018). Most cocoa farms in Ghana characteristically operate on small scale which are often family-run, with 2-4 ha (5-10 acres) with an average yield of 250kg/ha (Mabe, et al., 2021). This claim contradicts the farm size classification by Asare, et al., 2018, which gives signal as to the nature of ownership structure of most cocoa farms in Ghana.

Larger firms are more bureaucratic and tend to be inflexible compared with small firms that are more adaptive to changes and less bureaucratically structured (Rahman & Yilun, 2021). Inferring from this assertion, small cocoa farms are more likely to respond to changes in their operational activities that are occasioned by the supplier development practices by the cocoa buying companies when compared with large cocoa farms. Thus, small cocoa farms may easily adapt to changes brought by supplier development practices because such farms not rigidly structured in terms of organisational hierarchy. Small cocoa farms perhaps require smaller investment for their developmental needs compared with larger cocoa farms that require larger investment for such needs.

Larger firms are more likely to face more complex and many challenges which if not adequately catered for via support from buying firms could results in loss of return on investment which automatically causes disincentive for LBCs to undertake such supplier development practices. Cost of adaption is less in small cocoa farms than large cocoa farms, hence justifying the differences in adaption to change between small farms and large farms. Besides, reconfiguring the operational plans of large cocoa farms requires broader consultation and careful reflection about such decision, a situation that is easy for small cocoa farms, which are unlike large cocoa farms, require the judgement of usually a single owner with minimal consultation in change-based decision-making.

Changing the operational plans of small cocoa farms is easy and less costly, a motivation that probably justifies the high level of flexibility among small cocoa farms in terms of adjusting to the changes championed by the supplier development practices by produce-buying companies in Ghana. Another reason that could justify the flexibility of adjustment among small cocoa farms could be the kinds of supplier developmental needs and time frame for the successful execution of such activities. Relatively, small cocoa farms may face less complex developmental needs, even if the opposite is the case, solving such challenge could be less daunting unlike the situation of large cocoa farms. In the case of small cocoa farms, the time it takes to resolve such complex developmental problem(s) could be shorter than large cocoa farms hence influencing the state of adjustability in favour of small cocoa farms as against large cocoa farms.

In the agriculture export sector**,** Do et al., (2022) in their empirical study on the adoption of ecological strategies of agriculture exporting firms discovered that larger firms were more apt at adopting ecological strategies than smaller firms. This suggests large cocoa farms are better positioned to support ecological sustainability in a more productive manner than small firms. Comparatively, larger firms, unlike small firms, are able to procure in larger volumes and are more heavily involved in green supply chain practices (Younis & Sundarakani, 2020). Thus, contextually, large cocoa farms are expected to adhere strongly to buyer-initiated supplier development programmes that are pro-environmental than small cocoa farms. This also inherently prove perhaps small cocoa farms do not have the required resources and capabilities to invest in ecological strategies that seek to improve environmental sustainability.

Larger firms have more commitment and are able to corporate in inter-organisational alliances than small firms. This behaviour is anchored on the fact that, large firms are more technically and managerially capable with access to supporting resources in inter-organisational alliances, competencies that are limited in the case of smaller firms comparatively (Yang et al., 2019). Inferring from this position, large cocoa farms are deemed to possess the right kind of competence and required technical and managerial prowess that make them more efficient in terms of forming and managing inter-firm relationships which is a strong pillar for the success of supplier development practices for both buying firms and the suppliers alike in the cocoa production industry.

Relationships are keen to the success of operations of large firms because of the higher level of interdependence among actors in the complex network of supply chains that jointly work together to achieve common interests whilst satisfying the needs of customers. The degree of interdependence and mutual gain impose on large firms make them to commit enough resources in terms of finance, time, technology, managerial efforts and the likes to make such inter-firm relationship work, failure of which can costs the firms severely. Additionally, some empirical studies (Younis & Sundarakani, 2020; Siegel et al., 2019) have proven that access to resources, which favours larger firms, has the capacity to make such firms perform better in terms of environmental performance.

Besides, access to resource empowers large firms, or as in this context, large cocoa farms, to support their operations with all needed resources. Therefore, larger cocoa farms are better positioned to better support the supplier development initiative effects of LBCs to produced synergized outcome than small cocoa farms. Small cocoa farms may lack access to expensive resources due to the limited access to capital and finance, a situation that cripples their efforts to respond to changes brought by supplier development programmes in the cocoa sector. This situation is especially true in situations where such initiatives are not financially sponsored fully by the buying organisation.

In their empirical study, Rahman and Yilun, (2021) found that firm size related with firm profitability in a positive and significant manner. Inherently, the size of the cocoa farm perhaps determines how profitable agribusiness in the cocoa industry is. Large cocoa farms could capitalize on their resources and enviable capabilities to exploit the economics of scales in their operations, which in turn reduces cost of operations hence enhancing their profit-making potential, a case which is not usual for small cocoa farms. The more cocoa beans are produced through the interplay of internal operational efficiency and timely, adequate and right supplier development initiative, the more the larger cocoa farms stand to gain more profit compared to their counter-parts, the small cocoa farms.

Again, firm size was seen as a moderator in the relationship between default risk and the financial performance of listed firms (Mushafiq et al., 2022). Inherently, the finding proves firm size can meddle with the predictive relationship some variables. Firm size has implications for the level of responsiveness to the demands of the buying firms since large firms are structurally regulated via a bureaucratic institutional framework to responding to such changes (Yang et al., 2019). Jääskeläinen (2021) also found that large suppliers (firms) had vibrant and strong relational governance practices than smaller supplier.

Larger firms are more likely to invest in supplier development relationships than smaller firms (Saghiri & Wilding, 2021). Inferring from this claim, it appears more structured, formalized relationships along the supply chain favours and plays to the power of larger firms which the opposite may be the case for smaller firms. This situation is attributed to the commitment of larger firms to invest in information systems unlike smaller firms that are under-resourced to undertake such initiative (Jääskeläinen, 2021).

In support of this trajectory, larger firms in customer-supplier relationship were found to have effect on the degree of sophistication of collaboration, performance measurement and information sharing (Li & Lin, as cited in Jääskeläinen, 2021). Their power-balances in such inter-firm relationships are felts because they have the opportunity to dictate the pace of the governance of such dependability-driven inter-firm relationships.

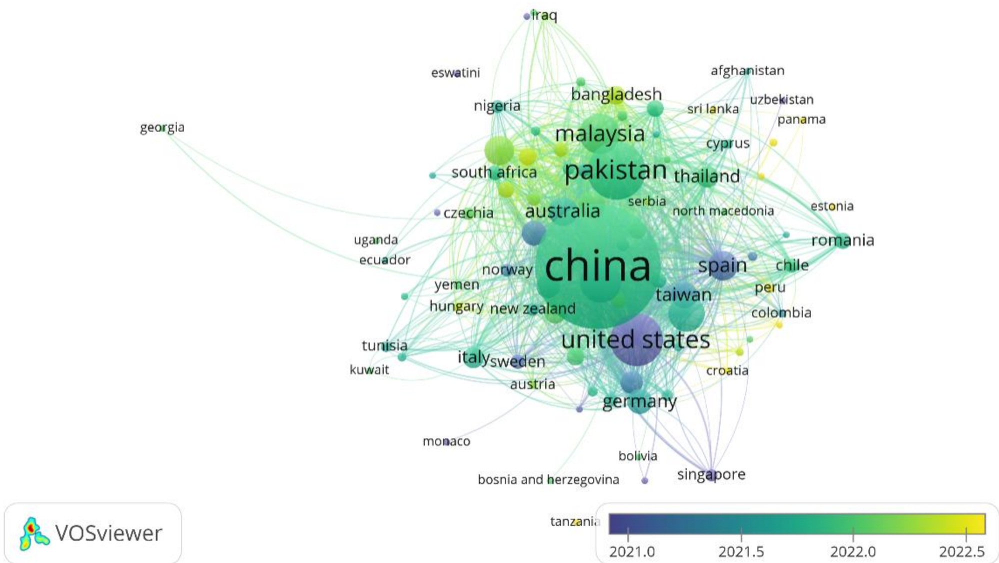

Figure 7: Network Analysis of Moderating Role of Firm Size
Source: Author’s Construction (2024)

Firm Age

Firm age captures the life-time at which some particular qualification, capacity or power arises or rest. The issue of time of inception of a thing becomes the base for determining its age. Farooq, et al., (2021) measure firm age as the number of years a firm exists after incorporation which gives legal backing as an artificial entity. Cocoa farms are agribusinesses and are therefore required to be registered by the appropriate regulatory body in Ghana (Adams et al., 2024). The age of a business, like the size, also has implications for both internal organisational operations as well as externalities. Old firms have more resources, align strongly with industry and has better management than younger firms because of the experience gained through the long-term operational existence (Farooq et al., 2021).

Do et al., (2022) also found that older firms are able to better sustain their growth effectively compared with younger firms owing to the experience gained through series on business operations and activities. This situation is perhaps based on the fact that older firms, contextually, old cocoa farms, are able to capitalize on their learning curves in their operations, cut down costs, minimize risks and eventually become more profitable which then translates into sustainable competitive advantage, a result that may not be the case for young cocoa farms comparatively.

Older firms are able to sustain their competitive advantage more than younger firms (Younis & Sundarakani, 2020). Mature and older firms are able to attract more investment than immature and small firms because of the confidence reposed in older and mature firms in terms of the capability to deliver rewarding returns of investment owing to their deeper roots in the market (Neves et al., 2022). Lwango et al., (2017) also recognized that older firms' behaviour is regulated by institutionalized norms and habits which makes it difficult to easily adapt to changes unlike the case of younger firms.

However, old firms incur more costs to responding to environmental turbulence than young firms (Reed, 2021) hence young firms are apt in strategic agility than older firms. Jääskeläinen (2021) also found that long-relationships between suppliers and customers (buyers) appears to be less governed by relational governance practices, especially among older firms. Young firms usually lack installed base and cannot extend their businesses as much as old firms that have installed capacity (Valtakoski & Witell, 2018). Besides, Valtakoski and Witell, acknowledges, customer knowledge and focus changes overtime, and firms with longer experience are better positioned to exploit such customer adaptation than firms with less or no prior experience at all. Firms and customers alike are able to adjust and clarify their roles in operations thereby shifting their focus on operational efficiency.

Also, older firms are able to replicate their operations in an efficient manner than young firms (Jensen & Szulanski, 2007). This positions older firms to improve productivity and profitability. Learning curve experience also throws in firm age as key contextual factor in this regard. Contextually, older cocoa farms may possess the required operational capacities that complement their adaptive responses to changes occasioned by subscription to supplier development programmes orchestrated by produce-buying companies. Furthermore, with the accumulated operational and managerial experiences built over the long-run, large cocoa farms may have the capacity to overcome operational barriers that occur due to the implementation of supplier development programmes.

Although biologically, typical cocoa tree can live for more than 100 years, the economic life of cocoa however expends for 30-40 years (Akinnagbe, 2017). Cocoa farms over 30 years usually experience somehow 20% drop in yield, if rehabilitation is not carried out. Elsewhere in Cameroon, some cocoa farms could maintain high yielding up to 40 years and rehabilitation practices are applied appropriately (Somarriba, et al., 2021). Age of cocoa tree also influences the technical efficiency of input use in cocoa production because output usually decreases as the cocoa tree ages especially beyond 40 years, which eventually increases operational/technical inefficiency (Obeng & Adu, 2016).

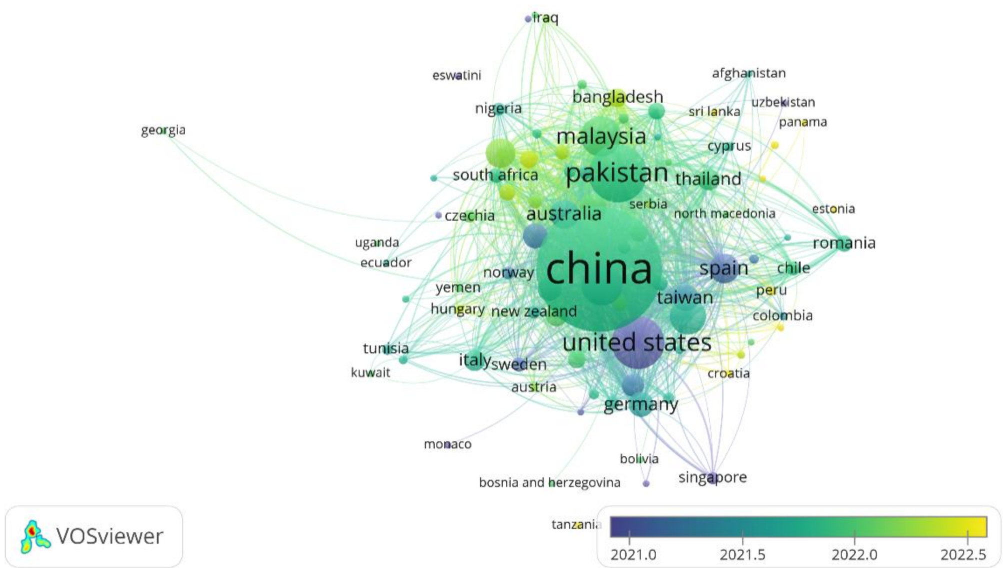

Figure 8: Network Analysis of Moderating Role of Firm Age
Source: Author’s Construction (2024)

Sustainable Firm Performance

The consideration of sustainable performance of the cocoa farms in this empirical study is theoretically warranted. There is urgent need for cocoa-producing countries to adopt new approach to ensure viable future for cocoa production (Pérez-Zuñiga, Rojas-Molina & Zabala-Perilla, 2021). The inclusion of sustainable supplier performance in supplier development-oriented studies in indispensable as means to detecting the effect of supplier development practices (Yawar & Seuring, 2020). Sustainability in performance is anchored on three main pillars; economic sustainability, social sustainability and environmental sustainability (Asaleye et al., 2020). Sustainability is achieved when the real costs and environmental costs of production remain stable or decrease as output increases. It as can as well be seen as the change in the pattern of social and structural economic transformation that echoes growth and development and other societal benefits available currently without jeopardizing the future generation to achieve the same interest (Asaleye et al., 2020).

Business sustainability refers to the pursuit of a business growth strategy by allocating financial or in-kind resources of the corporation to ESG practices (Benabed & Boeru, 2023). The focus is to generate shareholder value by implementing a more integrated, holistic and strategic approaches that embrace all dimensions of sustainability performance and engaging diverse stakeholders (Rezaee, 2016). Sustainability flourishes by integrating sustainability theories, risks and standards into corporate culture and business model (Rezaee, 2016). Agriculture sustainability is recognized global supply chains including cocoa. This recognition hinges on the need to promote sense of and commitment to global food security. For instance, in the case of the Chines melamine scandal in 2008, over 6,000 children took ill out of which three were reported dead after consuming a supposedly contaminated milk

(Mak, 2021). Cadbury spent £30m in 2006 because of the Salmonella scare that occurred in 2006.

The Triple Bottom Line (TBL) is also used in operationalising the sustainable performance of cocoa bean suppliers because it is a holistic approach that encompasses economic, environmental and social dimensions of sustainability. Economically, it ensures that cocoa bean suppliers are remunerative and ensures fair trade and secure livelihoods for cocoa bean suppliers. Environmentally, it ensures farming practices that reverse deforestation and soil erosion and biodiversity loss, which are some of the critical challenges in cocoa production. Socially, it is concerned with cocoa bean suppliers’ and cocoa communities' welfare by addressing issues in areas of child labour, decent wages, healthcare and educational accessibility. In its approach by encompassing these three dimensions, the strategy by the TBL ensures a holistic consideration of sustainability that is in line with global sustainability goals and enhance the long-term sustainability of Ghana’s cocoa industry.

Sustainable performance refers to a firm’s ability to achieve its objectives in a way that is economically, socially and environmentally responsible. Sustainable performance is a holistic approach that ensures the balance among economic, social and environmental firm-level goals (Afum, et al., 2020). Thus, measuring firm performance in this respect requires the assessment of firm efforts aimed at improving the environmental and social developments at all levels in their supply chain while concurrently creating value for its stakeholders (Çankaya & Sezen, 2019).

Sustainable social performance covers outcomes that cover workforce, human rights, community and product sustainability (Orazalin, 2020). Major social issues are included as metrics to measure the social sustainability of firms, including agri-businesses in the cocoa industry. Child labour is said to be pervasive in the cocoa industry, especially among West African countries. These children are exposed to hazardous work and working conditions in the cocoa farms (Busquet et al., 2021). This in turn affect the safety and health of the children. However, Busquet et al., clarified that not all engagement of children in cocoa farm activities is classified as child labour because depending on the context, especially in Ghana, where such inclusion could be part of child upbringing and socialization, the Western definition of child labour is contestable.

Economic sustainability refers to the capacity of economic process to replicate itself, to maintain its replication capacity and to maintain its structure (Mugoni et al., 2023). In the case of cocoa farms, cocoa farmers are said to be economically disadvantaged in terms of percentage of global value they get in the global value chain in the global cocoa value chain (Wibowo, et al., 2021). Wibowo, et al., 2021 also indicated that the prices of cocoa beans in the world market continue to dwindle from 2009 till date.

Cocoa farmers continue to receive, on the average only 6.6% of the total added value in the world cocoa-chocolate industry, compared to the intermediate product processing industry and final producers who respectively receive 7.6% and 35.2% (Anga, 2015). Production of high-quality beans given the nutritional composition, fermentative quality, flavour volatility and polyphenolic quality are inherent in sustainable cocoa performance (Perez et al., 2022). Through crop research, variety of products and viable seedlings are genetically engineered and modified which eventually enhances productivity of cocoa trees (Asaleye et al., 2020).

Food frauds including criminal adulteration or misrepresentation of food, food ingredients or packaging are motivated by economic gains (Perez et al., 2021). The drive to promote food safety has led to certification in the cocoa industry, which has boosted consumer confidence. To promote the survival of agri-businesses, the quest for improved productivity and sustainable growth through investment in cash crops could not be better timed, considering the presumption and ability to promote long-term welfare and employment creation (Asaleye et al., 2020).

Farmers need to generate enough income to support the operational activities and programmes in terms of acquiring inputs, preparing the land, paying workers, harvesting, storing, transporting and a host of other operational activities in cocoa production (Asaleye et al., 2020). Promoting capacity utilization among cocoa farmers, Asaleye et al., claims, also has implications for productivity, employment cost and efficiency in operations. Access to capital among cocoa farmers provides means of financing farming operations hence promoting the survival of farms. Financing schemes to cocoa farmers that promise better return on investment is needed to provide adequate financial support to cocoa farmers to garner growth and sustainability.

Another dimension of the triple bottom line for sustainability performance is environmental sustainability. Greenhouse emission through transportation of cocoa beans and extensive deforestation through cocoa farming operations have resulted in negative consequences on the ecological environment, especially, the loss of biodiversity (Perez et al., 2022). Bandanaa et al., (2021) also mapped the key metrics for measuring sustainable environmental performance in the cocoa sector of Ghana and included indicators such as greenhouse gases, air quality, water quality, soil quality, land degradation, ecosystem diversity, material use and disposal, animal health and freedom from stress as key measures of environmental sustainability.

Policy Context of Sustainability in the Cocoa Sector

Although Ghana has signed on the novel SDG agenda of the United Nations that seeks to achieve these goals by 2030 yet the country is still challenged in its efforts at achieving such goals, particularly on poor environmental, health, inadequate sanitation and limited access to portable drinking water (Hess, 2022). Am empirical study conducted by Hess revealed a number of sustainability challenges in the cocoa industry in Ghana. For instance, Hess further discovered that the cocoa industry is facing major challenge of deforestation where arable farm lands are now being destroyed by the activities of illegal mining activities *"galamsayers"*.

These incidences all suggest that agriculture has ranges of implications for the wellbeing of humanity, from forced labour to child labour, violation of labour standards to changes in livelihood activities among host of other issues (Traldi, 2021). Therefore, one significant intervention in the agriculture sector of many countries that aims to ensure sustainable farming is the voluntary sustainability standards (VSS's) which came to the forefront in the 1980's alongside other standards such as Organic and the Rainforest Alliance (Traldi, 2021). The central thrust of VSS's is that a proper blend of positive incentives, awareness and training, market-based approach and establishment of clear-cut consistent criteria for success in farming can boost sustainability (Traldi, 2021).

By and by, other VSS's came to the fore including Organic cropland (1972); Sustainable Agriculture Network (1987); FairTrade (1997); UTZ (2002); Better Cotton Initiative (2005); Common Code for the Coffee Community (2006); Roundtable on Sustainable Biomaterials (2007); Proterra (2012). Most VSS's outline their performance criteria in terms of environmental, social and economic dimensions with different criteria, specific principles and indicators across the various VSS's in the agriculture industry (Traldi, 2021). Some notable social performance includes nutrition, educational attainment, and poverty whilst household income and expenditure, yield are typical economic dimensions. Deforestation, on-farm biodiversity, soil organic carbon, and carbon stock are typical outcomes measured along the environmental dimension.

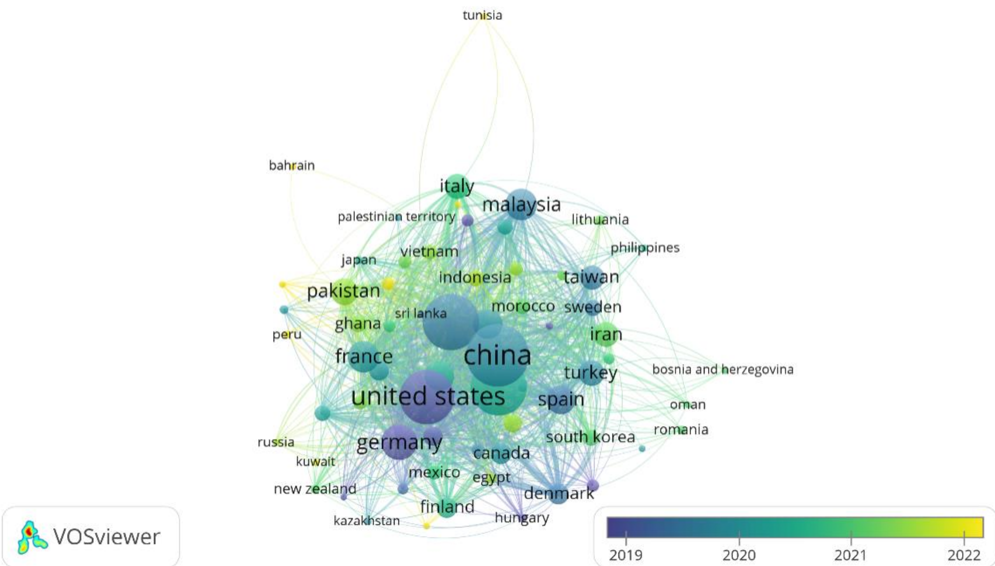

Figure 9: Network Analysis of Sustainability Studies in Cocoa Sector
Source: Author's Construction (2024)

Theoretical Relationships

Supplier Development and Operational Efficiency

From the perspective of the resource-dependence theory, firms form inter-firm relationships that can help them to get access to resources they lack or are deficient so as to help them to overcome their operational constraints and limitations. Furthermore, this exchange relationship breeds dependency between the actors which in this situation represents LBCs and cocoa farms (Pfeffer, 1981). In this regard, cocoa farms get access to resources that they cannot provide on their own from the LBCs which then provides the platform for the cocoa farms to improve their operations in an efficient manner.

Supplier development improves operational efficiency because it provides the means to promoting the operational capabilities of suppliers that are targeted for such activities. This inference is apt in the cocoa industry, where there is a huge gap between actual (400 kg/ hectare) and potential (1000 kg/hectare) cocoa yield in Ghana (Amfo et al., 2022). Amfo, et al., moreover asserted that this gap is partly ascribed to low access to fertilizer among cocoa farms in the country. Some cocoa farmers also do not possess the required knowledge on modern farm management techniques, tools and technologies which all culminates into poor operational inefficiency. Bannor et al., (2019) found that extension services provided by buyers and other relevant stakeholders to cocoa farmers improve productivity of those farmers that are supported in this regard. This is because such interventions provide the knowledge that helps suppliers to overcome their constraints and bottlenecks in operation which subsequently improves work performance.

Pest and diseases stifle the productivity of cocoa trees and this becomes a challenge for cocoa farms that do not have the capacity in terms of the right knowledge and resources to battle such threats (Boateng et al., 2023). Produce-buying companies give to cocoa farms the recommended pesticide, weedicide, fertilizer, insecticide, and other relevant logistics which when rightly applied improve the production efficiency of such cocoa farms (Astrid Fenger et al., 2017). Since soil nutrients are depleted (Wessel & Quist-Wessel, 2015) because of counterproductive farming practices, fertilizers are subsidized and supplied to cocoa farmers to promote the productivity of cocoa farms in Ghana (Hess, 2022).

Also, supply of hybrid high yielding cocoa seedlings and multi-purpose trees to cocoa farms helps to achieved enhanced yield, couple with enhanced forest governance. These ends prove the insight that there is a possibility of reducing pressures on forest and thus curbing unsustainable agriculture expansion thereby improving cocoa yield (Cocoa & Forests Initiative Annual Report, Ghana, 2020). Therefore, supply of inputs to cocoa farms is recognized as means to enhancing the operational capability of cocoa farms, which eventually improves the operational efficiency. Besides, mass pruning exercises carried out by LBCs for cocoa farms incentivize cocoa farmers to ensure the production and yielding of quality cocoa beans and productivity of the cocoa trees (Kodom et al., 2022).

This initiative is a step in the right direction because cocoa farmers often lack knowledge about how to undertake pruning, do not have the right equipment to undertake pruning as well as the workforce for such exercise (Niether et al., 2018). These challenges limit the capacity of the cocoa farms to maximize their operational capabilities, thereby resulting in inefficiency in farming operations. Another notable supplier development initiative that improves the operational efficiency of cocoa farms is certification. In this regard, certification in the cocoa industry provides a guarantee that the cocoa sold under seal of the standard organisation originates from farm operations that produce according to the relevant standard (Lalwani et al., 2018).

Therefore, certification provides learning orientation for cocoa farms, which then propels cocoa farms to scale up their operational efficiencies with the view to meeting the criteria set out in the certification. Certification also encourages cleaner production which drives sustainable production crop systems. Certification also facilitates traceability. The craving for ensuring sustainability and ethical procurement in the global cocoa supply chain, especially among those in the bean supply node such as cocoa farmers who are predominantly located in Ivory Coast and Ghana, have created strong pressure on COCOBOD and its stakeholders to develop mapping scheme to promote traceability programmes.

Evidentially, the COCOBOD as at 2020 had mapped almost 250,000 farms, with 82% traceability achieved (Cocoa & Forests Initiative Annual Report, Ghana, 2020). This enormous achievement also provides the clue to the fact that the cocoa farms would stick strongly to the provisions in such certification, thereby enhancing their operational efficiency. Again, financial support to cocoa farmers in Ghana improves their technical efficiency in a positive and significant manner, a feat that can potentially reduce poverty among cocoa farmers in the country (Attipoe et al., 2020). This position is justified by the fact that, for instance, extension services provided by LBCs is able to advance the agrarian knowledge, ideas, choice of technology and modern agricultural practices that improves the utilization of farm operational inputs in a most productive manner which the translates into improved productively in a sustainable manner.

Similarly, Nordjo and Adjasi found that access to production credit improves the productivity of smallholder farmers by 0.170 metric tons per hector. Getting access to credit provides means to investing in the farming operations, an investment that is normally regarded as high risk (Nordjo & Adjasi, 2020). Economic incentives have been seen as active drives for eliminating child labour in the cocoa industry of Ghana (Luckstead, Tsiboe & Nalley, 2019). Therefore, Luckstead, Tsiboe and Nalley, recommended a cocoa premium price of 2.81% for cocoa farms by the COCOBOD of Ghana.

In situations where cocoa trees are unproductive, pollination problems have often been recognized a key factor. Hence, LBCs support cocoa farms with artificial or hand pollination projects (Cocoa & Forests Initiative Annual Report, Ghana, 2020).

Hand pollination captures the technique to transfer pollen grains manually into targeted flowers and then increase their yields and subsequent farmer income (Wurz, Grass & Tscharntke, 2021). Due to deletion of biodiversity on cocoa farms, sometimes cocoa trees to not get the required pollinator agent to transport pollen within tree-farms to secure fruit set and yield, hence the need to apply artificial means to support the natural pollination drive. This exercise requires knowledge, skills and the technical capacity. LBCs in Ghana therefore sponsor artificial pollination projects to deserving cocoa farms.

Rehabilitation strategy initiated by LBCs, focuses on using new and improved hybrid cocoa planting materials to replace old or existing cocoa tree stocks that are usually planted to local landraces with accompanying poor cocoa yield (Asare, et al., 2018). The decision to undertake rehabilitation, from the perspective of Somarriba, et al., (2021) is influenced by three key things including cocoa yields (less than 500 kg ha^{-1} $year^{-1}$), planting density (less than 800 plants ha^{-1}) and age of the cocoa farm (More than 40 years).

Mediating Role of Operational Efficiency

The study perceives operational efficiency as playing a mediating role in the predictive relationship between supplier development and sustainable performance among cocoa farms. Mediation occurs when the intervening effect of a third variable potentiates the effect of an independent variable(s) on a dependent variable(s) (Oliverira et al., 2023; Stefanovic & Barjaktarovic, 2021). This assertion is based on the position of the resource-dependence theory and the dynamic capability theory (Yang, Bossink & Peverelli, 2023). From the perspective of the resource-dependence theory, produce-buying companies provide resources and equip cocoa farms with the capacity requirement with the aim of improving the efficiency in cocoa farming operations by undertaking both direct and indirect supplier development projects to these cocoa farms. These supports from the produce-buying companies provide much power to the produce-buying companies (Yang et al., 2023).

Supplier development programmes begin with the identification of suppliers that need to be developed to meet the needs of the buying organisations (Paybarjay et al., 2023). For instance, poor quality cocoa beans could trigger the conduct of training programme for cocoa farms who are facing such a problem by produce-buying companies. Such a need reflects inefficiency in the operations of the cocoa farms which when averted could improve the capacity of the cocoa farms to help improve the quality of cocoa beans. Most of the aims of such supplier development projects in the cocoa industry are tied with the sustainability bottom-line of social, economic and environmental ends (Gold, Trautrims & Trodd, 2015).

Therefore, the produce-buying companies create high level of dependence among suppliers by supporting them with their supplier development projects. To this effect, cocoa farms also compensate for such initiative by opening their operations to accommodate the changes that are brought by the acceptance of the supplier development initiatives. In this regard, cocoa farms are expected to exhibit dynamic capability in the process design to accommodate and respond promptly to meeting the changes that come along with the accepted supplier development initiative (Ramos, Patrucco & Chavez, 2023). For instance, if produce-buying companies may give viable cocoa seedlings to cocoa farms, the essence is to promote high cocoa yield but the cocoa farms have to abandon their own unviable cocoa seedlings.

Another typical situation is when produce-buying companies undertake training and extension services to cocoa farms to promote their state of operational efficiency in cocoa farming operations. From the perspective of Kos et al., (2023) the most important factors affecting the technical efficiency of cocoa farms include access to input technologies and improved farmer know-how, group support and extension visits. These instances clearly illustrate how the cocoa farms have to adapt their farming strategies to meeting the changes occasioned by the supplier development initiative in place.

Supplier development projects are undertaken to enhance the operational efficiency of cocoa farms. Inefficiency in operations escalates production costs which negatively relates to operational resilience negatively (Thai et al., 2023). Increasing productivity among cocoa farms rests its foundation on enhancing the efficiency of production, especially technical efficiency (Kos et al., 2023). Access to subsidized input supplies such as fertilizer and seedlings, access to services such as pest and disease control and farm mapping can improve operational efficiency. Operational efficiency then helps to transmit the impact of supplier development on the sustainable performance of the cocoa farms. From this perspective, the enhanced operational efficiency acts as a catalyst to enhancing the state of sustainable performance of the cocoa farms via supplier development projects for cocoa farms.

Mediating Role of Firm Ambidexterity

The study again conceives firm ambidexterity as playing a mediating role in the predictive relationship between supplier development practices and operational efficiency. This conceptualization is informed by the dynamic capability theory. Firms need ambidexterity capability to respond to environmental dynamics with both exploratory and exploitation orientations (Garousi Mokhtarzadedeh et al., 2022). This claim manifests in the instances where cocoa farms that are competent in undertaking ambidextrous activities can enhance the impact of the supplier development projects, they receive from their buyers on their operational efficiency which in turn improves sustainable performance.

Cocoa farms or cocoa bean suppliers are expected to exhibit the required ambidextrous capacity to accommodate changes that are caused by supplier development initiatives that produce-buying companies undertake for them. It is only when cocoa bean suppliers have the organisation-wide capacity to actively respond to changes in their operations that their operational efficiency can be improved. Cocoa farms that do not have the ambidextrous capacity cannot efficiently modify their operations to accommodate the demands of supplier development projects. Supplier development also provides means for cocoa farms to improve their organisational ambidexterity through the transfer of technology and knowledge.

It therefore means cocoa farms should possess supporting adaptive capacity. Adaptive capacity refers to the ability of the cocoa farm to adapt to changes in climate or to cope with extremes (Baffour-Ata et al., 2023). Access to climate change information, financial resources, training and technological abilities are critical instruments for enhancing cocoa farmers' adaptive capacity in Ghana (Baffour-Ata et al., 2023). Licence-buying companies provide such support to cocoa farms in Ghana. Some studies have recognized the mediating role of organisational ambidexterity (Batra & Dhir, 2023; Adusei, et al., 2022).

The essence of firms pursuing ambidexterity to neutralize the disadvantages associated with exploitation and exploration (Su et al., 2022). Therefore, the organisational ambidexterity becomes the conduit through with gains from supplier development initiatives for cocoa farms are transferred on the operational efficiency of such farms. In this regard, organisational ambidexterity becomes a critical factor in determining the success of supplier development projects on the operational efficiency of cocoa farms. Its mediating role in some empirical studies is recognized (Adusei et al., 2022; Manzani, El Idrissi & Lissaneddine, 2022; Garousi Mokhtarzadedeh et al., 2022; Su, et al., 2022; Turnalar-Çetinkaya, 2022).

Mediating Role of Buyer-Supplier Relationship

The consideration of buyer-supplier relationship quality is informed by the complementarity perspective of the contingency theory which recognizes that the complementary association could stem from distinct traits (Feizabadi & Alibakhshi, 2021). Thus, the contingency theory stipulates interaction rather than a simple linear relationship involved in the universalistic perspective. Inherently, the contingency theory proposes that the relationship between supplier development and operational efficiency change when a buyer-supplier relationship is included, which also helps to test the meaning of internal and external fit given the surrounding circumstances.

From the complimentary perspective, if the scores on quality buyer-supplier relationship increases, the marginal benefits of supplier development initiatives also rise, thereby conceptualizing buyer-supplier relationship quality as key factor for achieving fit (Feizabadi & Alibakhshi, 2021). Complementarity comes in due to the distinct trait associated with the interaction between the predictor variable(s) and the mediating variable(s). Building a successful supplier development programme is strongly contingent on the level of quality of inter-firm relationships existing between the license-buying companies and cocoa bean suppliers. To this effect, firms rely on their supplier development programmes to build profitable mutual relationships with their supplier based on strong state of trust that ensues between the LBCs and the cocoa bean suppliers.

Supplier-buyer relationship quality reinforces the relationship between supplier development and operational efficiency of the cocoa farms. The usefulness of the contingency theory is magnified in situations where there is a lack of an established overarching theoretical framework with a strong emphasis on contextually grounded approaches based on contingency fit and not a single best way of managing an organisation (Naidu et al., 2023). Holistically, the contingency theory depicts the environment-structure-performance relationship for the organisations concerned contextually (Williams et al., 2017).

Acting as a catalyst, the extent of effectiveness and efficiency of execution of supplier development activities given by produce-buying companies to the cocoa bean suppliers improves the quality of relationships between such actors built on trust. Therefore, buyer-supplier relationship is a key factor in supplier development projects (Norlyk Jørgensen, Ellegaard & Kragh, 2022). Thus, such investments could eventually improve the state of operational efficiency of the cocoa bean suppliers. With such a quality of relationship in such a context, LBCs could provide the needed support to their business partners in the supply chain.

Such support could provide capital useful for enhancing the operational efficiency of the cocoa bean suppliers. On the other hand, poor buyer-supplier relationships could trigger buyer opportunism which could derail the overall purpose of such supplier development projects. With an effective buyer-supplier relationship at work, commitments and efforts of supplier development projects are sustained over the period (Sillanpää, Shahzad & Sillanpää, 2015). Organisational resources are exchanged in buyer-supplier relationships and an avenue for learning is provided for the partnering organisations. The exchange of know-how on farming operations is made possible via a working buyer-supplier relationship, which eventually helps the supported cocoa farms to upgrade their operational capacity and thereby improve their operational efficiency.

For instance, a trustworthy buyer-supplier relationship between the produce-buying companies and cocoa bean suppliers is required to support rehabilitation programmes that normally lasts for a medium or long term. To this effect, buyer-supplier relationship potentiates the predictive effect of supplier development on operational efficiency of the cocoa farms. Supplier development is considered an indicator of a co-operative buyer-supplier relationship, an approach that improves such a relationship (Joshi et al., 2017). The mediating role of buyer-supplier relationship is recognized empirically (Dadzie et al., 2018; Frempong et al., 2021; Shukla et al., 2022).

Moderating Role of Firm Size

The concept of moderation is built on the idea that, an extraneous variable can interfere the relationship between a predictor and a dependent variable through interaction. Moderators could affect the direction of relationship between the dependent and independent variable or could affect the strength of such relationship (Chinelato, Oliveira & Souki, 2023). The operationalization of the role of firm size in this context is bounded by this analogy. Thus, the study conceives that firm size could moderate the predictive relationship between supplier development and operational efficiency.

The contingency theory also supports this logic. The configurational perspective of the contingency theory encourages the examination of how characteristics and their combination affect economic performance (Grandori & Fumari, 2013). The inclusion of the firm size in the context of the study was justified by the configurational perspective of the contingency theory (Feizabadi & Alibakhshi, 2021). A gamut of empirical studies has treated firm size (Valtakoski & Witell, 2018) as contingent variable given the respective contexts of study.

Larger firms have more outstanding capabilities and resources to capture business opportunities and have a higher propensity to survive than small firms (Cheah, Leong & Fernando, 2022). In addition, large firms may not engage in innovative solution because size liabilities hinder them to pursue innovation due to bureaucracy (Tarus & Sitienei, 2015). Supporting this notion, Yang and Wang, (2023) found that small firms are weaker in terms of resource advantage and capacity acquisition. Small firms (farms) are more constrained in terms of resources and awareness of the appropriate supportive technologies in their operations compared to large firms (Kim, 2022).

Contextually, decisions about the kind of supplier development initiative to give to cocoa farms in part is influenced by the size of the cocoa farms. Farm size has implications for the type of supplier development, investment requirement, level of commitment and kind of buyer-supplier relationships that need to be made available in that respect. Firm or farm size also determines the productivity of cocoa farms because large cocoa farms may require more investments in the form of supply of inputs, training and extension services, rehabilitation, financial support and other supplier developments than small firms (Owiredu et al., 2022).

It also means ignoring firm size in the supplier development-operational contingency interaction may pose a problem since the actual interactive effective effect may be blurred. Besides, small cocoa farms exhibit low level of technical efficiency than larger cocoa farms (Mukete, et al., 2018). The consideration of the moderating effect of firm size in this context is supported by the proposition that the interactive role of contingence variables provides some sort of synergistic benefits (Farooq et al., 2021; Mushafiq et al., 2022; Oyewo et al., 2022; Rojas-Córdova et al., 2022; Yang & Wang, 2022).

Moderating Role of Firm Age

Firm age has implications for the kind and type of supplier development given by buying firms to supply firms. Mature firms have more outstanding capabilities which help them to capture business opportunities better than young firms. The contingency theory also supports this logic. The configurational perspective of the contingency theory encourages the examination of how characteristics and their combination affect economic performance (Grandori & Fumari, 2008). The inclusion of the firm age in the context of the study was justified by the configurational perspective of the contingency theory (Feizabadi & Alibakhshi, 2021).

Aged cocoa farms may require huge investment to rehabilitate them than young cocoa farms because aged cocoa farms are unproductive and demand extra farm managerial efforts to keep them productive (Amfo et al., 2022). Young cocoa farms could easily be influenced to accept certain supplier development initiatives likes viable hybrid cocoa seedlings, require less fertilizer application and may not be attracted to much diseases and insects compared to older cocoa farms. Again, young cocoa farms are more likely to produce quality cocoa beans than old cocoa farms which has much bearing on the frequency of supplier development initiatives, kind of supplier development activities and the costs of investment for supplier development initiatives.

Older cocoa farms may explore their learning curve over the accumulated years of active operations, thereby promising a better farm managerial expertise and bundle of enviable capabilities than young cocoa farms. Old cocoa farms are able more likely to withstand climatic conditions and adjust to operational changes than young cocoa farms owing to the learning curve experience. Young cocoa farms may be more attractive for supplier development initiative because of cost-efficiency and higher possibility of operational plan adjustment than older cocoa farms.

Therefore, the impact of supplier development on operational efficiency could be affected by the age of the cocoa farms that are supported under such interventions. Given the same kind and investments in supplier development initiatives for young cocoa farms and old cocoa farms, the impact of supplier development on operational efficiency may not be at par hence the need to consider of indeed cocoa farm age does affect the strength and the direction of the impact of supplier development on operational efficiency of the cocoa farms or not. A gamut of empirical studies has treated firm age (Abdi, Li & Camara-Turull, 2022; Ardito, Petruzzelli & Albino, 2019) as contingent variable given the respective contexts of study.

Operational Efficiency and Sustainable Performance

The association between firm's operational efficiency and performance is recognized by some empirical studies (Mugoni et al., 2023) because the optional use of organisational resources constitutes operational efficiency (Gong, Liu & Zhu, 2019). Operational efficiency reflects the maximization of output per unit of input. Embedded in operational efficiency is the quest to achieve operational excellence. Operational excellence is linked to sustainability gains in business operations. Operational excellence refers to the efforts made by organisations to promote their continuous improvement to achieve competitive advantage (Sony, 2019).

From the perspective of the dynamic capability theory, firms that possess dynamic resources do respond aptly to changes in environmental factors, thereby achieving fit in that regard. The support cocoa farmers receive from LBCs helps them to improve their operational capabilities. Such operational capabilities are improved because the cocoa farms learn from the changes in farming operations that are brought by the supplier development initiatives undertaken by the LBCs. Appropriate supporting services are also provided by LBCs to ensure cocoa farmers benefiting from such projects are effectively achieving set targets.

Supplier development provides the resources and knowledge that equips cocoa farms to improve their operational efficiency, hence aiding the cocoa farms to achieve gains in social, economic and environmental perspectives. With improved operational efficiency in terms of how inputs are used to generated optimized outcome, the production outcomes of the farming operations of the cocoa farms are eventually improved (Mugoni et al., 2023). This is particularly true for sustainable performance of the cocoa farms because the goals of the supplier development initiatives are usually tied to sustainability standards (Balima et al., 2020; Hess, 2022; Traldi, 2021). Operational efficiency demands operational excellence, economic viability in operational excellence and sustainability of environment in operational excellence (Mugoni et al., 2023).

Achieving operational efficiency via operational excellence offers the means for interaction to ensue between employees and customers and is much concerned with both manufacturing processes and waste reduction to maximize customer value (Mugoni et al., 2023). Firms with strong operational efficiency withstand competition better than firms that are inefficient in their business operations. Firms that are inefficient in their operations are before doomed to collapse due to high operational costs that erode the profit margins on their business output (Gong et al., 2019; Henriquez-Machado, Muñoz-Villamizar & Santos, 2021).

Operational efficiency improves quality of products and services companies offer and thus, paving the way for improving business processes and practices that are environmentally friendly (Mugoni et al., 2023). Business processes that are unable to be maintained indefinitely without negatively impacting the environment are abandoned (Makaleng & Hove-Sibanda, 2022). Firms should therefore allocate budget to cater for recovering the environment damages that occur because of their business operations, activities and products (Henriquez-Machado et al., 2021).

Supplier Development and Sustainable Performance

Both buying firms and suppliers are seeking external help to acquire the necessary knowledge and resources that can help theme to become efficient in the execution of supplier development (Vermeulen, 2015; Liu, Zhang et al., 2018). Supplier development projects in the cocoa industry are normally tied to the attainment of the sustainable performance goals (Tennhardt et al., 2022; Liu et al., 2018). Supplier development initiatives are tilted to improving social sustainability. From the perspective of the resource-dependence theory, firms lacking the required resources and capabilities form inter-firm relationships with other firms and actors in the supply chain so that, they can get access to such means of operations.

The efficient use of such resources provides the impetus of the firms to achieve sustainability in operations and performance (Amfo et al., 2022; Wongnaa et al., 2022). Therefore, operational deficiencies could be reduced drastically when buying firms support suppliers lacking such resources. The provision of supplier development also creates inter-dependency among the partners, thereby conferring some retaliatory relationship between the sponsoring buying firms and cocoa bean suppliers (Tran, Gorton, & Lemke, 2022). Such retaliatory relationships impose on the suppliers (cocoa farms) to conform to the sustainability standards enshrined in such supplier development projects initiated by the buying firms. Therefore, constant monitoring programmes are initiated based on mutual trust in such inter-firm retaliatory relationships to ensure compliance and value in the investments made in supplier development projects.

The engagement in sustainable cocoa practices is the drive for most cocoa-oriented supplier development projects. Training on alternate agribusinesses to cocoa farms helps cocoa farms to generate income which improves their living conditions. Cocoa farm that are certified are discouraged from engaging child labour and slave labour in their farming operations (Das & Aston, 2023). Green supplier development practices in the cocoa industry are aimed at improving the environmental performance of suppliers. Through supplier development initiatives, improved agrochemicals are given to cocoa farms (Grohs, Grumiller & Peham, 2023). Using the non-poisonous chemicals could safeguard the lives of micro-organisms insects, plants, fish and birds and eventually end up in improving soil quality, air quality and water quality (Dhankhar & Kumar, 2023). Sustainability projects initiated by LBCs are also targeted at improving animal health, eco-system diversity and species diversity (Abdulai et al., 2018).

Rehabilitating aged and diseased infested cocoa trees through disease and pest control projects such as mass cocoa spraying project could reduce the incidence of pest and disease attacks on cocoa farms, thereby restoring lives of the affected cocoa trees to healthy trees (Boateng et al., 2023). Farmer schools organized for cocoa farmers in Ghana can also help cocoa farms to restore degraded lands and hence improving afforestation drive which ultimately can improve climate adaptation (Kouassi et al., 2023).

By providing viable cocoa seedlings to cocoa farms, LBCs provide support for long-term productivity gains for the beneficiary cocoa farms (Grohs et al., 2023). In a way, operational costs are reduced due to high level of disease resistance among viable cocoa seedlings, which eventually aid to reduce operational costs of the cocoa farm operations. Training and extension services to cocoa farms could provide skills, knowledge and competency cocoa farmers, cocoa farm managers and farm labour require to overcome difficulty in cocoa farm management.

With the right acumen for managing farm operations, cocoa farms could end up achieving their sustainability targets such as maximizing profit in their cocoa production businesses. With improved operational efficiency, unit cost of production reduces, which when met with same going market cocoa prices or increased cocoa prices, cocoa businesses stand the chance on earning more profit from their cocoa operations. Training of cocoa farmers about the best farming practices could potentially improve labour productivity on their cocoa farm operations (Basri et al., 2023).

Map of Cocoa Producing Areas in Ghana

The concentration of cocoa farms in Ghana is at the central belt and the southern belt of the country. These are typically found in the forest zones and some coastal areas in the country. Favourable regions noted for cocoa production thus include Western Region (Both North and South), Ashanti Region, Central Region, Brong Ahafo (Both Bono Reg-ion and Bone East Region), Eastern Region and Volta Region (2022 Cocoa Sector Report, GCB Strategy & Research Dept). The northern sector of Ghana is not favourable for cocoa production due to the nature of the climatic conditions there. Figure 10 shows the concentration of cocoa farms in Ghana.

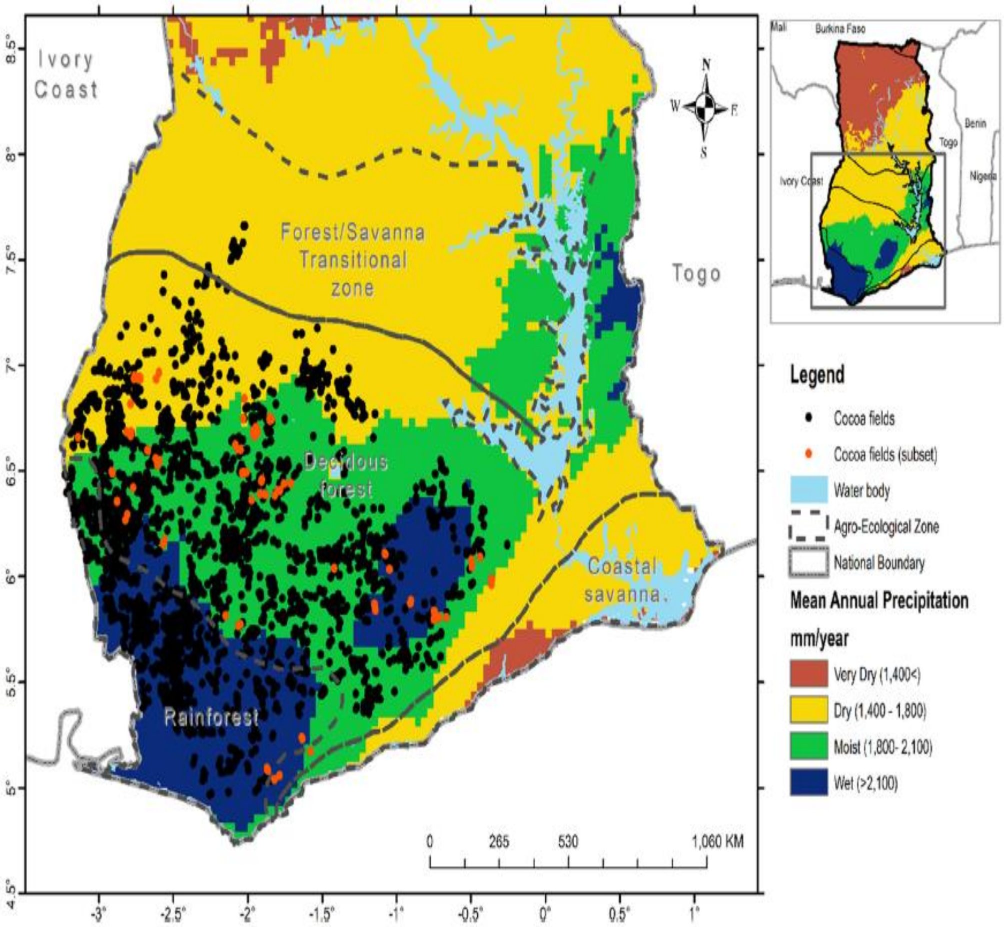

Figure 10: Map of Cocoa Producing Areas in Ghana
Source: Asante, et al., (2021)

Ghana's Cocoa Supply Chain Structure

The cocoa supply chain in Ghana is characterized by a complicated production process encompassing farmers, buyers, transportation and trading, certification, collection, storage, processors and chocolatiers and distributors. The domestic supply chain involves the manufacture and marketing of cocoa beans and semi-finished goods from the origin up to the point of export. Different participants are recognized in the supply chain, including from input suppliers to farmers, to dealers, to transport and other service providers to processors.

The consideration of supplier development activities occurs between LBCs and cocoa bean suppliers, which forms the upstream supply chain in the cocoa industry of Ghana (See the red ring in Figure 11). The supply of the smallholders is aggregated by the farmers or the cocoa bean suppliers for onward sale to the LBCs. Given the fact that COCOBOD fixes the minimum purchase price, these LBCs solely compete on non-pricing issues like as supply of finance and technical assistance (2022 Cocoa, Sector Report). Key LBCs operating in Ghana include PBC Limited, Armajaro (Gh) Limited, Kuapa Kokoo Limited, Olam (Ghana) Ltd, Federated Commodities, Transroyal (Gh) Limited, Adwumapa Buyers Limited, Cocoa Merchants (Gh) Limited, Akuafo Adamfo Marketing Limited, Kumankoma Company Limited and Brossaman Company Ltd (2022 Cocoa, Sector Report).

However, there are 44 active LBCs in Ghana. Cocoa industry in Ghana is structured around three key stages including pre-harvest, harvest and post-harvest. In all situations, supplier development measures are done by the LBCs to position cocoa farmers to achieve the goals of such interventions. The Cocoa Research Institute of Ghana and other institutions such as the International Institute of Tropical Agriculture also support cocoa farmers with research information which are turned into extension services (Obeng Adomaa et al., 2022). Furthermore, organisations include Public Cocoa Health and Extension Division (CHED) and other private sourcing and chocolate corporations engage with civic groups to continue to provide extension services to cocoa farmers (Obeng Adomaa et al., 2022).

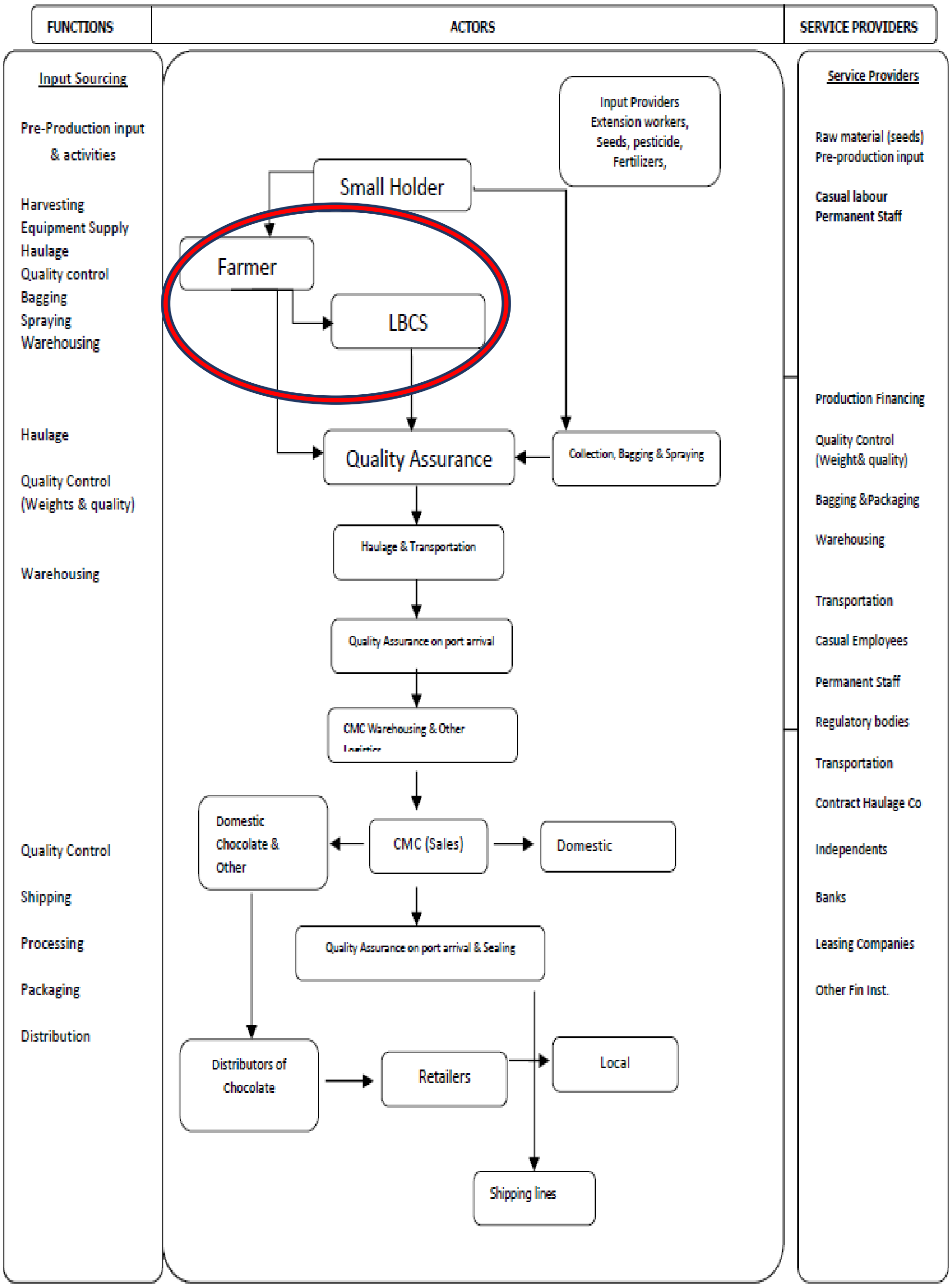

Figure 11: Ghana's Cocoa Supply Chain Structure

Source: 2022 Cocoa Sector Report, GCB Bank PLC Strategy and Research Department (2023)

Chapter Summary

The chapter focused on reviewing theories that support the purported predictive relationships between and or among the concepts considered in the context of the study. The theories were linked to explain the specific research objectives given the extent of justification by empirical studies and logic. The chapter also provided information about the key concepts considered in the study by explaining them, operationalizing them where necessary and contextualizing them.

CHAPTER THREE

EMPIRICAL REVIEW AND CONCEPTUAL FRAMEWORK

Introduction

This chapter focuses on empirical reviews, lessons learnt from the reviews and the conceptual framework formulated based on the theoretical postulations and trends observed in the empirical review section. The review of the empirical studies gives credence to the trend of affairs portrayed by the theoretical postulation and the conceptual inferences. It also offered the opportunity to develop the alternate hypotheses considered in the study.

Adequate grounds were laid for the comparison of the findings to the positions of some previous empirical studies. Lessons learnt from the empirical review gave support for the choices made, especially in the research methods section of this study. Based on the evidence gathered, a conceptual model was drafted to give a pictorial view of the purported relationships among the constructs of interest in this empirical study. A summary of the content of the chapter was also provided.

Supplier Development and Operational Efficiency

Research conducted by Biswas et al., (2021) empirically investigated the impact of agricultural extension services on the technical efficiency of rural rice farmers in Bangladesh. The work was grounded on the neo-classical theoretical framework. The study utilised an experimental research design and employed a quantitative research methodology to quantify the variables and analyse the main data obtained using structured questionnaires. The study utilised a freely available field data-collecting tool.

The primary data collection was conducted using mobile devices enabled by the Android operating system. The specification of the model was derived from the stochastic method to calculate the technical efficiency. The comparison findings demonstrated that farmers who availed themselves of extension services generated higher off-firm revenues compared to those who did not get any extension services. A substantial statistical difference was seen in the output between the treatment group and the control group, with the treatment group surpassing the control group in performance. Cobb-Douglas production function also revealed better output from land usage for farms that received extension services had greater technical efficiency than those in the control group.

In another study, Chandio et al., (2019) examined how agricultural credit and farm size affect technical efficiency. It was conducted in Sindh, Pakistan by using the stochastic production frontier approach. The research collected primary data from 180 rural households. These households had been given credit access by the ZaraiTaraqiyati Bank Limited with the view to supporting them to obtain the needed farm inputs to facilitate their production efficiency. The study applied the multi-stage sampling method for the selection of the participants.

The quantitative data gathered were analysed based on the stochastics production frontier approach by applying the Cobb-Douglas form of stochastic frontier approach. The maximum likelihood estimates results proved chemical fertilizer, labour, credit and farm size improved rice productivity significantly although seed rate did not. Such improvement in productivity was attributed to the higher level of technical efficiency (97%) among the rice farms due to access and use of inputs such as labour, fertilizer, credit and appropriate farm size. It was found that the rice farmers were technically efficient in their farming operations.

Mediating Role of Firm Ambidexterity

Adusei et al., (2022) evaluated the effect of intellectual capital on company performance and considered the putative mediation roles of creative leadership and organisational ambidexterity in Ghanaian SMEs' setting. The study additionally adjusted for the influence of business size and firm age. The study employed a cross-sectional survey. The SMEs targeted were all registered in the Ghana Business Directory and Registrar General's Department database with 8950 SMEs. The unit of analysis was at the firm level constructed on the ideals of the positivist philosophy. Participants were recruited purposively and supplied with standardized questionnaires for the data collection from 352 SMEs that were located in Kumasi and Accra. A personal data-gathering strategy was utilized and this assisted the creation of the 87.22% response rate obtained. Furthermore, the study employed a quantitative research technique. Using a 7-point Likert scale, the study acquired the data regarding the constructs/variables using already validated scales that were discovered through the existent literature review that was undertaken.

When assessing the controllable variables including firm age and firm size, the study employed the natural logs of such components in the estimated model. Both procedural procedures and statistical techniques were applied to mitigate the potential of common method bias. Also, confirmatory factor analysis was utilized to assess common method bias. It was observed that company ambidexterity mediates favourably and in a substantial link between intellectual capital and business performance. The study also revealed that adjusting for the influence of firm age and firm size increased the fit of the estimated model hence enhancing the direct association between intellectual capital and firm performance.

Turnalar-Çetinkaya in 2022 examined how managerial efforts at managing errors facilitate entrepreneurial orientation after controlling for the mediating role of ambidextrous leadership. Ambidextrous behavioiur among leaders was better explained with the dynamic capability theory because the study was guided by the logic that leaders are the main actors that undertake activities to exploit and explore changes in a business environment to champion innovation. Error management was treated as the main predictor, entrepreneurial orientation was considered as the dependent variable whilst ambidextrous leadership was treated as the mediating variable. In selecting the participants, the study utilized the convenience sampling technique and targeted some 400 white-colour organisations that were listed in the Instanbul Chamber of Industry. Data analysis was based on 220 cases.

Reliability of the data acquired with the structured questionnaires was assessed with Cronbach's Alpha. The scales for measuring the ideas were scored on a 6-point Likert scale. Confirmatory factor analysis was performed to assess the validity of the scales utilized for the measurement of the constructs. The study applied structural equation modelling to evaluate the proposed assumptions. Model evaluation was based on a two-stage strategy proposed for such an analytical procedure. Composite reliability and convergent validity were similarly calculated. VIF was utilized to assess the threat of collinearity.

Calculation of ambidexterity was based on the multiplication technique that treats ambidexterity as a combined construct of synergetic impact between exploitation and exploration. The path analysis results revealed mistake management positively affected progress in entrepreneurial orientation in a statistically meaningful manner. Error management also associated positively in a major degree with ambidextrous leadership. Ambidexterity partially mediated the predictive association that resulted between error management and entrepreneurial attitude.

In another empirical study, Su et al., (2022) studied how changes in exploration, exploitation and ambidexterity affected the performance of multinational SMEs in the USA. The study addressed SMEs registered with the U.S Small Business Administration. Data collecting was done by professional marketing agencies from CEOs and top IM managers. The online technique for data collection with a questionnaire was employed for the main data collection, which yielded a 14.30% response rate. The introduction of ambidexterity in the model was motivated by the dynamic capacity theory due to the demand for adapting to the fast-changing worldwide business environment.

Before the model definition was done concerning the structural equation modelling, descriptive statistics were done to describe the variables of interest. To decrease the likelihood of common method bias inherent in the organized technique adopted for the data collection via the structured questionnaire with Likert-type rating, various ex-ante considerations were observed appropriately. For instance, anonymity, secrecy, informed permission and submission of the cover letter were observed which in turn lowered the potential of common technique bias.

Harman's one-factor test was developed to quantify the threat of common method bias. Non-response bias was investigated using the independent t-test technique given the two waives of data collecting periods. The study revealed that adaptive marketing capabilities boosted business performance in a statistically meaningful manner. Adaptive market capacity also mediated the association between exploration and firm performance, relationship between ambidexterity and firm performance.

An empirical study was done by Manzani et al., (2022) that investigated the mediating impact of market orientation ambidexterity in the link between soft quality management techniques and product innovation ambidexterity. The sociotechnical systems theory was accepted. The study purposively chose ISO9001-certified Moroccan enterprises for the study. The study also adapted various earlier empirical scales in assessing the important constructs covered in the study. Data processing and analysis was quantitatively handled with the usage of structural equation modelling technique. Market ambidexterity orientation mediated, in a favourable and substantial manner, the association between soft quality management methods and product innovation ambidexterity.

In their empirical study, Lu, Zhou and Dou (2022) studied the effects of intelligent manufacturing on manufacturing and explored the mediating effect of ambidextrous capabilities based on the value co-creation theory. The study focuses on Chinese-listed enterprises from 2015 to 2020. Panel data was utilized. The study consequently adopted a quantitative research technique since it was supported by the predictive and explanatory character of the research design applied. Stata software was used to process the data. Mathematical model estimate using quantile regression was constructed to test the specified hypotheses. It was observed that exploratory skill adversely related with short-term performance but relates positively with long-term performance. Intelligent manufacturing projected a favourable change in both long-term performance and short-term performance.

Garousi Mokhtarzadedeh et al., (2022) also investigated the mediating function of company ambidexterity in transmitting the influence of knowledge management competence and entrepreneurial creativity on entrepreneurial intensity and firm performance by a cross-sectional research design online survey. The study addressed SMEs in Iran. The list of the firms was gathered from a government database. The estimation of the sample size was based on the G*Power program. Google link was established and delivered to the participants via the usage of social media. In following up with the supplied surveys, reminder messages and phone calls were made.

Using a 5-point Likert scale, the items measuring the variables of interest were measured from the perspective of participants which provided the primary data utilized for the analysis in determination of the outcomes for the set hypotheses. Data analysis was done at the firm level with a significant emphasis on quantitative research approach. Data analysis was done with the structural equation modelling technique where a 2-stage approach to data processing was completed for the determination of the suitability of the constructed reflective model. All-important indices for the measurement model evaluation were fulfilled and hence the model was judged fit for the research.

Axiologically, the study was value-free with the question of the impact of the value of the researcher on the study of the phenomena under the investigation. Explanatory study approach was used as it was based on examining cause-and-effect relationships statistically. SMART PLS software was utilized for processing and evaluating the data. The study revealed that firm ambidexterity positively connected to company performance considerably and in a direct manner. Also, Sobel's z-statistic revealed that company ambidexterity positively mediated in a substantial manner, the positive significant association between entrepreneurial innovation and firm success.

Hwang, Lai and Wang (2021) also examined the effect of open innovation on firm performance and considered the mediating role of firm ambidexterity in Taiwan's high-tech industry. Primary data were collected from the participating firms that were selected through stratified sampling technique. The questionnaires were mailed to the participating firms and to reinforce timely response, phone calls and or emails were sent as reminders. A total 243 questionnaires were retrieved but 215 turned out to be valid for the study after the initial screening exercise had been carried out. A 33.08% response rate was subsequently recorded. The study was supported by the organisational learning theory and resource-based theory.

Data analysis was at the firm level. The study employed certain previously validated scales in assessing the constructs which increased the validity of the scales used for the measurement of the concepts. A 7-point

Likert scale was used to evaluate the attitude of the participants on the items measuring the constructs. Multi-collinearity was quantified with the VIF score and ordinary least squares regression model employed to test the hypotheses. It was shown that open innovation created a statistically significant positive boost in business performance. company ambidexterity favourably and strongly connected with company success. Firm ambidexterity partially moderated considerably, the predictive link between open innovation and firm success.

Empirically, Belhadi et al., (2021) also tested how industry 4.0 capabilities affect sustainable supply chain performance after examining the mediating roles of ambidexterity and digital business transformation. Questionnaire-based survey was carried out with special focus on digitalized organisations that were located in the Mediterranean basin and Southern Asia with unit of analysis at the company-level. Email was sent for the primary data collection for October, 2019-January, 2020 period which eventually led to the recording of a 31.81% response rate. Thus, 962 firms were initially targeted for the primary data collection, however, only 306 questionnaires were retrieved for the data analysis in respect of the developed hypotheses in the context of the study. The study was guided by the resource-based view theory with both practice-based view and dynamic capability view.

The scales that were used for the measurement of the key constructs in the context of the study were adopted from empirically validated sources after careful literature review had been carried out. Structural equation modelling was done with the IBM SPSS (Version 26) given its capability of conducting regression analysis. A two-stage model evaluation based on the recommendations of Anderson and Gerbing (1988) was followed. It was discovered that industry 4.0 capabilities had a direct significant positive effect on sustainable performance. Furthermore, the study revealed organisational ambidexterity mediated significantly the predictive association between industry 4.0 capabilities and sustainable performance.

Monferrer et al., (2021) explored through an empirical study, how network market and entrepreneurial orientations affected the international performance of born globals and accounted for the mediating effect of ambidextrous dynamic capability. The study was founded on the principle of dynamic capacity. The research concentrated on some 1932 Spanish manufacturing businesses that were undertaking worldwide commercial activity. Structured questionnaire was initially pre-tested through a pilot research and based on the results, the questionnaire was amended. Field survey was done for the collecting of the primary data. Data analysis performed at the firm level and the study was based on 306 genuine instances.

The study employed an explanatory research design and consequently tackled the measurement and the data analysis using a quantitative research technique. The study employed various existing yet validated scales for the measuring of the constructs of interest in the context of the investigation. A 5-point Likert scale was utilized for grading the opinion and attitude of the study participants on the questions that were contained in the questionnaires that were used to gather the main data for the analysis. Validity of the constructs was tested by a confirmatory factor analysis in a structural equation modelling approach.

The measurement model was initially examined and certified as adequate before the structural model was evaluated. Cronbach's alpha was employed to verify the internal consistency of the primary data acquired. Convergent validity and discriminant validity were also evaluated and were judged to be satisfactory. VIF was utilized to check for multicollinearity alongside the usage of principal component factor analysis that provided the percentage variance explained. It was discovered that ambidextrous dynamic capability, which was configured as parallel mediation with adaptive capability and absorption capability mediated the relationship between network entrepreneurial orientation and innovative capability which subsequently translated into improved international performance among the born globals.

Karman, and Savanevičienė (2021) also evaluated the mediating role of organisational ambidexterity in the relationship between dynamic capabilities and sustainable competitiveness among research firms in the Baltic region. The study was underpinned by the resource-based view theory and the theory of dynamic capabilities. Data collection was done via a questionnaire-based survey from June to September 2019. The electronic data collection method, via the stratified sampling technique, was used for the primary data collection which yielded 455 valid cases, representing a 98.9% response rate.

Exploratory factor analysis was applied to test the validity of the scales via structural equation modelling. Kolmogrov-Smirnov test was carried out to assess the normality of the datapoint distribution for the dependent variable. This SEM approach applied the co-variance-based reflective model configuration. Two-stage model evaluation process was followed as has been prescribed for studies of this nature. The Sobel test results showed organisational ambidexterity partially mediated the predictive relationship between dynamic capabilities and sustainable competitive advantage.

Mediating Role of Buyer-Supplier Relationship

Empirically, Shukla et al., (2022) examined the impact of knowledge transfer on supplier performance in the agricultural supply chain and treated the buyer-supplier relationship as a mediating factor. Agency theory was adopted. The study was carried out in the India's agriculture sector. The study targeted agri-tech firms that engage in knowledge transfer to develop a smooth buyer-supplier relationship. One and half years was spent on the gathering of the primary data. Unit of analysis was with the farmers. Through the explanatory research approach, the study was quantitatively approached as guided by the positivist paradigm.

A response rate of 20% was recorded, which represented 121 usable responses obtained out of the 600 farmers that were contacted for the primary data collection. 7-point Likert scale ranging from 1-strongly disagrees to 7-strongly agree was used to measures the degree of responses from the participants on the items contained on the scales measuring the concepts. To improve assimilation of the content of the scales, some of the items were reversed coded. The order of the constructs was changed in order to reduce the possibility of the treat of common method bias.

To detect the presence of treat of common method bias, the study used Harman's single factor method. The two-stage model evaluation method was applied for the testing of the reflectively structured model. The SEM results proved knowledge transfer significantly improved buyer-supplier relationship. Buyer-supplier relationship positively related to supplier performance. Buyer-supplier relationship partially helped to better explain the effect of knowledge transfer on supplier performance in the agriculture supply chain in India.

Mallet, et al., (2021) in their study examine how supplier-buyer relationship related to supply chain sustainability and considered the moderating role, if any, of trust in that context through an empirical study. The relationship among the constructs was established based on the rational view theory as recognized by studies on SC context. The study used managers in stores, procurement, material handling and transport units as proxies for the respective pharmaceutical firms in Ghana.

A 5-point Likert scale was used for rating the attitude of the participants on the items that were contained in the subscales for the measurement of the constructs under investigation on the point of agreement from 1-strongly disagree to 5-agree. The items were adopted from some sources. SPSS was used as the main data processing software given its power in terms of the various techniques embedded in it. Cronbach's Alpha was used to test the reliability of the primary data collected via the questionnaire. The analysis of study was at the organisational level and therefore the researcher's personal values did not influence the conduct of the study and its analysis.

The structural equation analysis shows buyer-supplier relationship predicted a significant positive improvement in sustainability in SC and that trust in buyer-supplier relationships also predicted positive change in sustainability in SC even as the information sharing also portrayed similar results. Furthermore, supplier-buyer relationship failed to interact with trust.

However, trust significantly and in positive way proved as a power factor for transferring the effect of the supplier-buyer relationship on sustaining SC in the pharmaceutical industry of Ghana.

Frempong et al., (2021) examined the impact of corporate sustainability on firm performance and considered the mediating roles of green innovation capabilities and sustainability-oriented supplier-buyer relationship. The study was underpinned by the stakeholder theory and social capital theory. The study focused on the manufacturing industry in Ghana and targeted the firms that were located in Accra, Tema and Kumasi. Using structured questionnaire on a 7-point Likert scale, primary data was collected.

The use of quantitative data analytical tools was fuelled by the predictive orientation of the research as well as the numeric means for the data capturing, coding, entry and analysis. SMART pls was used to configure the structural equation model. Data analysis unit was at the firm level and thus data analysis was based on 243 cases. Buyer-supplier sustainability partnership mediated the relationship between facets of corporate sustainability and firm performance but failed to significantly mediate that of environmental sustainability and firm performance.

Huang and Huang (2019) in their empirical study examined the influence of transaction-specific investments on firm performance in buyer-supplier relationships and treated supply chain integration as a mediating construct in that regard. The study was underpinned by the transaction cost theory, resource-based view theory, social exchange theory and relational exchange theory. The study used email, fax or telephone calls to establish contacts after the list of the 143 hub firms (Customers) and 1140 satellite firms

(Suppliers) had been drawn from the 2005 list of Taiwan Central-Satellite Protection System. Marketing managers, sales managers, manufacturing managers and financial managers were the proxies for the respective firms hence the 524 questionnaires were mailed to the targeted firms.

To improve the response rate, eight-month telephone and email follow-ups were made over the period. The study used a quantitative research approach since the items in the scales were numerically coded for the data capture alongside the use of statistical techniques embedded in the appropriate statistics. Fit indexes were checked to ensure that the model fits the data collected. Hierarchical multiple regression was used to test the hypotheses. Variance inflation factor was used to test multicollinearity. The results proved that transaction-specific investment influenced firm performance significantly and in a positive way. Also, supply chain integration significantly mediated the relationship between transaction-specific investment and buyer-supplier relationships.

In the empirical study by Dadzie, et al., (2018) emphasis was placed on the trust and duration of buyer-seller relationship in emerging market economy and focused on the cocoa sector of Ghana. Particularly, the study focused on cocoa suppliers who were contacted in the five-leading cocoa-producing regions in Ghana. Primary data were gathered via the use of structured questionnaires administration. A 5-point Likert scale was used to measure the attitude of the participants. Reliability was measured via the Cronbach's alpha method. Confirmatory factor analysis was done to test the convergent validity and discriminant validity via the PROCALIS procedure recommended in SAA 9.4.

It was found that ability trust was the most important buyer-supplier relational trust in the cocoa sector, followed by integrity trust and then finally affective trust. Besides, only ability trust for purchasing officers related significantly with how long suppliers remained with their current buying firms in the past. Regarding future intentions to remain in buyer-supplier relationships, only affective trust significantly influenced cocoa suppliers' duration intention behaviour positively.

Mediating Role of Operational Efficiency

Mantje et al., (2023) in their empirical study examined how operational efficiency mediates the predictive relationship between knowledge management and firm competitiveness. The study was underpinned by the dynamic capability framework. The study was essentially quantitative and was anchored on the positivist research paradigm. Some 3165 small, medium and micro enterprises were targeted. A sample size of 343 SMEs was determined via online application after the appropriate parameters had been inculcated into the software. A response rate of 87.5% was computed.

Structured questionnaires were used to collect the primary data after the scales had been developed via a 5-point rating scale for the various constructs. ADANCO 7 software was used to process and analyse the data via SEM. The 2-stage model evaluation process was followed as recommended. It was found that operational efficiency mediated significantly the predictive relationship between knowledge management and firm performance. Such mediation was deemed complementary partial mediation because both the direct and indirect effects were statistically significant.

Danso-Abbeam et al., in 2020 examined gender differences in technical efficiency of cocoa farms in Ghana. The study applied a household survey for the primary data collection in cocoa growing areas including the Western, Brong Ahafo, Eastern and Ashanti regions of Ghana. Multi-stage sampling technique was used to select the respondents and questionnaire was used to collect the primary data. The study utilized the linear programming for the estimation of the efficiency of the unit farms through the non-parametric DEA.

The model estimation also made use of the Blinder-Oaxaca (B-O) which helped in the disaggregation of the efficiency scores between male farm managers and female farm managers. The findings proved there was a significant difference in the efficiency of male-managed cocoa farms and female-managed cocoa farms in that male-managed cocoa farms outperformed female-managed cocoa farms. The impact of institutional/policy drivers was also analyzed. These included access to extension services, visit demonstration farms, access to agricultural credit and membership of FBOs. Access to agricultural credit and access to extension services undermined the productivity of women cocoa farm managers more than men-managed cocoa farms.

Another empirical study was carried on by Effendy et al., in 2019 to ascertain the factors that influence the efficiency of cocoa farms in Indonesia. The study targeted cocoa farms in the Sulawesi region. Purposive sampling was done to select 424 household heads of cocoa farmers via a cross-sectional research design. Data analysis was done via the non-parametric approach which involved the use of deterministic approach-linear programming. It was found that improvements in farm efficiency prove farm income generation which eventually reduced poverty among the cocoa farmers. However, there was some deficiency in technical and allocative efficiencies calling for potential investments. Technical and allocative efficiencies were influenced by use of quality seeds, organic fertilizers, access to bank loan and market, frequency of extension and training of farm managers and participation of female managers in cocoa farming operations.

Sankowska (2016) also examined the effect of organisational trust on the market position after controlling for the mediating effect of innovativeness and operational efficiency. 202 companies were targeted. With a quantitative research approach, an explanatory research design was adopted which supported the use of the SEM in testing the hypotheses. The results proved innovativeness predicted significantly the change in operational efficiency. Operational efficiency significantly predicted market position in a positive manner. The mediation analysis also proved operational efficiency positively and in a significant manner transferred the effect of organisational trust on the market position.

In 2012, Lee, Kim and Choi evaluated the effect of green supply chain management on organisational performance and treated employee job satisfaction, relational efficiency and operational efficiency as mediating factors. The study was founded on the ideas of the resource dependence theory. The study was mostly quantitative and predictive-based. Structured questionnaire was employed for the data gathering. The items were adapted from pre-validated sources. A 5-point Likert scale was employed for grading the responses from the perspectives of the target population.

The targeted population comprised the operations/SC managers of electronic SMEs in Korea. Questionnaires were given to the intended respondents via a Korean research consulting organisation. Data analysis was at the firm level. Item-to-total correlation analysis was employed to test the reliability. Structural equation modelling was employed for the testing of the assumptions. It was discovered that both operational efficiency and relational efficiency mediated the predictive association between green supply chain management and organisational effectiveness. Inferring from the empirical research in question, the operational efficiency's mediating role in Western North regional production of cocoa is established based on the theoretical foundation laid in spite of study context variability.

Moderating Roles of Firm Characteristics

Firm Size and Firm Age

In 2023, Yang and Wang in their empirical study studied the influence of sustainable supply chain management on business economic performance and explored the moderating function of firm size. The research targeted manufacturing enterprises in China. The resource-based view theory and the dynamic capacities theory were used contextually. A questionnaire and interview were utilised for the collecting of the main data that were used for the testing of the generated hypotheses. 470 surveys were individually distributed. A response rate of 37.86% was reported. A test of nonresponse bias was based t-test based on business size (25%) and firm age for early respondents and late respondents (25%).

The investigation was handled utilising a mixed research strategy. Multi-stage sampling approach was applied appropriately with two primary stages. Firm size was determined based on the number of workers and firm age was measured based on an ordinal scale with 5 classes. Harman's single-factor was utilised to assess the common method bias. In testing the reliability of the primary data, the study employed Cronbach's Alpha whereas validity was examined by component analysis.

SPSS and SPSS process macro were the applications utilised for the data processing and analysis. Hierarchical multiple regression was carried performed to evaluate the hypotheses. The moderation analysis was assisted by the SPSS process macro package that was configured in the SPSS. Firm size influenced greatly the association between sustainable supply chain management techniques and the economic success of the firms examined. Dynamic capabilities somewhat mediated the predictive association between sustainable supply chain management strategies and business economic performance.

Empirically, Mushafiq et al., (2022) studied how changes in Merton-type default risk and financial performance and checked for the moderating influence of business size with dynamic panel moderation analysis. The data was taken from 250 KSE ALL index of the PSX nonfinancial enterprises throughout a period of six years from 2013 to 2018. The investigation was quantitative in nature and consequently stochastic mechanism based on Brownian geometric motion was utilised to examine the specified research hypotheses. Firm size was assessed using total assets and consequently measured at the ratio level. It was revealed that business size impacted considerably and favourably the association between distance-to-default and financial performance among the listed enterprises.

Furthermore, Rojas-Córdova et al., (2022) explored how organisational structure influences firm ambidexterity after adjusting for the moderating effect of firm size. The study employed the contingency theory to support the supposed link among the constructs/variables that were explored in the empirical investigation. The study employed survey and database archiving for the primary data gathering from chief executive officers from Chile. The scales that were employed for the measuring of the ideas were modified from the available literature study. The analysis was based on the firm-level unit of analysis.

Email mode for the primary data collection was done and following the initial issue, reminder messages were sent to all the chief executive officers of these SMES that were selected. The investigation was directed by the quantitative research technique because of the numeric mode for data gathering and analysis utilised in the study. The unit of study includes SMEs and 237 data instances (12% response rate) were included for the analysis. Common method bias was investigated with the use of Harman's single factor technique using confirmatory factor analysis. The constructs were assessed based on what has been widely validated through empirical investigations and after presenting the items to expert opinion, the items were eventually certified valid for the assessment of the constructs of interest.

Firm size was measured based on the number of full workers of the SMEs and hence natural log of firm size was considered in the data processing phase. Firm age was also calculated based on the number of years the enterprises had been in operation following their establishment. Other controllable factors were business location, alliances and business growth as assessed by average revenue for the most immediate last three years. The hierarchical regression findings demonstrated firm age linked considerably to company ambidexterity. The moderation results demonstrated firm size significantly moderated in a negative manner the predictive association between structural instrument in terms of formalization and employee participation and company ambidexterity.

Farooq et al., (2021) evaluated the moderating influence of firm size in the link between innovation orientation and business success. The study employed the purposive sample approach to pick the 278 manufacturing and service enterprises in India. The study employed the explanatory research design and quantitative research technique owing to the causal character of the proposed research hypotheses. Specifically, a self-developed non-disguised questionnaires were utilised to collect the primary data after it had been pilot tested and confirmed suitable for such a study. Unit of analysis was set at the firm level. To analyse the threat of common method bias, the study employed Harman’s single-factor approach whereas validity of the constructs was tested with the confirmatory factor analysis (CFA) in the AMOS 22.0 version.

Other significant contextual characteristics that were controlled for in the study include industry type (measured at the nominal level as manufacturing and service company respectively) and firm age (measured at the nominal level as young firm and elder firm respectively). Firm size was assessed by the number of workers as well as the threshold of investment. Structural equation modelling was employed to assess the specified hypotheses using a multi-stage co-variance technique. Multi-group moderation analysis was utilised to assess the moderating influence of firm size in the research. The results revealed firm size based on number of workers considerably affected the association between innovation orientation and business success. Similarly, the study revealed that firm size as assessed by threshold of investment was invariant across the business groupings thereby having a moderating influence in this respect of company age.

Abdi et al., (2022) in their empirical study evaluated the influence of sustainability disclosure on company value and financial performance in the aviation sector and adjusted for the moderate impacts of firm age and firm size. The study was guided by the stakeholder theory, the Fama-French theory and the resource-based theory. The study relies on secondary data that were taken from the recognized databases for the period 2009-2019. Panel data were employed for the testing of the hypotheses. Hence, a longitudinal study design was employed with a quantitative research focus.

The model findings revealed that firm size affected the association between sustainability metrics and firm value for the complete set and full-service airlines. Firm age also moderated the link between sustainability objectives and eco-friendly activities with older and bigger airline enterprises having greater resources to contribute to eco-friendly activities. However, age, in a holistic sense was viewed as not a significant mediator for firm value and sustainability participation.

Another empirical study was undertaken by Rahman and Yilun (2021) which studied the impact of company age and firm size on firm profitability among enterprises in China. The study was led by the theory of structural organisation, caught in the middle theory (Justifying the case of firm size) and theory of learning by doing (Justifying the inclusion of firm age). The study analysed data from public businesses from 2008 to 2018 with random sampling technique. Regression model specification was set to establish the supposed link existing among the companies. The data comprised secondary and panel data given the historical and distinguishing characteristics analysed. Firm size was calculated with log of total assets and firm age was measured based on the age of the company after establishment.

A Spearman's rank order correlation test was performed to analyse the link among the variables of interest in the specified regression model which also functioned as a measure of multicollinearity with the variance inflation component. The model was evaluated by panel least square regression. The fixed effects model results revealed business size and firm age jointly accounted for a statistically significant positive considerable improvement in profitability. Firm size positively associated with profitability in a major degree. Firm age associated with firm profit in a substantial but negative manner and board size favourably, but in an insignificant manner related with company profitability.

Moreover, Ardito et al., (2021) investigated the influence of alliance ambidexterity on innovation performance and addressed the moderating function of firm age. The study acquired secondary data from the proper database of biotechnology. Panel data were later created for the quantitative data analysis. Firm age was measured based on the natural log of a year of incorporation. Unit of analysis was at the firm level. Binomial regression was applied to test hypotheses. Alliance ambidexterity substantially associated favourably to innovation company success. Firm age affected considerably the association between alliance ambidexterity and the firm's innovation performance. Firm innovation performance develops with the relationship between fundamental research and technology capital. Innovativeness declines with hard age.

Furthermore, Reed (2020) evaluated the role of company age and size on strategic agility and its transmissive effect on firm performance after allowing for the moderating effect of environmental turbulence. The study was grounded by the theory on strategic dynamics and dynamic capabilities. The research measured company age was measured using the number of years since its inception and hence was computed by subtracting the current year from the founding year. Firm size was defined by financial assets, yearly revenue and number of workers.

A 7-point Likert scale was employed to assess strategic agility and whereas a subjective 5-point Likert scale was applied to measure business performance. A similar method was employed for the measurement of environmental turbulence. However, a 7-point Likert scale was utilised to quantify organisational alignment. The scales for the measurement of the constructs were adapted from several experimentally proven sources. Factor analysis was done to assess the validity of the scales. Harman's single-factor was utilised to assess the common method bias.

Non-response bias was revealed via ANOVA technique where no significant difference between-group variances were observed between the first wave and the second wave for the responses received throughout the two-phase approach to data collecting. The regression findings indicated that strategic agility influenced considerably the connection between strategic agility and firm performance. Older corporations become more strategically adaptive than younger firms. Firm size failed to substantially link with strategic agility but is correlated favourably with firm size and firm age. Small enterprises were deemed to have functioned better in the setting of turbulent conditions than older firms.

Furthermore, in 2020, Mabenge, Ngorora-Madzimure and Makanyeza empirically studied influence of innovation on the performance of small and medium firms and explored the moderating roles of firm age and firm size. The study employed an explanatory research design with the dependence on a quantitative research technique. A structured questionnaire was employed for the primary data gathering. The items used for the measurement of the variables were developed from several experimentally established sources. A 5-point Likert scale was used to assess the opinions of the respondents on the items that examined the major variables of interest contained in the structured data collecting instrument. Firm age was evaluated based on the number of years the firm has functioned following beginning. Firm age was evaluated by number of workers or yearly sales turnover.

Data collection was done via a cross-sectional survey approach. Owners and managers of manufacturing SMEs in Harare were questioned for the main data. A basic random sample procedure was utilised for the selection of the individuals that were finally supplied with the questionnaire. 350 surveys were provided but 320 returned their entirely filled questionnaires. Thus, 91.43% response rate was reached. Data gathering was based on personal administration. Furthermore, AVE and discriminant validities were estimated for the structural model.

Cronbach's alpha and composite reliability were employed to measure the dependability. The results demonstrated company age considerably attenuated the association between marketing innovation and financial performance. Younger enterprises have greater financial performance than older organisations given the application of marketing innovation. Bigger businesses had greater financial performance, given the influence of marketing innovation than smaller ones. Firm size failed to attenuate the association between marketing innovation and firm non-financial success.

Ngatno and Dewi (2019) in their empirical study explored how adaptable aptitude links with company performance and adjusted for the moderating variables of firm size and firm age.

The target demographic comprised UMKM Batik entrepreneur group in Central Java, Indonesia. A questionnaire was utilised to gather data from 198 managers on a voluntary basis. The scales measuring the constructions were altered. A 5-point Likert scale was utilised to measure the views of the respondents on the variables in the questionnaire. Firm age was measured based on the length of company activities from the time of incorporation and was then classed as <5 years [young], 5-10 years [Intermediate age] and > 10 years [adult age].

Firm size was determined based on the number of workers. Inherently, the study employed a quantitative research technique which equally supported the explanatory research design used. Data analysis was based on firm-level assessments. Generalized Structured Component Analysis was applied for the estimate of the structural equation modelling. Both the measurement model and structural model were assessed and were pronounced good based on set thresholds. The findings revealed firm size considerably attenuated the adaptive capability-firm performance association. However, firm age failed to mitigate the adaptive capability-firm performance link. Overall, the empirical research supports firm age and firm size as playing hypothesised moderating role. In addition, at the theoretical review section, a conceptual context is provided in which firm age and firm size are conceptualised as moderating variables in research. Inference is made from a perspective that these firm attributes (Firm age and firm size) had in contexts that are non-Western North in Ghana in the upstream cocoa sector.

Supplier Development and Sustainable Performance

Wang, Jia and Chen (2022) evaluated the influence of supplier engagement on financial performance and used ambidextrous innovations and product smartness as mediating and moderating factors respectively in the model estimate. The study was founded on the ideas of the social network theory and social exchange theory. The investigation targeted enterprises in China's high-tech industry. Face-to-face interviews were done for the primary data collection from the viewpoints of senior managers and project managers. Additionally, a standardised questionnaire was prepared and provided for the primary data collection. The study obtained a 12.7% effective rate for the primary data collection.

Measuring of the ideas was based on 7-point rated-Likert scales that had been accepted for the measuring of the constructs in the context of the study. Essentially, the study was regarded a quantitative study with an explanatory research design given how the entire investigation was planned and carried out in terms of data collection, analytical framework and development of the testable hypotheses. Firm size was controlled in the context of the study but was assessed by the number of workers. Model fit was tested with confirmatory factor analysis and the indices were found adequate.

The model was reflectively specified using parallel mediation configuration. Harman's single-factor method was computed to test common method bias. Cronbach's alpha and composite reliability were computed to assess the dependability of the primary data. Discriminant validity and convergent validity were also evaluated and deemed good. Supplier participation greatly impacted on both exploitative and exploratory innovation in a good manner. Exploitation and exploratory innovation influenced the supplier involvement-financial performance linkages favourably and considerably.

An empirical study was done by Owiredu et al., (2022) to assess the influence of farmer business school participation on productivity and food security among cocoa farmers in Ghana. The research addressed farmers in the Central and Western area of Ghana. The study employed the perception index on a five-point Likert scale. Multi-stage sampling approach was employed for the selection of the participants. The study employed the endogenous switching regression to evaluate the influence of participation in farmer business school on the dependent variables. The research targeted 542 cocoa producers. The results revealed farmers had a high good view on the farmer business school program. The study further revealed that off-farm income, years of schooling and household size strongly connected positively to productivity and food security of cocoa producers.

Similarly, research was undertaken by Wongnaa et al., in 2022 which assessed the perception and implementation of artificial pollination technology on cocoa production in Ghana. The study was founded on the utility maximising theory. The study employed the quantitative research technique and used both primary data and secondary data in evaluating the outcomes. Both structured questionnaire and interview were utilised in obtaining the data. Data analysis was based on 206 cocoa plantations. A 5-point Likert scale was used to elicit responses from the participants on the factors of interest.

The multi-stage sampling approach was utilised for the selection of the participants. Model estimate was based on the Hackman model based on a cross-sectional study approach. Cronbach's alpha was employed to verify the internal consistency of the primary data acquired. It was revealed that 50% of the participants embraced the artificial pollination. Cocoa growers utilising the artificial pollination had greater access to extension services than non-adopters. Artificial pollination was regarded as a feasible technique that impacts productivity of cocoa crops and revenue diversification. Fruit per plant was discovered to have increased considerably following the adoption of the artificial pollination among the adopters. Average yields, availability to extension services and household size strongly predicted artificial pollination adoption but farm size and farmer age adversely connected to artificial pollination adoption.

Another empirical study was conducted out by Amfo et al., (2022) but this time, it concentrated particularly on measuring the influence of fertilizer subsidy on productivity of cocoa producers. The study was undertaken in the Ashanti, Western and Western North regions of Ghana since the areas are the three leading cocoa growing regions in Ghana. The study employed the multi-stage sampling approach in the selection of the subjects. Therefore, 432 cocoa producers were finally picked. Semi-structured questionnaire was employed in choosing the participants randomly for the primary data that were examined to acquire the outcomes of the study.

The study employed the Cragg hurdle model and the Tobit model in the model estimate. Also, PSM, inverse-probability weights and AIPW were utilised for measuring the consequences of fertilizer subsidy on cocoa productivity. The data revealed cocoa producers came to hear about fertilizer subsidies through extension agents, media and other farmers. Only 50% of the cocoa producers had cocoa fertilizers. Averagely, 292 kg of subsidized fertilizers. Cocoa farmers that obtained access to the subsidized fertilizers had better level of production of cocoa beans than those that did not get access to subsidized fertilizers. Also, the study revealed access to fertilizer boosted advances in cocoa yield.

Furthermore, Tran, Gorton and Lemke, (2022) explored experimentally, how supplier development enhances buyer performance improvement and supplier opportunism through the mediating roles of goal congruence and long-term orientation. The study was conducted in Vietnam by targeting fruit and vegetable industries. CEOs, managers and directors of the buying organisations functioned as proxies for supplying the data acquired via structured questionnaire administration. A mixed data collecting approach involving telephone, email and face-to-face were employed for the data collection. Scales assessing the constructs were adapted from experimentally established sources.

A 7-point Likert scale was used to score the opinion and attitude of the responders on the items. Common method bias was evaluated by the confirmatory factor analysis. SEM was employed to test the formulated hypotheses. The -stage model evaluation process was used. It was shown that supplier development increases buyer performance and increase supplier opportunism. Supplier's long-term perspective mediates the predictive association between supplier development and buyer performance.

In 2021, Martínez, Gonzalez and Pellegrini in their study studied the influence of fairtrade certification on the well-being of small-scale miners in Colombia and Peru. The study was based on the private governance idea. The investigation targeted Fairmined certified gold mining enterprises in Hulda and Cauca departments. A survey technique with a structured questionnaire was utilised to collect the primary data for the study. Both certified and non-certified organisations were included in the study. Eventually, 321 were surveyed with 208 designated certified miners and 113 non-certified miners.

To acquire scales for the measurement of the construct, the study employed a validated scale for the measurement of the constructs given the applicability of such scales in the setting of the investigation. A quantitative research technique was employed for the measuring of the items and the analysis of the defined study goals. Data analysis was done by utilising linear regression and propensity score matching which is ideal for effect evaluation in studies where a non-random mean is utilised for the selection of the participants. The propensity score-matching results indicated that certified miners had superior well-being than non-certified miners. However, there was no statistically significant difference in well-being based on nation of membership. Certification also contributed to some considerable beneficial increases in the well-being of the miners.

Attipoe et al., (2021) in their study studied the influence of non-governmental organisation's extension activities on the sustainable performance of cocoa farmers and their revenue in Ghana. The research addressed cocoa growers in the Eastern Region of Ghana, including West Akim, Upper West Akim and New Juaben. Primary data was acquired for the 2017/2018 cocoa season via the use of structured questionnaires. Multi-stage sampling approach was utilised which permitted the researcher to obtain data from 200 cocoa families.

Stata software was used to examine the data. Regression on co-variance and regression propensity score approaches were applied to estimate the model. Heckman's treatment effect model assessed robustness. The study revealed that the extension programme accounted for a 14.3% substantial boost in cocoa farmers' production. Income for the cocoa growers also grew dramatically due to their participation in cocoa extension projects.

Elsewhere in Cameroon, Belek and Jean-Marie in 2020 explored how micro-finance services improve the production of cocoa family farms. The study relied on the decomposition model devised by Blinder and Oaxaca which provided the researchers to quantify disparities in the output between the two types of producers-beneficiaries and non-beneficiaries. The two-stage least squares of estimate approach was performed to test the hypotheses. Ten parameters were included in the model since the study claimed such variables had explanatory significance in predicting the degree of cocoa farm production with the credit support supplied to the participants.

The study relies on panel data that were obtained between 2008 and 2011 seasons. The data was obtained from 130 cocoa families. The coefficient of determination of used to quantify how much changes in productivity are assigned to changes in the predictors. Beneficiary farms outperformed in production than non-beneficiary farmers given the access to AVECA financing facility. The difference in productivity was calculated at 0.19 tons per hectare. Also, the study revealed that financial help and farm size were the important positive predictive variables to the improvement in cocoa production among the cocoa farms. Again, the study revealed that access to AVECA loans boosted the production of family cocoa plantations.

In 2020, Benton Jr., Prahinski and Fan in their empirical study focused on examining how supplier development programmes impact, if any, supplier performance in the automobile sector of the United States. The study was based on the premises of the resource dependency theory, behaviour research theory and the social exchange theory. The study framed supplier development as encompassing subdimensions such as incentives, competitive pressure and direct investment. These subdimensions of supplier development were operationalized as predictors in the calculated model. Buyer-supplier relationship was envisaged as performing a mediating function based on the resource-dependence theory and was operationalized at three levels including communication, commitment and corporation. Supplier performance was operationalized as the outcome variable.

The study focusses on gathering original data from first-tier suppliers for the car manufacturing industry. The four locomotive businesses that were identified as purchase firms included Honda, Chrysler, Ford Motor Company and General Motors. The study employed a structured questionnaire as the major primary data collecting tool for the data gathering. Data analysis was therefore done based on 142 examples at the company level. The study had no concern in terms of non-response bias given the t-test comparisons between early and late responder suppliers for the 20% of the survey items. A 7-point Likert scale was used to examine the views and opinions of the participants on the scale items that measured the major dimensions of interest.

The study also examined the components based on existing yet verified measures. To ensure that the items were correctly assessed, confirmatory factor analysis was used to examine the six constructs under inquiry in the study. The data analysis technique utilised for testing the defined hypotheses was structural equation modelling and the model was reflectively described and assessed based on the two-step approach which advises the pre-validation of the measurement model before the structural model. The route findings indicated that communication strongly predicted a favourable change in supplier performance.

A similar result was reached for corporate and supplier performance and commitment and supplier performance respectively. Incentive failed to substantially predict supplier performance in terms of communication, collaboration and commitment while it made some beneficial contributions. Also, competitive pressure and direct engagement all failed to meaningfully predict supplier performance in the direct model. All the three elements of buyer-supplier interaction mediated the predictive association between the supplier development (Incentives, competitive pressure and direct investment) and supplier performance.

Bannor et al., (2019) in their empirical study investigated the influence of non-price incentives on the choice of cocoa-licensed buying businesses by farmers in the Western North of Ghana. The study employed a mixed research strategy to approach the conduct of the investigation with emphasis on descriptive and causal research design. Multi-stage sample approach involving purposive sampling for the selection of the cocoa region-Western Region and farmers were randomly selected.

A sampling frame was gathered from the buying clerks in the targeted cocoa growing communities within the designated cluster. The study employed a quantitative research technique and depended on numbers for the coding of the semi-structured questionnaire used for the collecting of the primary data. The results indicated that distinct contextual variables impacted the choice of public buying firms and private buying businesses by the cocoa growers. In the absence of perfect competition in the cocoa marketing business, the study provided the supply of non-price incentives such as prompt payment of beans sold, provision of extension services, greatly affected the choice of public purchasing firms more than private buying companies. On the other hand, the provision of inputs like fertilizers and agro-chemicals, free transportation and bonuses failed to impact the choice of outlet for marketing cocoa beans or the volume of cocoa beans sold to such outlets by cocoa farmers.

Riedel et al., in 2019 experimentally studied the impact of rehabilitation pruning and agroforestry on cocoa tree growth on yield in an older full-sun plantation. The study was conducted out at Kuala Lipis, Malaysia. The research design was solely experimental. The study employed the binary logistic regression for the analysis of the primary data gathered. Continuous parameters were quantified by the application of the multi-level linear mixed fixed effects models. R was utilised for data analysis. It was revealed that agroforestry approaches boosted access to revenue and timber output. Agroforestry approaches aided in harmonising environmentally sustainable land use with natural, cost-effective pest management. Rehabilitation pruning paired with regular maintenance pruning had a good effect on pests and diseases in cocoa farms that followed the agroforestry methods.

In 2019, Subramaniam et al., evaluated how the practice of socially responsible supplier development practices on the reputation of the businesses and their financial performance. The study was anchored by the agency theory and the resource-based perspective theory. Socially responsible supplier development techniques studied included incentives, supplier partnership, supplier development and supplier development. 5-point Likert scale was employed for the measuring of the ideas and to examine the attitude of the participants on the constructions of interest.

The MNCs were those involved in the sale of consumer-branded items that are included in the FMM Directory. An internet connection was built for the collecting of the primary data in the survey however follow-up calls were conducted at two-week intervals to boost the response rate. A response rate of 29.3% was reported. Nonresponse bias was tested with an independent t-test where two waves (early responders and late respondents) were produced. Common technique variance was addressed with both procedural and statistical approaches suitably. All the needed indices for the model evaluation were confirmed to be adequate and acceptable. The SEM results indicated supplier development and supplier collaboration positively predicted a considerable increase in supplier social performance. Supplier monitoring and incentives had no substantial impact on supplier social performance but their contributions were favourable.

In 2017, empirical research was undertaken by Astrid Fenger, et al., which essentially assessed the influence of certification on the natural and financial capitals of the Ghanaian cocoa producers. The study employed both the qualitative and quantitative research technique to measuring, collecting and measuring the variables of interest as defined by the goals of the investigation. Focus-group discussion and interviews were undertaken for the acquisition of the primary data. Both the sustainable livelihood framework and the input-output-outcome-impact models was employed to determine how the various components of the certification schemes influenced the natural and financial capitals of the cocoa growers.

The results indicated certified cocoa farms had greater cocoa yields and improved cocoa productivity than traditional cocoa farmers that are not certified. Moreover, accredited cocoa farms earned better income than traditional cocoa farmers. Concerning natural capital, in these instances-enhanced water quality, better state of the forest, higher availability of bush meat, improved air quality and increased soil fertility-certified cocoa farms outperformed uncertified cocoa farms. Concerning changes in financial capital, the study revealed that traditional cocoa farms did badly in terms of cocoa productivity and revenue, whereas certified cocoa farms observed increased cocoa production and greater income.

In another study, Denkyirah et al., (2016) studied cocoa farmers' perspective regarding the use of pesticides and frequency of usage in the Brong Ahafo Region. Multi-stage sampling was performed for the identification of the 240 cocoa producers targeted. The study relies on the probit model for testing the objectives. The survey demonstrated over 80% of the cocoa growers rely on chemicals for pest and disease management, notably those approved and given by the COCOBOD under the bulk spraying plan. among the factors the impacted the usage and frequency of use of chemicals for disease and pest management included farming experience, access to extension services, access to financing, availability of agrochemical stores, age and level of education.

Gosling et al., (2015) in their empirical study investigated the influence of supplier development activities on the consistency of project performance. The study adopted a case study as the major design of the investigation. A UK-based building enterprise was understudied. Several supplier development strategies were evaluated in the framework of the study including competitive pressures, assessment and certification, incentives and direct engagement. Suppliers of the firm were grouped into three primary types such as strategic partner, preferred supplier and approved suppliers.

Longitudinal data was obtained for strategic suppliers with roughly 98 suppliers (1990-2013). The investigation was guided by the relational contracting hypothesis. One-way ANOVA was performed for the data analysis. The descriptive data indicated strategic partners had the greatest completion rate of all initiatives. It was also determined that there were no statistically significant variations in the closeout KPI. Also, authorized suppliers performed poorer on "closeout KPI" compared to other categories of suppliers, considering the sort of supplier development activities done by the organisation. The arguments, both empirically and on a conceptual level, are all in reference to whether supplier development is effective in improving sustainable performance, with research in these contexts varying. The above is in favour in an empirical context.

Lessons From Empirical Review

Contextually, none of the studies have empirically examined how supplier development affects the sustainable performance of cocoa bean suppliers in an emerging economy like Ghana although there is empirical evidence of supplier development in the cocoa industry, with most of the policy-initiatives making supplier development as their motive. The availability of other contextual elements such as supplier-buyer relationship quality, firm ambidexterity and company features give grounds for strengthening the uniqueness of this study, even as theories support their inclusion contextually. The choice of the theories explaining the link between the constructs is based on evidence from the available literature surveyed.

Particularly, resource dependence theory for the justification of supplier development (Benton Jr., et al., 2020), resource dependence theory for the justification of buyer-supplier relationship quality (Benton Jr., et al., 2020), dynamic capability theory for the justification of firm ambidexterity (Monferrer et al., 2021; Su et a., 2022; Reed, 2020; Turnalar-Çetinkaya, 2022) and contingency theory for justification of firm size and firm age (Abdi et al., 2022). Empirically, most of the research on supplier development relied on primary data that were acquired by structured questionnaire administration (Benton Jr., Prahinski & Fan, 2020; Glavee-Geo, 2019).

Such studies also relied on existing validated scales for measuring the constructs of interest, which also impacted the selection of pre-validated scales for assessing the components under research in this empirical study. Therefore, the researcher also relied on primary data for the testing of the hypotheses. The studies also utilized Likert-type of rating scale for measuring the opinions of the respondents on the items on the sub-scales (Mallet et al., 2021; Monferrer et al., 2021; Ngatno & Dewi, 2019; Yang et al., 2021) hence the use of 5-Point Likert scale for amassing the views of the participants on the constructs in the context of this study.

Contextually, none of the research explored the interaction among supplier development, supplier-buyer relationship quality, firm characteristics and sustainable performance in a single study in the cocoa business, consequently, this study's originality is founded in this respect. Glavee-Geo (2019) concentrated on supplier development among SMEs in agro-commodity supplies whereas Gorton and Lemke (2021) also focused on opportunism and its unanticipated results of supplier development in the agro-food sector but none focused on the cocoa business. Most of the research were done outside the setting of Ghana (Karia & Davadas Michael, 2022; Garousi Mokhtarzadedeh, et al., 2022; Wang et al., 2022) with few of such studies in Ghana focused on several industries (Mallet et al., 2021).

Methodically, the study utilized the SMART pls as the software for the data processing tool because some of the empirical studies proved it is appropriate for conducting studies that are more on explanation and prediction because of its parsimony in handling complex models concurrently (Dash & Paul, 2021). The use of SEM for the testing of the particular research objectives in this study is greatly inspired by the similar technique employed by some of the empirical investigations (Karia & Davadas Michael, 2022; Garousi Mokhtarzadedeh et al., 2022). Since supplier development, sustainable performance and firm ambidexterity or organisational ambidexterity are higher-order constructs, the study would utilise the two-stage embedded method with reflective-formative model creation for the testing of the defined research goals.

Criteria for the evaluation of the measurement model and the structural model were all devised to guide the same in the context of this study. The criteria were all acknowledged in these investigations (Frempong, et al., 2021; Karia & Davadas Michael, 2022; Garousi Mokhtarzadedeh et al., 2022; Wang, et al., 2022). These criteria comprised the measurement model (Construct reliability and validity, discriminant validity, collinearity statistics and common method bias) and structural model (Indicator reliability, indicator weights, path coefficients and coefficient of determination). There seems to be skewing of the unit of analysis of the research analysed at the firm level (Karia & Davadas Michael, 2022) so the study concentrated on its examination at the organisational level.

The study adopted directed hypotheses since the findings of the papers analysed were all pointing at favourable outcomes regarding the links between the exogenous latent constructs and the endogenous latent constructs included in the investigation. Therefore, in assessing the significance level of the estimated model, a 1-tailed level of significance was used correspondingly.

The adoption of a 1-tailed level of significance was justified since different hypotheses were properly created and evaluated with the relevant statistical technique PLS SEM.

To assess for the non-response bias, the study followed the technique proposed by Benton Jr., et al., (2020) whereby data collection was done based on two separate phases. Therefore, the t-test comparison approach was employed in this investigation. Observing the response rates of the study, it was found that those that relied on the online mode for data collection (Garousi Mokhtarzadedeh et al., 2022; Subramaniam et al., 2019) and mailing mode for data collection did record lower response rates so to improve the response rate, the face-to-face personal administration method via the drop-and-pick method was adopted. This strategy assisted the researcher in generating rapport with the participants and thus produced a personal link between the researcher and the subjects. Also, like this study (Garousi Mokhtarzadedeh et al., 2022), reminder calls and chats were made to remind the participants to finish the surveys.

Another conclusion from the empirical evaluation is that since the research employed structured questionnaires for the primary data collection, their investigations were susceptible to the potential of common method bias. To prevent a comparable issue in the context of this investigation, certain ex-ante rules were scrupulously followed as guided by existent literature. Common technique bias was then statistically evaluated to test its presence or otherwise in the study. The application of the inner VIF for the common method bias testing is acknowledged (Adusei et al., 2022; Glavee-Geo, 2019).

The choice of the explanatory research design in this study was informed by a similar method employed by some of the studies (Belek & Jean-Marie, 2020; Garousi Mokhtarzadedeh et al., 2022). This research design inextricably supported the quantitative research approach (Garousi Mokhtarzadedeh et al., 2022) that was adopted amid the cross-sectional data gathered via the use of structural questionnaires and the technique used for the data analysis (Glavee-Geo, 2019; Garousi Mokhtarzadedeh et al., 2022).

Conceptual Framework

Based on the position of the theories reviewed, conceptual relationships established among the constructs and the empirical evidence provided to support such relationships through empirical review, this conceptual framework was formulated to pictorially display the nature of purported predictive associated among the constructs under the phenomenon of study. Contextually, supplier development is operationalized as including both indirect supplier development initiatives (Financing schemes, certification, input supplies, training and extension services) and direct supplier development initiatives (Mass spraying, hand pollination, cocoa rehabilitation and mass pruning).

Analytically, supplier development is regarded as a higher-order construct, so the study envisioned it as the exogenous latent construct. Sustainable performance is regarded as an endogenous latent construct with three sub-dimensions encompassing social, economic and environmental performance matrix. It is also envisaged that good improvements in supplier development will promote beneficial changes in the operational efficiency of the cocoa plantations. The opposite also holds, thereby demonstrating H_1.

Firm ambidexterity and buyer-supplier relationship quality were operationalized as performing claimed mediation functions.

With this in mind, it is predicted that beneficial changes in two structures (firm ambidexterity and buyer-supplier relationship quality) will eventually aid to better transfer the influence of supplier development programmes on operational efficiency. Thus, the intervening functions of the constructions are likely to amplify the impact of supplier development programmes to improve the operational efficiency of cocoa plantations. These claimed links are shown as H_2 and H_3. Furthermore, the study claims operational efficiency potentiates the influence of supplier development on sustainable performance, thereby exhibiting H_4.

The study additionally analyses firm size and firm age as moderating factors since it is thought that the inclusion of these parameters has consequences for the nature of the influence of supplier development activities on the operational efficiency of cocoa plantations. Aged enterprises would thus have different reactions in terms of operational efficiency to changes produced by supplier development programmes compared with youthful firms. The supposed moderating influence of farm age is provided as $H5_a$. Similarly, small farms may have distinct supplier development demands than big farms thereby being viewed as a moderating factor.

The putative moderating influence of farm size is provided as $H5_b$. Finally, the report claims modifications in supplier development programmes are predicted to produce a shift in sustainable performance. This connection is symbolised with H_6. Therefore, it is suggested that favourable changes in supplier development might produce favourable changes in sustainable performance and unfavourable modifications in supplier development would create unfavourable changes in sustainable performance among cocoa farms. The putative links among the constructs as indicated in Figure 12.

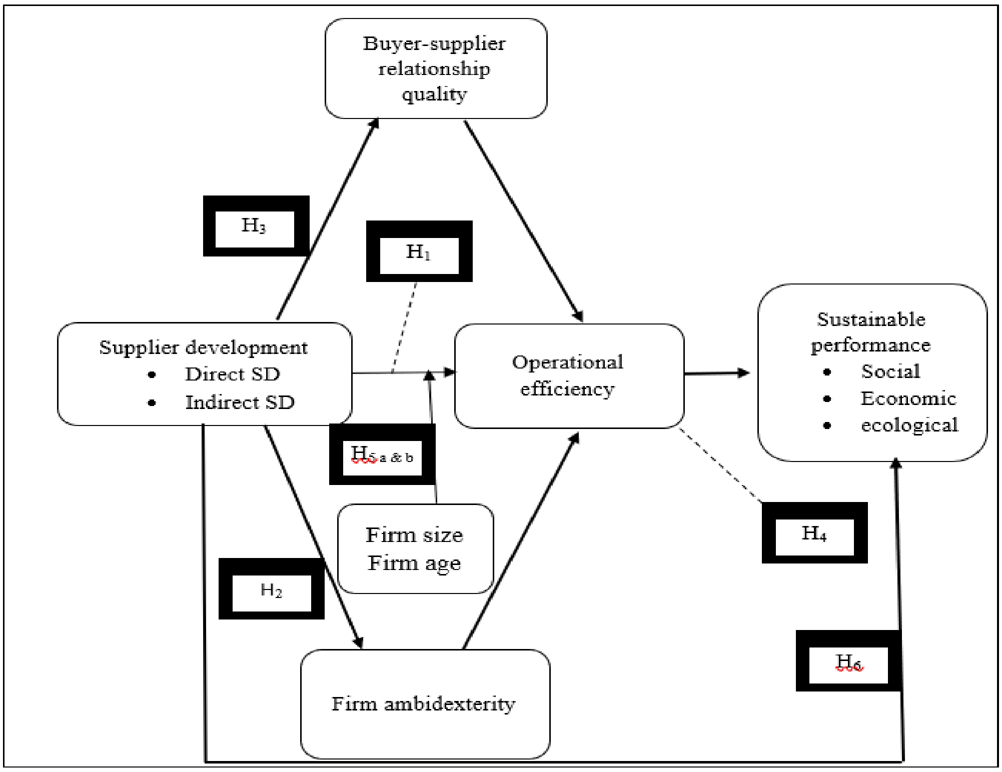

Figure 12: Conceptual Framework
Source: Author's Own Construction, (2024)

Chapter Summary

The chapter has provided information about the empirical reviews made. It thus recognized the need to provide useful information that could guide the interpretation of the findings of the study about other existing empirical studies, in terms of comparing the results with such studies. Furthermore, the chapter provided evidence purported relationship existing among the constructs/variables of interest in the study and demonstrated the expected relationships that are being established in the context of the study with the development of a conceptual framework.

CHAPTER FOUR

RESEARCH METHODS

Introduction

The study sought to examine how changes in supplier development by licensed buying firms in the cocoa industry affect the sustainable performance of cocoa farms in Ghana. Factors including buyer-supplier relationship quality, firm ambidexterity and firm characteristics such as firm age and firm size were also considered contextually. The previous chapter focused on the literature review. This chapter provides in detail the various research methodological techniques, approaches, assumptions, procedures and activities that are applied in the study.

Research Philosophy

The research philosophy underpinning the conduct of this empirical study is post-positivism research philosophy. The post-positivism research approach is supportive in that it recognises social and economic phenomena as complex in character with a systematic and objective research approach. In comparison with rigorous positivism that calls for absoluteness in terms of objectivity, post-positivism recognises that contextuality as well as subjectivity have impacts on knowledge; hence, empirical research and hypothesis testing are merited (Creswell & Creswell, 2018). Using statistical precision and understanding context, post-positivism undertakes a complete study on development projects with suppliers' influence on sustainability in Ghana's production of cocoa.

The post-positivism research approach is underlying in research because it acknowledges that although objective reality does exist, it is imperfectly known because it is influenced by prejudices as well as context. The research approach is appropriate in examining the impact of supplier development on sustainable performance of cocoa bean suppliers in Ghana because it is appropriate in conducting a structured investigation with quantitative methods in consideration of complexity in supply chain dynamics. The approach is also appropriate in considering operational efficiency, firm ambidexterity, quality in relation between buyers and suppliers [mediating variables] as well as firm size as well as firm age [moderating variables], in consideration that variable relationships are not necessarily straight lines as influenced by circumstances. The approach is appropriate in that it allows the study to produce practicable insights with consideration of rigour in methodology as well as critical scrutiny on outcomes.

The essence of testing the specific objectives through statistical means is to assess the predictive power of the structural model and to provide means to explain the phenomenon under investigation, the pursuit of which satisfies the quest for truth in post-positivist science (Maksimovic & Evtimov, 2023). The ontological position of post-positivism is anchored on the idea that reality exists, can be known and observable as least as imperfectly hence the researcher believes truth can be observed given the uninterrupted interaction among the constructs of interest in the context of the study as espoused in the conceptual framework. The variables were numerically measured although the

Therefore, the idea that "there is a world out there composed of observable, perceptible, measurable and quantifiable phenomena, all awaiting to be discovered, sensed and explained by humans" (Sousa, 2010, p. 465) guided the actions and inactions of the researcher. With this in mind, the study was conducted on the ontological position that reality is out there regarding the interaction among the constructs/variables in the estimated model with enough stability and patterning to be known (Bisel & Adame, 2017). This is the realism stance.

Epistemology is concerned with the nature of knowledge, its possibility, scope and general basis. The epistemological stance of the post-positivism research objective is based on the belief that “human knowledge is based on human conjectures and thus, knowledge is justified by a set of warrants, which can be modified or withdrawn in the light of further investigation”. The epistemological stance is that social reality is measurable and knowable, albeit difficult to access (Bisel & Adame, 2017). Post-positivism as an epistemology is committed to the pursuit of truth while at the same time acknowledging the difficulty of ever getting there. This is the most rational response to the extremes of postmodern relativism and positivism’s overly optimistic assertion that certain and universal truths can be definitively established. It accommodates a description of how scientific paradigms undergo regular and fundamental reformations, rather than closing in on a singular and unchanging objective truth (Kuhn, 1970).

The use of the 5-point Likert scale and the use of structural equation modelling that deals with latent issues made the research gather subjectively quantitative data for statistical analysis with the appropriate software and technique (Soomro & Shah, 2021). With this in mind, the research relied on a quantitative research approach to evaluating the phenomenon which is being studied. The claim that research approaches used strongly influences the epistemological position taken by the researcher hence supporting the epistemological position of the post-positivism used in the context of this study (Tembo & Akintola, 2021).

With the post-positivism philosophy, the study can be replicated given the capacity to test the validity and reliability of the scales and the primary data statistically. With quantitatively generated data, the testing of the formulated research objectives/hypotheses through the use of statistical techniques became eminent. The nature of knowledge is verified or non-falsified hypotheses with a strong emphasis on scientific reportage. The application of the scientific method follows inductive generalization (Sousa, 2010). Axiologically, the researcher recognized biases are undesired but unavoidable hence, a deliberate attempt to avoid or minimize such biases and to detect and correct them.

Research Paradigm

Research paradigm refers to “the set of common beliefs and agreements shared between scientists about how problems should be understood and addressed accordingly” (Kuhn, as cited in Razavi, 2023). It therefore captures the basic belief systems based on the epistemological, ontological, axiological and methodological assumptions. The three main paradigms regulating the conduct of empirical studies are positivism, constructivism otherwise interpretivism and pragmatism. The positivist research paradigm goes with the notion of “Having an undistorted contact with reality” thereby requiring researchers to conduct scientific research by complying with established procedures to produce objective results (Amadi, 2023).

The epistemological stance of the positivism paradigm is that "The world exists externally and independently of the researcher, and that knowledge comes from objectively observing the world around us" (Amadi, 2023, p. 212). This study adopts the positivism research paradigm because the study aligns strongly with the position of the natural scientists which requires working with an observable social reality to produce law-like generalizations. Therefore, existing theories were relied on in the development of the hypotheses that were subjected to rigorous statistical manipulation.

Ontologically, the study seeks to uncover truth objectively via the etic orientation of the study. The ontological position of realism therefore guided this study. It is anchored on the tenet that one truth exists, can be objectively be attained and the findings can be generalized. The epistemological stance therefore prescribes the need to follow scientific methods that minimize biases. In this case, the researcher quantitatively approached the study via probability sampling means, without intervening in any way, with the research phenomenon under consideration. Test of reliability and validity were conducted alongside test of common method bias all in the way to fulfil the realist ontological and etic epistemological stance of this empirical study.

Axiologically, the neutral stance of the researcher rendered the study value-free and biases (Moon & Blackman, 2014). Amadi, (2023) also emphasised research is considered value-free with the view to maintaining credibility of the research outcomes. The research, therefore, adopted the etic approach to avoid the personal biases of the researcher in the study. A highly structured methodology was followed to ensure the replication of the study. Numerical data on organisational features were obtained and analysed objectively to establish verifiable facts via the use of appropriate statistical techniques to test the established hypotheses (Amadi, 2023). The positivist paradigm also supported the deductive approach used for theory testing which equally supported the quantitative orientation of the measurement and testing employed in this study.

Research Design

An explanatory research design is appropriate for this study because it seeks to establish causal relationships between supplier development and the sustainable performance of cocoa bean suppliers, with operational efficiency, buyer-supplier relationship quality and firm ambidexterity as mediating factors and firm size and firm age as moderating factors. This design allows for a structured investigation into how supplier development initiatives—such as training, financial support, and technological assistance—enhance sustainability outcomes through improved efficiency.

Prior studies have employed explanatory research to analyze similar relationships, such as Khan et al., (2020) who examined the impact of supply chain practices on sustainability performance, and Gualandris et al., (2018) who explored the mediating role of operational efficiency in supplier development programmes. By using this approach, the study can systematically test hypotheses and determine the extent to which supplier development influences sustainable performance through operational efficiency in Ghana's cocoa sector.

The research adopted an explanatory research design to conduct this empirical study because of its predictive and explanatory orientation, as informed strongly by the nature of the specific objectives formulated for testing with the appropriate statistical techniques (Afum et al., 2022). With this research design, the emphasis was on examining, via the use of statistical methodologies, how changes in supplier development affected, if any, changes in the sustainable performance of first-tier cocoa farms or suppliers. It also attempted to evaluate the purported mediation functions of buyer-supplier relationship quality, company ambidexterity and operational efficiency and the moderating effect of firm characteristics (Firm size and firm age).

With this strategy, statistical tools were applied to statistically test the established research objectives/hypotheses. Also, the use of structured questionnaires with Likert-type rating scales gave the means for the gathering of subjectively quantifiable data for the setup of the structural equation modelling. The use of the explanatory research design aids the attempt of the researcher to discover and control personal biases that could influence the outcome of this empirical study. Therefore, ex-ante principles were followed to mitigate personal biases in the investigation. Besides, studies in procurement are currently focused primarily on confirmatory, survey-based studies instead of case studies because purchasing literature is becoming more mature (Mogre, Lindgreen & Hingley, 2017).

Study Design

A cross-sectional survey design was appropriate for this study because it allows for the collection of data at a single point in time to analyze relationships between supplier development, buyer-supplier relationship quality, firm ambidexterity, operational efficiency and sustainable performance among cocoa bean suppliers in Ghana. This design is widely used in business and supply chain research as it provides a cost-effective and time-efficient means of capturing perceptions and practices within a given industry (Saunders et al., 2019; Hunziker & Blankenagel, 2024; Dadaczynski et al., 2022). Additionally, cross-sectional studies are effective in examining mediation effects, as they facilitate the assessment of indirect relationships in organisational contexts (Hair et al., 2020). Prior studies on supplier development and sustainability, such as those by Nyamah et al. (2017) and Gunasekaran et al. (2018), have successfully employed cross-sectional approaches to explore similar constructs, reinforcing its suitability for this study.

The study relied on a cross-sectional design to acquire the main data that were evaluated in arriving at the results reached for the tested research objectives. The data was collected to provide a snapshot of how changes in supplier development initiatives affect, if any, changes in the sustainable performance of the cocoa farms in the Western North Region of Ghana and controlled for the intervening effect of changes in firm ambidexterity, relationship quality and firm characteristics. The data were obtained from the participants at a single moment in time in a circumstance where no effort of the research was made to affect the variables.

Research Approach

A quantitative research strategy is suitable for examining the effect of supplier development on the sustainable performance of cocoa bean suppliers with mediating variables such as operational efficiency, quality of buyer-supplier relationships, and firm ambidexterity and as moderating variables in firm age and firm size. The strategy is suitable because systematic data collection and statistical examination is available with quantitative data, making it more comfortable in distinguishing and quantifying relationships between these variables. For instance, quantitative research can be used in examining cause-effect relationships in complex contexts with structural equation models as well as hypothesis testing in direct as well as indirect impacts in supply chain contexts.

A quantitative research strategy is suitable for examining the impact of supplier development on the sustainability performance of cocoa bean suppliers with mediating variables kept in operational efficiency, quality of buyer-supplier relationships and firm ambidexterity as moderating variables in firm age as well as firm size. The strategy is suitable because systematic collection and statistical examination is available with quantitative data, making it more comfortable in distinguishing and quantifying relationships between these variables (Al-Shboul, 2023). For instance, quantitative research can be used in examining cause-effect relationships in complex contexts with structural equation models and hypotheses testing in direct and indirect impacts in supply chain contexts (Jajja et al., 2017).

With the quantitative technique, the research relied on quantifiable variables and used numeric means to measure the variables addressed in this empirical study (Dehalwar & Sharma, 2024). Thus, the use of a Likert-type rating scale for measuring the opinions of the research participants on the constructs under inquiry is warranted. The use of the quantitative research approach supported the use of a relatively higher sample size unlike the case of qualitative research which employs a relatively smaller sample size (Ibrahim et al., 2022).

Furthermore, the use of statistical means for the primary data analysis was strongly determined by the numeric means employed for the measurement of the variables in the structured questionnaire employed for the primary data gathered for the testing of the research objectives as well as coding of the variables with a numeric option in the Statistical Package for Social Sciences, a software used for the data analysis. The approaches chosen for the data analysis in respect of the demands of the specific research objectives are meant for quantitative research as proved in some prior similar quantitative studies (Dehalwar & Sharma, 2024). Therefore, the use of descriptive statistics and inferential statistical techniques for the testing of the established study objectives is justified (Ullah & Ameen, 2022).

The employment of the quantitative research approach also aided the quest of generalizing the findings from the point of the sample to the situation of the target population (Verlaan & Langton, 2024). The quantitative technique also contributed in the attainment of predictive and explanatory direction of the investigation. The randomization applied in the selection of the sample affects the power to generalize the findings. Therefore, the logical reasoning for theory building was warranted. Furthermore, relying on a quantitative research approach, the study tested statistically, the assumptions underlying the usage of the research techniques that were used to test the specific research objectives including text of common method bias, reliability of the primary data, validity of the scales, and test of multi-collinearity.

With the etic orientation to knowledge generation, the use of the quantitative research approach supported the objective orientation of the positivist research paradigm applied in the study (Seyfi & Hall, 2022).

Therefore, the use of scientific procedures for the conduct of this empirical investigation tried to discover truth objectively. Thus, the epistemology of performing this empirical study is built on the assumption that truth can be sought and measured, therefore taking outsiders' view to acquire objective research. Axiologically, the values of the researcher were divorced from the study and consequently, the position that there exists a single reality, which is the core focus of the realism ontological path of this empirical investigation (Amadi, 2023). The occurrences being researched were not impacted in any way by the researcher.

Research Type

The study adopted the deductive method for theory construction. With this strategy, the investigation started with established ideas and frameworks because of the confirmatory nature of the outcomes of this study. Using an extant literature review, the study made use of theories and ideas that were tested using the data acquired. Such theories were tested using the acquired data through the use of relevant statistical techniques. The use of a comparatively larger sample size in the study is acceptable for the deductive method to theory construction as the formulated hypotheses/objectives were evaluated and the outcomes compared to the viewpoints entrenched in the theories that supported the study.

Furthermore, the replicability of the study in similar circumstances with a high reliance on the theories employed in the study is justified by deductive reasoning (Spens & Kovács, 2006). The use of deductive reasoning also collaborates with the scientific principles that guided the conduct of this study, testing and application of controls to improve validity, operationalization of the constructs and use of a highly structured approach to gathering and analyzing data (Saunders, Lewis & Thornhill, 2009) all with the view to testing the theories used in the context of this study. The essence of deductive reasoning was to enable the researcher establish conclusions about the phenomena or behaviour based on theoretical or logical reasons and the initial set of premises.

Study Area

Conducting this study in an emerging market assists in extending existing theories (Hess et al., 2017). To this aim, the study targeted cocoa bean suppliers in the Western North Region of Ghana. Until 2019, the Western North had been part of the Western Region of Ghana and these two regions jointly accounted for 60% of Ghana's cocoa output (Attipoe et al., 2020). The Western North and Western South cocoa regions alone accounted for 162,145.875 and 284,331.625 metric tons of cocoa during the 2021 crop calendar year (Boateng et al., 2023).

The Western Region is the highest cocoa-producing region in Ghana due to its high record of rainfall and access to supportive fertile soils compared to other cocoa regions, with the region alone, accounting for 43% of the total 766,977 tons of annual regional cocoa purchases in the 2019/2020 season (Cocoa Sector Report, 2022). It boasts the most rainfall in Ghana, lush green hills and excellent soils. Thus, agriculture is the primary activity notably cash farming includes cocoa, rubber, coconut and oil palm (Boateng et al., 2023).

Specifically, the study targeted cocoa bean suppliers located in the Sefwi Wiawso Municipality. This municipality has two cocoa district, Sefwi

Bekwai Cocoa District and Boako Cocoa District under the Cocoa Extension Division. The investigation then targeted cocoa farms or cocoa bean suppliers in the Boako Cocoa District. LBCs are also dominant in the region due to their ambition to buy premium cocoa beans from these cocoa farms. These LBCs likewise undertake supplier development activities to support cocoa farmers with the objective to enhancing their operations and performance sustainably (Aziadzo, 2018).

Figure 13: Map of Area of Study

Population

The study targeted registered cocoa bean suppliers or cocoa farms that directly supply cocoa beans to the LBCs in the Western North region of Ghana. Similar research by Owusu Ansah et al., (2017) unearthed that competition between domestic LBCs in the cocoa marketing sector pushes them towards undertaking supplier development projects or activities towards cocoa bean suppliers in the upstream supply chain. LBCs directly buy cocoa beans from the cocoa bean suppliers and have over the years been supporting the cocoa bean suppliers through supplier development initiatives (Hess, 2022). The cocoa bean suppliers are technically counted as first-tier suppliers because they aggregate cocoa bean supply from smallholders and then sell them to the LBCS. Likewise, a similar study by Benton Jr et al., (2020) confirms the use of first-tier suppliers for supplier development-led studies in the cocoa production sector.

Also, since the internal marketing structure of the cocoa industry in Ghana is considered oligopolistic with strong competition, there are various power relationships between buying firms [LBCs] and the suppliers of the cocoa beans, hence, stretching the degree of dependency between the LBCs and the cocoa bean suppliers, thereby deepening the need for quality relationship for maintaining supplier development projects for their mutual gains (Owusu Ansah et al., (2017). To get a reliable source of sample frame, the research focused on registered cocoa bean suppliers in the Boako Cocoa district. There are 23,000 listed cocoa bean suppliers in the Boako Cocoa District as of the study date (Cocoa Extension Division Report, 2023). The registered cocoa bean suppliers are those cocoa agribusinesses that sell cocoa beans directly to LBCs. The research focused on cocoa bean suppliers that are agribusinesses in the Western North Region because they have received enormous supplier development initiatives over a long time (Bannor et al., 2019; Kissi & Herzig, 2024).

Sampling Procedure

Since it is impossible to access data from all elements in the target population, an adequate representative sample size was selected. This was done through the use of the sample size determination formula by Yamane, (1967) due to the heterogeneity of the target population (Kazungu & Kubenea, 2023). A minimum sample size of 393 was subsequently determined based on the formula. Since over-sampling helps to cater for non-response bias, 450 sample size was eventually targeted. The formula for the minimum sample size is given as follows: $SS= N/[1+N(e)^2]$

Where: SS=Sample size

N=Total population

e=Margin of error

Regarding the sampling technique applied in selecting the respondents, a multi-stage sampling technique was employed for the selection of the elements that participated in the study. First, the study applied the purposive sampling, which helped in selecting the Western North region for the study. The study selected the Western-North out of the eight cocoa regions in Ghana because the Western North is one of the major cocoa bean producer regions in Ghana (Boateng et al., 2023) and cocoa bean suppliers in the region have been targeted by LBCs for supplier development projects (Bannor et al., 2019; Kissi & Herzig, 2024). Despite their contribution to sustaining the upstream cocoa bean supply in Ghana, the cocoa farms in the region are also said to have performed poorly on their operational efficiency score compared to other cocoa regions such as the Bono region and the Ashanti region (Jebuni-Dotsey & Senaza, 2023).

The homogeneity displayed among all the clusters made this technique applicable. There are 11 cocoa districts in the Western North Region. These are the Adabokrom cocoa district, Adjoafua cocoa district, Juaboso cocoa district, Enchi cocoa district, Essam cocoa district, Dadieso cocoa district, Sefwi Bekwai cocoa district, Bibiani cocoa district, Boako cocoa district, Bodi cocoa district and Akontombra cocoa district. The Boako cocoa district was randomly selected for the main data collection because the clusters were big enough to allow the conduct of the study and afforded the potential for the researcher to sample inexpensively whilst retaining the characteristics of a random sample (Adeoye, 2023).

With a valid sampling frame, the simple random sampling technique was employed in selecting the respondents. This was to ensure randomness in selecting the firms (Soong, Ahmed & Tan, 2020). Based on 23000, a minimum sample size of 393 but since oversampling was done, 450 cocoa bean suppliers were targeted. Therefore, 450 random numbers were generated via the Excel application. Once the random numbers were generated, they were tracked on serial numbers of the registered farms on the sampling frame. All cocoa bean suppliers or farms whose serial numbers appeared as part of the random numbers were selected and contacted for the collection of the primary data.

The managers and owners of the cocoa bean suppliers were used as proxies for the data collection for the respective cocoa farms. The respondents were deemed to have accurate knowledge about cocoa farming operations in terms of the interplay among supplier development, operational efficiency, sustainable performance, ambidexterity, buyer-supplier relationship and firm characteristics. The use of the simple random sampling technique was appropriate because it eliminated bias risks from the sampling process and is quick, easy and inexpensive to use (Adeoye, 2023).

Instrument

The study relies on the structured questionnaire for the gathering of the primary data. With the structured questionnaire, pre-determined replies were supplied as alternatives for the various items allowing the participants to simply tick those ones that reflected their viewpoints. The closed-ended questioning technique was applied for the building of the scales for the corresponding constructs. For the constructs, a 5-point Likert scale rating was applied. Different rating scales were applied to different concepts. Using the 5-point Likert scale proved to be advantageous because it gave means for better sensitivity of measurement.

To improve the state of the validity of the scale and reliability of the primary data obtained in this empirical investigation, the study adapted various previously validated scales. The scales were assessed at the interval level which gave continuous data for the statistical analysis. These scales after rigorous interrogation from specialists, especially the project supervisors were found appropriate in the context of the study. Furthermore, structured interviews were carried out with several key stakeholders working in LBCs that enabled the researcher to better develop the instrument used to collect the primary data used in the study.

Supplier development construct was conceptualized as a higher-order construct based on the scales developed via an extant literature review. To this effect, the sub-scales measuring supplier development practices and the major sources influencing their formulation are as follows. Disease and pest control/mass spraying (Hess, 2021; Gyimah, 2019; Oyekale, 2021); Hand pollination/artificial pollination (Umeh et al., 2022); Mass pruning (Tosto et al., 2022; Baffoe-Asare, Danquah & Annor-Frimpong, 2013); Cocoa rehabilitation (Oluyole et al., 2015; Adebiyi & Okunlola, 2013; Somarriba et al., 2021). These scales were conceptualized as direct supplier development.

In the case of indirect supplier development, the following subscales were adapted to measure them. Financing scheme (Bakang et al., 2021), certification (Akinwale, Ojerinde & Owoade, 2019; Astrid Fenger et al., 2017; Hess, 2021); input supply (Onumah et al., 2014); training and extension services (Onumah et al., 2014; Owiredu et al., 2022). The scale had eight subscales. A 5-point Likert scale ranging from 1=not effective to 5=very effective was used to measure the opinions of the participants about the extent of effectiveness of the implementation of supplier development activities organised by the buyers. The level of measurement of supplier development was at the interval level, which produced continuous data.

The scale for measuring operational efficiency was adapted from these sources (Al Yami, Ajmal & Balasubramanian, 2022; Mantje et al., 2023; Sankowska, 2016; Lee, et al., 2012). A 5-point Likert scale was used for the capturing of the opinion of the respondents on the items in the scale. The use of the Likert scale for measuring operational efficiency is empirically supported (Panigrahi et al., 2021; Rahman et al., 2022). Similarly, the scale measuring sustainable performance was adapted from these sources: Sustainable economic performance (Bandanaa et al., 2021; Souto, 2022); Sustainable environmental performance (Bandanaa et al., 2021; Souto, 2022;

Yildiz Çankaya, & Sezen, 2019); Sustainable social performance (Bandanaa et al., 2021; Souto, 2022; Yildiz Çankaya, & Sezen, 2019). It was measured on a 5-point Likert scale rated on the degree of improvement rated from 1=poor improvement to 5=excellent improvement.

The scale used to measure the firm ambidexterity construct was adapted from these existing validated scales (Garousi Mokhtarzadedeh et al., 2022; Su et al., 2022; Rojas-Cordova et al., 2022). The scale was rated on a 5-point Likert scale that ranged from 1 (least agreement) to 5 (very high agreement) on the extent of agreement on how ambidextrous the farm operations were. The level of measurement of sustainable performance was at the interval level, which produced continuous data. In the same manner, the scale measuring buyer-supplier relationship quality was adapted from these pre-validated sources (Dadzie et al., 2018; Li et al., 2022). A 5-point Likert scale was used to measure the views of the participants about the extent of quality of their relationship with their buyers and was rated from 1-poor to 5-excellent. The level of measurement of supplier-buyer relationship quality was at the interval level, which produced continuous data.

Firm characteristics addressed in the context of the study included farm age and farm size. These qualities were measured at the nominal level as defined by a community of practice in the context of the study. Therefore, discrete data were created for these variables. The factors were measured as part of the demographics of the target population. The questionnaire contained 5 primary subsections. The questionnaire is given in Appendix A for additional reading. The implementation of a structured questionnaire made it easy for coding and data processing compared to the interview technique.

However, the structured questionnaire exposed the study to the potential of common method bias. Therefore, some ex-ante criteria were closely maintained to limit the potential of common technique bias.

Data Collection Procedure

The study adopted the drop-and-pick method of personal data administration for the gathering of the primary data. After official permission had been sought and granted by the qualified participating firms, informed consent of the participants who functioned as proxies for the cocoa farms (owners/caretakers or managers of the farms) was then sought, after which the participants were issued with the structured questionnaires. The selection of the participants was based on the random numbers that were created via the simple random sampling technique. The selected would-be respondents were contacted via mobile phone appointments and field visits. They all agreed to participate in the study. Most of the participants were residents of the Boako Cocoa District and that facilitated the accessibility of the respondents for the primary data.

Five [5] field assistants were hired to assist in the data collection. These field assistants were trained to fully grasp the data collection method, the substance of the scales, and the observance of ethical considerations. In this scenario, the researcher and the research assistants set appointments with the would-be responders for the data collection. The would-be respondents were allowed to engage in the survey at their convenience. Most of these target participants were registered members of the local Cocoa Farmers Association in the locality. Through their member associations, they were approached for the collection of the primary data, notably during meetings. Others were contacted throughout the community.

The inclusion criteria are that the farm should be a first-tier supplier to the LBCs and should be a registered cocoa farm. Ordinary cocoa farm labourers and non-first-tier cocoa bean suppliers are excluded from the study. 450 questionnaires were sent to the respondents. Reminder messages were delivered to the group at least three times during the period when the questionnaires were in the possession of those who had not returned their questionnaire. At the completion of the data collection exercise, 430 questionnaires were retrieved. After the initial data cleansing process, 424 questionnaires were considered fit for their inclusion in the creation of the final data file. A response rate of 94.22% was observed.

Data gathering was done from 26th August 2024 to 10th September 2024. The use of this approach for primary data collection is considered a better choice for the gathering of primary data in research of this sort compared to mail, telephone, or online modes of data collection (Garousi Mokhtarzadedeh et al., 2022; Subramaniam et al., 2019). No wonder the response behaviour of the participants and the actual response rate improved dramatically. However, this method of data collection was difficult and time-consuming because the participants were sparsely spread, and it took a longer duration for the data collection exercise to be completed. Also, the strategy was regarded as pricey given the amount invested to get it completed in record time.

Common Method Bias

Since the study utilised a structured questionnaire for the main data collection, the chance of the existence of the threat of common method bias [CMB] was created in the primary data obtained. CMB happens when both the dependent and independent latent variables are measured in a single survey, using the same response strategy (Kock, Berbekova & Assaf, 2021). To limit the threat of CMB in the study, several ex-ante rules were scrupulously observed. A fair number of variables were employed for the measurement of the constructs with the objective to minimise the length of questions to be responded to by the participants.

Furthermore, the study utilised pre-validated scales because, in validating such scales, issues of CMB were previously handled, hence its minimisation in the context of this investigation. As was indicated by Kock et al. (2021), the data were acquired from the correct sources, including cocoa farm owners and cocoa farm managers. These respondents served as proxies for the individual cocoa plantations targeted for the study. Additionally, some of the elements in the scales were negated, and following the data-gathering activity, these items were reverse coded. This gave tools to cause the participants to ponder the choice of the options presented with the various rating scales.

Like in the case of Shukla et al., (2022), the order of the constructs was adjusted, which offered some type of pausing clause that enhanced the readability and assimilation of the content of the scale by the responders. The inclusion of different rating scales for the measuring of the constructs offered a buffer for the participants to deliberate on the choice of responses before selecting the suitable options that reflected their probable choices. The scales in the instrument were split from each other, which made it evident to the participants that they were responding to various constructs, hence the need to pause and ponder on the issues addressed.

Ample time was allowed to the participants to complete the questionnaire through the drop-and-pick approach employed for the data-gathering exercise. This allowed the participants the choice to use their time and resources at convenient times to complete the questionnaire. The reminder calls additionally boosted the completion of the questionnaires by the participants (Parente et al., 2020). Preambles were offered for each build. By reading the preambles, the participants were again reminded of what was necessary for each subsection. Moreover, the informed consent of participants was legally requested, thereby giving a legitimising mechanism for voluntary involvement in the study.

No participant was coerced to enrol in the study; consequently, they willingly completed the questionnaire. The presentation of the ethical clearance report to the participants further strengthened their confidence in the formality and legitimacy of the study, given the intrinsic benefits thereof. The items on the scale were formulated in plain language without degrading their technical significance, which made it easier for the participants to understand. Expert opinions from project supervisors on the inclusion of items in the scale backed this drive as well.

Once these ex-ante principles were strongly adhered to, the researcher became confident that the threat of CMB had been reduced significantly if not completely eradicated. Therefore, a statistical measure of the threat of CMB was carried out once the primary data had been collected with the structured questionnaire. The study utilized the random dependent variable technique for the determination of the threat of CMB. This technique is recognized as an appropriate technique for the detection of CMB in primary data collected with structured questionnaires (Kock et al., 2021). The results of the collinearity statistics and CMB for the respective constructs are presented as follows.

Collinearity Statistics of Final Model (Appendix B)

The findings in Table 1 (Appendix B) reveal the multicollinearity scores for the indicators in the estimated model. The data reveal there is a limited threat of multicollinearity in the estimate, with a few of the indicators recording > 5 inner VIF scores (Kock et al., 2021). It should be understood that these components are the final items used for the estimated and satisfactorily evaluated model. Therefore, these indicators represent the real measures of their respective latent structures.

Table 2: Inner VIF

	VIF
Artificial pollination -> Random	5.815
Buyer-Supplier Relationship Quality-> Random	1.075
Certification -> Random	1.042
Cocoa rehabilitation -> Random	5.708
Financing scheme -> Random	1.510
Input supplies -> Random	1.078
Mass pruning -> Random	2.163
Mass spraying -> Random	6.510
Operational efficiency -> Random	1.503
Organisational ambidexterity -> Random	1.433
Sustainable performance -> Random	1.116
Training and extension services -> Random	4.678

Source: Field survey, (2024)

The findings in Table 2 demonstrate the state of presence or absence of threat of CMB in the final estimated model. There appears to be minimal problem concerning the threat of CMB in the model. Except for a few pairings of the constructions that had inner VIF scores > 5, all the remaining pairs of the constructs had inner VIF scores < 5 (Kock et al., 2021). In as much as the inner VIF scores are not > 10, they are acceptable under circumstances relating to the complexity of the final estimated model (James et al., 2013; Kock et al., 2021). A visual presentation of the stated model utilised for the test of CMB using the random independent approach is provided in Figure 14.

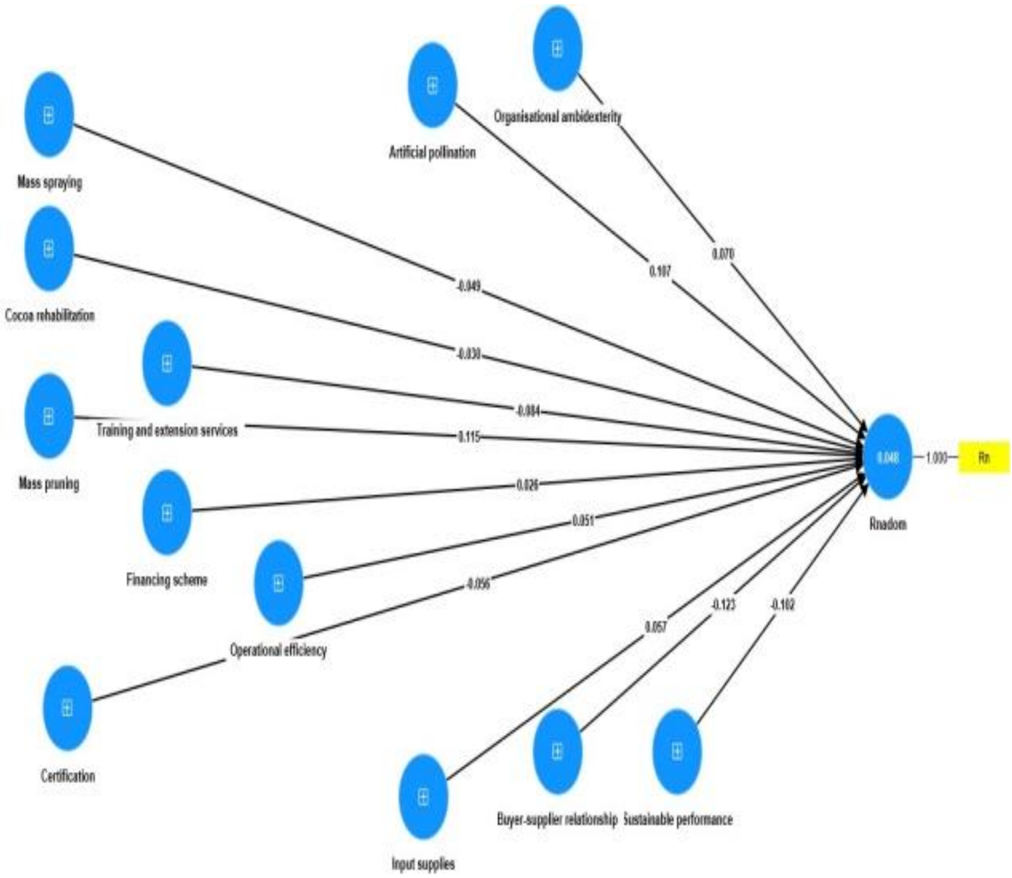

Figure 14: Common Method Bias Model
Source: Field survey, (2024)

Non-Response Bias

Non-response bias captures the tendency for collected data to differ from what is expected systematically. It occurs when an individual chosen for the sample cannot be contacted or refuses to cooperate (Mölenberg et al., 2021). The presence of non-response bias jeopardises the accuracy of the data collected because it causes an unrepresentative sample. Therefore, there is a need for efforts to be expended to enrich auxiliary information to reduce the possibility of incidence of non-response biases in this empirical study. Also, the study employed some measures to avoid the threat of non-response bias during the data collection phase. Some prior actions were carried out to reduce non-responses, including stressing anonymity and emphasising academic sponsorship (Moqbel et al., 2020). The submission of the ethical clearance report made it possible for the respondent to believe the legality and academic orientation of the study.

Official permission was sought from the participants; hence, they willingly agreed to partake in the study, which influenced them in responding to the items in the questionnaire (Dong, Tang & Wang, 2024). A reasonable number of items were included in the structured questionnaire, which encouraged the participants to complete the questionnaire. The questionnaire was explained to participants before their completion, and this gave way for the researcher to respond to challenging issues raised by the participants.

Moreover, reminder calls were from time to time made to those participants who had in possession of the questionnaires after one week of receipt, which made the participants respond within the time slated for the primary data collection. The rapport built with the participants during the issuance of the structured questionnaires also facilitated the response rate. A reasonable period was allowed for the participants to complete the questionnaires in their own time, even though reminders were sent to encourage them to support the course of the study.

The data collection was done in multiple waves in terms of first-stage data collection and final-stage data collection. Levene's homogeneity of variance technique was employed to measure non-response bias subsequently (Ahmed, Jakubowska & Sadilek, 2024). This was done via the SPSS application. Based on a wave of early response and late response (to discriminate between the groups), the results prove there was no threat of non-response bias for the variables in the scales used for measuring the constructs ($p>0.05$). Thus, there was no statistically significant difference in responses of the two groups (early respondents and late respondents); hence, there was no threat of non-response bias.

Data Processing and Analysis

Once the retrieved questionnaires were ready, initial data cleaning was conducted to weed out unfit questionnaires, especially those with more than 50% non-response items and extreme outliers. Also, questionnaires with incomplete and non-serious responses were removed, a procedure recommended by Farooq et al. (2021). The essence of this exercise was to improve the accuracy of the data file to be compiled for the data analysis phase of the study. A codebook was then developed to guide the coding exercise that was done in the Statistical Package for Social Sciences (SPSS version 26.0).

After the codebook had been created, data entry proceeded. This exercise was carried out with extreme care to transfer the exact data gathered via the manual means of data collection with the questionnaire administration into a soft form that is usable in the SPSS application. When the data entry was finalised, the data file (sav.) was checked with descriptive statistics to check for missing values and outliers. This helped in the creation of an accurate data file. Once the data file was ready, the appropriate statistical tools were employed to analyse the data.

Demographic characteristics were analysed with the descriptive statistics techniques of frequency and percentage. The choice of these techniques was based on the fact that the variables were measured at the nominal level, which required such techniques as appropriate means for analysis. Before the main objectives were assessed, descriptive analysis was done concerning the constructs of interest. Afterward, the data file (sav.) was converted into a CSV file for importation into the SMART PLS software that was employed for the data analysis. The unit of analysis was at the firm level, which is recognised as a major trend in supplier development study contexts (Jørgensen, Ellegaard & Kragh, 2022).

Structural equation modelling [SEM] was configured to test the formulated research objectives. Specifically, the embedded two-stage approach, which supports the reflective-formative constructs considered in the study, was employed for the model testing in lieu of the demands of the specific objectives (Ringle et al., 2012). The first-order latent constructs were reflectively specified via the use of the repeated indicator approach and were validated in terms of the measurement model. Once the first-order latent constructs were declared satisfactory, the latent data file was extracted and used to specify the second model configuration through the formative model specification for the higher-order constructs. Once the latent constructs for the higher order were declared satisfactory per their evaluation, the structural model and test of robustness were conducted to complete the test of the objectives/hypotheses.

The choice of this technique for the analysis of the objectives was based on the fact that the study was prediction-orientated, and this required a technique that could provide a means of explaining the configured model meaningfully. Furthermore, the PLS-SEM is a causal-predictive method that overcomes the apparent dichotomy between explanation and prediction (Shmueli et al., 2019). Additionally, the complexity of the model made the PLS-SEM more appealing than other alternatives (Hair et al., 2019).

The configured model was evaluated based on the two-step approach recommended by experts in the field (Shehzad et al., 2022). The measurement model was first evaluated and confirmed as adequate before the structural model was assessed. Among the major indexes used for evaluating the measurement model were tests of the reliability of data. This was measured with Cronbach's Alpha and rho_A (Kock et al., 2021). The minimum threshold of scores > 0.7 is required for their validation and acceptance (Hair et al., 2021).

Composite reliability was also tested, and a minimum threshold of 0.7 is required (Hair et al., 2021). Convergent validity was measured with the average variance extracted [AVE], and a minimum threshold of 0.5 is required (Hair et al., 2021). Discriminant validity was measured with the heterotrait-monotrait ratio [HTMT], and a minimum of < 1 is required (Kock et al., 2021). Again, common method bias was measured with the inner VIF via the random dependent variable approach recommended in the PLS-SEM technique, and an inner VIF threshold of < 5 is required (Kock et al., 2021). Outer VIF was used to check for the threat of multicollinearity, and a threshold of < 5 is required.

The structural model was measured with these indexes. Indicator reliability was assessed with the outer loading, and outer loading >0.7 is required and should be significant ($p<0.05$). All outer loadings with a score <0.7 and their retention in the model could weaken the measurement model and were deleted through the iteration procedure (Hair Jr., et al., 2021). Contributions of the predictors in the configured model were assessed with the beta [β] coefficient and were tentatively reclassified based on the effect size, which is measured with the f-square value. Tentative cut-off points for the f-square are given as follows: Effect size values above 0.35, 0.15, and 0.02 can be interpreted as large, medium, and small.

The coefficient of determination (denoted by r^2) was used to assess the predictive capacity of the reflectively configured model. R-square results above 0.67 are considered substantial, above 0.33 are moderate, and those above 0.19 are rated as weak. Evaluation of the structural model was influenced strongly by these scholars (Benitez, Henseler & Castillo, 2020; Becker et al., 2023). Furthermore, the estimation of the reflective structural model was based on these parameters: a 1-tailed test of significance, a 95% confidence interval, 1.96 t-statistics, a 5% level of significance, 5000 bootstrapping, and the PLS algorithm.

The predictive capacity of the model was tested with the application of the PLSpredict (Shmueli et al., 2019). Predictive relevance was also examined with the PLSpredict. As a rule of thumb, Q2 values above 0, 0.25, and 0.50 suggest minor, medium, and large predictive importance in the PLS-SEM estimated model (Hair et al., 2019). Regarding the predictive power, the PLSpredict runs k-fold cross-validation (Hair et al., 2019). Some predictive statistics that are characterised by the quantity of the prediction error include the mean absolute error (MAE) and the root mean squared error (RMSE). This post-structural analysis is appropriate because the R^2 only assesses a model's explanatory power and fails to provide any information about an indication of out-of-sample predictive power in the sense of an ability to predict the values of new cases not included in the estimation process (Shmueli et al., 2019).

Furthermore, importance-performance map analysis [IPMA] was also done to aid in prioritising to concentrate on whatever variable based upon significance and performance. The general goal of the IPMA is to find the (unstandardised) entire influence of the predecessor construct's relevance in predicting a specific target endogenous construct (Tailab, 2020). The overall effect displays the relevance of apparent factors, whereas the mean value of their scores represents their performance (Tailab, 2020). According to Tailab (2020), the interpretation of the IPMA is that a 1-a unit increase in the predecessor's performance raises the performance of the target construct by the magnitude of the predecessor's unstandardised total effect.

Endogeneity occurs when the relationship between the independent variable and the dependent variable is not causal because the independent variable is affected by the dependent variable or both the dependent and independent variables are influenced by an omitted variable (Gudergan et al., 2025). It could happen because of the incidence of simultaneous causality, omitting variables, measurement errors, unobserved heterogeneity or CMB. Statistically, the Gaussian copula approach in SMART PLS-SEM was followed procedurally to test endogeneity in the estimated regression-based model because threat of endogeneity in the estimated model could potentially lead to biased and inconsistent coefficients hence rendering the causally uninterpretable (Gudergan et al., 2025). The use of the Gaussian copula approach aided in handling multiple endogenous regressors and interactions in a single model (Eckert & Hohberger, 2023).

Furthermore, test of heterogeneity was conducted to examine if there were some unobserved grouping variables having bearing on the relationships between the endogenous latent constructs and the exogenous latent constructs. This was checked via the latent class analysis technique called the FIMIX which helps to discover unobserved heterogeneity in the estimated model because if unckeched, if can adversely affect the validity of the results (Gudergan et al., 2025). FIMIX first unravels if there are unobserved heterogeneity in the data and model fit statistics are used to estimate the optimum number of segments. If there is heterogeneity in the model, it thens goes to check what really accounts for such situation and then prescribes solutions thereof.

Limitations

The study comes with some weaknesses. For instance, the usage of questionnaires reduced the potential to analyse the unique individual experiences about phenomena that may have been accumulated with unstructured interviews. Furthermore, employing the structured questionnaire exposed the study to the possibility of CMB, to which several ex-ante guidelines were closely followed to limit the occurrence of such an issue. Again, the study focused only on cocoa bean suppliers, hence limiting the generalisability of the findings to cover LBCs. The study also depended on a cross-sectional study design, which restricts the capacity to investigate trends of the influence of supplier development activities on the sustainable performance in the cocoa sector amid the intervening roles of other contextual factors.

Ethical Consideration

The study rigorously followed to various ethical principles to carry out this empirical investigation. This is because social science study of this sort necessitates that rigorous and intentional measures are made to preserve the privacy, dignity and confidentiality of the numerous stakeholders who are affected by the conduct of the empirical investigation. Ethical permission was requested from the Institutional Review Board of the University of Cape Coast. An Ethical Clearance ID [UCCIRB/CHLS/2023/152] was finally provided. Rigorous validation methods were implemented in the examination of the proposal and accompanying documentation before eventual approval was obtained. The competent supervision from the supervisors chosen by the University of Cape Coast further helped the ethical clearance procedure.

A formal official introduction letter was submitted to the participating subjects alongside a copy of the ethical clearance form. This supplied the route for the obtaining of consent for the collecting of the main data from the participants. Informed permission was sought from the participants once the objective and advantages of the study had been described in detail to them. The participants eventually willingly decided to engage in the study concerning the primary data-gathering exercise. Therefore, no volunteer was compelled or pressured to participate in the study.

The identity and privacy of the participants were strictly secured per the nature of the design of the structured questionnaire. No personal information of the participants was measured and released thereafter. The original data obtained were kept secret consequently the data file was not made available and accessible to any third party. No data tampering was considered however a comprehensive data purification effort was carried out to eliminate outliers and missing data in the whole data file, the aim of which was to guarantee an accurate data file was created for data analysis.

Additionally, all sources referenced in the study were recognized and acknowledged correctly through the reference list provided. This was done to avoid the possibility of plagiarism and to enhance the validity and originality of the study. The similarity index was tested with the Turnitin program which generated findings that met the minimal similarity index needed by the University of Cape Coast. Additionally, the researcher used the primary data gathered for the purpose for which they were collected. The study report was submitted to the Graduate Study Unit of the University of Cape Coast for public usage as required by the research community of practice.

Chapter Summary

The chapter has discussed in full the numerous methodological procedures, strategies and techniques that were used to make this empirical investigation scientifically finished. The decisions made about the tools, methodologies, methods, assumptions and activities adopted were justified scientifically with empirical evidence as accepted in social science research. The interrelationships among the subsections of the research techniques were also formed considering the level of inter-dependencies among such subsections. The decisions taken were heavily affected by the lessons acquired from the empirical review analysis in the literature review sections.

CHAPTER FIVE

RESULTS

Introduction

The research studied the impact of supplier development on the sustainable performance of cocoa plantations in the Western North Region of Ghana. The research targeted cocoa bean suppliers (farms) in the Boako Cocoa District. The preceding chapter focused on the research methodology adopted in carrying out this empirical investigation. This chapter focuses on giving information on the study findings as needed by the research hypotheses. Information on the demographic characteristics of the respondents is also supplied.

Demographic Characteristics

The demographic characteristics of the respondents and the cocoa farms were analyzed via the use of descriptive statistics. The use of descriptive statistics is justified on the accounts that the variables were measured on either nominal or ordinal levels. In this case, the preferred measure of central tendency is frequency whilst percentage is the appropriate measure of corresponding dispersion. The findings are summarized in Table 3.

Table 3: Demographic Characteristics

Variable	Options	Frequency	Percentage
Work status	Caretaker (Manager)	79	18.6%
	Farm owner	221	52.1%
	Caretaker (Manager) /Owner	124	29.2%
Gender	Male	272	64.2%
	Female	152	35.8%
Level of education	No education	102	24.1%
	Basic	127	30.0%
	Junior high school	92	21.7%
	Senior high school	61	14.4%
	DBS/HND	14	3.3%
	First degree	20	4.7%
	Masters	4	0.9%
	PhD	4	0.9%
Cocoa farm age	Young cocoa farm (Less than 20 years)	362	85.4%
	Old cocoa farm (20 years and above)	62	14.6%
Cocoa farm size	Small cocoa farm (Less than 5 acres)	191	45.0%
	Large cocoa farm (5 acres and more)	233	55.0%
Land tenure system	Communal	71	16.7%
	Rent/lease	107	25.2%
	Privately owned	246	58.0%
Number of years with LBCs	Below 5 years	59	13.9%
	5-10 years	175	41.3%
	Over 10 years	190	44.8%
Type of LBCs cocoa farms deal with	Private company	66	15.6%
	Public company	158	37.3%
	Both private and public company	200	47.2%
Number of workers	1-5 workers	314	74.1%
	6-10 workers	76	17.9%
	11-15 workers	15	3.5%
	15-20 workers	4	0.9%
	Above 20 workers	15	3.5%

Source: Field survey, (2024)

The data in Table 3 reflect the demographics of the respondents and the businesses they represent. In all, 424 cocoa bean suppliers were surveyed for the primary data. Regarding their job status, majority of the respondents are cocoa farm owners (52.1%), followed by those who are cocoa caretakers (Farm managers)/owners alike and then those who are cocoa farm caretakers/ managers only (18.6%). Concerning their gender, most of them are male (64.2%) although females are equally but somewhat represented (35.8%). Most of the participants have basic education although 24.1% have no formal education. 21.7% have a junior high school certificate. Only a few have master's and PhD certificates.

A consideration of the farm age shows that most of the firms are young cocoa farms with less than 20 years of operational existence (85.4%). The remaining 14.6% are old cocoa farms. The size consideration shows most of the firms are large cocoa farms (55.0%) although equally a sizeable number are small cocoa farms (45.0%). Most of the cocoa farms are privately owned (58.0%). 25.2% of the farms are rent/lease lands whilst the remaining 16.7% are on communal lands. Most of the respondents have worked with their LBCs for over 10 years (44.8%). 41.3% have 5-10 years of dealing with their LBCs. Only 13.9% have less than 5 years of working relationships with LBCs. The respondents deal mostly with both private and public LBCs (47.2%) although some deal with public LBCs only and private LBCs only. Majority of the cocoa bean suppliers employ between 1-5 workers (74.1%), followed by those with 6-10 workers (17.9%). Only 3.5% have more than 20 workers.

Annual Harvest (Appendix C)

The consideration of the annual harvest shows the maximum annual output in terms of bags of cocoa harvested by the suppliers is 700 bags (0.5%). This was followed by those with 450 bags per annum (0.5%), 350 bags per annum (0.5%). However, the majority (5.9%) produce 10 bags per annum. The remaining findings are presented in Table 4 (Appendix C).

Preliminary Analysis

Before the analysis of the data respective to the formulated hypotheses, reverse coding was made with respect to the items that were negatively worded to prevent the incidence of the threat of CMB. This was done in the completed data file through the SSS software. After the reverse coding, a thorough check on missing values and outliers was done via descriptive statistics. The essence was to clean the data file to reduce the threat of errors. Once the data file had been declared satisfactory, the data file was uploaded into the SMART pls software (Version 4.0) for onward model specification.

Model Estimation

The study adopted the two-stage embedded model estimation technique in testing the hypotheses formulated in this empirical study. The use of this technique was influenced by the fact that the model was conceptualized as including higher-order constructs for both endogenous latent constructs and exogenous latent constructs. In assessing the model, the lower-order constructs' measurement models were evaluated and declared satisfactory via the use of the standard model evaluation criteria applied to standard constructs. After this, the second step was carried out. Once satisfactory results had been obtained, a new data file was generated from the old data which provided data points on the latent scores for the validated latent constructs. The new data file was then imported into the SMART PLS for the specification and evaluation of the final model.

Measurement Model

Initial Model

Table 5: Construct Validity and Reliability of Initial Model

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Artificial pollination	0.713	0.919	0.832	0.510
Buyer-supplier relationship	0.897	0.903	0.913	0.451
Certification	0.647	0.751	0.738	0.296
Cocoa rehabilitation	0.918	0.955	0.940	0.645
Direct supplier development	0.965	0.982	0.973	0.573
Financing scheme	0.689	0.840	0.795	0.395
Indirect supplier development	0.927	0.967	0.942	0.392
Input supplies	0.596	0.810	0.747	0.455
Mass pruning	0.873	0.944	0.925	0.655
Mass spraying	0.964	0.965	0.970	0.822
Operational efficiency	0.866	0.866	0.892	0.453
Organisational ambidexterity	0.897	0.901	0.914	0.451
Supplier development	0.971	0.986	0.977	0.450
Sustainable economic performance	0.842	0.854	0.875	0.376
Sustainable environmental performance	0.888	0.889	0.906	0.409
Sustainable performance	0.943	0.948	0.948	0.321
Sustainable social performance	0.839	0.864	0.872	0.346
Training and extension services	0.970	0.970	0.973	0.769

Source: Field survey, (2024)

The measurement model evaluation criteria prove there were problems regarding the convergent validity in the initial model. For instance, Buyer-supplier relationship quality (AVE=0.451; AVE<5), certification (AVE=0.296: AVE < 0.5), sustainable social performance (AVE=0.346;

AVE<5), sustainable performance (AVE=0.321; AVE<5), sustainable environmental performance (AVE=0.409; AVE<5), sustainable economic performance (AVE=0.376; AVE<5) and host of others as shown in Table 5 had problem with the convergent validity. Construct reliability for the primary data were satisfactory (rho_ a > 0.7), same was the situation for composite reliability (rho_c > 0.7).

Discriminant Validity of Initial Model (Appendix D)

The findings in Table 6 (Appendix D) show the results concerning the test of discriminant validity between the pairs of the latent constructs that were configured in the initial model in the context of this empirical study. All the first-order constructs achieved satisfactory discriminant results via their comparison, hence there is no threat of discriminant validity in the estimated model.

Indicator Reliability of Initial Model (Appendix E)

The results in Table 7 (Appendix E) show the indicator reliability for the indicators is problematic because some of the indicator loadings had scores < 0.7 (8). This situation therefore calls for an iteration process to be carried out to improve the indicator reliability and other measures of the measurement model of the configured model especially the final endogenous latent construct (Sustainable performance). Figure 15 shows the pictorial view of the estimated model.

Structural Model Image of Initial Model

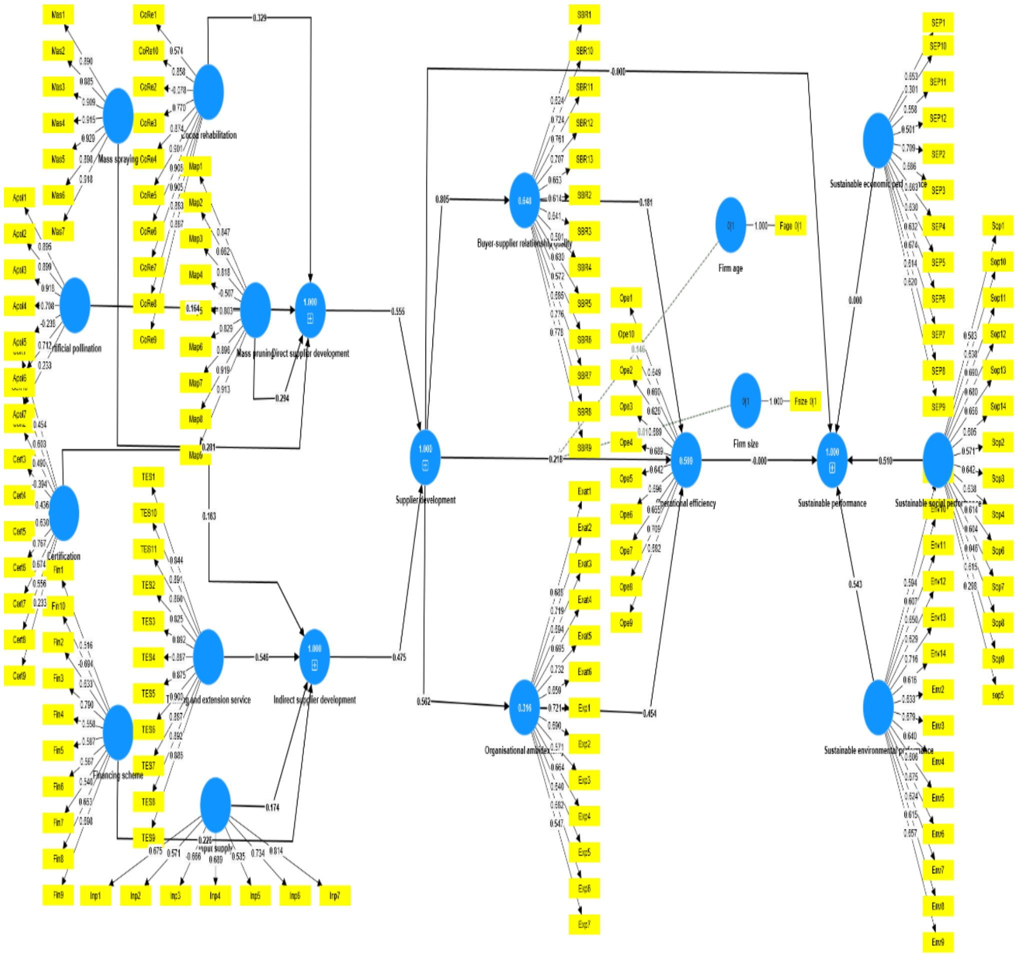

Figure 15: Image of Initial Model
Source: Field survey, (2024)

Final Model

The final model was specified after the measurement model indices for the endogenous latent construct-Sustainable performance-was declared satisfactory in the iteration process. Once declared as satisfactory, a latent data file was created for its upload into the model for further evaluation of the other constructs. After the uploading, iteration exercises were carried out until a satisfactory measurement model was achieved for the overall model. The findings are hereby presented.

Measurement Model

Table 8: Construct Validity and Reliability

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Buyer-supplier relationship quality	0.885	0.889	0.908	0.526
Operational efficiency	0.831	0.830	0.877	0.543
Organisational ambidexterity	0.870	0.873	0.898	0.524

Source: Field survey, (2024)

Observation of the results in Table 8 shows the primary data collected via the various scales are reliable at measuring the key constructs considered in this study (rho_a >0.7). This shows the primary data collected on the scales measuring the targeted constructs via the structured questionnaire are free from errors and that the data file is deemed accurate for the subsequent analysis in lieu of the specific research objectives or the formulated hypotheses.

Composite reliability for the respective scales for the constructs is satisfactory in all instances (rho_c > 0.7). Therefore, the individual indicators for each of the constructs work collectively to represent the latent constructs in the estimated structural equation model. Convergent validity for the constructs is satisfactory (AVE > 0.5). The implication is that each of the latent constructs is uniquely measured by its indicators. The quality dimensions of the final model are satisfactory hence proving the model is devoid of weaknesses that can bring the power and relevance of the estimated model into disrepute.

Discriminant Validity of Final Model (Appendix F)

The findings in Table 9 illustrate that there are no threats of discriminant validity for all the pairs of the latent constructs considered in the configured model (HTMT ratio < 1). It is important to appreciate that some of the pairs had more than 0.85 HTMT ratio but these pairs were specified as higher-order constructs hence this is not any threat to the reliability, validity and power of the estimated model (Hair Jr., et al., 2021). In this regard, it is inferred that the constructs are independently measured by their respective indicators.

Validation of Higher Order Constructs

Table 10: Validation of Higher Order Constructs

	Outer Weight	Mean	T statistics	P values
Dir SD -> Supplier development	0.195	0.198	1.773	0.038
Ind SD -> Supplier development	0.822	0.818	8.006	0.000
LV - SEcoPerf -> Sustainable performance	0.550	0.546	7.627	0.000
LV- SEnviPerf -> Sustainable performance	0.169	0.172	2.081	0.019
LV- SSocPerf -> Sustainable performance	0.417	0.414	5.288	0.000

Source: Field survey, (2024)

Table 10 shows information about the quality dimensions of the final estimated model. All the outer weight scores are statistically significant (p>0.05) confirming the indicators measure the latent constructs in the estimated model.

Collinearity Statistics

Table 11: Outer VIF

	VIF
Dir SD	4.781
Exat1	1.809
Exat2	1.786
Exat3	1.803
Exat4	1.914
Exat5	1.980
Exat6	1.851
Exp1	1.690
Exp6	1.432
Fage	1.000
Fsize	1.000
Ind SD	4.781
LV – SecoPerf	1.894
LV- SEnviPerf	2.049
LV- SSocPerf	2.003
Ope10	1.786
Ope4	1.326
Ope6	1.580
Ope7	1.616
Ope8	1.873
Ope9	1.844
SBR10	2.086
SBR11	1.916
SBR12	1.776
SBR13	1.671
SBR2	1.451
SBR3	1.425
SBR7	1.768
SBR8	2.483
SBR9	2.607
Firm age x Supplier development	1.000
Firm size x Supplier development	1.000

Source: Field survey, (2024)

Table 11 shows collinearity statistics for the final model. Variance Inflation Factor (VIF) measures indicate the degree to which independent variables are multicollinear. Generally, a VIF measure greater than 5 reflects a high degree of collinearity and hence can affect regression estimations. Both Direct Supplier Development (Dir SD) and Indirect Supplier Development (Ind SD) in this dataset have VIF measures of 4.781, indicating a significant but not extremely high degree of correlation with other predictors. All other variables have VIF measures either below or very close to 2 and hence do not reflect any serious issues with collinearity.

The firm-related variables, namely firm age and firm size, have a Variance Inflation Factor (VIF) value of 1.000; hence, there is no problem concerning multicollinearity. Thus, these variables are independent and do not show correlation with other predictors. Likewise, external variables from Exat1 to Exat6, operating efficiency variables from Ope4 to Ope10, and buyer-supplier relationship variables from SBR10 to SBR13 all have VIF values under 2.5, and hence there are minimal problems with regard to multicollinearity. Additionally, latent variables for sustainable economic, environmental, and social performance—namely, LV - SEcoPerf, LV - SEnviPerf, and LV - SSocPerf—are all within desired levels for collinearity; hence, these sustainability variables do not highly overlap with each other.

In the buyer-supplier relationship, SBR8 (2.483) and SBR9 (2.607) do have a high VIF value, although it's below the critical value of 5. This indicates that they can be somewhat correlated with each other without being a huge problem with multicollinearity. Generally, there aren't any severe multicollinearity problems with the model, and independent factors vary sufficiently to provide valid estimates in examining the sustainable performance of buyers in cocoa.

Table 12: Inner VIF

	VIF
Buyer-supplier relationship quality -> Operational efficiency	3.130
Firm age -> Operational efficiency	1.117
Firm size -> Operational efficiency	1.082
Operational efficiency -> Sustainable performance	1.364
Organisational ambidexterity -> Operational efficiency	1.489
Supplier development -> Buyer-supplier relationship quality	1.000
Supplier development -> Operational efficiency	4.272
Supplier development -> Organisational ambidexterity	1.000
Supplier development -> Sustainable performance	1.364
Firm age x Supplier development -> Operational efficiency	1.507
Firm size x Supplier development -> Operational efficiency	2.950

Source: Field survey, (2024)

The VIF values inform us about how much each hidden factor impacts sustainable performance in providers of cocoa beans (Table 12). Typically, a VIF value under 5 is acceptable, whereas a value greater than 5 may indicate likely problems with multicollinearity. In our model, all inner VIF values are under 5, and thus multicollinearity does not pose a great problem for our model, although there do exist some moderate relationships between some variables. Supplier Development has a variance inflation factor of 4.272, indicating that Operational Efficiency has the highest VIF in comparison to the rest. This indicates that there exists a high correlation between these two factors. This indicates that supplier development, giving resources, and training have a great impact in improving operational efficiency. Though a VIF value below 5 indicates low multicollinearity, it also indicates that supplier development has a capability to enhance efficiency in the cocoa supply chain.

Other relationships have low to moderate multicollinearity, making the model more stable. The quality of buyer-supplier relationship impacts how effectively operations work (VIF = 3.130) and supplier development and firm size also impact operational efficiency (VIF = 2.950). This indicates that supplier development, firm size, and relationship quality matter for operational efficiency. Meanwhile, firm age, firm size, organisational ambidexterity and sustainable performance have VIF values below 2, indicating they do not have multicollinearity. Overall, supplier development plays a very critical role in operational efficiency, and no multicollinearity. This indicates that relationships in the model can be utilized to measure sustainable performance in cocoa bean suppliers.

Structural Model

Indicator Reliability of Final Model (Appendix G)

The findings in Table 13 (Appendix G) show that indicator reliability is achieved for the estimated model. All the indicators loading had significant contributions ($p < 0.05$). Iteration was made to eliminate indicators that had a negative and significant impact on the measurement model via the iteration process. This approach is empirically recognized (Hair Jr., et al., 2021). The implication is that, collectively, all the indicators purporting to measure the constructs indeed are measuring such constructs in the specified model.

Test of Hypotheses

Table 14: Path Co-efficient

	Std. Beta	f-square	T statistics	P values
Buyer-supplier relationship quality -> Operational efficiency	0.192	0.021	3.074	0.001
Firm age -> Operational efficiency	0.222	0.010	2.009	0.022
Firm size -> Operational efficiency	-0.123	0.006	1.614	0.053
Operational efficiency -> Sustainable performance	0.431	0.263	10.627	0.000
Organisational ambidexterity -> Operational efficiency	0.480	0.283	13.004	0.000
Supplier development -> Buyer-supplier relationship quality	0.816	1.992	50.274	0.000
Supplier development -> Operational efficiency	0.164	0.012	2.245	0.012
Supplier development -> Organisational ambidexterity	0.530	0.390	15.746	0.000
Supplier development -> Sustainable performance	0.367	0.192	10.343	0.000
Firm age x Supplier development -> Operational efficiency	-0.032	0.000	0.336	0.368
Firm size x Supplier development -> Operational efficiency	0.071	0.002	1.058	0.145

Source: Field survey, (2024)

The test of hypotheses yielded the data described in Table 14. Supplier development made a statistically significant positive contribution to predicting the variance in operational efficiency of the cocoa farms (β=0.164; p=0.012) with a small effect size (f^2=0.012). Additionally, supplier development had a statistically significant positive contribution to predicting the variation in sustainable performance of the cocoa bean suppliers (β=0.367; p=0.0001) with a moderate effect size (f^2=0.192). Regarding the moderation analysis, it was revealed that firm age did not modify significantly, the predictive association between supplier development and operational efficiency (β=-0.032; p=0.368: p>0.05). Similarly, firm size fails to significantly alter the predictive link between supplier development and operational efficiency (β=0.071; p=0.145: p > 0.05).

Mediation Analysis

Table 15: Specific Indirect Effect

	Std. Beta	T statistics	P values
Supplier development -> Organisational ambidexterity -> Operational efficiency	0.254	9.891	0.000
Supplier development -> Buyer-supplier relationship quality -> Operational efficiency	0.156	3.044	0.001
Supplier development -> Operational efficiency -> Sustainable performance	0.071	2.281	0.011

Source: Field survey, (2024)

The indirect impact results are provided in Table 15. It can be demonstrated that buyer-supplier relationship quality partially mediated significantly, in a positive manner, the predictive link between supplier development and operational efficiency (β=0.156; p=0.001: $p<0.05$). Organisational ambidexterity partially, significantly and favourably, mediated the predicted causal relationship between supplier development and operational efficiency (β=0.254; p=0.0001: $p < 0.05$). Finally, operational efficiency mediated somewhat, favourably and in a significant manner, the influence of supplier development on the sustainable performance of the cocoa bean suppliers in the Western North Region (β=0.071; p = 0.011: $p < 0.05$).

Co-efficient of Determination

Table 16: Co-efficient of Determination

	R-square	R-square adjusted
Buyer-supplier relationship quality	0.666	0.665
Operational efficiency	0.453	0.444
Organisational ambidexterity	0.281	0.279
Sustainable performance	0.484	0.482

Source: Field survey, (2024)

The findings in Table 16 demonstrate the change in the external latent construct as accounted for by changes in the endogenous latent constructs. It was observed that improvements in supplier development amid the partial mediating roles of firm ambidexterity and buyer-supplier relationship quality account for a 45.3% variance in the operational efficiency of the cocoa bean suppliers (R^2=0.453). This change in operational efficiency as accounted for by changes in supplier development and contingent factors is best described as moderate given the threshold of the R^2 attained. Other variables other than supplier development and contingent factors including firm ambidexterity and buyer-supplier relationship quality that might increase the operational efficiency of the cocoa farms but are not incorporated in the model can account for a 54.7% improvement in operational efficiency assuming the occurrence of identical conditions in such a research scenario.

Furthermore, variations in supplier development explain a 66.6% variance in buyer-supplier relationship quality (R^2=0.666). This change in buyer-supplier relationship quality as accounted for by changes in supplier development is best defined as moderate given the threshold of the R^2 achieved. Other factors other than supplier development that might enhance buyer-supplier relationship quality but are not included in the model can account for a 33.4% improvement in buyer-supplier relationship quality assuming the occurrence of identical conditions in such a research scenario.

Again, it was discovered that variations in supplier development explain a 28.1% variance in the organisational ambidexterity of the cocoa farms (R^2=0.281). This shift in organisational ambidexterity as accounted for by changes in supplier development is best defined as weak given the threshold of the R^2 achieved. Other variables other than supplier development that can improve organisational ambidexterity but are not represented in the model can account for a 71.9% improvement in organisational ambidexterity assuming the occurrence of identical conditions in such a research scenario.

Changes in operational efficiency and supplier development collectively account for a 48.4% change in sustainable performance (R^2=0.484). This change in sustainable performance as accounted for by changes in supplier development and operational efficiency is best described as moderate given the threshold of the R^2 achieved. Other factors other than supplier development and operational efficiency that might increase sustainable performance but are not represented in the model can account for a 51.6% improvement in sustainable performance assuming the occurrence of identical conditions in such a research scenario.

The aspects of operational efficiency improved because of the access to supplier development projects amid the partial positive significant mediating roles of organisational ambidexterity and buyer-supplier relationship quality amid the interaction roles of firm size and firm age include utilization of farm equipment proficiently, maintenance of business relationships with other supply chain partners, production on agreed schedules, optimal use of chemicals and fertilizers, maximization of land use and use of labour productively. On inspecting the derived latent score data file after evaluation of the measurement model for the sustainable performance construct, the study reveals the aspects of sustainable economic performance that predicted sustainable performance include an increase in returns on investment, an increase in profitability, improved stability of supply, improved stability of the market, an increase in market share and improved sales growth.

In the case of sustainable social performance, it was found that indicators such as an increase in the development of employee skills, improvement in customer satisfaction, improvement in investment in social projects, improved living standards of farmers and their families and improved employee relations reflected sustainable social performance. The indicators contributing to the sustainable environment performance include a decrease in the frequency of environmental mishaps, enhanced forest reservation, increased climate adaption, improved eco-system variety, improved air quality and no land degradation. Figure 16 illustrates the final structural model for the tested assumptions.

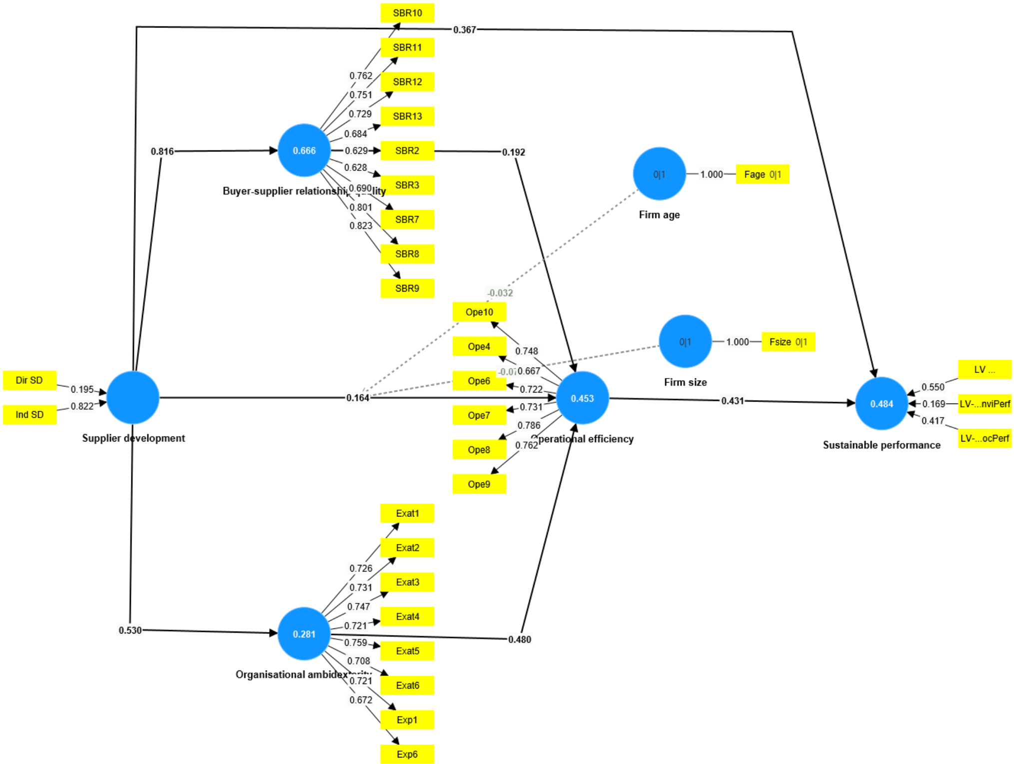

Figure 16: Structural Model Image of Final Model
Source: Field survey, (2024)

Test of Robustness of Final Model

A test of robustness was carried out to check how accurate and reliable the estimated model is. Two robustness checks conducted include PLSpredict and importance-performance map analysis. The results are hereby presented in Table 16.

PLSpredict (Appendix H)

The PLSpredict was carried out since the R^2 has a restriction in quantifying the predictive power of the estimated model (Hair, Risher, Sarstedt & Ringle, 2019). Thus, the R^2 merely reveals the model's in-sample explanatory capacity but tells nothing about the model's out-of-sample predictive potential (Hair, et al., 2019). The findings are now provided in Table 17.

The findings of the PLSpredict carried conducted are provided in Table 17. From the perspective of Hair, et al., (2019) it is procedural and sensible to first evaluate predictive relevance before measuring the model's predictive capability. In this sense, this technique is rigorously adhered to in this empirical investigation. the predictive significance is assessed by the Q^2predict findings. The Q^2predict findings demonstrated the model achieves predictive significance (Q^2predict>0). Therefore, the model demonstrates the values are successfully rebuilt and that the calculated model has predictive relevance (Hair et al., 2019).

Using sustainable performance as the endogenous latent construct, the findings in Table 15 reveal that the estimated mode has a weak predictive power because a minority of the indicators in the PLS-SEM analysis has lower RMSE (or MAE) values compared to the naïve LM benchmark (Shmueli et al., 2019). The findings indicate that it may be possible to improve the predictions by making adjustments to the PLS-SEM model. Perhaps relationships in the model may be weaker than they would be to provide good predictions. Therefore, employing alternative techniques such as increasing more relevant factors, re-specifying assumptions in the model or employing more sophisticated techniques such as machine learning may result in improved results.

Importance-Performance Map Analysis

The importance-performance map analysis [IPMA] helps to compare the total effect (Importance) and average value (Performance) of a target construct's antecedents. In this way, it provides means to offer advice on resource prioritization based on how the other factors relate with the target construct (Gudergan, et al., 2025). The IPMA is a strategic tool that aids in understanding where managerial improvement efforts should be focused in estimated PLS-SEM models (Hauff, Richter, Sarstedt & Ringle, 2024). It is regarded as a post-hoc analysis of an estimated PLS-SEM (Petkovski & Milošević, 2024; Ahmed et al., 2024; Rahi et al., 2021).

Importance-Performance Map Analysis

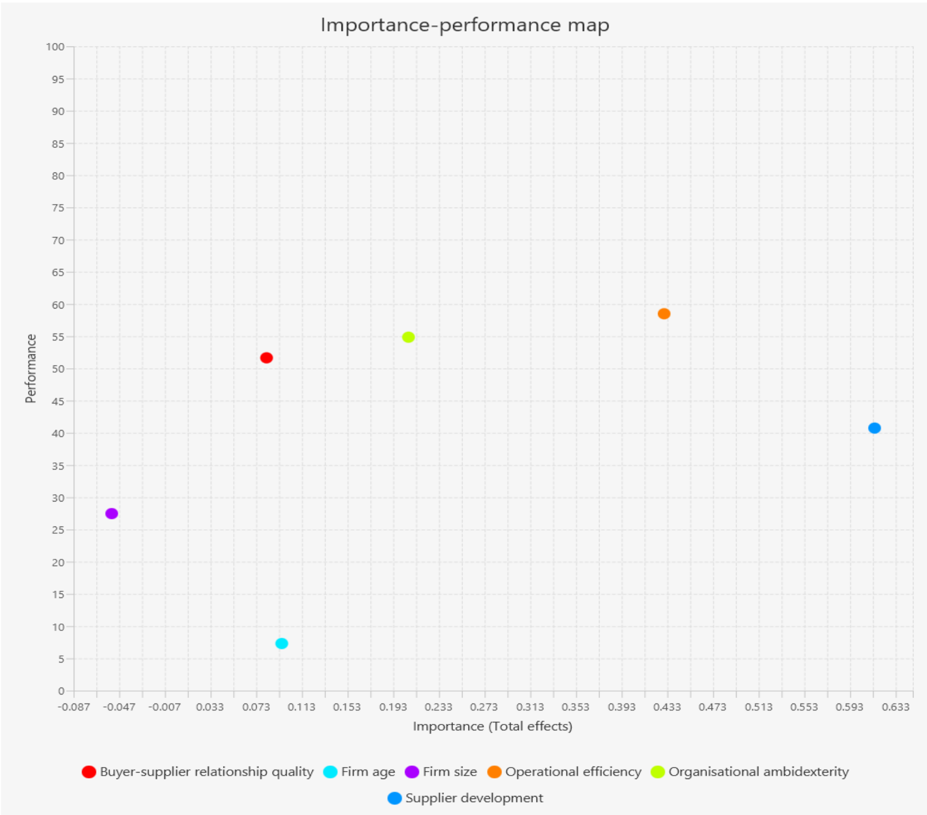

Figure 17: Importance-Performance Map Analysis for Latent Constructs
Source: Field survey, (2024)

Figure 17 illustrates the final model's IPMA analysis results of the latent constructs. The IPMA evaluates key factors influencing the sustainable performance of cocoa bean suppliers in the Western North region of Ghana. The x-axis represents the importance of each factor in driving sustainability, while the y-axis measures the current performance of these factors. Supplier development emerges as the most critical determinant of sustainability, with the highest importance score among all variables. However, its performance is only moderate, suggesting that enhancing direct supplier development [Cocoa rehabilitation, cocoa mass spraying, cocoa mass pruning and artificial pollination] and indirect supplier development projects [Input supply, training and extension services, financing scheme and certification] could significantly improve sustainability outcomes.

Operational efficiency also plays a crucial role in sustainable performance, ranking high in both importance and performance. This indicates that cocoa suppliers have made considerable strides in optimizing their processes to enhance sustainability. Nonetheless, continuous improvements in efficiency, such as waste reduction and productivity enhancements, could further strengthen their sustainable operations. Organisational ambidexterity has moderate importance and performance, implying that fostering adaptability and resilience could yield better sustainability results.

Buyer-supplier relationship quality holds moderate importance but shows potential for improvement in performance. Strengthening trust, collaboration, and long-term partnerships between cocoa bean suppliers and buyers could lead to greater stability and sustainability in the supply chain. Conversely, factors such as firm age and firm size exhibit the lowest importance and performance, indicating that the size or maturity of a firm does not significantly impact its sustainability. This suggests that strategic actions should focus more on operational and relational factors rather than structural characteristics.

In conclusion, supplier development and operational efficiency are the most influential drivers of sustainable performance, warranting prioritized investment and improvement efforts. Strengthening buyer-supplier relationships and fostering organisational ambidexterity could further enhance sustainability outcomes. Meanwhile, firm size and age appear to have minimal impact, reinforcing the need to focus on factors that directly contribute to supplier capabilities and efficiency. By addressing these key areas, cocoa suppliers can achieve more sustainable and resilient operations in the long run.

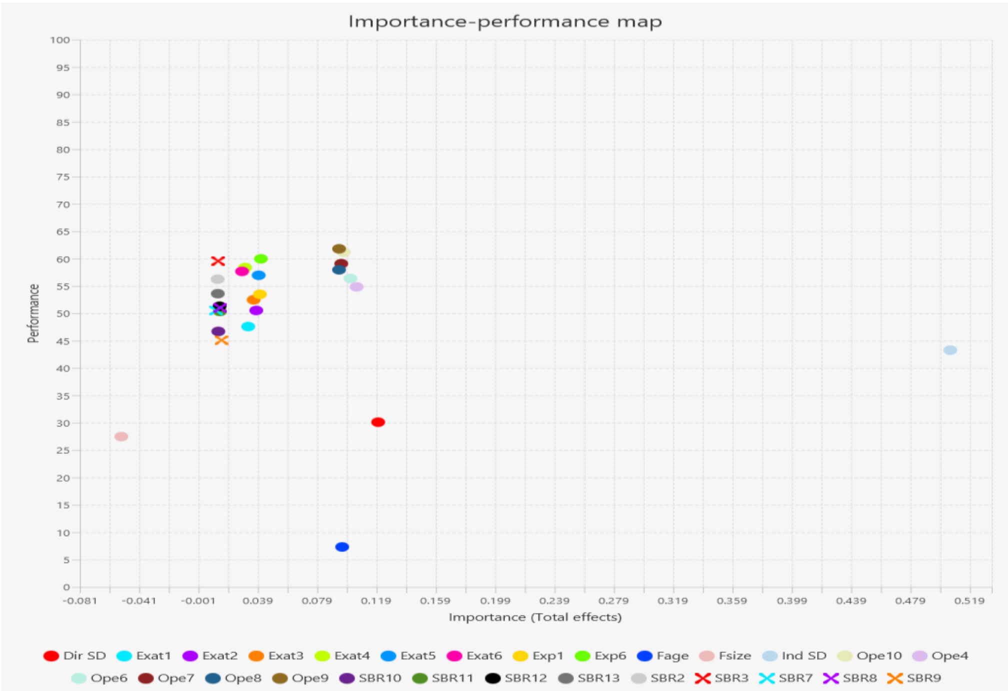

Figure 18: Importance-Performance Map Analysis for Indicators
Source: Field survey, (2024)

The importance-performance map provides a visual representation of the key factors influencing the sustainable performance of cocoa bean suppliers. The x-axis represents the importance of each factor in driving sustainability, while the y-axis reflects their current performance levels. The clustering of many factors on the left side of the graph, particularly firm age, firm size, and some operational efficiency (Ope) and supplier relationship

(SBR) indicators, suggests that these variables have low importance and low performance. This implies that they do not significantly contribute to sustainability and should not be prioritized for improvement.

A key area for strategic intervention is direct supplier development (Dir SD), which has relatively high importance but only moderate performance. This indicates that investing in supplier training, better resource allocation, and improved supply chain practices could yield significant sustainability benefits. Additionally, some ambidextrous factors (Exat) and supplier relationship indicators (SBR11, SBR12) show moderate importance with relatively high performance, suggesting they contribute to sustainability but may not require immediate improvement efforts.

Lastly, certain factors such as SBR3, SBR7, and SBR8 exhibit high performance but low importance, meaning they are well-managed but do not play a major role in sustainability improvements. Maintaining their current levels while focusing on more influential variables would be a resource-efficient strategy. In conclusion, improving supplier development while maintaining strong-performing but less critical factors will help optimize the sustainability of cocoa bean suppliers.

Test of Endogeneity (Appendix I)

Table 18: Test of Endogeneity Results

Gaussian copula procedure was used to test the degree of endogeneity of the estimated model. It was discovered that supplier development relates negatively with both buyer-supplier relationship quality and sustainable performance signaling efforts to developing by LBCs may introduce strain in relationships and also may lead to inefficiencies, increased costs or short-term trade-offs offs which negatively affect sustainability performance. These limitations may be due to the fact that there could perhaps be pre-existing relationship quality that affects how supplier development projects are implemented or firms with lower sustainability performance may invest more in supplier development projects which may may it unclear as to whether supplier development truly reduces sustainable performance or if struggling cocoa bean suppliers engage more efforts in supplier development. Unmeasured variables such as market competition or regulatory pressure could be the driving force leading to supplier development-sustainable performance bias.

Failure of supplier development affecting, significantly, operational efficiency and organizational ambidexterity suggest developing suppliers alone is not enough to enhance internal operations of cocoa bean suppliers or their ability to balance exploration and exploitation strategies. With buyer-supplier relationship quality and organnisational ambidexterity failing to significantly contribute to operational efficiency, it affirms maintaining strongly supplier development relationship and fostering organizational ambidextrous activities among the cocoa bean suppliers may not directly improve operational efficiency. Interestingly, a positive significant relationship is seen between operational efficiency and sustainable performance hence cocoa bean suppliers should streamline their operations and optimize their processes to achieve sustainability performance over the long term, thereby reinforcing the importance of operational efficiency in enforcing broad business success.

Test of Unobserved Heterogeneity

Table 19: Heterogeneity Test Results

	1	2	3	4
AIC (Akaike's information criterion)	3971.002	3767.634	3682.274	3623.679
AIC3 (modified AIC with Factor 3)	3986.002	3798.634	3729.274	3686.679
AIC4 (modified AIC with Factor 4)	4001.002	3829.634	3776.274	3749.679
BIC (Bayesian information criterion)	4031.748	3893.176	3872.611	3878.813
CAIC (consistent AIC)	4046.748	3924.176	3919.611	3941.813
MDL5 (minimum description length with factor 5)	4394.732	4643.343	5009.961	5403.345
EN (normed entropy statistic)	0.000	0.526	0.697	0.719

Source: Field survey, (2024)

FIMIX-PLS findings indicate that there exists unobserved heterogeneity in the data and model fit statistics are employed to estimate the optimum number of segments. The Akaike Information Criterion (AIC) decreases monotonically as segments increase and the model fit improves with increasing segments. Bayesian Information Criterion (BIC) and CAIC both have their minimum at two segments, reflecting a better parsimonious model. The entropy (EN) measure, a quality measure of class separation, is highest for three and four segments (0.697 and 0.719, respectively), reflecting strong subgroup differentiation. Although four segments provide a slightly higher entropy score, the difference is minimal. Given the balance between model fit, parsimony, and entropy, the three-segment solution is recommended as the optimal solution for the depiction of heterogeneity in the data.

Table 20: FIMIX-PLS Results

Complete			Group 1		Group 2		Group 3			Over 10 years		5-10 years		Below 5 years	
	Original sample (O)	**P values**	**Original sample (O)**	**P values**	**Original sample (O)**	**P values**	**Original sample (O)**	**P values**		**Original sample (O)**	**P values**	**Original sample (O)**	**P values**	**Original sample (O)**	**P values**
BSRQ ->OPE	0.146	0.01	0.69	0	0.391	0	0.263	0.241	**BSRQ-> OPE**	0.159	0.027	0.145	0.122	0.099	0.323
OPE -> SP	0.262	0	0.605	0	0.082	0.33	-0.438	0.105	**OE -> SP**	0.216	0.011	0.3	0	0.476	0.002
OAMB -> OPE	0.371	0	0.3 7	0	-0.062	0.154	0.106	0.356	**OAM -> OPE**	0.427	0	0.283	0.005	0.303	0.047
SD -> BSRQ	0.706	0	0.82	0	0.792	0	0.498	0.132	**SD -> BSRQ**	0.708	0	0.747	0	0.611	0
SD-> OPE	0.212	0	-0.294	0	0.599	0	0.159	0.286	**SD -> OPE**	0.242	0.001	0.218	0.021	0.192	0.075
SD -> OAM	0.546	0	0.535	0	0.709	0	0.387	0.037	**SD -> OAM**	0.525	0	0.604	0	0.519	0
SD -> SP	0.453	0	0.451	0	0.505	0.002	-0.116	0.395	**SD -> SP**	0.471	0	0.489	0	0.364	0.011

Source: Field survey, (2024)

Unobserved heterogeneity in the structural model indicates that cocoa beans supplying firms have distinct patterns in the relationships between supplier development, the quality of the buyer-supplier relationship, operational efficiency, and sustainable performance. While some of these latent groups are consistent with the working with LBCs experience-based segments, thus, length of years of working with LBCs, others are behavioural outliers that cannot be explained by tenure such relationship alone. This reveals that supply chain performance heterogeneity is the result of not only experience but strategic focus, resource capabilities, and operational thrusts.

The findings highlight three key patterns: (1) Group One and Over 10 Years is best represented by mature, well-established firms with more working experience with BLCs that have significant strong relationships between operational efficiency and sustainable performance, clearly utilizing ambidextrous capabilities; (2) Group Two and 5-10 Years captures firms with medium-term relationship with LBCs exhibit moderate effects, but there are noted inconsistencies in how the supplier development and ambidexterity operationalize efficiency relate; and (3) Group Three and Below 5 Years represents less experienced firms who cannot seem to transform operational efficiency into sustainable performance, resulting in weak or insignificant effects in critical paths. These differences endorse the notion that firm behavior is heterogeneous and that solely relying on regressed or observed characteristics (like experienced with LBCs) ignores key latent factors that are shaping the performance outcomes.

In sum, the FIMIX-PLS findings determine the direction and complexity of supplier development and operational strategy in their detail and segmentation. An organization's classification cannot rest on merely with LBCs experience as monolithic, as there are concealed subgroups with different levels of skill and achievement. From this perspective, researchers need to understand the issue of latent heterogeneity in PLS-SEM analysis, while for practitioners, it means that different firm segments suffer from distinct problems and call for tailored solutions. More evidence can be collected through subsequent research by employing different segmentation methods, like REBUS-PLS, or adding firm-level contextual variables to issue more focused strategic advice.

Empirically Manifested Profile of the Conceptual Framework

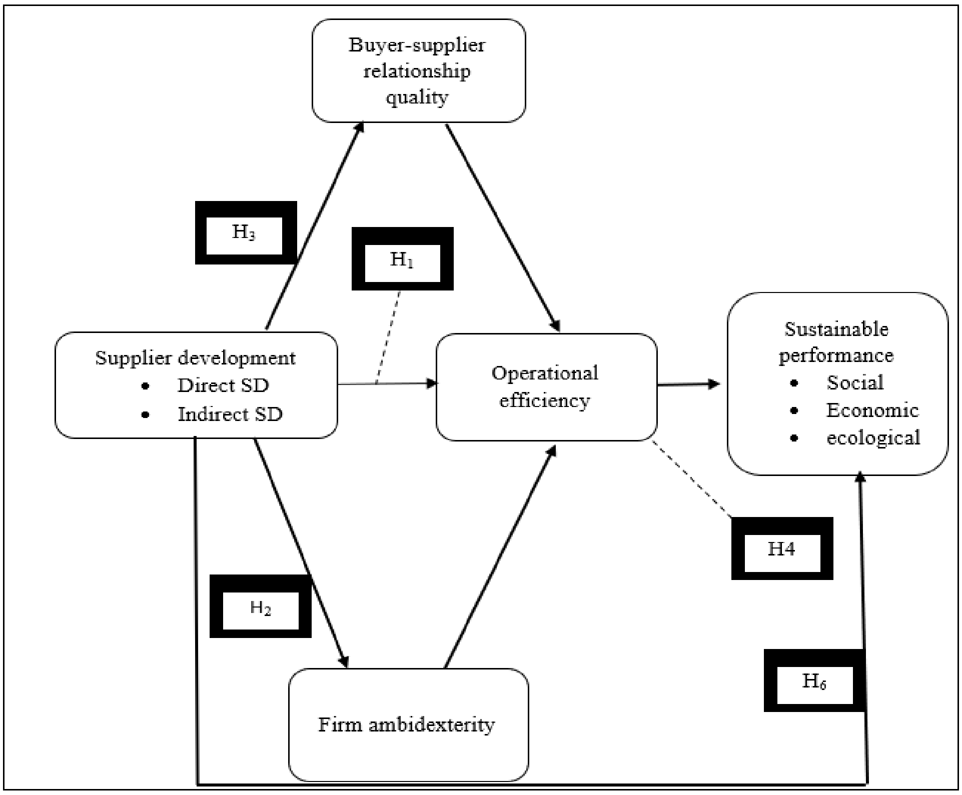

Figure 19: Empirically Manifested Profile of the Conceptual Framework
Source: Field survey, (2024)

Figure 19 shows the empirically manifested relationships between the constructs based on the tested hypotheses. It should be noted that only H_{5a} and

H_{5b} were not empirically supported. All the remaining 5 hypotheses were supported from the empirical standpoint. Table 20 also supports the summary results as demonstrated in Figure 20.

Summary of Hypotheses

Table 21: Summary of Hypotheses

No	Hypothesis	Decision
H_1	Supplier development positively and significantly predicts operational efficiency	Supported
H_2	Organisational ambidexterity positively and significantly mediates the predictive relationship between supplier development and operational efficiency	Supported
H_3	Buyer-supplier relationship quality positively and significantly mediates the predictive relationship between supplier development and operational efficiency	Supported
H_4	Operational efficiency positively and significantly mediates the predictive relationship between supplier development and operational efficiency	Supported
H_{5a}	Firm size positively and significantly moderates the predictive relationship between supplier development and operational efficiency	Not supported
H_{5b}	Firm age positively and significantly moderates the predictive relationship between supplier development and operational efficiency	Not supported
H_6	Supplier development positively and significantly predicts sustainable performance	Supported

Source: Field survey, (2024)

Chapter Summary

This chapter presents information about the findings in respective of the tested hypotheses considered in the context of this empirical study. The study proves four of the hypotheses are supported but two are not supported. The direct effects and mediation effects were fully supported but the moderation effects were not supported.

CHAPTER SIX

DISCUSSION

Introduction

This chapter focuses on the discussion of the findings obtained concerning the tested hypotheses. The discussion is made in terms of the implications of the findings obtained thereon, theoretical underpinning and position of some previous empirical studies. This section provides the chance to make meaning of the findings concerning the tested research objectives or hypotheses.

Personal Demographic Characteristics

The participants' personal characteristics indicate that the majority are owners of cocoa farms. The owners are actively engaged in the management of their agribusiness according to the operational characteristics of the enterprise. Both owners and managers were simultaneously called for data collection. The respondents' portfolio categories provide a robust understanding of the interactions among the constructs in the study phenomenon being examined. Both males and females participate in the cocoa agribusiness, although males dominate according to the gender structure. This discovery offers valuable knowledge, as both genders participate in cocoa-producing business activities.

The educational attainment of the respondents is somewhat promising, as the majority possess basic education and junior high school certifications. Only a limited number possess master's and doctoral degrees. This shows that the owners and managers of the cocoa agribusiness still require more attention to improve their education formally. Those without any formal education totalled 24.1%. This is quite substantial. Investigating why most caretakers/managers and owners of agribusinesses do not go through formal schooling could perhaps help in policy initiation and intervention. Maybe other informal education on agribusiness centred on cocoa production and selling is required for these respondents.

Demographic Characteristics of Firms

The study surveyed 424 cocoa bean suppliers in the Western North Region of Ghana. The specific area of study is Boako Cocoa District. Most of the cocoa farms are young cocoa farms because they are less than twenty years old. This shows a promising future for the LBCs because young cocoa bean farms have the potential to generate higher-yielding beans than older ones. This also ensures the likely continuation of the supply of cocoa beans to the cocoa LBCs in the cocoa market in the long run. It also suggests the LBCs still have more respondents for giving supplier development initiatives to a big number of young first-tier cocoa suppliers.

Special programmes for long-term supplier development for cocoa plantations become eminent in this respect. Meanwhile, the old cocoa farms or suppliers require greater attention for supplier development including rehabilitation and disease and pest control projects to maintain them productive in the meanwhile. Most of the cocoa bean suppliers are large cocoa farms with 5 acres or more. This data demonstrates people are still investing substantially in cocoa farms and are eager to support the development of Ghana in terms of selling the produce to LBCs for export and local industrial purposes. Small cocoa farms are equally represented. In all instances, the LBCs support these cocoa bean suppliers which is a good signal for the attraction of investment in the cocoa farming industry. Small cocoa farms could also develop expansion strategies related to supplier development strategies to improve their operational efficiency and subsequent benefits in sustainable performance.

Most of the cocoa farms are privately owned although some are on lease and community bases. The private stake in the cocoa farming business is a good signal as it provides as a buffer to assist job creation in the country. Renting for cocoa farm enterprises seems approved among the cocoa farm investors in this area. The cocoa bean suppliers have over ten years of working relationship with the LBCs, highlighting the value of buyer-supplier partnerships in the cocoa production and marketing industry. Furthermore, just a few cocoa bean suppliers have less than five years of working experience with the LBCs. With such lengthy interaction with the LBCs, the respondents are better equipped to hold the necessary kind of knowledge and experience to provide reliable facts about the issues examined in the context of the study. This also demonstrates that, in the context of supplier development, solid buyer-supplier connection is a vital aspect that must be present to make such inter-firm partnerships succeed.

The cocoa bean suppliers deal largely with both private and public LBCs. Also, roughly 37.3% deal with public LBCs for the selling of their produce which implies perhaps the cocoa-supplying enterprises prefer to deal with public LBCs than that of private LBCs. This signal is inferred from the distribution of the respondents that claimed that they deal with solely private LBCs. There could be some special advantages in dealing with public LBCs in the cocoa bean market. Private LBCs are expected to enhance their marketing efforts to attract more cocoa bean suppliers to grow their market penetration and eventual competitive advantage.

The assessment of the permanent workforce for the cocoa bean suppliers shows most of them employ between 1-5 workers, followed by those that employ between 6-10 workers. Perhaps this condition explains for the usage of forced labour and child labour in cocoa growing business since the farms are not able to pay the correct cost of labour to support their operations especially during bumper harvest seasons. Maybe most cocoa farms utilise labour on casual and seasonal contracts. This technique helps to decrease staffing costs and maintaining their farms with the few regular personnel they have. The cyclical character of cocoa-growing operations likely accounts for this blend of worker acquisition techniques. The annual output of the cocoa bean suppliers shows most of them do not produce much, a fact that validates the earlier claim that cocoa production in Ghana has been dropping of late (Wibowo, et al., 2021; ICO, 2022).

Effect of Supplier Development on Operational Efficiency

The PLS-SEM result demonstrates changes in supplier development account for a moderate positive impact in the operational efficiency of the cocoa bean suppliers. This change in operational efficiency is deemed a significant moderate change given the fact that it falls within the permitted range and the impact of supplier development is significant and positive. Supplier development gives a statistically significant positive contribution to forecasting the variance in operational efficiency of the cocoa bean suppliers with a small effect size.

Supplier development programmes for the cocoa bean suppliers are delivering positive significant gains in the operational efficiency of the cocoa bean suppliers as agribusinesses. The engagement in direct supplier development projects (Mass pruning, cocoa rehabilitation, artificial pollination and mass spraying/pest and disease control) and indirect supplier development initiatives (Financing scheme, certification input supplies and training and extension services) by the LBCs is viable in enhancing the state of operational excellence exhibited among the agribusinesses and should be commended.

For direct supplier development, focus on artificial pollination practices including undertaking artificial pollination for first-tier cocoa suppliers, supporting cocoa bean suppliers or farms with insect pollination, providing logistical support for artificial pollination, undertaking hand pollination projects at the right time and transferring the know-how of artificial pollination to farmers are critical. Regarding cocoa rehabilitation, practices such as assisting cocoa farmers in adopting coppicing, assisting cocoa farmers in adopting side grafting, assisting cocoa farmers in undertaking early intercropping, assisting cocoa farmers in propagating elite trees, compensating cocoa farmers that rehabilitate their cocoa bean suppliers or farms, compensating landowners (traditional) authorities when they rehabilitate cocoa bean suppliers or farms, assisting in the clearing of land during rehabilitation projects and assisting cocoa farmers to cut down unproductive aged cocoa trees and paying for hired labour for mass pruning exercises manifest in this context.

In respect of mass pruning activities such as assisting cocoa farmers in removing dead branches, husks and pods, helping cocoa farmers to eliminate mispositioned and cross trees, ensuring that the absolute amount of pruned materials varies among trees, assisting farmers to remove all hosts on the farm, transferring pruning techniques to cocoa farmers, assisting cocoa farmers in farm mapping to prevent overcrowding and recruit pruning labourers through farmer cooperatives are critical contextually. Mass spraying activities that manifested in the study include supporting cocoa farmers to identify pests and diseases, providing the right inputs (Approved chemicals, spraying machines, et cetera) for mass spraying, recommending chemicals for pests and disease control, ensuring the number of times cocoa bean suppliers are sprayed is adequate, providing mass spray within the recommended months for such spraying, using community volunteers for mass spraying exercises and providing gang spraying services to cocoa farmers.

Concerning the indirect supplier development projects to the cocoa bean suppliers is equally a commendable practice. In this case, for training and extension services activities such as organizing farmer educational campaigns on farms, providing adult education to farmers, training farmers on good agronomic practices, undertaking cocoa farmer educational campaigns on radio and television stations, conducting farm studies for cocoa farmers, ensuring the effective transfer of research findings by cocoa farmers, training cocoa farmers on cultural and chemical methods to pest and disease controls, training cocoa farmers in safe pesticides usage, training farmers to enhance the acquisition of knowledge, skills and technique on new and improved agricultural technologies, training farmers on sharing and diffusing of knowledge amongst participants and neighbours and training farmers on how to plan their farm business manifested in the study.

Financing schemes activities such as providing input credit to cocoa farmers, leasing agricultural machinery or facilities, assisting cocoa farmers to get loans from financial institutions, having savings schemes for cocoa farmers and paying price premiums to cocoa farmers. For input supplies, the LBCs should focus on giving hybrid seeds for cultivation, giving spraying machines to cocoa farmers, giving approved agrochemicals to cocoa farmers and providing disease-tolerant hybrids for planting and replanting also critically manifested in the study. Certification programmes, especially by ensuring cocoa farmers comply with standards for handling protective wear after use, ensuring cocoa farmers comply with standards for fertilizer application, ensure cocoa farmers comply with standards for regular farm record keeping on farm activities, production and sale and ensuring cocoa farmers comply with standards regulating soil fertility, conservation and management are critical dimensions of certification scheme that manifested in the context of this empirical study.

The findings confirm that supplier development plays a strong role in increasing farm operation efficiency, even to a limited degree. From a practical business perspective, what it means for farms to pursue supplier development is that they can achieve real performance gains in terms of operational efficiency. While statistically significant, however, the limited magnitude of impact means that supplier development must not be seen as a standalone driver to efficiency, but just one factor in a collection of factors affecting efficiency. It is thus critical that managers use supplier development in combination with such other efforts as quality buyer-supplier relationship and ambidextrous strategies in order to achieve best operational efficiency.

From a managerial perspective, this finding emphasizes the need for strategic supplier engagement to improve supply chain effectiveness. Since supplier development has a positive yet limited impact, managers should focus on targeted interventions that align with their farms' specific needs. For example, providing training on sustainable farming techniques or ensuring timely access to high-quality inputs could enhance productivity while strengthening supplier relationships. Additionally, managers must weigh the cost-benefit aspect of supplier development programmes, ensuring that investments in supplier support yield sufficient returns in operational efficiency. Given the small effect size, supplier development should be viewed as part of a broader set of strategies aimed at improving cocoa farm performance rather than a standalone solution.

The study reinforces the perspective of the RDT that says firms build inter-firm alliances to acquire access to crucial resources which they do not have from their partners (Pfeffer & Salancik, 1978; Roundy & Bayer, 2019). The bringing strategies applied by the LBCs for managing the dependency in the relationships with their suppliers are having a positive and viable impact on the operational efficiency of the cocoa bean suppliers, thereby deepening the bond between cocoa bean suppliers and the LBCs (Pfeffer & Salancik, 1978). Also, the supplier development activities aid the cocoa bean suppliers in strengthening the usage of their internal resources optimally, a push that boosts the operational efficiency of the cocoa bean suppliers to the LBCs.

With the favourable influence of supplier development on operational efficiency among the cocoa bean suppliers, the strength of the link of the relationship between the cocoa bean suppliers and the LBCs will be strengthened. To this effect, the study validates the position that enterprises create collaborative connections with external stakeholders to manage their dependency on vital resources (Prasad, et al., 2018). With a strengthened relational link based on feasible economic outcomes, the parties might build a more lasting and mutually advantageous partnership to promote the entire development of the cocoa production and marketing sector in Ghana.

Supplier development improving the operational efficiency of the cocoa bean suppliers confirms the position of the resource dependency theory that LBCs maximize their power on cocoa suppliers by increasing the dependence of cocoa bean suppliers through supporting the cocoa suppliers in terms of supplier development projects (Pfeffer & Salancik, 1978). The outcome further underlines the premise embodied in the RDT that the LBCs are in a position to maximize their influence given how impactful their supplier development operations are to the operational efficiency of the cocoa bean suppliers (Pfeffer, 1981).

The degree of dependence on cocoa suppliers is heightened because if the cocoa suppliers withdraw from the contract establishing supplier development from the LBCs, the operational efficiency of the cocoa bean suppliers will likely face challenges in terms of inefficiency and thus, this could be too costly for the suppliers to do by themselves (Pfeffer, 1981). Inherently, due to the inefficiencies, the LBCs might equally suffer in terms of access to a sustained supply of cocoa beans from the cocoa bean suppliers. The cocoa bean suppliers may suffer if there are no such supplier development programmes from the buying corporations.

Once the operational efficiency of the cocoa bean suppliers is improved via the supplier development projects, the cocoa bean suppliers are motivated to reciprocate the goods they have got from the buying firms by selling their cocoa beans to such supportive buying companies (Pfeffer, 1987). In this way, this advantageous exchange functions as a catalyst to build up the mutually beneficial relationship between the LBCs and the cocoa bean suppliers (Roundy & Bayer, 2019). The conclusion further verifies the position of the RDT that the collaborative relationship between LBCs and the cocoa bean suppliers helps the parties control their dependence on vital resources.

The important resources needed by the cocoa bean suppliers are captured in the supplier development initiatives they receive from the LBCs. The critical resource for the LBCs is the cocoa beans that are sold to the buying firms by the suppliers. Essentially, the supplier development for the suppliers typifies the bridging technique utilised by enterprises to manage their relationships as recognized theoretically (Roundy & Bayer, 2019). Supplier development enhances operational efficiency since it provides the means to promote the operational capabilities of suppliers that receive such actions. The significant disparity between current (400 kg/ hectare) and potential (1000 kg/hectare) cocoa output in Ghana (Amfo et al., 2022) is anticipated to be improved due to the supplier development initiatives of the LBCs to their customers-cocoa bean suppliers. The study disproves the position of some earlier problems highlighted that cocoa farmers in the Western North region of Ghana were found to be less technically efficient in their farming operational efficiency (Danso-Abbeam et al., 2020).

This finding contradicts the earlier concern stated by Kos et al., (2023) that despite the supplier development help given to these cocoa farmers, cocoa farms in Ghana still experience technical efficiency challenges. The claim that apart from fertilizer application that improved the efficiency of cocoa farms in Ghana, other support services including extension services, free spraying of fungicides and insecticides and hand pollination failed to improve the production efficiency of the cocoa farms (Jebuni-Dotsey & Senadzo, 2023) is contested by this established finding because, jointly, supplier development as conceptualized makes a significant positive contribution to predicting the change in operational efficiency. This study also gives a solution to the allegation by Kos et al., (2023) that whereas government subsidies aim at encouraging the use of improved inputs, there is little evidence on how such supports increase the operational efficiency of cocoa farms in Ghana. This research undoubtedly indicates supplier development enhances the operational efficiency of cocoa bean suppliers in Ghana.

Moreover, the challenges bemoaned by Bannor et al., (2019) that cocoa bean suppliers in the cocoa regions in Ghana are limited by challenges such as inadequate credit support, low prices of cocoa beans, adjustment of weighing scales, and lack of incentives to farmers and poor access to market information are perhaps not as damaging to the operational efficiency of the cocoa bean suppliers as they might seem because of the supplier development packages that are given to the cocoa bean suppliers by the LBCs. In this situation, supplier development programmes by the LBCs to the cocoa bean suppliers serve as a buffer that lowers the detrimental impact of the issues on the operating efficiency of the cocoa bean suppliers.

With increase in operational efficiency among the cocoa bean providers, there is the possibility of enhanced productivity and sustainable performance for the cocoa bean suppliers. Attaining greater operational efficiency also gives the push to accomplish SDG2 which focuses on achieving zero anger (Shukla et al., 2022) and SDG12 (Responsible consumption and production). Inferring from this conclusion it may be adduced that, with maintained operational efficiency, Ghana may overcome the problem in terms of a reduction in productivity as suggested by Wibowo et al., (2021). The optimistic view expressed by Quartey-Papafio et al., (2021) that the future of Ghana's cocoa production and thus estimates 2.49% growth rate in cocoa production in Ghana by 2030 is likely to be achieved if both LBCs and cocoa bean suppliers collaboratively work to ensure the efficiency of the implementation of supplier development projects.

The non-price competition among LBCs in the cocoa industry is vital for driving supplier development initiatives for cocoa bean suppliers, hence with the net positive impact on operational efficiency, these LBCs may attract suppliers so that they (LBCs) can achieve their operational efficiency targets (Amfo et al., 2022). Hence, the coordinated effort of the government of Ghana and its developmental partners is giving solid foundations for cocoa bean suppliers, in terms of enhanced operational efficiency, a discovery that is backed by the stance of Astrid Fenger, et al., (2017).

Confirming this logic, the finding underscores the idea that, with improved operational efficiency, the cocoa bean suppliers are better equipped to avoid escalating production costs, hence enhancing operational efficiency resilience whilst maximizing gains in the agribusiness operational efficiency for the investors in the cocoa industry. This finding provides empirical support for the claim that the combination of resources from both the buying firms and the cocoa bean suppliers affects both the technical and scale efficiencies of production, thereby invariably affecting crop productivity and profit potential of cocoa bean suppliers (Eyitayo et al., 2011). Again, the prior allegation that the fall in Ghana's cocoa production over the most recent years reflects inefficiencies in cocoa cultivation (Wibowo et al., 2021) despite the expenditures made in that sector is contestable. Perhaps, such decline may be ascribed to other variables and not operational inefficiencies.

Regarding the position of the studied empirical research, this conclusion collaborates with the position of Biswas et al., (2021) where it was proven that agricultural extension services boost the operational efficiency of rural paddy farmers. This specific study applied the Cobb-Douglas production function that demonstrated the firms that are involved in extension services may make excellent use of the land and that are having superior technical efficiency than the control group. Therefore, the result that supplier development boosts the operating efficiency of cocoa bean suppliers partly authenticates the points presented by Biswas et al., (2021). Identically, this finding is in line with the findings of Chandio et al., (2019) who concluded, like in the case of Biswas et al., (2021), that productivity improvement was attributed to a higher level of technical efficiency (97%) among the rice farms due to access and use of inputs such as labour, fertilizer, credit and appropriate farm size.

Mediating Effect of Organisational Ambidexterity

Changes in supplier development contribute to a weak positive variance in the organisational ambidexterity of the first-tier cocoa suppliers. Therefore, this study indicates supplier development produces some positive but weak variance in the organisational ambidexterity of the cocoa bean suppliers. This means engaging in supplier development among cocoa bean suppliers offers the incentive for improving the degree of change to satisfy the needs of the supplier development efforts to improve the condition of operational efficiency among the bean cocoa suppliers.

Supplier development makes a statistically significant positive contribution to predicting the change in organisational ambidexterity across cocoa bean suppliers with a high effect size. This implies that, by adequate interaction between LBCs and suppliers, suppliers may adapt their operating model to exploit and explore the opportunities that come with supplier development programmes from LBCs. Such supplier development programmes are having a viable influence on the level of organisational ambidexterity among cocoa bean suppliers. This research also emphasises the capacity of supplier development in the cocoa business to encourage ambidextrous conduct among cocoa bean suppliers in that sector.

Supplier development projects influence the organisational ambidexterity of the cocoa bean suppliers in terms of the acquisition of entirely new managerial and organisational skills in their farming operations, learning new skills for the first time through supplier development, strengthening innovation skills in areas where they have no prior experience, concentration on improving products to suit what LBCs want, constant pursuance of new opportunities to expand production to meet international standards, the inclusion of some new aspects to their processes, products and services compared to prior strategies, upgrade of their current knowledge and skills for familiar products and technologies and continuous improvement of the reliability of their products.

This discovery ameliorates the problem raised by Jurksiene and Pundziene, (2016) that there appears to be little attention on the impact of organisational ambidexterity on company results even with variances across different study areas. Perhaps the uncertainty regarding the capacity of organisational ambidexterity to deliver favourable consequences on company performance (Su et al., 2022) is vigorously challenged by this empirical conclusion. Also, the problem that was stated by He et al., (2021) that cocoa bean suppliers are unable to execute organisational ambidextrous methods is rendered unpalatable by the finding.

Firm ambidexterity makes a statistically significant positive contribution to forecasting the variance in operational efficiency across the cocoa bean suppliers with a moderate impact size. The cocoa bean suppliers are positioned to respond appropriately to changes orchestrated by supplier development initiatives by the LBCs hence providing hope for the partners to ignore the problem identified by Jørgensen, Ellegaard and Kragh, (2022) that it is difficult to sustain supplier development over time, because such projects demand considerable changes in terms of capabilities and practice. The cocoa bean suppliers seem formidable in embracing changes prompted by supplier development projects they receive from the LBCs.

Firm ambidexterity significantly and favourably affects somewhat, the predicted connection between supplier development and operational efficiency. Such mediation is best defined as complementary partial mediation since relative to the direct effect, both had considerable yet beneficial outcomes in the mediation investigation. In this scenario, supplier development complements the capacity of organisational ambidexterity to boost the operational efficiency of the cocoa bean suppliers. The two concepts, supplier development and organisational ambidexterity work together to raise the level of operational efficiency.

From the perspective of the contingency theory, although supplier development improves the operational efficiency of suppliers, the exhibition of strong and effective ambidextrous behaviour by the cocoa bean suppliers to anticipate, accommodate and react to changes that happen because of the need to comply with supplier development initiatives provides the mechanism for enhancing the effect of supplier development on the operational efficiency of the suppliers. In this way, organisational ambidexterity works as a catalyst to boost the synergistic effect of supplier development on operational efficiency.

This conclusion verifies the position of the contingency theory that claims universalistic thinking and attitude to doing things is not managerially wise as strategies are made more successful only when they are effectively integrated inside a specific organisational and environmental context. The complementarity viewpoint of the contingency theory is consequently supported by the mediating role of firm ambidexterity (Feizabadi & Alibakhshi, 2021). The study demonstrates concurrent undertaking of supplier development and firm ambidexterity increases operational efficiency among the cocoa suppliers in the Western North Region of Ghana. In this view, firm ambidexterity ensures the capacity to learn, optimize and balance (Karman & Savaneviciene, 2021). Serial mediation develops from this method.

The joint position held by some previous empirical studies that firm ambidexterity performs a mediation role in a study of this nature is strongly supported (Adusei et al., 2022; Belhadi et al., 2021; Manzani et al., 2022; Garousi Mokhtarzadedeh et al., 2022; Monferrer et al., 2021), especially its partial mediation role (Hwang et al., 2021; Turnalar-Çetinkaya, 2022; Karman et al., 2021). In this circumstance, the cocoa bean suppliers absorb the internal advantages and external opportunities that come with the execution of supplier development given by the LBCs in the Western North Region of Ghana.

Mediating Role of Buyer-Supplier Relationship Quality

Changes in supplier development contribute to a moderate positive variance in buyer-supplier relationship quality. This increase in buyer-supplier relationship quality is deemed moderate and significant. Again, supplier development makes a statistically significant positive contribution to forecasting the variance in buyer-supplier relationship quality among the cocoa bean suppliers with a large impact size. Therefore, improvements in buyer-supplier relationship quality are tied to scientific changes in supplier development and not assigned to chance. This result shows supplier development offers the framework for creating high exceptional inter-firm relationships between the buying firms and the suppliers.

A practical implication for managers from this finding is that firms involved in supplier development activities should actively develop strong buyer-supplier relationships to improve operational efficiency. Since supplier development's quality acts as a strong and positive mediator in connecting supplier development and operational efficiency, cocoa bean suppliers have to display commitment not just in technical and financial assistance to buyers but also in terms of commitment, trust, and effective communication. This calls for the formation of frequent contact activities such as joint planning, knowledge-exchange mechanisms and conflict resolution mechanisms to ensure a collaborative supply chain. Through these activities, cocoa bean buyers in the Western North Region of Ghana can maximally utilize the benefits from supplier development activities, thus realizing efficiency in terms of cost savings, timely delivery and high-quality products.

An additional management implication is that buyers of cocoa need to be aware of the strategic value of relationship quality as a means to improve supply chain performance. The strong mediating effect indicates that even with supplier development programmes in place, full benefits may not be realized without strong relational ties. It would be advisable then for managers to focus on developing long-term partnerships and not just transactional relationships with a focus on common goals and mutual success. This may require paying premiums, either in terms of high prices for high-quality cocoa or in terms of long-term contracts with stability and production improvement incentives. Through combining relational factors with supplier development, buyers can create a more stable and effective supply chain, ultimately improving competitiveness in the global cocoa supply chain.

The implementation of supplier development projects to nurture buyer-supplier relationship quality by the LBCs is a beneficial technique since such supports give the means to enhance the lots of the suppliers in varied ways including enhancing their operational performance and consequent relationship quality. In this circumstance, the assumption that the cocoa bean industry in Ghana is usually oligopolistic in structure with some form of unhealthy rivalry among LBCs (Owusu Ansah et al., 2017) is problematic. This claim comes because unlike the negative impacts (Unfair influence by LBCs and breach of agreements between LBCs and cocoa farmers) such competition is said to have occasioned, this empirical finding shows supplier development rather improves moderately and in a significant manner the quality of buyer-supplier relationship quality between the LBCs and the first-tier cocoa suppliers.

Also, the problem that there are low levels of trust and commitment among participating firms and poor coordination of supplier development between buying organisations and suppliers (Jørgensen, Ellegaard & Kragh, 2022) is objected to by the positive significant large effect of buyer-supplier relationship quality on operational efficiency of the first-tier cocoa suppliers. Buyer-supplier relationship quality mediates favourably the predictive link between supplier development and operational efficiency and sustainable performance. Such mediation is best defined as complementary partial mediation since, relative to the direct effect, both had substantial but favourable findings in the mediation study. To this result, the study underlines the crucial importance of how supplier growth increases the quality of buyer-supplier interactions. With the mediating function of buyer-supplier relationship quality, the study indicates the presence of excellent buyer-supplier relationship quality helps to transform the benefits in supplier development activities into better operational efficiency.

With excellent buyer-supplier relationship quality, an atmosphere is established for the interchange of resources notably the transmission of technology that is helpful to the agricultural operations of the cocoa suppliers. The interaction that develops between LBCs and suppliers allows the LBCs to adjust the supplier development efforts to the demands of the cocoa bean suppliers which in a sense translates into improving the status of the operational efficiency of the cocoa bean suppliers. In this case, from the standpoint of the contingency theory, buyer-supplier relationship quality is a complementary practice because the positive variation in buyer-supplier relationship quality leads to an increase in marginal benefits of supplier development on operational efficiency (Feizabadi & Alibakhshi, 2021). Neglecting the core of creating excellent buyer-supplier connections might therefore restrict the potency of supplier development in increasing the level of operational efficiency of the cocoa bean suppliers.

This finding confirms the position of some previous empirical studies that the capacity for supplier development to improve supplier performance via improved operational efficiency is strongly anchored on the degree of the sufficiency of the presence of an adequate collaborative and relational learning context (Arroyo-Lopez et al., 2012). The finding also demonstrates the competition in the cocoa marketing sector makes it economically prudent for both buying organisations and suppliers to forge profitable buyer-supplier relationship quality to limit switching behaviour among buying firms and suppliers (Dadzie et al., 2018; Tran et al., 2021).

The position of Dadzie et al., (2018) that realizing the value of good buyer-supplier relationship quality in the cocoa supply chain, the purchasing officials or agents live in the cocoa-producing communities, speak the local dialect and enjoy trusting relationships with such communities and the farming entrepreneurs is strongly affirmed by this empirical result. Also, the problem identified by Sikombe and Phiri, (2021) that there appear to be some little studies on supplier development with emphasis on collaborative relationships, particularly from the standpoint of the suppliers (Nagati & Rebolledo, 2013) is somewhat resolved halfway through this empirical study.

The quality of the buyer-supplier relationship quality is judged by the assumed responsibilities placed on the partners to the supplier development initiative to continuously improve the production process and the product, thereby justifying the craving for improved operational efficiency as a prime mechanism for transmitting the effect of supplier development on the sustainable performance of the cocoa bean suppliers (Lascelles & Dale, 1990). Compared to some other empirical research, this analysis validates the stance alluded to previously that buyer-supplier quality helps to better explain the influence of supplier development on operational efficiency (Frempong et al., 2021; Huang & Huang, 2019; Song et al., 2012). The complementing partial mediation function of buyer-supplier relationship quality is similar to certain research evaluated in the empirical review (Shukla et al., 2022).

Mediating Effect of Operational Efficiency

Changes in operational efficiency and supplier development jointly account for a moderate variance in sustainable performance. This finding essentially proves both operational efficiency and supplier development are instrumental factors for achieving sustainable performance among the cocoa bean suppliers. This finding in a way says with effective supplier development and operational efficiency among cocoa bean suppliers, cocoa suppliers are better positioned to achieve a moderate significant improvement in sustainable performance. The strength of both supplier development and operational efficiency in causing positive variance in sustainable performance among the cocoa bean suppliers is confirmed solidly by this empirical finding.

It is advisable to evaluate the link between operational efficiency and sustainable performance before interpreting the mediation results. The investigation demonstrated that operational efficiency offers a statistically significant positive contribution to forecasting the variance in sustainable performance across the cocoa bean providers with a moderate effect size. The views of Mugoni et al., (2023) that with improved operational efficiency in terms of how inputs are used to generate an optimized outcome, the production outcomes of the farming operations of the cocoa bean suppliers are eventually improved are supported by this empirical claim that operational efficiency causes a significant positive change in sustainable performance of the cocoa bean suppliers.

Operational efficiency mediates partially, positively and in a significant manner, the effect of supplier development on the sustainable performance of the cocoa bean suppliers in the Western North Region. Such mediation is best described as complementary partial mediation because compared to the direct effect, both had significant but positive results in the mediation analysis. This means that although supplier development improves the sustainable performance of cocoa-supplying firms, however, the degree of operational efficiency of the suppliers, based on the supplier development they receive from the LBCs, potentiates the effect of supplier development projects on the sustainable performance of the cocoa bean suppliers.

The finding that the effectiveness with which suppliers perform influences how supplier development improves sustainable performance by cocoa bean suppliers in the Western North Region has valuable lessons for managers. It indicates that activities such as supplier training, technology transfer, and financial assistance can be effective when they enhance how suppliers perform. This implies that actors in the cocoa value chain, including cooperatives, government institutions, and private buyers, have to enable suppliers to perform better to make it easier, reduce expenditure, and conserve resources. Through this, they can enhance the payoffs from supplier development programmes such that investments in supplier competencies result in tangible sustainability dividends such as increased yields, improved quality, and environmental conservation.

Second, the results indicate that managers must keep a watchful eye to ensure everything goes right in order to be successful in the long term. To enable suppliers and get good sustainability outcomes, being effective relies on it, and thus companies and policy makers must establish key performance indicators (KPIs) to measure efficiency achievements by cocoa suppliers. This could be minimizing wastage, energy savings, and reducing production time. Through problem detection and solving, managers can ensure that assisting suppliers results in economic, social, and environmental impacts. This cautious approach will provide a robust and competitive value chain for cocoa in the region to both the suppliers and industry in general.

The finding suggests that organisational ambidexterity—an organisation's ability to balance and integrate both exploratory and exploitative activities—plays a crucial role in enhancing the impact of supplier development on operational efficiency. From a practical standpoint, this means that cocoa bean suppliers in the Western North Region of Ghana can achieve higher efficiency when they actively manage both short-term improvements (exploitation) and long-term innovations (exploration) in supplier development programmes. Managers should therefore design strategies that not only focus on immediate performance gains, such as process optimization and cost reduction, but also encourage learning, adaptation, and innovation in supply chain practices. By doing so, suppliers can sustain operational improvements while remaining flexible to changes in the market and agricultural environment.

From a managerial perspective, this finding highlights the importance of fostering a dual-focused organisational culture that supports both incremental improvements and innovative growth. Since organisational ambidexterity significantly mediates the relationship between supplier development and operational efficiency, managers should implement structured programmes that simultaneously enhance supplier capabilities and promote adaptive thinking. For instance, they can invest in training programmes that not only improve technical skills but also encourage problem-solving and continuous improvement. Additionally, supply chain managers should establish mechanisms for knowledge sharing, collaboration, and feedback loops with suppliers to ensure that efficiency gains from supplier development initiatives are sustainable. By leveraging organisational ambidexterity, managers can create a more resilient and competitive supply chain in the cocoa industry.

The finding that efficiency matters in how supplier development assists in improving farm efficiency among cocoa producers in Western North Region in Ghana aligns with what previous research stated regarding supplier development and farm efficiency. LBCs have initiatives to develop the skills of cocoa producers to enhance their productive and efficiency levels (Onumah et al 2013). Operational efficiency indicates how efficiently cocoa bean suppliers, mostly, operate on small-scale business, activities are performed (Xue et al., 2022) and it links supplier development to improved sustainable performance.

Studies show that collaboration with resources among buyers and selling firms enhances skills and production capacities, enhancing productivity and profit margins (Eyitayo et al., 2011). Government initiatives, sometimes in collaboration with private partners, have attempted to make cocoa bean suppliers or cocoa agri-businesses perform optimally to be sustainable in the long term (Ahamefule et al., 2017). This implies that assisting cocoa bean providers directly enhances sustainability, although it is optimal efficiency in performance that brings about these advantages.

How much supplier development enhances how well operations get accomplished also has to do with how effectively new information can be absorbed and with relationships with the supplier (Arroyo-Lopez et al., 2012). The strategic flexibility of cocoa suppliers to be included in supplier development programmes relies on whether they can utilize what they do best and come up with new means to enhance operations (Clampit et al., 2022). But numerous challenges render it difficult to attain these improvements.

Technical inefficiencies persist in the form of poor farm management techniques, improper use of pesticides and fertilizers and input wastage and these persist even with continued efforts to build suppliers (Kos et al., 2023). In Ghana, production has increased mainly by means of land expansion and not by increasing efficiency, with considerable sustainability challenges in the country (Obeng & Adu, 2016; Dzene, 2010). The Western North Region has seen fewer efficiencies in comparison to other regions with supply-side interventions (Jebuni-Dotsey & Senadza, 2023). Moreover, socio-economic factors like small farm landholdings, low levels of educational attainment and lack of access to credit contribute to these inefficiencies (Danso-Abbeam et al., 2020). Therefore, while operational efficiency acts as a mediator, it is necessary to address these structural barriers in a bid to use supplier development to enhance sustainable performance in the cocoa value chain effectively.

The finding reflects the central theme of resource dependency theory. It states that LBCs provide resources and enable the needs of cocoa bean suppliers to be met by performing direct and indirect support activities for them (Yang et al., 2023). This results in improved efficiency for the cocoa farms. The finding that improved efficiency has a strong impact on how supplier development impacts the sustainable performance of cocoa bean suppliers in the Western North Region of Ghana aligns with central concepts of RDT. RDT states that firms belong to a network of relationships and must connect with external groups to obtain valuable resources (Pfeffer & Salancik, 1978).

In this instance, LBCs assist farmers by enhancing their capacities through support schemes. This resolves challenges in producing and marketing cocoa. The high impact demonstrates that these support schemes truly make a difference positively, enabling producers to produce more sustainably without harming the environment. This corroborates what RDT asserts, that firms utilize partnerships and contracts to address their needs in terms of resources and enhance performance (Roundy & Bayer, 2019).

Operational efficiency serves as a vehicle through which supplier development programmes transform into sustainable performance enhancement. Increased efficiency provides a foundation for improved utilization of resources, savings, and a more positive contribution to environmental and social dimensions. Additionally, power and influence dynamics in buyer-supplier relationships enhance RDT's open system approach in describing that cocoa bean farmers or producers depend not just on access to resources but also strategic direction in managing operation risks (Pfeffer, 1981). The results of this study thus confirm that effectively organized interdependencies in supply chains can drive performance enhancement, subject to firms being dedicated to collaborative partnerships for reducing inefficiencies and collective progress.

Moderating Roles of Firm Characteristics (Firm Age and Firm Size)

Firm age does not moderate much, the predicted link between supplier development and operational efficiency. Rather, the insignificant moderating impact is negative and minor. In this example, firm age has the potential to diminish the influence of supplier development on operational efficiency among cocoa bean suppliers in the Western North Region of Ghana but does not materialise in the context of this study. Firm age does not interact with the predicted link between supplier development and the operational efficiency of the cocoa bean suppliers.

The influence of supplier development on operational efficiency is not affected by how long the cocoa bean suppliers have been in existence. This result could be attributed to the fact that before the choice of supplier development projects for the cocoa bean suppliers, the LBC always accounted for the possible impact of firm age hence providing the grounds to capture the likely impact on firm age in their choice of supplier development projects accurately. Therefore, for both young cocoa bean suppliers and old cocoa bean suppliers, the identical supplier development efforts received from the LBCs are having the same amount of influence on their operational efficiency. There is no statistically significant variance in operational efficiency related to the supplier development both young and old cocoa bean suppliers get from the LBCs.

The conduct of supplier development for the cocoa bean suppliers provides the ground for overcoming the challenges that come with the age of the cocoa farms, hence mitigating the possibility of firm age interacting in the predictive relationship between supplier development and operational efficiency. Inherently, the concept that old enterprises, specifically old cocoa farms, are more inventive than young firms (Ngatno & Dewi, 2 019) which could affect how supplier development influences operational efficiency is slightly contradicted by this finding.

However, it was observed that firm age also provided some significant positive direct contributions to forecasting the change in operational efficiency of the cocoa bean suppliers with a small effect size. This may be occasioned by the fact that the choice of supplier development for cocoa bean suppliers is based on a careful consideration of the ages of the cocoa bean suppliers therefore providing means to improving the state of operational efficiency among the cocoa bean suppliers (Glock et al., 2017).

Thus, in the first phase of the stages in supplier development, supplier assessment is done to acquire sensible evidence on whether really suppliers require supplier development efforts or not (Lascelles & Dale, 1990) with suitable consideration of the firm age (Do et al., 2022; Obeng & Adu, 2016). The opinion held by Obeng and Adu (2016) that age of cocoa tree significantly affects the technical efficiency of input utilisation in cocoa production since output normally falls as the cocoa tree ages especially beyond 40 years, which finally raises operational/technical inefficiency seems to be supported.

Similarly, firm size fails to moderate the predictive link between supplier development and operational efficiency. This conclusion suggests the influence of supplier development on the operational efficiency of the cocoa bean suppliers is not affected by the size of the cocoa bean suppliers that are supported by the LBCs. Supplier development's potential to increase operational efficiency is not influenced by the size of the supplier that is supported by the LBCs locally. Inferring from this result, the study indicates firm size does not entail determining how changes in supplier development affect changes in the operational efficiency of the cocoa suppliers in the Western North Region in Ghana.

By extension, the theoretical stance of the contingency theory that firm size is a structural feature that should be included in organisational strategies for the attainment of sustainable organisational objectives does not hold in this situation. Firm size fails to have any major consequence on how supplier development influences operational efficiency. Hence, firm size does not interact with the influence of supplier development on operational efficiency for cocoa bean suppliers that are supported by the LBCs. How operational efficiency reacts in the face of supplier development is not ascribed to the interplay of firm size in such a setting but rather changes in contextual characteristics such as buyer-supplier relationship quality and firm ambidexterity.

The conclusion contradicts the stance of certain empirical research that indicates business size is a moderating factor (Mushafiq et al., 2022). The argument that large businesses are more likely to invest in supplier development partnerships than smaller enterprises (Saghiri & Wilding, 2021) is challenged by the data. Unlike the case of Yang and Wang, (2022) that found that firm size moderated significantly the relationship between sustainable supply chain management practices and the economic performance of the enterprises, this study finds no moderation effect of firm size in the predictive relationship between supplier development and operational efficiency of cocoa bean suppliers. The study also challenges the assumption that firm size is a structural feature that might interact with supplier development and operational efficiency (Valtakoski & Witell, 2018; Yang & Wang, 2021).

The firm size has a statistically significant negative contribution to predicting the variance in operational efficiency of the cocoa bean suppliers with a small impact size. The result may be related to the fact that LBCs execute non-discrimination-orientated supplier development initiatives when it comes to helping suppliers and hence examine their particular conditions before discharging such supplier development programmes. Based on this finding, the study challenges the position that historically, smallholders are tainted as being risk-averse partly due to their vulnerability to absorb shocks (McKinley et al., 2016) and that smallholders, compared to their counterparts' large-scale farmers, are unable to access cocoa financing schemes to support their farming operations (McKinley et al., 2016). These obstacles might have altered how supplier development relates to operational efficiency in a statistically meaningful manner.

In conclusion, neither firm age nor firm size has a statistically significant impact on whether or not supplier development impacts operational efficiency in cocoa bean suppliers in Ghana's Western North Region. Pragmatically, what it means is that direct or indirect supplier development efforts remain effective whether a firm has just been established or has a long history in business in the cocoa upstream industry. Managers or owners of the cocoa bean supplying firms do not have to adjust supplier development programmes in terms of a firm's age in terms of years because the benefits such programmes offer do not vary with a firm's age. This offers policymakers and industry players a chance to come up with supplier development schemes that can be applied across the board, thus increasing their scope and effectiveness.

In a similar vein, a lack of statistically significant moderation by firm size means that small and large providers of cocoa beans stand to gain equally from increased efficiency brought about by supplier development programmes. This means managers can direct efforts towards instituting such programmes without regard to firm size, and resources can be assigned according to the particular needs of each supplier and not according to firm size. This also means that supplier development policies can be implemented across industries, and not by firm size, making it easier to implement. Large cocoa bean suppliers do not have a natural competitive edge when it comes to using supplier development to increase efficiency; therefore, smaller cocoa bean suppliers can compete just as effectively, as long as they receive a like amount of assistance as that provided to larger firms.

Impact of Supplier Development on Sustainable Performance

Changes in operational efficiency and supplier development jointly account for 47.9% change in sustainable performance. This variance in sustainable performance is considered moderate and positive. Therefore, the study underscores the viability of supplier development and operational efficiency in determining improvement in sustainable performance among agribusinesses otherwise cocoa bean suppliers in the Western North Region of Ghana. This change means other factors that could cause improvement in sustainable performance other than supplier development and operational efficiency among the cocoa bean suppliers could account for a 52.1% variance in sustainable performance of the cocoa bean suppliers.

The aspects of sustainable economic performance that predicted sustainable performance include an increase in returns on investment, an increase in profitability, improved stability of supply, improved stability of the market, an increase in market share and improved sales growth. In the case of sustainable social performance, it was found that indicators such as an increase in the development of employee skills, improvement in customer satisfaction, boost in investment in social projects, improved living standards of farmers and their families and improved employee relations measured it. The indicators contributing to the sustainable environment performance include a decrease in the frequency of environmental accidents, improved forest reservation, improved climate adaptation, improved eco-system diversity, improved air quality and no land degradation.

Regarding the contributions, it was revealed that supplier development offers a statistically significant positive contribution to predicting the variation in sustainable performance of the cocoa bean suppliers with a moderate effect size. In this instance, supplier development is a powerful and useful strategy used by LBCs to improve the sustainable performance of cocoa bean suppliers in the upstream cocoa industry in Ghana. The result is based on scientific interaction among the variables in the estimated model and it is not attributable to chance. This finding substantiates the idea that cocoa bean suppliers could achieve sustainable performance if they are supported by buying companies in terms of provision of supplier development projects to cocoa bean suppliers.

Contributing positively to causing a moderate change in sustainable performance shows how important supplier development is in supporting cocoa bean suppliers to meet their sustainability targets. Hower, since the contribution of supplier development to improving sustainable performance is moderate and not strong, it seems there still require substantive investment in both direct supplier development and indirect supplier development by both LBCs and cocoa bean suppliers to enhance its effectiveness in implementation to positively and strongly improve the sustainable performance of the cocoa bean suppliers in the Western North region of Ghana.

The findings show that supplier development plays a key role in enhancing the sustainable performance of Western North region cocoa bean suppliers in Ghana. From a practical approach, it would be recommended that firms and stakeholders in the value chain in the cocoa industry undertake supplier development activities as presented in the framework in this study. Based on the statistically significant contribution and moderate effect size to supplier development, it can be predicted that these activities would have ignificant impacts in environmental, social, and economic sustainability with regard to the suppliers.

From a managerial perspective, this result highlights the importance of linking supplier development with purchasing and sustainability efforts. Managers in the cocoa industry should consider developing long-term relationships with buyers instead of short-term transactional relationships. The strong statistical power shows that official supplier development programmes not only provide high returns but also serve as effective predictors of performance. Therefore, managers in LBCs and among buyers of cocoa beans can justify investments in direct supplier development, in addition to indirect supplier development including training and extension service, input supply, certification schemes, and supply chain financing, as strategic activities and not CSR efforts. Moreover, due to the moderate effect size, it is important to integrate supplier development with other sustainability initiatives—such as better infrastructure, improved access to markets, and regulations—to leverage the synergistic effects that can enhance supplier performance.

From the perspective of the RDT, both LBCs and cocoa bean suppliers form inter-firm relationships to obtain benefits from such relationships. LBCs stand the chance to benefit from the supplier development projects they deliver to cocoa bean suppliers in terms of a sustained supply of quality cocoa beans from the cocoa bean suppliers they support. The positive moderate improvement in sustainable performance as accounted for by the moderate significant contribution of supplier development initiatives quantifies the benefits cocoa bean suppliers obtain from their inter-firm relationship with LBCs in the internal cocoa marketing arena in Ghana.

Furthermore, operational efficiency makes a statistically significant positive contribution to predicting the variance in sustainable performance among the cocoa bean suppliers with a moderate effect size. This shows how proper execution of business operations in turn translates into influencing positive variance in sustainable performance of the first-tier cocoa suppliers. The finding contradicts the problems highlighted by some studies that cocoa bean suppliers in Ghana still face technical efficiency challenges due to factors such as small farm size, poor educational background and engagement in non-farm activities (Danso-Abbeam et al., 2020). Even if such challenges exist, they do not stifle the predictive potential of operational efficiency in boosting significant gains in sustainable performance of cocoa bean suppliers.

Also, the study indicates the problem that sustainability is often treated in a biased fashion, with less focus on social and economic sustainability but greater emphasis on environmental sustainability (Souto, 2022) is not the case in the cocoa industry in the Western North Region of Ghana. In this case, the claim that some global sustainability frameworks are too ambitious particularly those enshrined in the CFI because details on how zero-deforestation cocoa is defined, cut-off dates and sourcing geographies and precise measures for execution were generally not available in the action plans of CFI (Carodenuto & Buluran, 2021) is contested by the fact that the study proves both supplier development projects and operational efficiency are tilted at improving the state of suppliers' sustainable performance, confirming that supplier development projects enshrined in the CFI in Ghana are sustainability-oriented and producing viable outcomes.

This conclusion is confirmed by various earlier empirical research that collectively held the view that there more efficient corporate operational efficiency grows, the more such organisations produce enhanced sustainable performance (Hussain et al., 2019). The joint beneficial effect of supplier development and operational efficiency on sustainable performance is an indicator that the function of LBCs in the cocoa sector is crucial to the sustainability of the cocoa industry. Therefore, problems such as the use of child labour and slave labour in cocoa farming (Stringer & Michailova, 2018), working under hazardous conditions, deforestation and excessive reliance on sustainability standards on yields and quality (Lambin & Thorlakson, 2018) are not as prevalent in the cocoa production industry in Western North Region to deter improvement in sustainable performance.

Perhaps this situation is anchored on the effectiveness of the implementation of supplier development projects to the cocoa bean suppliers by the buying companies. The suspicion that the trade-off between risks and benefits of supplier development activities is seldom available (Dalvi & Kant, 2015) is defeated by the positive impact of supplier development on both operational efficiency and sustainable performance of the cocoa bean suppliers in the Western North Region of Ghana. Also, the finding solves the problem of the research gap where most of the studies (Biswas et al., 2021; Chandio et al., 2019) rather focused on examining the state of operational efficiency without assessing how supplier development, organisational ambidexterity and buyer-supplier relationship quality collectively work to influence the state of operational efficiency of the cocoa farms.

In this case, the problem bemoaned by Obeng and Adu, (2016) and Dzene, (2010) that the expansion of cocoa production is attributed to land expansion and not operational efficiency is objected by the evidence established by this empirical study. The study, per the conceptualization and measurement of sustainable performance, the study proves the assertion by Lambin and Thorlakson, (2018) that firm-level standards for supplier development tend to focus on more yields and quality rather than smallholder empowerment is objected. The study proves sustainability performance targets include social, economic and environmental matrices for both small and large cocoa farms.

This finding proves there is hope for a better future in the cocoa industry given the kind of support the LBCs are providing to the cocoa bean suppliers. The study has confirmed supplier development improves the sustainable performance of cocoa bean suppliers which contradicts the gloomy picture that was given that perhaps there is going to be a sharp decline in cocoa production in Ghana in future (Wibowo et al., 2021) based on previous empirical evidence (Bryant & Mitchell, 2021). Supplier development projects have helped the cocoa bean suppliers to get access to improved planting materials, and have given them training on maintenance practices, which have collectively worked together to improve the sustainable performance of the first-tier cocoa suppliers.

Confirming this point, Ahamefule et al., (2017) disclosed that the massive government support for cocoa bean suppliers amid private sector participation is tilted at promoting the operational efficiency of cocoa bean suppliers which eventually translates to improved sustainable performance. The collective effort between LBCs and cocoa bean suppliers to work together perhaps helps to resolve the sustainability problems in the cocoa industry. This claim is justified because, practically, sustainability problems seem to be systematic and therefore solving such problems requires collective efforts (Kimpimaki, Malacina & Lahdeaho, 2022), a case confirmed by the significant joint effects of operational efficiency among the cocoa bean suppliers and supplier development initiated by LBCs for the first-tier cocoa suppliers.

Supplier development projects in the cocoa-growing sector of Ghana can be said to have helped to resolve the ecological problems such as misuse of pesticides and weedicides, soil infertility, and deforestation that are militating against the value-creation efforts of the cocoa farmers (Bandanaa et al., 2021). Furthermore, Busse et al., (2016) found that supplier development can empower firms to improve their economic performance a typical case recognized among cocoa bean suppliers in developing countries like Ghana.

For instance, Aboah et al., (2021) found that mass cocoa spraying exercises and extension services rendered by LBCs to cocoa bean suppliers in Ghana led to an exponential growth in cocoa productivity. This claim is fully supported by the positive significant impact of supplier development projects on the sustainable performance of the cocoa bean suppliers. Also, the claim by Vukey et al., (2022) that a financing scheme for cocoa farmers helps the farmers to adequately finance their farming operations efficiently is confirmed by this empirical study. The study proves both supplier development and operational efficiency improve the sustainable performance of cocoa bean suppliers.

The finding also refutes the earlier claim by Jia, Stevenson and Hendry, (2021) that achieving sustainability in supplier development initiatives, for lower-tier suppliers is challenging especially where there are complex networks characterized by no direct control, limited public scrutiny and information asymmetry which eventually makes it difficult for focal firms to directly access lower-tier suppliers where most sustainability violations mostly occur. The problem that was highlighted by Souto, (2022) that sustainability is often approached in a biased way, with less emphasis on social and economic sustainability but more emphasis on environmental sustainability is also refuted by the finding. The finding demonstrates a balance between the triple-bottom-line metrics [Ecological, economic and social] outcomes of supplier development and the operational efficiency among cocoa bean suppliers thereby affirming that much as cocoa bean producers are motivated by economic gains, they equally emphasize improving ecological and social sustainability outcomes in their operations.

Chapter Summary

The discussion focused on the implications of the respective findings for all the tested hypotheses. It related the findings to the theoretical positions espoused in literature and then linked the findings to the positions of some previous empirical studies. It also made special reference to some of the problems identified earlier and demonstrated how the findings help in ameliorating such issues.

CHAPTER SEVEN

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

The research studied the impact of supplier development on the sustainable performance of cocoa bean suppliers in the Western North Region of Ghana. The research targeted cocoa bean suppliers in the Boako Cocoa District. The study employed a structured questionnaire to acquire primary data from the respondents. In all, 424 cocoa bean suppliers were polled for the primary data. The study also employed the quantitative research perspective in measuring the constructs as well as assessing the hypotheses. Partial least square structural equation modelling was built to test the proposed study hypotheses. The preceding chapter concentrated on the discussion of the findings. This chapter focuses on the summary of the key findings and the conclusions derived based on the hypotheses. It also provides information about the recommendations made based on the findings in respect of practice, policy and theory.

Summary

The coefficient of determination finding demonstrates that changes in supplier development amid the partial mediating role of firm ambidexterity and buyer-supplier relationship quality account for a moderate change in the operational efficiency of the cocoa bean suppliers. Furthermore, variations in supplier development account for moderate fluctuation in buyer-supplier relationship quality. Again, it was discovered that variations in supplier development account for a moderate variance in the organisational ambidexterity of the cocoa bean suppliers. Changes in operational efficiency and supplier development collectively account for a moderate change in sustainable performance.

Regarding the contributions of the predictors to changes in the endogenous latent variables, it was discovered that supplier development provides a statistically significant positive contribution to predicting the variation in operational efficiency of the cocoa bean suppliers with a moderate effect size. Furthermore, buyer-supplier relationship quality predicts large improvements in the operational efficiency of cocoa bean providers with a small effect size. Moreover, operational efficiency offers a statistically significant positive contribution to forecasting the variance in sustainable performance across the cocoa bean providers with a moderate effect size.

Organisational ambidexterity offers a statistically significant positive contribution to forecasting the variance in operational efficiency across the cocoa bean suppliers with a moderate effect size. Again, supplier development makes a statistically significant positive contribution to predicting the variance in buyer-supplier relationship quality among the cocoa bean suppliers with a large effect size. Supplier development makes a statistically significant positive contribution to predicting the variation in organisational ambidexterity among cocoa bean suppliers with a large effect size.

Firm age also provided some substantial positive direct contributions to forecasting the change in operational efficiency of the cocoa bean suppliers with a minor impact size. The firm size has a statistically significant negative contribution to predicting the variance in operational efficiency of the cocoa bean suppliers with a weak effect size. Additionally, supplier development offers a statistically significant positive contribution to forecasting the variance in sustainable performance of the cocoa bean suppliers with a moderate effect size. Regarding the moderation impact, it was shown that firm age did not modify much, the predictive association between supplier development and operational efficiency. Similarly, firm size fails to moderate the predicted link between supplier development and operational efficiency.

In terms of the mediation analysis, it was discovered that buyer-supplier relationship quality mediates partially, significantly and positively, the predictive association between supplier development and operational efficiency. Buyer-supplier relationship quality influences partially and favourably, the predictive association between supplier development and operational efficiency and sustainable performance. Organisational ambidexterity partially, significantly and in a good manner impacts the predicted association between supplier development and operational efficiency. Again, operational efficiency mediates partially, positively and in a significant degree, the influence of supplier development on the sustainable performance of the cocoa bean providers in the Western North Region.

Conclusions

The research indicates that supplier development initiatives by LBCs, including training and extension service, financing scheme, artificial pollination, mass pruning, mass spraying, certification, cocoa rehabilitation and input supply, are beneficial but have a moderate effect on improving operational efficiency. Thus, supplier development initiatives are instruments for equipping cocoa bean suppliers to moderately maximize their operational capacity. The net effect is the consequential gains in sustainability performance. While such activities contribute positively to farming operations and efficacy ultimately, other elements may also play key roles in determining total efficiency. Through supplier development, the quality of the buyer-supplier relationship between the LBCs and the cocoa bean suppliers is enhanced greatly. Again, buyer-supplier relationship quality greatly boosts the influence of supplier development on the operational efficiency of the cocoa suppliers.

The cocoa suppliers adjust their operational plans to accommodate changes that are caused by supplier development projects initiated by the LBCs. In this case, supplier development substantially boosts improvement in organisational ambidexterity. Also, ambidexterity potentiates the effect of supplier development to achieve better operational efficiency among cocoa suppliers. With improved operational efficiency, as a result of supplier development initiatives implemented by the collaboration between the LBCs and the cocoa suppliers, the sustainable performance of the suppliers is eventually enhanced.

Whilst firm age and firm size predict significant change in operational efficiency, they each fail to interact with supplier development to improve the operational efficiency of the cocoa bean suppliers. Thus, firm age and size do not prevent supplier development from attaining its target by improving the operational efficiency of cocoa bean suppliers. The study indicates that LBCs' supplier development moderately improves the sustainability performance of cocoa bean suppliers or farms in Ghana, although these efforts are not the sole dominant factors.

Recommendations

Based on the findings of this empirical study, the following recommendations are offered for the various stakeholders in the context of the study for their decision-making and subsequent actions.

Implications for Practice

LBCs are advised to continue supporting the cocoa bean suppliers they buy from through supplier development projects. The LCBs should intensify investments in supplier development projects for cocoa bean suppliers to empower the cocoa bean suppliers to meet their operational capacities sustainably. LBCs should set up budgets earmarked for supplier development initiatives for cocoa bean suppliers based on solid cost-benefit analysis. The essence is to justify returns on investment in the supplier development initiatives to the cocoa bean suppliers.

LBCs are to engage efficiently and effectively, with all the conceptualized supplier development practices to support cocoa bean suppliers. Targeting supplier development efforts to the needs of cocoa bean suppliers by the LBCs is required. Therefore, the selection of beneficiaries (Cocoa bean suppliers) should be based on a thorough need assessment by the LBCs through collaborative efforts of both parties to the supplier development initiatives. The cocoa bean suppliers should collaborate with the LBCs and provide their internal capacities to ensure the successful implementation of the various supplier developments they receive from the LBCs.

To help Western North Region cocoa bean suppliers improve, they must be flexible in planning. They must prioritize short-term and long-term improvement in their programmes, such as farm practice training, processes, and investment in digital tools and partnerships. LBCs, government organizations and industry leaders must initiate these by giving resources, motivation and assistance in skill building. These activities must be frequent, with monitoring every three to six months to review progress and adjust accordingly. Being flexible enables suppliers to develop in the long term and be competitive in the value chain for cocoa.

Ambidextrous strategies in the cocoa production operation that are critical in improving the effect of supplier development on operational efficiency as per the finding of this empirical study include acquiring entirely new managerial and organisational skills in their farming operations, learning new skills for the first time through supplier development practices and strengthening innovation skills in areas where they have no prior experience. Other ambidextrous practices include cocoa bean suppliers concentrating on improving products to suit what LBCs want, constantly pursuing new opportunities to expand production to meet international standards, including some new aspects to their processes, products and services compared to prior strategies, upgrading their current knowledge and skills for familiar products and technologies and continuously improve the reliability of their products. To this effect, cocoa bean suppliers should adopt new agricultural technologies and practices that enhance their ambidextrous capacity and eventual improvement in their operational efficiency.

Furthermore, the study proves buyer-supplier relationship quality mediates significantly and partially, the predictive relationship between supplier development and the operational efficiency of the cocoa bean suppliers. Therefore, involving cocoa bean suppliers or farmers in joint planning and decision-making may further enhance the quality of the relationship by bringing about improved operational performance. From the perspective of the cocoa bean suppliers, LBCs should go out of their way to help them and other cocoa farmers, abide by their commitments, communicate effectively with cocoa bean suppliers, demonstrate trustworthiness in the process of collaborative innovation, be knowledgeable about farmers' needs, process farmers' transaction, possess a strong sense of ethics toward customers, care about the cocoa suppliers and look out for what is important for first-tier cocoa suppliers. Effective implementation of these practices culminates in better buyer-supplier relationship quality. The LBCs should thus develop supplier development initiatives that could focus not only on enhancing technical skills but also on building good relationships with partners.

Again, LBCs should set KPIs to routinely evaluate the quality of buyer-supplier interactions. This can include satisfaction surveys, feedback methods, and performance measures relating to operational efficiency. Cocoa bean suppliers should be honest in providing the proper facts regarding the challenges evaluating quality indicators in buyer-supplier partnerships. Cocoa bean suppliers should try to attain the targets established in buyer-supplier standards by committing resources to such standards in their farming operations and marketing supply chains. Finally, use such feedback acquired from relationship quality evaluations to effect necessary adjustments in supplier development plans to ensure their alignment with the aims of the relationship.

The age and size of a business do not determine how supplier development enhances efficiency. Therefore, LBCs can design supplier development programmes that enhance efficiency for all cocoa bean supplying businesses regardless of how long they have existed. This implies that rather than designing different programmes for new and established cocoa bean suppliers and small and large cocoa bean suppliers, supplier development programmes must be equal for all. To achieve this, LBCs can design programmes to develop skills, transfer technology, and enhance supply chain links to enhance efficiency for both new and established cocoa bean suppliers.

Government agencies, processing companies, and industry players must collaborate to provide equal opportunities for funding, training, and resources to everyone. This benefits new and established cocoa bean suppliers and small and big cocoa bean suppliers, to enhance how they operate. This matters because if a firm's age and size prevent it from enhancing how it develops suppliers, then everyone can develop in equal measure. The best time to implement such a plan is at the formation of the supplier development initiative. This will ensure sustainability and efficiency improvements stick and do not rely on a firm's age and size.

To help Western North produce cocoa beans sustainably, managers and LBCs have to enable suppliers to develop new skills. This can be achieved by instructing them in good agriculture practices, minimizing wastage, and utilizing resources efficiently. They have to provide cocoa bean suppliers with improved processing facilities and transport means, and promote good quality management practices such as Good Agricultural Practices (GAP). Government agencies, cocoa-buying firms, and others in the industry have to support cocoa bean suppliers so that a majority of suppliers can implement these practices.

The primary reason for this focus is that operational efficiency partially mediates the relationship between supplier development and sustainability performance of the cocoa bean suppliers, meaning that well-developed cocoa bean suppliers who operate efficiently contribute more effectively to environmental, economic, and social sustainability. The beneficiaries of these efforts are cocoa bean suppliers, processing firms, and the entire cocoa value chain, as improved efficiency leads to cost reduction, higher product quality, and long-term environmental benefits. These initiatives should be implemented continuously and strategically, particularly during pre-harvest and post-harvest periods, to maximize supplier preparedness and reduce losses while strengthening the sustainability of the cocoa supply chain.

LBCs should initiate special schemes to assist cocoa bean producers in the Western North region in a sustainable manner. They can provide financial assistance, training, and new farming implements to increase production and promote green farming. LBCs can collaborate with small farmers and groups of suppliers and provide them with knowledge and implements to employ green farming practices, reduce post-harvest losses, and achieve international sustainability standards. This matters because assisting suppliers enhances sustainability, and by developing their capacities, LBCs can establish a stable, high-quality, and ethical supply chain. This recommendation comes at a timely moment because international markets require more sustainability and clarity. Hence, LBCs have to motivate and support producers to compete in international markets.

Managers of LBCs must seek partnerships with NGOs, international organizations, and development agencies in a bid to secure financial and technical assistance for sustainability programmes. This can be achieved by recognizing stakeholders with common interests in sustainability and engaging them through collaborative schemes, funding applications, or capacity-building initiatives. Sustainability officers, operational managers, and procurement managers in LBCs have the critical responsibility of championing these partnerships to ensure that resources get to be utilized in supplier development schemes. It is important to initiate these partnerships as early as possible in planning sustainability activities to have a great impact. The ultimate objective of these partnerships is to improve both operational and sustainable performance among producers of cocoa beans, thus strengthening the supply chain, improving product quality, and adhering to international standards of sustainability.

Implications for Policy

The Ministry of Agriculture, via the Ghana Cocoa Authority, must develop more policies rewarding LBCs and producers of cocoa beans, not merely with price incentives. The Ministry of Agriculture, via the Ghana Cocoa Authority, must aim at non-price incentives—such as those proposed in this study—of LBCs and producers of cocoa beans. This policy must be implemented by establishing official reward schemes that incentivize efficiency, sustainable production and high quality in cocoa production. The GCA, LBCs, banks, and agriculture support services must oversee the programme to ensure that rewards reach deserving recipients—producers of cocoa beans.

The plan should be implemented in stages, beginning with pilot programmes in key cocoa production regions prior to expansion throughout the country. It's essential to employ non-price incentives because they ensure long-term investment in the cocoa business, increase farmers' and producers' production, and render Ghana competitive in the international cocoa business, and not merely in terms of prices. Once the cocoa bean suppliers achieve sustainable performance, this would provide access to stable access to cocoa beans in the cocoa market which would also sustain the operations of the LBCs.

Cocoa bean producers play a very critical role in ensuring that non-price benefits from LBCs function effectively. They can contribute by participating in programmes emphasizing these benefits. They ought to apply good production and post-harvest practices, such as drying and fermentation, to achieve quality standards for benefits. Producers also ought to be involved in training and schemes by LBCs and the GCA to enhance production and sustainability. They ought to cooperate with LBCs by providing clear and accurate information about production and supply chain problems. This enhances how effectively the benefit schemes function. Maintaining good relationships with LBCs by delivering high-quality cocoa and adhering to sustainability regulations will enable them to continue enjoying non-price benefits such as input assistance, infrastructure, and financial support. This will enhance efficiency and profit in the cocoa industry.

The Ghana Cocoa Authority ought to establish a robust system to monitor and review LBCs to ensure they comply with regulations regarding non-price incentives to support cocoa farmers. This can be achieved by establishing clear regulations, making periodic checks and monitoring how effectively LBCs comply with these regulations. The GCA ought to collaborate with regulating institutions and farmer organizations to continue enforcing these regulations persistently, ensuring that assistance such as training, input provision, and infrastructural construction is effectively delivered. This ensures that all LBCs contribute to long-term growth and sustainability in cocoa production in Ghana, enhancing productivity, farmer incomes, and competitiveness in business.

The Ghanaian government can institute reward schemes to motivate LBCs to assist farmers, such as farmer training, money management lessons, and provision of farm inputs. This can be achieved by providing tax reductions or financial assistance to LBCs that assist farmers, ensuring such farmers receive inputs and knowledge to enhance production. The Ministry of Agriculture and other government institutions have to design and implement these reward schemes to ensure that they can function effectively. These plans have to be established in a short time to address immediate challenges in assisting farmers and making the value chain in the cocoa industry sustainable and competitive to spur economic growth and rural development. Such a strategy aims to enhance farming, enhance farmers' livelihoods, and make the value chain in the cocoa industry in Ghana competitive and sustainable, which will enhance economic growth and rural development.

The revelation that operational efficiency plays a central and pivotal role in bridging the positive impact of supplier development to enhance the sustainable performance of cocoa bean suppliers in Ghana has tremendous policy implications. It may be accepted that supplier development improves sustainable performance and it is operational efficiency that acts as the key to strengthening such a link. With such a finding, policymakers can institute targeted interventions that not only enhance supplier development—through training, capital injection, and technological assistance—but also enhance operational efficiency in logistics, digital traceability, and best agronomic practices. The Ghana Cocoa Board and government institutions, sustainability certification bodies, NGOs, and multinational buyers must come together to ensure effective application of programmes to improve efficiency. Action has to be taken immediately, because continued inefficiencies in the supply chain in the cocoa industry continue to threaten economic, social, and environmental sustainability. Achieving sustainable performance in cocoa production is essential to ensuring long-term economic sustainability, livelihoods for farmers, environmental conservation and contribution to global sustainability targets while maintaining a competitive advantage for Ghana in the cocoa industry.

The discovery that assistance from suppliers enhances efficiency in the supply chain in Ghana relies to a great extent on how flexible companies can be. This is because the suppliers become more skilled and experienced, and apply flexible techniques to enhance efficiency. Institutions engaged in policy-making, such as cocoa boards and major buyers, can set regulations to enable suppliers to develop flexible skills. Such regulations are very critical in initial stages in supplier development programmes and can involve training to ensure long-term success. Increased operational efficiency results in a robust and competitive supply chain in cocoa, which enhances productivity, sustainability, and livelihoods in the cocoa business in Ghana.

The finding that age and size do not matter in terms of how assistance from a supplier influences performance among Western North region cocoa bean producers has significant policy implications. It can improve sustainable performance by cocoa bean suppliers regardless of experience and size. Thus, it is imperative that stakeholders such as LBCs develop supplier development schemes such as training schemes, offer financial assistance, and utilize technology that reaches all categories and levels of suppliers and not just those with more experience and larger sizes. The principal providers must be government institutions such as the Ghana Cocoa Board, Ministry of Agriculture, and stakeholders in the cocoa industry. Such measures must be initiated immediately and be a long-term strategy because being effective matters in terms of future production in cocoa. It improves competitiveness in the cocoa industry, raises farmers' incomes, and promotes economic growth in Ghana, making supplier development a priority in terms of policy.

LBCs should develop and implement supplier development policies that prioritize sustainability, thus ensuring long-term environmental, social, and economic sustainability in their supply chains. To achieve such a goal would require developing formal sustainable sourcing regulations, in conjunction with capacity-building programmes and incentives meant to promote sustainability in cocoa bean suppliers. Such activities would have to be implemented by specialized departments or teams in LBCs in collaboration with cocoa bean suppliers, industry actors, and regulators. Policymaking and implementation processes would have to be prompt, or begin with a set timeframe, to ensure a quick convergence with sustainability standards and expectations in markets. The foundation of such a policy would be to improve supplier sustainability performance, ensure international sustainability standard compliance, reduce risks associated with unsustainable sourcing, and improve competitiveness and reputation for LBCs in the industry.

The finding indicates that it is necessary to enhance buyer-supplier relationships to achieve sustainable performance from supplier development. This will enable cocoa bean suppliers in Ghana to work more efficiently. Buyers and suppliers of cocoa beans must develop commitment, trust and collaboration through particular policies. This can be achieved by establishing planned supplier development programmes and establishing strong relationships, such as open communications, problem-solving jointly, and long-term contracts. Good relationships enhance supplier development efforts to achieve better efficiency, productivity, and sustainability in business in the cocoa industry. These policies must be initiated early in supplier development programmes to ensure relationships develop with financial and technical assistance. These policies must be applied to the cocoa supply chain, particularly to cocoa bean suppliers who always require assistance from buyers to enhance performance.

Implications for Theory

Supplier development entails training, capacity-building, and providing resources or support to suppliers (in this case, cocoa farmers). LBCs, as external players, give the resources—knowledge, technology, and inputs—that farmers need to improve their operational efficiency. According to RDT, organisations (i.e., cocoa bean suppliers or farms) attempt to lessen their dependence on external entities by gaining more control over the resources they need. The fact that supplier development enhances operational efficiency shows that these cocoa bean suppliers or farms are lowering their dependent on uncertain external factors by becoming more self-sufficient in production operations. This coincides with RDT's philosophy of eliminating uncertainty in the supply chain.

In a normal supplier-buyer relationship, the buyer (LBCs) possesses more power due to their control over important resources (e.g., market access, loans, or inputs). Through supplier development programmes, LBCs may consciously balance this power disparity. RDT says that organisations aim to balance the power dynamics when they depend on another entity for crucial resources. As LBCs engage in farmers' operational capacities, they develop a more interdependent relationship. Cocoa bean suppliers or farms become more efficient and possibly less reliant on just one LBC. This interdependence coincides with RDT's perspective that the more control an organisation has over essential resources, the more power it retains.

This study thus supports the complementarity approach in contingency theory through the complementary mediating influence of buyer-supplier relationship quality. Contingency theory believes that an organisation is effective, both in strategy or structure terms, only when there is a fit between the organisation and its environment. It is in this sense that the quality of the interaction of buyers will be crucial to impacting operational efficiency. In other words, relationship quality can be understood as a contingency element that facilitates or hinders operational effectiveness in varied settings.

Supplier development activities can be regarded as strategic initiatives that depend upon the nature of connections between buyers and suppliers. The quality of these ties could affect the effectiveness of development programmes. Partial mediation shows that supplier development efforts play an extremely essential part in operational efficiency; nevertheless, its effectiveness can exist only when good previous quality already exists in the buyer-supplier relationship. This means that activities aiming at operational efficiency improvement should also address ways through which relationship quality could be strengthened if such initiatives are to be effective. The mediation effect underscores the fact that operational effectiveness is not just a function of the supplier development initiative but also highly depends on how well buyers and suppliers communicate. In theoretical models, relationship quality should be addressed as a significant mediating variable on operational efficiency in agricultural environments.

The finding suggests that factors such as firm size and age do not significantly impact the relationship between supplier development and operational efficiency. This indicates that the benefits of supplier development may be universally applicable, regardless of these firm characteristics. Traditionally, contingency theory would suggest that larger or older firms might have different capabilities or resources that could moderate operational relationships. The lack of moderation by size and age challenges the notion that these characteristics are critical contingencies in this context. The research emphasizes the importance of supplier development as a strategy that can enhance operational efficiency independently of the firm's characteristics. This indicates that LBCs can successfully implement supplier development projects without needing to tailor them based on the size or age of the cocoa bean suppliers or farms.

The mediating role of organisational ambidexterity in the predictive relationship between supplier development and operational efficiency of the cocoa bean suppliers confirms the position of the dynamic capability theory that there is a need for developing firm-specific capabilities and renewing competencies to respond to shifts in the business environment. The cocoa bean suppliers operate an open system that assists them to ideally respond to changes in their operations dependent on the kind of supplier development projects they receive from the LBCs.

The study confirms that supplier development requires ambidextrous behaviour among cocoa bean suppliers and these cocoa bean suppliers have built in their operational plans, ambidextrous strategies that position them to efficiently and effectively accommodate changes that come with supplier development projects. In this circumstance, the ambidextrous methods much better describe the impact of supplier development programmes on operational efficiency. Thus, ambidextrous cocoa bean suppliers attain congruence with the changing business environment by modifying their operational methods to suit the changes produced by the adoption of supplier development efforts from the buying organisations.

Suggestions for Further Studies

Further studies should be carried out to examine how supplier development affects the performance of LBCs amid the intervening roles of buyer-supplier relationship quality via a mixed research approach. Future research could focus on identifying other moderating factors or exploring the dynamics between LBCs and cocoa bean suppliers or farms that contribute to operational efficiency beyond firm age and size.

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APPENDIX A

UNIVERSITY OF CAPE COAST

COLLEGE OF HUMANITIES AND LEGAL STUDIES

SCHOOL OF BUSINESS

This questionnaire solicits primary data on a study that seeks to examine the effect of supplier development on the sustainable performance of cocoa farms in Ghana. This is to help Mr. Lawrence Yaw Kusi to partially complete a PhD programme in Business Administration at the University of Cape Coast. The data is for academic purposes only. There are no right or wrong answers. Do well and complete the questionnaire to the best of your ability. Thank you.

SECTION A: DEMOGRAPHICS

1. Work status a. Farm manager [ ] b. Farm owner [ ] c. Farm manager/owner [ ]
2. Gender a. Male [ ] b. Female [ ]
3. Level of education a. No education [ ] b. Basic [ ] c. Junior high school [ ] d. Senior High school [ ] e. DBS/HND [ ] f. First degree [ ] g. Masters [ ] d. PhD [ ]
4. Cocoa farm age [……….. years]
5. Farm size [……………… acres]
6. Number of workers […………]
7. Annual harvest […… bags]
8. Land tenure system a. Communal [ ] b. Rent/lease [ ] c. Privately owned [ ]
9. Number of years with licensed-buying companies
   a. Below 5 years [ ]
   b. 5 – 10 years [ ]
   c. Over 10 years [ ]
10. Type of licensed-buying companies your farm deals with
    a. Private company [ ]
    b. Public company [ ]
    c. Private and public companies [ ]

SECTION B: DIRECT SUPPLIER DEVELOPMENT INITIATIVES

11. How effective are these direct supplier initiatives in your cocoa farm operations?

Where: 1=Not effective; 2=Slightly effective; 3=Moderately effective; 4=Effective; 5=Highly effective

No	**Mass Spraying/Disease and Pest Control**	**1**	**2**	**3**	**4**	**5**
1	Buyer companies support cocoa farmers to identify pests and diseases	*1*	*2*	*3*	*4*	*5*
2	Buyer companies provide the right inputs (Approved chemicals, spraying machines, etc.) for mass spraying	*1*	*2*	*3*	*4*	*5*
3	Buyer companies recommend chemicals for pests and disease control	*1*	*2*	*3*	*4*	*5*
4	Buyer companies ensure the number of times cocoa farms are sprayed is adequate	*1*	*2*	*3*	*4*	*5*
5	Buyer companies provide mass spray within the recommended months for such spraying	*1*	*2*	*3*	*4*	*5*
6	Buyer companies use community volunteers for mass spraying exercises	*1*	*2*	*3*	*4*	*5*
7	Buyer companies provide gang spraying services to cocoa farmers	*1*	*2*	*3*	*4*	*5*
No	**Artificial Pollination**	**1**	**2**	**3**	**4**	**5**
1	Buyer companies undertake artificial pollination for cocoa farms	*1*	*2*	*3*	*4*	*5*
2	Buyer companies support your cocoa farm with insect pollination	*1*	*2*	*3*	*4*	*5*
3	Buyer companies provide logistical support for artificial pollination	*1*	*2*	*3*	*4*	*5*
4	Buyer companies undertake hand pollination projects at the right time	*1*	*2*	*3*	*4*	*5*
5	Buyer companies do not help cocoa farmers to decide the fate of the unpollinated flower	*1*	*2*	*3*	*4*	*5*
6	Buyer companies transfer the know-how of artificial pollination to farmers	*1*	*2*	*3*	*4*	*5*
7	Buyer companies do not pollinate diseased cocoa trees	*1*	*2*	*3*	*4*	*5*
No	**Cocoa Rehabilitation**	**1**	**2**	**3**	**4**	**5**
1	Buyer companies assist cocoa farmers in adopting coppicing	*1*	*2*	*3*	*4*	*5*
2	Buyer companies do not assist cocoa farmers in adopting replanting	*1*	*2*	*3*	*4*	*5*
3	Buyer companies assist cocoa farmers in adopting side grafting	*1*	*2*	*3*	*4*	*5*
4	Buyer companies assist cocoa farmers in undertaking early intercropping	*1*	*2*	*3*	*4*	*5*
5	Buyer companies assist cocoa farmers in propagating elite trees	*1*	*2*	*3*	*4*	*5*

6	Buyer companies compensate cocoa farmers that rehabilitate their cocoa farms	*1*	*2*	*3*	*4*	*5*
7	Buyer companies compensate landowners (traditional) authorities when they rehabilitate cocoa farms	*1*	*2*	*3*	*4*	*5*
8	Buyer companies assist in the clearing of land during rehabilitation projects	*1*	*2*	*3*	*4*	*5*
9	Buyer companies assist cocoa farmers to cut down unproductive aged cocoa trees	*1*	*2*	*3*	*4*	*5*
10	Buyer companies provide disease-resistance seedlings to cocoa farmers	*1*	*2*	*3*	*4*	*5*
No	**Mass Pruning**	**1**	**2**	**3**	**4**	**5**
1	Buyer companies assist cocoa farmers to remove dead branches, husks and pods	*1*	*2*	*3*	*4*	*5*
2	Buyer companies help cocoa farmers to eliminate mispositioned and cross trees	*1*	*2*	*3*	*4*	*5*
3	Buyer companies ensure that the absolute amount of pruned materials vary among trees	*1*	*2*	*3*	*4*	*5*
4	Buyer companies do not assist farmers to remove basal chupons and overhead canopies	*1*	*2*	*3*	*4*	*5*
5	Buyer companies assist farmers to remove all hosts on the farm	*1*	*2*	*3*	*4*	*5*
6	Buyer companies transfer pruning techniques to cocoa farmers	*1*	*2*	*3*	*4*	*5*
7	Buyer companies assist cocoa farmers in farm mapping to prevent overcrowding	*1*	*2*	*3*	*4*	*5*
8	Buyer companies pay for hired labour for mass pruning exercises	*1*	*2*	*3*	*4*	*5*
9	Buyer companies recruit pruning labourers through farmer cooperatives	*1*	*2*	*3*	*4*	*5*

SECTION C: INDIRECT SUPPLIER DEVELOPMENT INITIATIVES

12. How effective are these direct supplier initiatives to you in your cocoa farm operations?

Where: 1=Not effective; 2=Slightly effective; 3=Moderately effective; 4=Effective; 5= Highly effective

No	**Financing Scheme**	**1**	**2**	**3**	**4**	**5**
1	Buyer companies provide loans to cocoa farms	*1*	*2*	*3*	*4*	*5*
2	Buyer companies provide input credit to cocoa farmers	*1*	*2*	*3*	*4*	*5*
3	Buyer companies lease agricultural machinery or facilities	*1*	*2*	*3*	*4*	*5*
4	Buyer companies assist cocoa farmers to get loans from financial institutions	*1*	*2*	*3*	*4*	*5*
5	Buyer companies give bonuses to cocoa farmers	*1*	*2*	*3*	*4*	*5*

6	Buyer companies provide subsidized inputs to cocoa farmers	*1*	*2*	*3*	*4*	*5*
7	Buyer companies make prompt payments	*1*	*2*	*3*	*4*	*5*
8	Buyer companies have savings schemes for cocoa farmers	*1*	*2*	*3*	*4*	*5*
9	Buying companies pay price premiums to cocoa farmers	*1*	*2*	*3*	*4*	*5*
10	Buyer companies do not pay minimum prices for certified cocoa beans	*1*	*2*	*3*	*4*	*5*
No	**Certification**	**1**	**2**	**3**	**4**	**5**
1	Buyer companies ensure cocoa farmers comply with quality standards for cocoa beans	*1*	*2*	*3*	*4*	*5*
2	Buyer companies ensure cocoa farmers comply with standards for handling protective wear after use	*1*	*2*	*3*	*4*	*5*
3	Buyer companies do not ensure cocoa farmers comply with standards for methods of storing agrochemicals	*1*	*2*	*3*	*4*	*5*
4	Buyer companies ensure cocoa farmers comply with standards for drying cocoa beans	*1*	*2*	*3*	*4*	*5*
5	Buyer companies ensure cocoa farmers comply with standards for fertilizer application	*1*	*2*	*3*	*4*	*5*
6	Buyer companies ensure cocoa farmers comply with standards for regular farm record keeping on farm activities, production and sale	*1*	*2*	*3*	*4*	*5*
7	Buyer companies ensure cocoa farmers comply with standards regulating soil fertility, conservation and management	*1*	*2*	*3*	*4*	*5*
8	Buyer companies encourage industry-recognized certification among cocoa farmers	*1*	*2*	*3*	*4*	*5*
9	Buyer companies undertake farm audits timely	*1*	*2*	*3*	*4*	*5*
10	Buyer companies monitor certified cocoa farms	*1*	*2*	*3*	*4*	*5*
No	**Input Supplies**	**1**	**2**	**3**	**4**	**5**
1	Buyer companies give hybrid seeds for cultivation	*1*	*2*	*3*	*4*	*5*
2	Buyer companies give fertilizers to cocoa farmers	*1*	*2*	*3*	*4*	*5*
3	Buyer companies do not give fungicides/insecticides to cocoa farmers	*1*	*2*	*3*	*4*	*5*
4	Buyer companies give spraying machines to cocoa farmers	*1*	*2*	*3*	*4*	*5*
5	Buyer companies give Wellington boots to farmers	*1*	*2*	*3*	*4*	*5*
6	Buyer companies give approved agrochemicals to cocoa farmers	*1*	*2*	*3*	*4*	*5*
7	Buyer companies provide disease-tolerant hybrids for planting and replanting	*1*	*2*	*3*	*4*	*5*
No	**Training and Extension Services**	**1**	**2**	**3**	**4**	**5**
1	Buyer companies organize farmer educational campaigns on farms	*1*	*2*	*3*	*4*	*5*

2	Buyer companies undertake cocoa farmer educational campaigns on radio and television stations	*1*	*2*	*3*	*4*	*5*
3	Buyer companies conduct farm studies for cocoa farmers	*1*	*2*	*3*	*4*	*5*
4	Buyer companies ensure the effective transfer of research findings by cocoa farmers	*1*	*2*	*3*	*4*	*5*
5	Buyer companies train cocoa farmers on cultural and chemical methods to pest and disease controls	*1*	*2*	*3*	*4*	*5*
6	Buyer companies train cocoa farmers in safe pesticides usage	*1*	*2*	*3*	*4*	*5*
7	Buyer companies train farmers to enhance the acquisition of knowledge, skills and technique on new and improved agricultural technologies	*1*	*2*	*3*	*4*	*5*
8	Buyer companies train farmers on sharing and diffusing of knowledge amongst participants and neighbours	*1*	*2*	*3*	*4*	*5*
9	Buyer companies train farmers on how to plan their farm business	*1*	*2*	*3*	*4*	*5*
10	Buyer companies provide adult education to farmers	*1*	*2*	*3*	*4*	*5*
11	Buyer companies train farmers on good agronomic practices	*1*	*2*	*3*	*4*	*5*

SECTION D: OPERATIONAL EFFICIENCY

13. How do you rate the degree of efficiency of your farm's operations?

1=Not efficient; 2=Slightly efficient; 3=Moderately efficient; 4=Very efficient; 5=Extremely efficient

No	Operational Efficiency	1	2	3	4	5
1	The farm leverages technology in farming operations	*1*	*2*	*3*	*4*	*5*
2	Workers have enhanced agronomic skills	*1*	*2*	*3*	*4*	*5*
3	The farm promotes efficiency in the delivery of goods to buyers	*1*	*2*	*3*	*4*	*5*
4	The farm maintains business relationships with other partners	*1*	*2*	*3*	*4*	*5*
5	The farm reduces operational costs	*1*	*2*	*3*	*4*	*5*
6	The farm produces on the agreed production schedule	*1*	*2*	*3*	*4*	*5*
7	The farm uses chemicals and fertilizers optimally	*1*	*2*	*3*	*4*	*5*
8	The farm maximizes land use	*1*	*2*	*3*	*4*	*5*
9	The farm utilizes labour productively	*1*	*2*	*3*	*4*	*5*
10	Farm equipment are utilized proficiently	*1*	*2*	*3*	*4*	*5*

SECTION E: BUYER-SUPPLIER RELATIONSHIP

14. How do you rate the quality of the relationship between your business and LBCs in these instances?

Where: 1=Poor; 2=Fair; 3=Good; 4=Very good; 5=Excellent

No	Supplier-Buyer Relationship	1	2	3	4	5
1	Buyer companies are very capable of performing the sales transaction process accurately	*1*	*2*	*3*	*4*	*5*
2	Buyer companies are knowledgeable about farmers' needs	*1*	*2*	*3*	*4*	*5*
3	Buyer companies have the ability to process farmers' transactions	*1*	*2*	*3*	*4*	*5*
4	Buyer companies can be trusted to process my transaction on time without demanding a bribe	*1*	*2*	*3*	*4*	*5*
5	Buyer companies can be trusted to complete transactions without demanding tips	*1*	*2*	*3*	*4*	*5*
6	Buyer companies can be trusted to perform services to customers who qualify	*1*	*2*	*3*	*4*	*5*
7	Buyer companies have strong sense of ethics toward customers	*1*	*2*	*3*	*4*	*5*
8	Buyer companies care about me and other cocoa farmers	*1*	*2*	*3*	*4*	*5*
9	Buyer companies seem to look out for what is important for farmers	*1*	*2*	*3*	*4*	*5*
10	Buyer companies go out of their way to help me and other cocoa farmers	*1*	*2*	*3*	*4*	*5*
11	Buyer companies are able to abide by their commitments	*1*	*2*	*3*	*4*	*5*
12	Buyer companies communicate effectively with us	*1*	*2*		*4*	*5*
13	Buyer companies are trustworthy in the process of collaborative innovation	*1*	*2*	*3*	*4*	*5*

SECTION F: ORGANISATIONAL AMBIDEXTERITY

15. How effective are these ambidextrous activities in your cocoa farm operations?

Where: 1=Not effective; 2=Slightly effective; 3=Moderately effective; 4=Effective; 5= Highly effective

No	Exploration	1	2	3	4	5
1	We have acquired entirely new managerial and organisational skills in my cocoa farm	*1*	*2*	*3*	*4*	*5*
2	We have learned new skills for the first time through supplier development initiatives	*1*	*2*	*3*	*4*	*5*
3	We have strengthened innovation skills in areas where we had no prior experience	*1*	*2*	*3*	*4*	*5*
4	We concentrate on improving products to suit what	*1*	*2*	*3*	*4*	*5*

	produce-buying firms want					
5	We constantly pursue new opportunities to expand production to meet international standard	*1*	*2*	*3*	*4*	*5*
6	We have included some new aspects to our processes, products and services compared to prior strategies	*1*	*2*	*3*	*4*	*5*
No	**Exploitation**	**1**	**2**	**3**	**4**	**5**
1	We have upgraded their current knowledge and skills for familiar products and technologies	*1*	*2*	*3*	*4*	*5*
2	There are enhanced skills in exploiting well-established technologies that improve the productivity of current innovation operations	*1*	*2*	*3*	*4*	*5*
3	We have enhanced competencies in searching for solutions to customer problems close to established solutions rather than entirely new ones	*1*	*2*	*3*	*4*	*5*
4	We have upgraded skills in product development processes in which the business unit already possessed significant experience	*1*	*2*	*3*	*4*	*5*
5	We commit to improving quality and lowering costs	*1*	*2*	*3*	*4*	*5*
6	We continuously improve the reliability of our products	*1*	*2*	*3*	*4*	*5*
7	We finetune what we offer to keep buyers satisfied	*1*	*2*	*3*	*4*	*5*

SECTION G: SUSTAINABLE PERFORMANCE

16. How do you rate these performance measures of your cocoa farm business because of the supplier development initiatives you have received over the years?

Where: 1=Poor; 2=Fair; 3=Good; 4=Very good; 5=Excellent

No	Sustainable Economic Performance	1	2	3	4	5
1	Increase in returns on investment	*1*	*2*	*3*	*4*	*5*
2	Increase in profitability	*1*	*2*	*3*	*4*	*5*
3	Improved stability of supply	*1*	*2*	*3*	*4*	*5*
4	Improved stability of market	*1*	*2*	*3*	*4*	*5*
5	Improved product quality	*1*	*2*	*3*	*4*	*5*
6	Decreased in environmental fines and charges	*1*	*2*	*3*	*4*	*5*
7	Increase in market share	*1*	*2*	*3*	*4*	*5*
8	Improved sales growth	*1*	*2*	*3*	*4*	*5*
9	Improved productivity per hectare	*1*	*2*	*3*	*4*	*5*
10	Improved revenue from the sale of economic shade trees	*1*	*2*	*3*	*4*	*5*
11	Production cost savings	*1*	*2*	*3*	*4*	*5*
12	Income from alternate livelihood activities	*1*	*2*	*3*	*4*	*5*
No	**Sustainable Social Performance**	**1**	**2**	**3**	**4**	**5**
1	Fair access to means of production	*1*	*2*	*3*	*4*	*5*
2	Respecting the rights of suppliers	*1*	*2*	*3*	*4*	*5*
3	Improved employee relations	*1*	*2*	*3*	*4*	*5*

4	No use of forced labour	*1*	*2*	*3*	*4*	*5*
5	No use of child labour	*1*	*2*	*3*	*4*	*5*
6	Improved workplace safety and health for workers	*1*	*2*	*3*	*4*	*5*
7	Non-discrimination in hiring	*1*	*2*	*3*	*4*	*5*
8	Improved gender diversity	*1*	*2*	*3*	*4*	*5*
9	Increase in job satisfaction levels of employees	*1*	*2*	*3*	*4*	*5*
10	Increase in the development of employee skills	*1*	*2*	*3*	*4*	*5*
11	Improvement in customer satisfaction	*1*	*2*	*3*	*4*	*5*
12	Improvement in investments in social projects	*1*	*2*	*3*	*4*	*5*
13	Improved living standards of farmers and their family	*1*	*2*	*3*	*4*	*5*
14	Purchase of cocoa beans from certified farmers	*1*	*2*	*3*	*4*	*5*
No	**Sustainable Environment Performance**	**1**	**2**	**3**	**4**	**5**
1	Improved soil quality	*1*	*2*	*3*	*4*	*5*
2	Improved water quality	*1*	*2*	*3*	*4*	*5*
3	Proper waste reduction and disposal	*1*	*2*	*3*	*4*	*5*
4	Improved animal health	*1*	*2*	*3*	*4*	*5*
5	Improved species diversity	*1*	*2*	*3*	*4*	*5*
6	Improved ecosystem diversity	*1*	*2*	*3*	*4*	*5*
7	Improved air quality	*1*	*2*	*3*	*4*	*5*
8	No land degradation	*1*	*2*	*3*	*4*	*5*
9	Improvement in the firm's environmental situation	*1*	*2*	*3*	*4*	*5*
10	Decrease in consumption of hazardous/harmful/toxic materials	*1*	*2*	*3*	*4*	*5*
11	Decrease in frequency of environmental accidents	*1*	*2*	*3*	*4*	*5*
12	Improved forest reservation	*1*	*2*	*3*	*4*	*5*
13	Improved climate adaptation	*1*	*2*	*3*	*4*	*5*
14	Improved insect pollination	*1*	*2*	*3*	*4*	*5*

APPENDIX B

Table 1: Outer VIF of Final Model (Appendix B)

		VIF
Apol1	Buyer companies undertake artificial pollination for cocoa farms	3.449
Apol2	Buyer companies support your cocoa farm with insect pollination	4.140
Apol3	Buyer companies provide logistical support for artificial pollination	4.577
Apol4	Buyer companies undertake hand pollination projects at the right time	2.327
Apol6	Buyer companies transfer the know-how of artificial pollination to farmers	2.332
Cert2	Buyer companies ensure cocoa farmers comply with standards for handling protective wear after use	1.244
Cert5	Buyer companies ensure cocoa farmers comply with standards for fertilizer application	1.638
Cert6	Buyer companies ensure cocoa farmers comply with standards for regular farm record keeping on farm activities, production and sale	1.549
Cert7	Buyer companies ensure cocoa farmers comply with standards regulating soil fertility, conservation and management	1.673
CoRe10	Buyer companies assist cocoa farmers in adopting coppicing	3.672
CoRe3	Buyer companies assist cocoa farmers in adopting side grafting	2.022
CoRe4	Buyer companies assist cocoa farmers in undertaking early intercropping	3.689
CoRe5	Buyer companies assist cocoa farmers in propagating elite trees	4.980
CoRe6	**Buyer companies compensate cocoa farmers that rehabilitate their cocoa farms**	**5.231**
CoRe7	Buyer companies compensate landowners (traditional) authorities when they rehabilitate cocoa farms	4.759
CoRe8	Buyer companies assist in the clearing of land during rehabilitation projects	4.026
CoRe9	Buyer companies assist cocoa farmers to cut down unproductive aged cocoa trees	4.252
Exat1	We have acquired entirely new managerial and organisational skills in my cocoa farm	1.809
Exat2	We have learned new skills for the first time through supplier development initiatives	1.786
Exat3	We have strengthened innovation skills in areas where we had no prior experience	1.803
Exat4	We concentrate on improving products to suit what produce-buying firms want	1.914
Exat5	We constantly pursue new opportunities to expand production to meet international standard	1.980
Exat6	We have included some new aspects to our processes, products and services compared to prior strategies	1.851
Exp1	We have upgraded their current knowledge and skills for familiar products and technologies	1.690
Exp6	We continuously improve the reliability of our products	1.432
Fin2	Buyer companies provide input credit to cocoa farmers	1.394
Fin3	Buyer companies lease agricultural machinery or facilities	1.957
Fin4	Buyer companies assist cocoa farmers to get loans from financial institutions	1.285

Fin8	Buyer companies have savings schemes for cocoa farmers	1.487
Fin9	Buying companies pay price premiums to cocoa farmers	1.524
Inp1	Buyer companies give hybrid seeds for cultivation	1.395
Inp4	Buyer companies give spraying machines to cocoa farmers	1.476
Inp6	Buyer companies give approved agrochemicals to cocoa farmers	1.634
Inp7	Buyer companies provide disease-tolerant hybrids for planting and replanting	1.899
LV-SEP	Sustainable environmental performance	2.049
LV-SEcP	Latent score-Sustainable economic performance	1.894
LV-SSP	Latent score-Sustainable social performance	2.002
Map1	Buyer companies assist cocoa farmers to remove dead branches, husks and pods	2.825
Map2	Buyer companies help cocoa farmers to eliminate mispositioned and cross trees	1.628
Map3	Buyer companies ensure that the absolute amount of pruned materials vary among trees	2.476
Map5	Buyer companies assist farmers to remove all hosts on the farm	2.397
Map6	Buyer companies transfer pruning techniques to cocoa farmers	2.672
Map7	Buyer companies assist cocoa farmers in farm mapping to prevent overcrowding	4.213
Map8	Buyer companies pay for hired labour for mass pruning exercises	**5.686**
Map9	Buyer companies recruit pruning labourers through farmer cooperatives	**5.613**
Mas1	Buyer companies support cocoa farmers to identify pests and diseases	4.094
Mas2	Buyer companies provide the right inputs (Approved chemicals, spraying machines, etc.) for mass spraying	4.754
Mas3	Buyer companies recommend chemicals for pests and disease control	**5.210**
Mas4	Buyer companies ensure the number of times cocoa farms are sprayed is adequate	**5.427**
Mas5	Buyer companies provide mass spray within the recommended months for such spraying	**6.620**
Mas6	Buyer companies use community volunteers for mass spraying exercises	4.686
Mas7	Buyer companies provide gang spraying services to cocoa farmers	**6.470**
Ope10	Farm equipment are utilized proficiently	1.786
Ope4	The farm maintains business relationships with other partners	1.326
Ope6	The farm produces on the agreed production schedule	1.580
Ope7	The farm uses chemicals and fertilizers optimally	1.616
Ope8	The farm maximizes land use	1.873
Ope9	The farm utilizes labour productively	1.844
Rn	Random	1.000
SBR10	Buyer companies go out of their way to help me and other cocoa farmers	2.086

SBR11	Buyer companies are able to abide by their commitments	1.916
SBR12	Buyer companies communicate effectively with us	1.776
SBR13	Buyer companies are trustworthy in the process of collaborative innovation	1.671
SBR2	Buyer companies are knowledgeable about farmers' needs	1.451
SBR3	Buyer companies have the ability to process farmers' transactions	1.425
SBR7	Buyer companies have strong sense of ethics toward customers	1.768
SBR8	Buyer companies care about me and other cocoa farmers	2.483
SBR9	Buyer companies seem to look out for what is important for farmers	2.607
TES1	Buyer companies organize farmer educational campaigns on farms	3.376
TES10	Buyer companies provide adult education to farmers	4.563
TES11	Buyer companies train farmers on good agronomic practices	3.490
TES2	Buyer companies undertake cocoa farmer educational campaigns on radio and television stations	3.251
TES3	Buyer companies conduct farm studies for cocoa farmers	5.098
TES4	Buyer companies ensure the effective transfer of research findings by cocoa farmers	4.753
TES5	Buyer companies train cocoa farmers on cultural and chemical methods to pest and disease controls	4.033
TES6	Buyer companies train cocoa farmers in safe pesticides usage	4.743
TES7	Buyer companies train farmers to enhance the acquisition of knowledge, skills and technique on new and improved agricultural technologies	4.593
TES8	Buyer companies train farmers on sharing and diffusing of knowledge amongst participants and neighbours	4.239
TES9	Buyer companies train farmers on how to plan their farm business	4.505
SEP1	Increase in returns on investment	1.796
SEP2	Increase in profitability	1.775
SEP3	Improved stability of supply	1.524
SEP4	Improved stability of market	1.735
SEP7	Increase in market share	1.771
SEP8	Improved sales growth	1.478
Sop10	Increase in the development of employee skills	1.522
Sop11	Improvement in customer satisfaction	1.547
Sop12	Improvement in investments in social projects	1.592
Sop13	Improved living standards of farmers and their family	1.411
Sop3	Improved employee relations	1.505
Env11	Decrease in frequency of environmental accidents	1.405
Env12	Improved forest reservation	1.768

Env13	Improved climate adaptation	1.915
Env6	Improved ecosystem diversity	1.631
Env7	Improved air quality	1.728
Env8	No land degradation	1.432

Source: Field survey, (2024)

APPENDIX C

Table 4: Annual Harvest

		Frequency	Percent
Valid	1 bag	2	0.5
	10 bags	25	5.9
	100 bags	6	1.4
	107 bags	2	0.5
	109 bags	2	0.5
	11 bags	20	4.7
	12 bags	9	2.1
	121 bags	2	0.5
	126 bags	2	0.5
	13 bags	7	1.7
	14 bags	13	3.1
	145 bags	2	0.5
	15 bags	16	3.8
	150 bags	2	0.5
	16 bags	9	2.1
	17 bags	10	2.4
	18 bags	19	4.5
	19 bags	14	3.3
	2 bags	8	1.9
	20 bags	10	2.4
	200 bags	2	0.5
	21 bags	6	1.4
	23 bags	6	1.4
	25 bags	8	1.9
	26 bags	6	1.4
	27 bags	2	0.5
	28 bags	2	0.5
	29 bags	2	0.5
	3 bag	15	3.5
	30 bags	8	1.9
	31 bags	6	1.4
	32 bags	2	0.5
	33 bags	2	0.5
	34 bags	2	0.5
	350 bags	2	0.5
	36 bags	2	0.5
	37 bags	2	0.5
	38 bags	2	0.5
	39 bags	2	0.5
	4 bags	4	0.9
	40 bags	10	2.4
	41 bags	4	0.9
	42 bags	2	0.5

44 bags	4	0.9
45 bags	4	0.9
450 bags	2	0.5
46 bags	2	0.5
49 bags	4	0.9
5 bags	9	2.1
50 bags	2	0.5
52 bags	2	0.5
54 bags	4	0.9
55 bags	2	0.5
58 bags	2	0.5
6 bags	12	2.8
60 bags	2	0.5
61 bags	2	0.5
66 bags	2	0.5
68 bags	2	0.5
69 bags	2	0.5
7 bags	20	4.7
70 bags	12	2.8
700 bags	2	0.5
76 bags	4	0.9
79 bags	2	0.5
8 bags	24	5.7
8.5 bags	2	0.5
83 bags	2	0.5
9 bags	14	3.3
95 bags	2	0.5
99 bags	2	0.5
Total	424	100.0

Source: Field survey, (2024)

APPENDIX D

Table 6: Heterotrait-Monotrait Ratio of Initial Model

	HTMT Ratio
Buyer-supplier relationship quality<-> Artificial pollination	0.633
Certification <-> Artificial pollination	0.752
Certification <-> Buyer-supplier relationship	0.832
Cocoa rehabilitation <-> Artificial pollination	0.875
Cocoa rehabilitation <-> Buyer-supplier relationship quality	0.801
Cocoa rehabilitation <-> Certification	0.827
Direct supplier development <-> Artificial pollination	0.969
Direct supplier development <-> Buyer-supplier relationship	0.783
Direct supplier development <-> Certification	0.821
Direct supplier development <-> Cocoa rehabilitation	1.011
Financing scheme <-> Artificial pollination	0.817
Financing scheme <-> Buyer-supplier relationship quality	0.810
Financing scheme <-> Certification	0.900
Financing scheme <-> Cocoa rehabilitation	0.801
Financing scheme <-> Direct supplier development	0.826
Firm age <-> Artificial pollination	0.077
Firm age <-> Buyer-supplier relationship quality	0.117
Firm age <-> Certification	0.113
Firm age <-> Cocoa rehabilitation	0.075
Firm age <-> Direct supplier development	0.082
Firm age <-> Financing scheme	0.117
Firm size <-> Artificial pollination	0.071
Firm size <-> Buyer-supplier relationship quality	0.090
Firm size <-> Certification	0.204
Firm size <-> Cocoa rehabilitation	0.056
Firm size <-> Direct supplier development	0.069
Firm size <-> Financing scheme	0.143
Firm size <-> Firm age	0.241
Indirect supplier development <-> Artificial pollination	0.796
Indirect supplier development <-> Buyer-supplier relationship quality	0.867
Indirect supplier development <-> Certification	1.026
Indirect supplier development <-> Cocoa rehabilitation	0.896
Indirect supplier development <-> Direct supplier development	0.904
Indirect supplier development <-> Financing scheme	0.989
Indirect supplier development <-> Firm age	0.133
Indirect supplier development <-> Firm size	0.116
Input supplies <-> Artificial pollination	0.758
Input supplies <-> Buyer-supplier relationship quality	0.749

Input supplies <-> Certification	0.832
Input supplies <-> Cocoa rehabilitation	0.785
Input supplies <-> Direct supplier development	0.812
Input supplies <-> Financing scheme	0.835
Input supplies <-> Firm age	0.198
Input supplies <-> Firm size	0.103
Input supplies <-> Indirect supplier development	0.952
Mass pruning <-> Artificial pollination	0.802
Mass pruning <-> Buyer-supplier relationship quality	0.759
Mass pruning <-> Certification	0.784
Mass pruning <-> Cocoa rehabilitation	0.980
Mass pruning <-> Direct supplier development	0.981
Mass pruning <-> Financing scheme	0.754
Mass pruning <-> Firm age	0.065
Mass pruning <-> Firm size	0.041
Mass pruning <-> Indirect supplier development	0.872
Mass pruning <-> Input supplies	0.787
Mass spraying <-> Artificial pollination	0.899
Mass spraying <-> Buyer-supplier relationship quality	0.744
Mass spraying <-> Certification	0.746
Mass spraying <-> Cocoa rehabilitation	0.862
Mass spraying <-> Direct supplier development	0.944
Mass spraying <-> Financing scheme	0.782
Mass spraying <-> Firm age	0.098
Mass spraying <-> Firm size	0.102
Mass spraying <-> Indirect supplier development	0.851
Mass spraying <-> Input supplies	0.752
Mass spraying <-> Mass pruning	0.811
Operational efficiency <-> Artificial pollination	0.588
Operational efficiency <-> Buyer-supplier relationship quality	0.721
Operational efficiency <-> Certification	0.739
Operational efficiency <-> Cocoa rehabilitation	0.633
Operational efficiency <-> Direct supplier development	0.640
Operational efficiency <-> Financing scheme	0.734
Operational efficiency <-> Firm age	0.060
Operational efficiency <-> Firm size	0.082
Operational efficiency <-> Indirect supplier development	0.751
Operational efficiency <-> Input supplies	0.717
Operational efficiency <-> Mass pruning	0.622
Operational efficiency <-> Mass spraying	0.582
Organisational ambidexterity <-> Artificial pollination	0.436
Organisational ambidexterity <-> Buyer-supplier relationship quality	0.629
Organisational ambidexterity <-> Certification	0.615
Organisational ambidexterity <-> Cocoa rehabilitation	0.548
Organisational ambidexterity <-> Direct supplier development	0.525

Organisational ambidexterity <-> Financing scheme	0.655
Organisational ambidexterity <-> Firm age	0.107
Organisational ambidexterity <-> Firm size	0.100
Organisational ambidexterity <-> Indirect supplier development	0.638
Organisational ambidexterity <-> Input supplies	0.545
Organisational ambidexterity <-> Mass pruning	0.541
Organisational ambidexterity <-> Mass spraying	0.439
Organisational ambidexterity <-> Operational efficiency	0.783
Supplier development <-> Artificial pollination	0.907
Supplier development <-> Buyer-supplier relationship quality	0.845
Supplier development <-> Certification	0.944
Supplier development <-> Cocoa rehabilitation	0.980
Supplier development <-> Direct supplier development	0.993
Supplier development <-> Financing scheme	0.928
Supplier development <-> Firm age	0.110
Supplier development <-> Firm size	0.094
Supplier development <-> Indirect supplier development	0.999
Supplier development <-> Input supplies	0.902
Supplier development <-> Mass pruning	0.951
Supplier development <-> Mass spraying	0.921
Supplier development <-> Operational efficiency	0.711
Supplier development <-> Organisational ambidexterity	0.594
Sustainable economic performance <-> Artificial pollination	0.456
Sustainable economic performance <-> Buyer-supplier relationship	0.667
Sustainable economic performance <-> Certification	0.677
Sustainable economic performance <-> Cocoa rehabilitation	0.566
Sustainable economic performance <-> Direct supplier development	0.531
Sustainable economic performance <-> Financing scheme	0.612
Sustainable economic performance <-> Firm age	0.081
Sustainable economic performance <-> Firm size	0.185
Sustainable economic performance <-> Indirect supplier development	0.642
Sustainable economic performance <-> Input supplies	0.481
Sustainable economic performance <-> Mass pruning	0.545
Sustainable economic performance <-> Mass spraying	0.424
Sustainable economic performance <-> Operational efficiency	0.728
Sustainable economic performance <-> Organisational ambidexterity	0.904
Sustainable economic performance <-> Supplier development	0.600
Sustainable environmental performance <-> Artificial	0.450

pollination	
Sustainable environmental performance <-> Buyer-supplier relationship	0.633
Sustainable environmental performance <-> Certification	0.579
Sustainable environmental performance <-> Cocoa rehabilitation	0.561
Sustainable environmental performance <-> Direct supplier development	0.538
Sustainable environmental performance <-> Financing scheme	0.539
Sustainable environmental performance <-> Firm age	0.122
Sustainable environmental performance <-> Firm size	0.109
Sustainable environmental performance <-> Indirect supplier development	0.586
Sustainable environmental performance <-> Input supplies	0.508
Sustainable environmental performance <-> Mass pruning	0.556
Sustainable environmental performance <-> Mass spraying	0.448
Sustainable environmental performance <-> Operational efficiency	0.664
Sustainable environmental performance <-> Organisational ambidexterity	0.836
Sustainable environmental performance <-> Supplier development	0.575
Sustainable environmental performance <-> Sustainable economic performance	0.877
Sustainable performance <-> Artificial pollination	0.481
Sustainable performance <-> Buyer-supplier relationship quality	0.675
Sustainable performance <-> Certification	0.647
Sustainable performance <-> Cocoa rehabilitation	0.585
Sustainable performance <-> Direct supplier development	0.565
Sustainable performance <-> Financing scheme	0.599
Sustainable performance <-> Firm age	0.114
Sustainable performance <-> Firm size	0.150
Sustainable performance <-> Indirect supplier development	0.640
Sustainable performance <-> Input supplies	0.530
Sustainable performance <-> Mass pruning	0.579
Sustainable performance <-> Mass spraying	0.474
Sustainable performance <-> Operational efficiency	0.737
Sustainable performance <-> Organisational ambidexterity	0.898
Sustainable performance <-> Supplier development	0.617
Sustainable social performance <-> Artificial pollination	0.488
Sustainable social performance <-> Buyer-supplier	0.658

relationship	
Sustainable social performance <-> Certification	0.629
Sustainable social performance <-> Cocoa rehabilitation	0.569
Sustainable social performance <-> Direct supplier development	0.566
Sustainable social performance <-> Financing scheme	0.593
Sustainable social performance <-> Firm age	0.123
Sustainable social performance <-> Firm size	0.149
Sustainable social performance <-> Indirect supplier development	0.632
Sustainable social performance <-> Input supplies	0.544
Sustainable social performance <-> Mass pruning	0.576
Sustainable social performance <-> Mass spraying	0.499
Sustainable social performance <-> Operational efficiency	0.750
Sustainable social performance <-> Organisational ambidexterity	0.869
Sustainable social performance <-> Supplier development	0.613
Sustainable social performance <-> Sustainable economic performance	0.902
Sustainable social performance <-> Sustainable environmental performance	0.917
Sustainable social performance <-> sustainable performance	1.038
Training and extension services <-> Artificial pollination	0.686
Training and extension services <-> Buyer-supplier relationship	0.825
Training and extension services <-> Certification	0.848
Training and extension services <-> Cocoa rehabilitation	0.885
Training and extension services <-> Direct supplier development	0.880
Training and extension services <-> Financing scheme	0.801
Training and extension services <-> Firm age	0.102
Training and extension services <-> Firm size	0.043
Training and extension services <-> Indirect supplier development	0.963
Training and extension services <-> Input supplies	0.787
Training and extension services <-> Mass pruning	0.877
Training and extension services <-> Mass spraying	0.844
Training and extension services <-> Operational efficiency	0.654
Training and extension services <-> Organisational ambidexterity	0.572
Training and extension services <-> Supplier development	0.944
Training and extension services <-> Sustainable economic performance	0.605
Training and extension services <-> Sustainable	0.552

environmental performance	
Training and extension services <-> sustainable performance	0.601
Training and extension services <-> Sustainable social performance	0.589

Source: Field survey, (2024)

APPENDIX E

Table 7: Indicator Reliability of Initial Model

	Outer loading
Apol1 <- Supplier development	0.825
Apol1 <- Direct supplier development	0.844
Apol1 <- Artificial pollination	0.895
Apol2 <- Supplier development	0.788
Apol2 <- Artificial pollination	0.899
Apol2 <- Direct supplier development	0.823
Apol3 <- Supplier development	0.854
Apol3 <- Artificial pollination	0.918
Apol3 <- Direct supplier development	0.882
Apol4 <- Direct supplier development	0.556
Apol4 <- Artificial pollination	0.708
Apol4 <- Supplier development	0.506
Apol5 <- Supplier development	-0.138
Apol5 <- Artificial pollination	-0.238
Apol5 <- Direct supplier development	-0.135
Apol6 <- Supplier development	0.518
Apol6 <- Artificial pollination	0.712
Apol6 <- Direct supplier development	0.576
Apol7 <- Artificial pollination	0.233
Apol7 <- Supplier development	0.138
Apol7 <- Direct supplier development	0.156
Cert1 <- Certification	0.454
Cert1 <- Indirect supplier development	0.367
Cert1 <- Supplier development	0.343
Cert10 <- Certification	0.603
Cert10 <- Indirect supplier development	0.623
Cert10 <- Supplier development	0.593
Cert2 <- Supplier development	0.354
Cert2 <- Indirect supplier development	0.384
Cert2 <- Certification	0.490
Cert3 <- Certification	-0.394
Cert3 <- Supplier development	-0.465
Cert3 <- Indirect supplier development	-0.464
Cert4 <- Certification	0.436
Cert4 <- Indirect supplier development	0.322
Cert4 <- Supplier development	0.284
Cert5 <- Supplier development	0.424
Cert5 <- Certification	0.630
Cert5 <- Indirect supplier development	0.494
Cert6 <- Indirect supplier development	0.631
Cert6 <- Certification	0.767
Cert6 <- Supplier development	0.575

Cert7 <- Indirect supplier development	0.515
Cert7 <- Certification	0.674
Cert7 <- Supplier development	0.489
Cert8 <- Supplier development	0.410
Cert8 <- Indirect supplier development	0.408
Cert8 <- Certification	0.556
Cert9 <- Supplier development	0.224
Cert9 <- Indirect supplier development	0.211
Cert9 <- Certification	0.233
CoRe1 <- Cocoa rehabilitation	0.574
CoRe1 <- Supplier development	0.513
CoRe1 <- Direct supplier development	0.570
CoRe10 <- Supplier development	0.799
CoRe10 <- Direct supplier development	0.823
CoRe10 <- Cocoa rehabilitation	0.858
CoRe2 <- Supplier development	-0.120
CoRe2 <- Direct supplier development	-0.099
CoRe2 <- Cocoa rehabilitation	-0.078
CoRe3 <- Cocoa rehabilitation	0.770
CoRe3 <- Supplier development	0.715
CoRe3 <- Direct supplier development	0.752
CoRe4 <- Cocoa rehabilitation	0.874
CoRe4 <- Supplier development	0.827
CoRe4 <- Direct supplier development	0.821
CoRe5 <- Cocoa rehabilitation	0.901
CoRe5 <- Supplier development	0.861
CoRe5 <- Direct supplier development	0.861
CoRe6 <- Direct supplier development	0.893
CoRe6 <- Supplier development	0.879
CoRe6 <- Cocoa rehabilitation	0.906
CoRe7 <- Cocoa rehabilitation	0.905
CoRe7 <- Supplier development	0.854
CoRe7 <- Direct supplier development	0.875
CoRe8 <- Cocoa rehabilitation	0.883
CoRe8 <- Direct supplier development	0.838
CoRe8 <- Supplier development	0.825
CoRe9 <- Cocoa rehabilitation	0.887
CoRe9 <- Supplier development	0.840
CoRe9 <- Direct supplier development	0.862
Env1 <- Sustainable performance	0.613
Env1 <- Sustainable environmental performance	0.596
Env10 <- Sustainable environmental performance	0.606
Env10 <- Sustainable performance	0.523
Env11 <- Sustainable performance	0.586
Env11 <- Sustainable environmental performance	0.647
Env12 <- Sustainable environmental performance	0.632
Env12 <- Sustainable performance	0.584
Env13 <- Sustainable environmental performance	0.717

Env13 <- sustainable performance	0.634
Env14 <- Sustainable environmental performance	0.617
Env14 <- Sustainable performance	0.581
Env2 <- Sustainable performance	0.612
Env2 <- Sustainable environmental performance	0.632
Env3 <- Sustainable environmental performance	0.676
Env3 <- Sustainable performance	0.658
Env4 <- Sustainable environmental performance	0.633
Env4 <- Sustainable performance	0.578
Env5 <- Sustainable environmental performance	0.606
Env5 <- Sustainable performance	0.597
Env6 <- Sustainable performance	0.627
Env6 <- Sustainable environmental performance	0.677
Env7 <- Sustainable performance	0.580
Env7 <- Sustainable environmental performance	0.628
Env8 <- Sustainable performance	0.587
Env8 <- Sustainable environmental performance	0.617
Env9 <- Sustainable performance	0.625
Env9 <- Sustainable environmental performance	0.657
Exat1 <- Organisational ambidexterity	0.688
Exat2 <- Organisational ambidexterity	0.719
Exat3 <- Organisational ambidexterity	0.694
Exat4 <- Organisational ambidexterity	0.695
Exat5 <- Organisational ambidexterity	0.732
Exat6 <- Organisational ambidexterity	0.659
Exp1 <- Organisational ambidexterity	0.721
Exp2 <- Organisational ambidexterity	0.690
Exp3 <- Organisational ambidexterity	0.571
Exp4 <- Organisational ambidexterity	0.664
Exp5 <- Organisational ambidexterity	0.640
Exp6 <- Organisational ambidexterity	0.682
Exp7 <- Organisational ambidexterity	0.547
Fage <- Firm age	1.000
Fin1 <- Supplier development	0.374
Fin1 <- Indirect supplier development	0.435
Fin1 <- Financing scheme	0.516
Fin10 <- Financing scheme	-0.694
Fin10 <- Indirect supplier development	-0.617
Fin10 <- Supplier development	-0.593
Fin2 <- Supplier development	0.523
Fin2 <- Indirect supplier development	0.577
Fin2 <- Financing scheme	0.633
Fin3 <- Supplier development	0.702
Fin3 <- Financing scheme	0.790
Fin3 <- Indirect supplier development	0.707
Fin4 <- Financing scheme	0.558
Fin4 <- Indirect supplier development	0.453
Fin4 <- Supplier development	0.451

Fin5 <- Indirect supplier development	0.476
Fin5 <- Financing scheme	0.587
Fin5 <- Supplier development	0.434
Fin6 <- Indirect supplier development	0.448
Fin6 <- Supplier development	0.424
Fin6 <- Financing scheme	0.567
Fin7 <- Financing scheme	0.540
Fin7 <- Indirect supplier development	0.449
Fin7 <- Supplier development	0.421
Fin8 <- Indirect supplier development	0.603
Fin8 <- Financing scheme	0.653
Fin8 <- Supplier development	0.601
Fin9 <- Supplier development	0.568
Fin9 <- Indirect supplier development	0.583
Fin9 <- Financing scheme	0.698
Fsize <- Firm size	1.000
Inp1 <- Input supplies	0.675
Inp1 <- Supplier development	0.574
Inp1 <- Indirect supplier development	0.607
Inp2 <- Supplier development	0.443
Inp2 <- Indirect supplier development	0.480
Inp2 <- Input supplies	0.571
Inp3 <- Supplier development	-0.614
Inp3 <- Input supplies	-0.666
Inp3 <- Indirect supplier development	-0.634
Inp4 <- Supplier development	0.466
Inp4 <- Indirect supplier development	0.496
Inp4 <- Input supplies	0.689
Inp5 <- Indirect supplier development	0.400
Inp5 <- Input supplies	0.535
Inp5 <- Supplier development	0.389
Inp6 <- Supplier development	0.521
Inp6 <- Indirect supplier development	0.544
Inp6 <- Input supplies	0.734
Inp7 <- Supplier development	0.648
Inp7 <- Input supplies	0.814
Inp7 <- Indirect supplier development	0.671
Map1 <- Direct supplier development	0.829
Map1 <- Mass pruning	0.847
Map1 <- Supplier development	0.792
Map2 <- Mass pruning	0.662
Map2 <- Direct supplier development	0.612
Map2 <- Supplier development	0.607
Map3 <- Direct supplier development	0.777
Map3 <- Supplier development	0.771
Map3 <- Mass pruning	0.818
Map4 <- Mass pruning	-0.507
Map4 <- Supplier development	-0.475

Map4 <- Direct supplier development	-0.474
Map5 <- Direct supplier development	0.739
Map5 <- Supplier development	0.728
Map5 <- Mass pruning	0.803
Map6 <- Supplier development	0.764
Map6 <- Direct supplier development	0.777
Map6 <- Mass pruning	0.829
Map7 <- Supplier development	0.825
Map7 <- Direct supplier development	0.836
Map7 <- Mass pruning	0.896
Map8 <- Direct supplier development	0.875
Map8 <- Supplier development	0.843
Map8 <- Mass pruning	0.919
Map9 <- Mass pruning	0.913
Map9 <- Supplier development	0.823
Map9 <- Direct supplier development	0.842
Mas1 <- Direct supplier development	0.796
Mas1 <- Supplier development	0.785
Mas1 <- Mass spraying	0.890
Mas2 <- Direct supplier development	0.795
Mas2 <- Supplier development	0.804
Mas2 <- Mass spraying	0.885
Mas3 <- Mass spraying	0.909
Mas3 <- Direct supplier development	0.800
Mas3 <- Supplier development	0.795
Mas4 <- Mass spraying	0.915
Mas4 <- Supplier development	0.792
Mas4 <- Direct supplier development	0.823
Mas5 <- Direct supplier development	0.882
Mas5 <- Supplier development	0.863
Mas5 <- Mass spraying	0.929
Mas6 <- Direct supplier development	0.860
Mas6 <- Supplier development	0.839
Mas6 <- Mass spraying	0.898
Mas7 <- Mass spraying	0.918
Mas7 <- Supplier development	0.838
Mas7 <- Direct supplier development	0.872
OE1 <- Operational efficiency	0.651
OE10 <- Operational efficiency	0.689
OE2 <- Operational efficiency	0.628
OE3 <- Operational efficiency	0.689
OE4 <- Operational efficiency	0.687
OE5 <- Operational efficiency	0.642
OE6 <- Operational efficiency	0.696
OE7 <- Operational efficiency	0.656
OE8 <- Operational efficiency	0.709
OE9 <- Operational efficiency	0.681
SBR1 <- Buyer-supplier relationship	0.624

SBR10 <- Buyer-supplier relationship	0.724
SBR11 <- Buyer-supplier relationship	0.761
SBR12 <- Buyer-supplier relationship	0.707
SBR13 <- Buyer-supplier relationship	0.653
SBR2 <- Buyer-supplier relationship	0.614
SBR3 <- Buyer-supplier relationship	0.641
SBR4 <- Buyer-supplier relationship	0.501
SBR5 <- Buyer-supplier relationship	0.630
SBR6 <- Buyer-supplier relationship	0.572
SBR7 <- Buyer-supplier relationship	0.685
SBR8 <- Buyer-supplier relationship	0.776
SBR9 <- Buyer-supplier relationship	0.778
SEP1 <- sustainable performance	0.554
SEP1 <- Sustainable economic performance	0.655
SEP10 <- sustainable performance	0.312
SEP10 <- Sustainable economic performance	0.296
SEP11 <- sustainable performance	0.513
SEP11 <- Sustainable economic performance	0.557
SEP12 <- Sustainable economic performance	0.497
SEP12 <- Sustainable performance	0.479
SEP2 <- Sustainable performance	0.614
SEP2 <- Sustainable economic performance	0.712
SEP3 <- Sustainable performance	0.624
SEP3 <- Sustainable economic performance	0.686
SEP4 <- Sustainable performance	0.653
SEP4 <- Sustainable economic performance	0.659
SEP5 <- Sustainable performance	0.539
SEP5 <- Sustainable economic performance	0.632
SEP6 <- Sustainable performance	0.589
SEP6 <- Sustainable economic performance	0.631
SEP7 <- Sustainable performance	0.608
SEP7 <- Sustainable economic performance	0.675
SEP8 <- Sustainable economic performance	0.619
SEP8 <- Sustainable performance	0.514
SEP9 <- Sustainable performance	0.533
SEP9 <- Sustainable economic performance	0.623
SEP1 <- Sustainable performance	0.600
SEP1 <- Sustainable social performance	0.589
SEP10 <- Sustainable social performance	0.637
SEP10 <- Sustainable performance	0.574
SEP11 <- Sustainable performance	0.643
SEP11 <- Sustainable social performance	0.691
SEP12 <- Sustainable social performance	0.680
SEP12 <- Sustainable performance	0.626
SEP13 <- Sustainable social performance	0.653
SEP13 <- Sustainable performance	0.602
SEP14 <- Sustainable performance	0.593
SEP14 <- Sustainable social performance	0.608

SEP2 <- sustainable performance	0.513
SEP2 <- Sustainable social performance	0.573
SEP3 <- Sustainable social performance	0.638
SEP3 <- Sustainable performance	0.593
SEP4 <- Sustainable social performance	0.632
SEP4 <- Sustainable performance	0.567
SEP6 <- Sustainable performance	0.579
SEP6 <- Sustainable social performance	0.617
SEP7 <- Sustainable social performance	0.607
SEP7 <- Sustainable performance	0.589
SEP8 <- Sustainable performance	0.047
SEP8 <- Sustainable social performance	0.053
SEP9 <- Sustainable performance	0.531
SEP9 <- Sustainable social performance	0.615
TES1 <- Indirect supplier development	0.801
TES1 <- Supplier development	0.776
TES1 <- Training and extension services	0.844
TES10 <- Indirect supplier development	0.842
TES10 <- Supplier development	0.821
TES10 <- Training and extension services	0.891
TES11 <- Supplier development	0.805
TES11 <- Indirect supplier development	0.838
TES11 <- Training and extension services	0.860
TES2 <- Indirect supplier development	0.776
TES2 <- Supplier development	0.756
TES2 <- Training and extension services	0.825
TES3 <- Supplier development	0.850
TES3 <- Training and extension services	0.892
TES3 <- Indirect supplier development	0.853
TES4 <- Training and extension services	0.887
TES4 <- Indirect supplier development	0.854
TES4 <- Supplier development	0.870
TES5 <- Supplier development	0.827
TES5 <- Indirect supplier development	0.843
TES5 <- Training and extension services	0.875
TES6 <- Supplier development	0.828
TES6 <- Training and extension services	0.900
TES6 <- Indirect supplier development	0.857
TES7 <- Supplier development	0.821
TES7 <- Training and extension services	0.887
TES7 <- Indirect supplier development	0.848
TES8 <- Indirect supplier development	0.864
TES8 <- Training and extension services	0.892
TES8 <- Supplier development	0.844
TES9 <- Supplier development	0.826
TES9 <- Training and extension services	0.886
TES9 <- Indirect supplier development	0.826
SEP5 <- Sustainable social performance	0.291

SEP5 <- sustainable performance	0.205
Firm size x Supplier development -> Firm size x Supplier development	1.000
Firm age x Supplier development -> Firm age x Supplier development	1.000

Source: Field survey, (2024)

APPENDIX F

Table 9: Heterotrait-Monotrait Ratio of Final Model

	HTMT
Firm age <-> Buyer-supplier relationship quality	0.118
Firm size <-> Buyer-supplier relationship quality	0.103
Firm size <-> Firm age	
Operational efficiency <-> Buyer-supplier relationship quality	0.592
Operational efficiency <-> Firm age	0.045
Operational efficiency <-> Firm size	0.060
Organisational ambidexterity <-> Buyer-supplier relationship quality	0.557
Organisational ambidexterity <-> Firm age	0.085
Organisational ambidexterity <-> Firm size	0.124
Organisational ambidexterity <-> Operational efficiency	0.712

Source: Field survey, (2024)

APPENDIX G

Table 13: Indicator Loading of Final Model

Indicator Loadings

	Outer loading	T statistics	P values
Dir SD -> Supplier development	0.927	43.625	0.000
Exat1 <-Organisational ambidexterity	0.726	23.981	0.000
Exat2 <-Organisational ambidexterity	0.731	27.922	0.000
Exat3 <-Organisational ambidexterity	0.747	35.389	0.000
Exat4 <-Organisational ambidexterity	0.721	26.371	0.000
Exat5 <-Organisational ambidexterity	0.759	31.983	0.000
Exat6 <-Organisational ambidexterity	0.708	24.766	0.000
Exp1 <- Organisational ambidexterity	0.721	31.384	0.000
Exp6 <- Organisational ambidexterity	0.672	21.415	0.000
Ind SD -> Supplier development	0.996	203.916	0.000
LV - SEcoPerf -> Sustainable performance	0.915	35.404	0.000
LV- SEnviPerf -> Sustainable performance	0.790	15.547	0.000
LV- SSocPerf -> Sustainable performance	0.869	27.411	0.000
Ope10 <- Operational efficiency	0.748	31.500	0.000
Ope4 <- Operational efficiency	0.667	19.243	0.000
Ope6 <- Operational efficiency	0.722	27.154	0.000
Ope7 <- Operational efficiency	0.731	26.339	0.000
Ope8 <- Operational efficiency	0.786	36.222	0.000
Ope9 <- Operational efficiency	0.762	31.692	0.000
SBR10 <- Buyer-supplier relationship quality	0.762	34.474	0.000
SBR11 <- Buyer-supplier relationship quality	0.751	36.042	0.000
SBR12 <- Buyer-supplier relationship quality	0.729	26.312	0.000
SBR13 <- Buyer-supplier relationship quality	0.684	22.073	0.000
SBR2 <- Buyer-supplier relationship quality	0.629	22.019	0.000
SBR3 <- Buyer-supplier relationship quality	0.628	20.390	0.000
SBR7 <- Buyer-supplier relationship quality	0.690	22.237	0.000

SBR8 <- Buyer-supplier relationship quality	0.801	45.695	0.000
SBR9 <- Buyer-supplier relationship quality	0.823	57.881	0.000

Source: Field survey, (2024)

APPENDIX H

Table 17: PLSpredict

	Q^2predict	PLS-SEM_RMSE	PLS-SEM_MAE	LM_RMSE	LM_MAE
SBR10	0.355	0.911	0.725	0.913	0.730
SBR11	0.360	0.829	0.659	0.831	0.658
SBR12	0.384	0.815	0.681	0.805	0.650
SBR13	0.304	0.858	0.690	0.848	0.680
SBR2	0.306	0.822	0.662	0.824	0.665
SBR3	0.253	0.816	0.649	0.814	0.652
SBR7	0.257	0.853	0.690	0.854	0.694
SBR8	0.434	0.828	0.683	0.817	0.679
SBR9	0.461	0.827	0.657	0.828	0.666
Ope10	0.151	0.903	0.757	0.901	0.750
Ope4	0.192	0.912	0.751	0.894	0.736
Ope6	0.129	0.913	0.739	0.909	0.733
Ope7	0.058	1.044	0.832	1.042	0.836
Ope8	0.109	1.040	0.862	1.040	0.862
Ope9	0.121	0.871	0.713	0.870	0.716
Exat1	0.165	0.981	0.832	0.970	0.822
Exat2	0.210	0.909	0.773	0.906	0.767
Exat3	0.137	0.966	0.791	0.965	0.787
Exat4	0.063	0.894	0.736	0.894	0.750
Exat5	0.122	0.905	0.728	0.909	0.731
Exat6	0.070	0.934	0.749	0.930	0.755
Exp1	0.210	0.896	0.743	0.884	0.736
Exp6	0.125	0.837	0.685	0.836	0.679
LV - SEcoPerf	0.318	0.828	0.668	0.808	0.646
LV-SEnviPerf	0.206	0.893	0.682	0.894	0.683
LV-SSocPerf	0.193	0.901	0.715	0.893	0.703

Source: Field survey, (2024)

APPENDIX I

	Original sample	T-statistics	P-value
GC (Supplier development) -> Buyer-supplier relationship quality	-0.509	3.161	
GC (Supplier development) -> Operational efficiency	0.031	0.166	0.434
GC (Supplier development) -> Organisational Ambidexterity	-0.092	0.552	0.291
GC (Buyer-supplier relationship quality) -> Operational efficiency	-0.04	0.406	0.342
GC (Organisational Ambidexterity) -> Operational efficiency	-0.094	0.554	0.29
GC (Operational efficiency) -> Sustainable performance	0.351	3.453	0
2nd stage combination			
GC (Supplier development) -> Buyer-supplier relationship quality	-0.509	3.161	0.001
GC (Supplier development) -> Sustainable performance	-0.569	3.236	0.001
GC (Supplier development) -> Operational efficiency	0.031	0.166	0.434
GC (Supplier development) -> Sustainable performance	-0.569	3.236	0.001
GC (Supplier development) -> Organisational Ambidexterity	-0.092	0.552	0.291
GC (Supplier development) -> Sustainable performance	-0.569	3.236	0.001
GC (Supplier development) -> Sustainable performance	-0.569	3.236	0.001
GC (Buyer-supplier relationship quality) -> Operational efficiency	-0.04	0.406	0.342
GC (Supplier development) -> Sustainable performance	-0.569	3.236	0.001
GC (Organisational Ambidexterity) -> Operational efficiency	-0.094	0.554	0.29
GC (Supplier development) -> Sustainable performance	-0.552	3.168	0.001
GC (Operational efficiency) -> Sustainable performance	0.343	3.56	0
GC (Supplier development) -> Buyer-supplier relationship quality	-0.509	3.161	0.001
GC (Supplier development) -> Operational efficiency	0.031	0.166	0.434
GC (Supplier development) -> Buyer-supplier relationship quality	-0.509	3.161	0.001

GC (Supplier development) -> Organisational Ambidexterity	-0.092	0.552	0.291
GC (Supplier development) -> Buyer-supplier relationship quality	-0.509	3.161	0.001
GC (Buyer-supplier relationship quality) -> Operational efficiency	-0.04	0.406	0.342
GC (Supplier development) -> Buyer-supplier relationship quality	-0.509	3.161	0.001
GC (Organisational Ambidexterity) -> Operational efficiency	-0.094	0.554	0.29
GC (Supplier development) -> Buyer-supplier relationship quality	-0.509	3.161	0.001
GC (Operational efficiency) -> Sustainable performance	0.351	3.453	0
GC (Supplier development) -> Operational efficiency	0.031	0.166	0.434
GC (Supplier development) -> Organisational Ambidexterity	-0.092	0.552	0.291
GC (Supplier development) -> Operational efficiency	0.032	0.171	0.432
GC (Buyer-supplier relationship quality) -> Operational efficiency	-0.04	0.409	0.341
GC (Supplier development) -> Operational efficiency	0.035	0.184	0.427
GC (Organisational Ambidexterity) -> Operational efficiency	-0.095	0.555	0.289
GC (Supplier development) -> Operational efficiency	0.031	0.166	0.434
GC (Operational efficiency) -> Sustainable performance	0.351	3.453	0
GC (Supplier development) -> Organisational Ambidexterity	-0.092	0.552	0.291
GC (Organisational Ambidexterity) -> Operational efficiency	-0.094	0.554	0.29
GC (Supplier development) -> Organisational Ambidexterity	-0.092	0.552	0.291
GC (Operational efficiency) -> Sustainable performance	0.351	3.453	0
GC (Operational efficiency) -> Sustainable performance	0.351	3.453	0
GC (Organisational Ambidexterity) -> Operational efficiency	-0.094	0.554	0.29
GC (Organisational Ambidexterity) -> Operational efficiency	-0.095	0.555	0.29
GC (Buyer-supplier relationship quality) -> Operational efficiency	-0.04	0.407	0.342
3 stage combination			

GC (Supplier development) -> Buyer-supplier relationship quality	-0.509	3.161	0.001
GC (Supplier development) -> Operational efficiency	0.031	0.166	0.434
GC (Supplier development) -> Sustainable performance	-0.569	3.236	0.001
GC (Supplier development) -> Buyer-supplier relationship quality	-0.509	3.161	0.001
GC (Supplier development) -> Organisational Ambidexterity	-0.092	0.552	0.291
GC (Supplier development) -> Sustainable performance	-0.569	3.236	0.001
GC (Supplier development) -> Buyer-supplier relationship quality	-0.509	3.161	0.001
GC (Supplier development) -> Sustainable performance	-0.569	3.236	0.001
GC (Buyer-supplier relationship quality) -> Operational efficiency	-0.04	0.406	0.342
GC (Supplier development) -> Buyer-supplier relationship quality	-0.509	3.161	0.001
GC (Supplier development) -> Sustainable performance	-0.569	3.236	0.001
GC (Organisational Ambidexterity) -> Operational efficiency	-0.094	0.554	0.29
GC (Supplier development) -> Buyer-supplier relationship quality	-0.509	3.161	0.001
GC (Supplier development) -> Sustainable performance	-0.552	3.168	0.001
GC (Operational efficiency) -> Sustainable performance	0.343	3.56	0
GC (Supplier development) -> Buyer-supplier relationship quality	-0.509	3.161	0.001
GC (Supplier development) -> Sustainable performance	-0.552	3.168	0.001
GC (Operational efficiency) -> Sustainable performance	0.343	3.56	0
GC (Supplier development) -> Buyer-supplier relationship quality	-0.509	3.161	0.001
GC (Supplier development) -> Operational efficiency	0.032	0.171	0.432
GC (Buyer-supplier relationship quality) -> Operational efficiency	-0.04	0.409	0.341
GC (Supplier development) -> Buyer-supplier relationship quality	-0.509	3.161	0.001
GC (Supplier development) -> Operational efficiency	0.035	0.184	0.427

GC (Organisational Ambidexterity) -> Operational efficiency	-0.095	0.555	0.289
GC (Supplier development) -> Buyer-supplier relationship quality	-0.509	3.161	0.001
GC (Supplier development) -> Operational efficiency	0.031	0.166	0.434
GC (Operational efficiency) -> Sustainable performance	0.351	3.453	0
GC (Supplier development) -> Operational efficiency	0.035	0.184	0.427
GC (Supplier development) -> Organisational Ambidexterity	-0.092	0.552	0.291
GC (Organisational Ambidexterity) -> Operational efficiency	-0.095	0.555	0.289
GC (Supplier development) -> Operational efficiency	0.032	0.171	0.432
GC (Supplier development) -> Organisational Ambidexterity	-0.092	0.552	0.291
GC (Buyer-supplier relationship quality) -> Operational efficiency	-0.04	0.409	0.341
GC (Supplier development) -> Operational efficiency	0.031	0.166	0.434
GC (Supplier development) -> Organisational Ambidexterity	-0.092	0.552	0.291
GC (Operational efficiency) -> Sustainable performance	0.351	3.453	0
GC (Supplier development) -> Organisational Ambidexterity	-0.092	0.552	0.291
GC (Buyer-supplier relationship quality) -> Operational efficiency	-0.04	0.407	0.342
GC (Organisational Ambidexterity) -> Operational efficiency	-0.095	0.555	0.29
GC (Supplier development) -> Organisational Ambidexterity	-0.092	0.552	0.291
GC (Organisational Ambidexterity) -> Operational efficiency	-0.094	0.554	0.29
GC (Operational efficiency) -> Sustainable performance	0.351	3.453	0
GC (Organisational Ambidexterity) -> Operational efficiency	-0.095	0.555	0.29
GC (Operational efficiency) -> Sustainable performance	0.351	3.453	0
GC (Buyer-supplier relationship quality) -> Operational efficiency	-0.04	0.407	0.342
stage 4 combinations			
GC (Supplier development) -> Buyer-supplier relationship quality	-0.509	3.161	0.001

GC (Supplier development) -> Operational efficiency	0.031	0.166	0.434
GC (Supplier development) -> Organisational Ambidexterity	-0.092	0.552	0.291
GC (Supplier development) -> Sustainable performance	-0.569	3.236	0.001
GC (Supplier development) -> Buyer-supplier relationship quality	-0.509	3.161	0.001
GC (Supplier development) -> Operational efficiency	0.035	0.184	0.427
GC (Supplier development) -> Sustainable performance	-0.569	3.236	0.001
GC (Organisational Ambidexterity) -> Operational efficiency	-0.095	0.555	0.289
GC (Supplier development) -> Buyer-supplier relationship quality	-0.509	3.161	0.001
GC (Supplier development) -> Operational efficiency	0.032	0.171	0.432
GC (Supplier development) -> Sustainable performance	-0.569	3.236	0.001
GC (Buyer-supplier relationship quality) -> Operational efficiency	-0.04	0.409	0.341
GC (Supplier development) -> Buyer-supplier relationship quality	-0.509	3.161	0.001
GC (Supplier development) -> Operational efficiency	0.031	0.166	0.434
GC (Supplier development) -> Sustainable performance	-0.552	3.168	0.001
GC (Operational efficiency) -> Sustainable performance	0.343	3.56	0
GC (Supplier development) -> Buyer-supplier relationship quality	-0.509	3.161	0.001
GC (Supplier development) -> Operational efficiency	0.031	0.166	0.434
GC (Supplier development) -> Sustainable performance	-0.552	3.168	0.001
GC (Operational efficiency) -> Sustainable performance	0.343	3.56	0
GC (Supplier development) -> Buyer-supplier relationship quality	-0.509	3.161	0.001
GC (Supplier development) -> Operational efficiency	0.035	0.184	0.427
GC (Supplier development) -> Organisational Ambidexterity	-0.092	0.552	0.291
GC (Organisational Ambidexterity) -> Operational efficiency	-0.095	0.555	0.289

GC (Supplier development) -> Buyer-supplier relationship quality	-0.509	3.161	0.001
GC (Supplier development) -> Operational efficiency	0.031	0.166	0.434
GC (Supplier development) -> Organisational Ambidexterity	-0.092	0.552	0.291
GC (Operational efficiency) -> Sustainable performance	0.351	3.453	0
GC (Supplier development) -> Operational efficiency	0.036	0.19	0.425
GC (Supplier development) -> Organisational Ambidexterity	-0.092	0.552	0.291
GC (Organisational Ambidexterity) -> Operational efficiency	-0.095	0.556	0.289
GC (Buyer-supplier relationship quality) -> Operational efficiency	-0.04	0.41	0.341
GC (Supplier development) -> Operational efficiency	0.035	0.184	0.427
GC (Supplier development) -> Organisational Ambidexterity	-0.092	0.552	0.291
GC (Organisational Ambidexterity) -> Operational efficiency	-0.095	0.555	0.289
GC (Operational efficiency) -> Sustainable performance	0.351	3.453	0
Stage 5 combinations			
GC (Supplier development) -> Buyer-supplier relationship quality	-0.509	3.161	0.001
GC (Supplier development) -> Operational efficiency	0.032	0.171	0.432
GC (Supplier development) -> Organisational Ambidexterity	-0.092	0.552	0.291
GC (Supplier development) -> Sustainable performance	-0.569	3.236	0.001
GC (Buyer-supplier relationship quality) -> Operational efficiency	-0.04	0.409	0.341
GC (Supplier development) -> Buyer-supplier relationship quality	-0.509	3.161	0.001
GC (Supplier development) -> Operational efficiency	0.035	0.184	0.427
GC (Supplier development) -> Organisational Ambidexterity	-0.092	0.552	0.291
GC (Supplier development) -> Sustainable performance	-0.569	3.236	0.001
GC (Organisational Ambidexterity) -> Operational efficiency	-0.095	0.555	0.289
GC (Supplier development) -> Buyer-supplier relationship quality	-0.509	3.161	0.001

GC (Supplier development) -> Operational efficiency	0.031	0.166	0.434
GC (Supplier development) -> Organisational Ambidexterity	-0.092	0.552	0.291
GC (Supplier development) -> Sustainable performance	-0.552	3.168	0.001
GC (Operational efficiency) -> Sustainable performance	0.343	3.56	0
GC (Supplier development) -> Buyer-supplier relationship quality	-0.509	3.161	0.001
GC (Supplier development) -> Operational efficiency	0.036	0.19	0.425
GC (Supplier development) -> Organisational Ambidexterity	-0.092	0.552	0.291
GC (Buyer-supplier relationship quality) -> Operational efficiency	-0.04	0.41	0.341
GC (Organisational Ambidexterity) -> Operational efficiency	-0.095	0.556	0.289
GC (Supplier development) -> Buyer-supplier relationship quality	-0.509	3.161	0.001
GC (Supplier development) -> Operational efficiency	0.032	0.171	0.432
GC (Supplier development) -> Organisational Ambidexterity	-0.092	0.552	0.291
GC (Buyer-supplier relationship quality) -> Operational efficiency	-0.04	0.409	0.341
GC (Operational efficiency) -> Sustainable performance	0.351	3.453	0
GC (Supplier development) -> Operational efficiency	0.036	0.19	0.425
GC (Supplier development) -> Organisational Ambidexterity	-0.092	0.552	0.291
GC (Organisational Ambidexterity) -> Operational efficiency	-0.095	0.556	0.289
GC (Buyer-supplier relationship quality) -> Operational efficiency	-0.04	0.41	0.341
GC (Operational efficiency) -> Sustainable performance	0.351	3.453	0
6th stage combination			
GC (Supplier development) -> Buyer-supplier relationship quality	-0.509	3.161	0.001
GC (Supplier development) -> Operational efficiency	0.036	0.19	0.425
GC (Supplier development) -> Organisational Ambidexterity	-0.092	0.552	0.291
GC (Supplier development) -> Sustainable performance	-0.569	3.236	0.001

GC (Buyer-supplier relationship quality) -> Operational efficiency	-0.04	0.41	0.341
GC (Organisational Ambidexterity) -> Operational efficiency	-0.095	0.556	0.289
GC (Supplier development) -> Buyer-supplier relationship quality	-0.509	3.161	0.001
GC (Supplier development) -> Operational efficiency	0.035	0.184	0.427
GC (Supplier development) -> Organisational Ambidexterity	-0.092	0.552	0.291
GC (Supplier development) -> Sustainable performance	-0.552	3.168	0.001
GC (Organisational Ambidexterity) -> Operational efficiency	-0.095	0.555	0.289
GC (Operational efficiency) -> Sustainable performance	0.343	3.56	0
GC (Supplier development) -> Buyer-supplier relationship quality	-0.509	3.161	0.001
GC (Supplier development) -> Operational efficiency	0.035	0.184	0.427
GC (Supplier development) -> Organisational Ambidexterity	-0.092	0.552	0.291
GC (Supplier development) -> Sustainable performance	-0.552	3.168	0.001
GC (Organisational Ambidexterity) -> Operational efficiency	-0.095	0.555	0.289
GC (Operational efficiency) -> Sustainable performance	0.343	3.56	0
7th stage combination			
GC (Supplier development) -> Buyer-supplier relationship quality	-0.509	3.161	0.001
GC (Supplier development) -> Operational efficiency	0.036	0.19	0.425
GC (Supplier development) -> Organisational Ambidexterity	-0.092	0.552	0.291
GC (Supplier development) -> Sustainable performance	-0.552	3.168	0.001
GC (Buyer-supplier relationship quality) -> Operational efficiency	-0.04	0.41	0.341
GC (Organisational Ambidexterity) -> Operational efficiency	-0.095	0.556	0.289
GC (Operational efficiency) -> Sustainable performance	0.343	3.56	0

APPENDIX J

UNIVERSITY OF CAPE COAST

INSTITUTIONAL REVIEW BOARD SECRETARIAT

TEL: [illegible] / [illegible]
E-MAIL: [illegible]
OUR REF: IRB/C3/Vol.2/0089
YOUR REF:
OMB NO: 0990-0279
IORG #: IORG0011497

12TH AUGUST, 2024

Mr. Lawrence Yaw Kusi
Department of Marketing and Supply Chain Management
University of Cape Coast

Dear Mr. Kusi,

ETHICAL CLEARANCE – ID (UCCIRB/CHLS/2023/152)

The University of Cape Coast Institutional Review Board (UCCIRB) has granted Provisional Approval for the implementation of your **Towards Supplier Development and Sustainability of Cocoa Supply Chain in Ghana: Consideration of Contextual Factors.** This approval is valid from **12th August 2024 to 11th August 2025.** You may apply for an extension of ethical approval if the study lasts for more than 12 months.

Please note that any modification to the project must first receive renewal clearance from the UCCIRB before its implementation. You are required to submit a periodic review of the protocol to the Board and a final full review to the UCCIRB on completion of the research. The UCCIRB may observe or cause to be observed procedures and records of the research during and after implementation.

You are also required to report all serious adverse events related to this study to the UCCIRB within seven days verbally and fourteen days in writing.

Always quote the protocol identification number in all future correspondence with us about this protocol.

Yours faithfully,

Kofi F. Amuquandoh
Ag. Administrator

ADMINISTRATOR
INSTITUTIONAL REVIEW BOARD
UNIVERSITY OF CAPE COAST

Prof Fiifi Amoako Johnson
Chairperson

CHAIRPERSON
INSTITUTIONAL REVIEW BOARD
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