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Review

Review of Strategic Agility: A Holistic Framework for Fresh Produce Supply Chain Disruptions

David Eshun Yawson ^{1,*}  and Fred A. Yamoah ² 

¹ GIMPA Business School, Ghana Institute of Management and Public Administration (GIMPA), Achimota, Accra P.O. Box AH 50, Ghana

² Department of Management, Birkbeck-University of London, London WC1E 7HX, UK

* Correspondence: dyawson@gimpa.edu.gh

Abstract: The influence of the rapidly changing business environment due to the COVID-19 global pandemic presents an important organizational challenge to fresh produce export supply chains in developing countries such as Ghana. Such an inimical supply chain problem highlights the relevance of supply chain agility as a potent methodological framework to measure, monitor and evaluate these challenges in stable as well as turbulent times. This review paper focuses on the applicability of a framework for Supply Chain Agility as a methodological framework in stable (pre-COVID-19) versus turbulent (COVID-19) business environments. We argue and propose that Supply Chain Agility Framework is a holistic framework which is efficacious in both stable and unstable supply chain environments. This is amply supported by the central plank of our proposition that the Supply Chain Agility Framework offers an adaptable tool that can serve as a panacea to fresh produce supply chain challenges not only in a stable (pre-COVID-19) business environment but also effective and applicable in a turbulent business environment, such as experienced during the COVID-19 pandemic. The implications of this proposition for the fresh produce export supply chain industry and relevant stakeholders are duly presented.



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Keywords: fresh produce supply chain; ombudsman agility framework; stable business environment; COVID-19 turbulent environment

1. Introduction

The COVID-19 pandemic has disrupted global supply chains and negatively impacted national economies around the world [1]. This has revealed vulnerabilities in global food supply chains that are critical for human survival. Gao et al. [2] (p. 832) define supply chain disruptions as events such as fire or machine breakdown in a production facility, an unexpected surge in demand or a reduction in supply, natural disasters, or customs delays in a node of the supply chain. Food industry players in developing countries have been encouraged to explore global markets for their produce [3] to grow and further develop their businesses [4]. Such a strategy will enable them to take advantage of the potential benefits of participating in the global economy [5,6]. However, global food supply chains have been largely affected and brought under scrutiny during this pandemic as countries respond to measures and regulations to combat the pandemic [7–9]. Indeed, food production, transporting and shipping have been disrupted to different degrees and in different instances [10,11]. These have caused unprecedented disruptions at various operational levels in these supply chains and participating organisations. [8,11–13] The attendant disruptions in the demand patterns from international to the local have called into question the paradigm anchored in overreliance on global supply chains in times such as the current pandemic as against alternative parallel development of “local food” channels for these global export food chains [14,15], especially those with linkages to Sub-Saharan African food supply chains [16].

Ghana, a Sub-Saharan African lower middle-income country has been supported by global organisations to develop alternate exports, which are mainly for food products and termed as Non-Traditional Exports (NTEs) [17,18]. In Ghana, one of the main NTEs is the export of fresh pineapples. Typically, food export supply chains have been developed based on the paradigm of participating in world trade [3,6,19] with the hope of building competitiveness [20]. However, these food export supply chains, especially the fresh pineapple export chains have on many occasions suffered major incidents/shocks of changes in market regulation and in demand patterns that have bankrupted a significant number of chain actors (companies) seeking to export in the recent past [21–23]. Admittedly, the COVID-19 pandemic is by all measures a major global challenge which has severely impacted the export food chains. These shocks especially by this pandemic are more devastating as almost all food exporters in developing countries such as Ghana, do not have alternative competitive “local food” product outlets to rely on in times of such global pandemics [5,16]. Therefore, where almost all national country borders were closed to human and goods traffic for food exporters at some point during the pandemic as part of measures to manage the pandemic, this did create critical challenges. These issues cascade into other issues of safeguarding small and medium businesses to protecting local economies. However, these incidences and shocks encountered by actors in the fresh fruits export supply chain would have to serve as learning opportunities to build strategic agility in these chains [4,24–26]. This is to improve competitiveness in these chains and enable them to withstand shocks in their connection to international food supply chains [4,10,24,26,27].

In this review paper, therefore, we use a developing country fresh fruit export supply chain (i.e., Ghanaian Pineapple Exports Supply Chain) as a case study to illustrate the pre-COVID and during COVID scenarios of developing country fresh fruit supply chains, to explore the current supply chain paradigm, the alternatives to building agility and competitiveness, and the paradigm of creating alternative “local food” channels in fresh fruit supply chains. The review is grounded in the domain of alternative methodological framework used for the evaluation and monitoring of strategic agility in horticultural export supply chains and their context of development [5] to make the following contributions: First, present the competitiveness and agile efficacy imperatives of the Ghanaian Fresh Pineapple Exports supply chain before the COVID-19 pandemic. Secondly, we present the competitive advantage and strategic agile efficacy imperatives of the Ghanaian Fresh Pineapple Exports supply chain during COVID-19 pandemic.

It is our position that the need has arisen for a second look at paradigms for the development of fresh fruit supply chains, especially in Sub-Saharan African countries to build competitiveness through strategic agility to ensure corresponding resilience. Based on a critical review focused on the applicability of Supply chain agility as a methodological framework in a stable (pre-COVID-19) versus turbulent (COVID-19) business environment, we argue that strategic agility framework offers an adaptable tool as a panacea to fresh produce supply chain challenges in both stable and turbulent fresh produce export supply chain environments.

The rest of the paper is organized as follows: the theoretical foundations of agility in supply chains; horticulture exports supply chain and the COVID-19 pandemic; horticulture exports supply chain monitoring and evaluation and the theoretical lens for supply chain agility. Then, the scenarios for comparing the applicability of strategic agility under stable and turbulent COVID-19 business environments are presented. Followed by the background of the Ghanaian fresh pineapple supply chain to Europe; supply chain agility as a methodological framework in a stable (pre-COVID-19) and turbulent (COVID-19) business environments; propositions; and concluding remarks and contributions. The paper concludes with the implications for research.

2. Theoretical Foundations of Agility in Supply Chains

The literature describes strategic agility as the “ability of management to constantly and rapidly sense and respond to a changing environment by intentionally making strategic

moves and consequently adopting the necessary organizational configuration for successful implementation” (Weber and Tarba, [28] (p. 7)). Therefore, strategic agility examines processes, actions, structures, culture, attributes, skills and relationships designed to ensure the organization remains flexible when it faces uncertainties [28]. This is important as De Groot [29] defines flexibility as a hedge against the diversity of the environment. Additionally, Shukla et al. [30] defined it as the ability to change with little penalty in time effort, cost or performance’ across four dimensions: temporal, range, intention and focus. Strategic agility gained prominence as current theoretical approaches such as “strategic planning”, “competitive advantage” and “resource-based view” were found inadequate and vague for strategic options in the complex business environment and market disruptions [28,31]. The introduction of the concept of the agile enterprise was driven by the emergence of rapid change in the business environment is accelerating and overtaking the abilities of many organisations to adapt [32]. Thus, as enabling, many organisations gained leverage from the strategic agility concept [33]. From the literature, the main thrust of strategic agility is flexibility notably the capacity of the actors and or entities to rapidly sense and seize opportunities, change direction and avoid collusion or failure [30,34–36]. However, the ability and potency to remain sufficiently agile in order to manage and adjust to change caused by strategic discontinuities, business environments and disruptions remain the main crust of the strategic agility philosophy [37]. Thus, strategic agility examines actions, processes, structures, culture, attributes, skills and relationships designed to ensure the organization, the network or the supply chain remains flexible when it encounters uncertainties [28].

However, does strategic agility provide leverage in supply chains? The thrust of strategic agility’s relationships with flexibility throughout an organisation or supply chain implies a perspective of reconfiguring resources in an organization or supply chain for optimum performance [38,39]. Thus, as a competitive strategy component that can be pursued in management scenarios, it is the ability to swiftly change businesses and business processes beyond the normal level of flexibility to effectively manage unpredictable external and internal changes in an organisation or supply chain. Strategic agility, therefore, is seen as a concept with broad scope and has “multidimensional constructs” in supply chains and is generally presented as supply chain agility (SCA) [40].

The literature traces the evolution of the concept of supply chain agility to four main aspects: pathways, criteria, scope and objectives [41]. The early proponents restricted it to customer responsive manner [42], thus limiting the concept to a reactive capability of providing speedy responses to sudden changes in demand, to gain leverage [41]. However, after Li et al. [43] work, the concept has been significantly widened with different adaptations. Do et al. [41] capture this evolution in Figure 1.

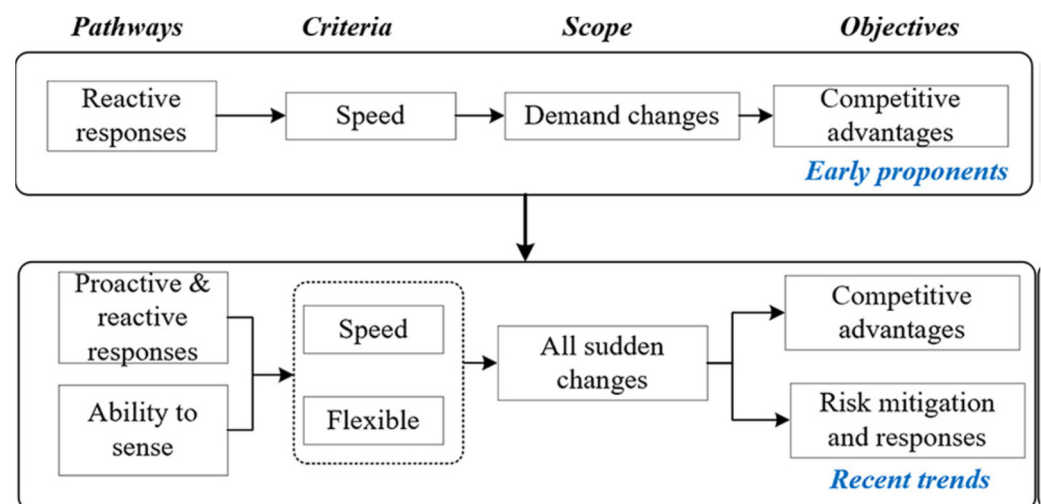


Figure 1. Evolution of Supply Chain Agility Concept (Adapted from Do et al. [41] (p. 739)).

As a pathway, supply chain agility is now conceptualized to include the physical capability of taking reactive and proactive measures, and the cognitive capability of alertness and quick anticipation and detection of opportunities and sensing turbulence [41]. Golgeci et al. [44] expanded these cognitive capabilities to include market learning and innovation. The criteria perspective of supply chain agility expands the speed criterion for response assessment to change to include flexibility [36,39,43,45–47]. The scope perspective ensues supply chain agility expanded to include all sudden changes both internal and external. Li et al. [43] included the immediate and sudden components of change to the scope and other literature includes uncertain, temporary, abrupt and unexpected changes in the short and immediate term [47–50]. Do et al. [41] assert that this attribute of supply chain agility is more pertinent in scenarios such as the COVID-19 pandemic context. From the dimension of the objectives or the overarching goal of the supply chain, Yusuf et al. [47] emphasize that supply chain agility enables firms to attain leverage and competitive advantage. Thus, improving competitive metrics such as operational performance indicators (i.e., product innovation, lead time reduction and service quality), and strategic performance indicators (i.e., competitiveness, financial, relational and marketing performance) [51–53]. In addition, the literature incorporates supply chain agility in business continuity [54], and opportunity-seeking in times of turbulence [13,55] to serve as risk-mitigating factors [38,56,57].

2.1. Horticulture Exports Supply Chain and COVID-19 Pandemic

Research on the global COVID-19 pandemic posits that it is expected to have severe economic consequences, resulting in a 3 % contraction of the world economy [22]. In this view, countries in Sub-Saharan Africa (SSA) are expected to be most severely affected [16]. Vos et al. [9] posited that the COVID-19 pandemic will affect food supply chains in three main ways. These are succinctly captured in Van Hoyweghen et al. [13] (p. 424) as:

- i. “disruptions in international trade, stemming from an increase in trade costs due to restrictions in international mobility and quarantine measures, or stemming from trade policy measures, such as export taxes and bans, in response to the crisis.”
- ii. “decline in on-farm labour, stemming from workers being unwilling or unable to work due to contamination risk and various containment measures, leading to reductions in land productivity and declining agricultural output.”
- iii. “decline in productivity and farm output, caused by disruptions in distribution channels and in the provision of capital inputs and services. Effects likely differ with the type of product, and the structure and organization of supply chains.”

In addition, the literature recognises that the size of production and distribution units, the capital intensity of operations, the level of vertical coordination, the length of the chains, and the level of integration in international markets will be impacted differently resulting in supply chains exhibiting different levels of resilience to the effects of COVID-19 pandemic [49,58,59]. These will affect supply chains differently with distinctions in traditional, transitional and modern supply chains. Van Hoyweghen et al. [13] (p. 424) therefore argued that “as traditional and transitional supply chains are less integrated in international markets on the output side and oriented more toward production for domestic markets, they might be less affected by international trade disruptions.”

2.2. Horticulture Exports Supply Chain Monitoring and Evaluation

We then proceed to review the literature on monitoring and evaluation frameworks for horticultural supply chains to enable the study to evaluate the effects of the global COVID-19 pandemic measures in the Ghanaian horticultural supply chain. There is a need to monitor and evaluate the horticulture export supply chain for the impact of the pandemic and present strategic agility imperatives. The literature presents studies and frameworks for optimal replenishment strategy [60] and disruption risk mitigation [2]. However, Webber and Labaste [20] posit the application of traditional monitoring approaches in most Sub-Saharan African horticultural export supply chains encounters difficulties. These include, but are not limited to systems, that are not adjusted to the measurement vocabulary of the

industry; challenges in attributing industry changes to strategic interventions; inability to provide insights from monitoring into enhancing organisational practices to drive the industry; and inability to clearly delegated or insufficient resources allocated monitoring responsibilities. There is, therefore, the need for appropriate methods for monitoring performance in the Sub-Saharan African horticultural export supply chain to provide feedback for decision-making, especially in a global disruption such as the COVID-19 pandemic. Even as the markets for the exporters are driven by foreign demand with high continual business environment changes.

Currently, the literature acknowledges the PAID (Process indicators, Action indicators, Investment indicators, Delivered results) framework as the most comprehensive evaluation approach used for supply chains [20]. This framework not only measures co-investment by stakeholders in addition to delivered results and can be used in supply chain projects when proper benchmarks are determined by chain actors. However, it has not been designed to measure impacts experienced by actors in the supply chain and various systems components of the supply chain. The framework focuses on performance chain-wide by (1) implementation of strategy and (2) increases in productivity [20]. Therefore, leaving a gap of in need for a framework to measure the effects on the systems component of the supply chains.

2.3. A Theoretical Lens for Supply Chain Agility

From Section 2, supply chain agility seen as strategic agility requires the competence to manage, sense changes and mobilize resources to adjust to change caused by strategic discontinuities, business environment and disruptions. Thus, supply chain agility could be considered a dynamic capability, since the literature defines dynamic capability as the ability to “integrate, build and reconfigure internal and external competencies to address rapidly changing environments” (Teece, [61] (p. 516)). Do et al. [41] present research that has employed dynamic capability as a theoretical lens to enhance understanding of strategic supply chain agility [45,48,53,61,62].

The framework to sense the required supply chain agility prerequisites and redesign variables as discussed in Section 2.2 has been sparsely researched and has left a gap in the measurement of supply chain components. Since supply chain agility as strategic agility is a management decision and Mentzer et al. [63] proposed a broader and generalised definition for supply chain management as the systematic, strategic coordination of business functions and organisation tactics across actors within the supply chain, ultimately for improving the long-term performance of the supply chain actors and the supply chain as a whole. In addition, from the system dynamics view and the “logistical concept”, a supply chain scenario consists of a managed system, managing system, information and organization [64].

Therefore, to ensure the application of supply chain agility and to implement it, there are identified variables in the supply chain that could be redesigned to achieve the required agile configuration of the supply chain. These are the supply chain redesign variables. A supply chain redesign variable is defined as a management decision variable at the strategic, tactical or operational level that determines the setting of one of the descriptive elements of the managed, managing, information system or organization structure [49]. Vorst [46] (p. 64) classifies these redesign variables in a supply chain as shown in Table 1.

Additionally, Yawson and Aguiar [65,66] developed elements of the components that will require supply chain agility in developing countries’ horticultural export supply chains based on the redesign variables in Table 1 and is presented in Table 2.

With the disruptive change due to the COVID-19 pandemic in fresh produce supply chains, therefore, dealing with uncertainty denotes whether or when a certain event occurs. However, dealing with uncertainty requires evaluating the implications if certain events were to occur. In the case of the fresh produce supply chain, strategic agility would be the supply chain actor organizations or chain-wide supply chain response. Generally, for fresh produce supply chains, horticultural producers adopt and develop various strategies in

order to survive and develop [51]. These strategies are based on three key aspects: (1) organisational innovation; (2) production innovation; and (3) product innovation [67].

Table 1. Classification of Supply Chain Redesign Variables. Adapted from Vorst (2000) [46] (p. 64).

Managed System	Managing System	Information System	Organization
Network design Facility design Resource and product characteristics	Hierarchical decision levels Type of decision making Position of the Customer order decoupling point (CODP) Level of coordination <ul style="list-style-type: none"> ○ Within organization ○ Within the supply chain 	Transactional IT systems Analytical IT systems	Division of tasks Division of authority and responsibilities.

Table 2. Typology of Fresh Produce Horticultural Export Supply Chain Elements of the Components Requiring Agility.

Supply Chain Management Concept Component	Elements of The Supply Chain Components Requiring Agility
Managed System (Infrastructure) (MDS)	Cold chain infrastructure_(MDS 1)
	Post-harvest infrastructure_(MDS2)
	Packaging material (e.g., pallets, cartons)_(MDS3)
	Field infrastructure for production_(MDS4)
	Field infrastructure for labour_(MDS5)
	Internal logistics infrastructure (e.g., transport)_(MDS6)
	External logistics infrastructure (e.g., shipping, air)_(MDS7)
	Road infrastructure_(MDS8)
	Environment (e.g., taxes, regulation)_(MDS9)
	Production infrastructure_(MDS10)
	Input suppliers (e.g., fertilizers, pesticides)_(MDS11)
	Planting material production_(MDS12)
	Distribution network design_(MDS13)
	Product varieties_(MDS14)
	Land for production_(MDS15)
	Irrigation facilities_(MDS16)
Managing System (Management) (MGS)	Management structure_(MGS1)
	Management Systems_(MGS2)
	Decision Making_(MGS3)
	Level of coordination in the organization_(MGS4)
	Level of coordination in the supply chain_(MGS5)
Information System (INS)	Information exchange system_(INS1)
	Electronic information systems_(INS2)
	Electronic information management_(INS3)
	Databases on markets and competition_(INS4)
	Standardized information system for supply chain integration_(INS5)

Table 2. Cont.

Supply Chain Management Concept Component	Elements of The Supply Chain Components Requiring Agility
Organization (ORG)	Definition of organizational logistical objectives_(ORG1)
	Definition of supply chain logistical objectives_(ORG2)
	Definition of organizational logistical performance indicators_(ORG3)
	Definition of supply chain logistical performance indicators_(ORG4)
	Training of staff (internal and external)_(ORG5)

Therefore, we adopt the framework by Yawson and Aguiar [65] and Yawson and Aguiar [66] to identify components and elements in a developing countries' horticultural export supply chain that required agility due to the disruption of the COVID-19 pandemic. This is to provide insight into supply chain evaluation in the horticultural export development context to enable the building of the critical responsive strategy required to compete. In the framework, the external and internal environment are conceptualised to affect the four theoretical (logistical concept) components of the supply chain, the managed system (infrastructure), managing system (management), information system and organisation system. The framework is shown in Figure 2. The relationships of the agility drivers to the various components of the supply chain are presented, ensuring the framework account for internal and external environmental factors (politics, economics, society and technology) [68] and also four agility dimensions: cooperating to enhance competitiveness, enriching the customer, mastering change and uncertainty, and leveraging the impact of people and information [69]. Additionally, the framework also accounts for companies as part of a network, showing the affected and the level of agility of the supply chain [70]. From the framework in Figure 2, the change factors relate to the following components of the supply chain elements:

- **The managed system:** The supply chain actors with specified roles in the supply chain and their required infrastructure [71], which can be viewed from three levels: network design, facility design, and resource characteristics.
- **The managing system:** This component plans, controls and coordinates the business processes in the supply chain to ensure the realization of the logistical objectives within the limitations of the supply chain configuration and strategic supply chain objectives [72].
- **The information system:** This component provides and coordinates the information for the managing system for decision-making and control of actions.
- **The organisation structure:** This component comprises two main elements [73]: the establishment of tasks and their coordination to realize set objectives.
- **Agility drivers:** These are internal or external factors in the business environment influencing the required level of business agility. Zhang and Sharifi [55] (p. 498) define "agility drivers as changes/pressures from the business environment that necessitate a company to search for new ways of running its business in order to maintain its competitiveness".
- **Specification of redesign variables (capabilities):** These are the essential capabilities variable needed by the company in order to respond positively to utilising the business environment changes.
- **Agility gaps:** Agility gaps arise when the firm has difficulty in acquiring the level of agility to respond to business environment changes in a timely and cost-effective manner.
- **Agility enablers:** Agility enablers are the required variables for a business to enhance its strategic agility. The model presents enablers of supply chain actors and supply chain strategic agility.

- **Supply chain performance:** Supply chain performance is the level at which a supply chain fulfils end-user requirements based on performance indicators and the given total cost to the supply chain [46].
- **Agility redesign variable:** This is management decisions at the strategic level that determines one of the logistic concept components of the supply chain (managed, managing, information system and organisation structure).

A conceptual framework for supply chain agility analysis

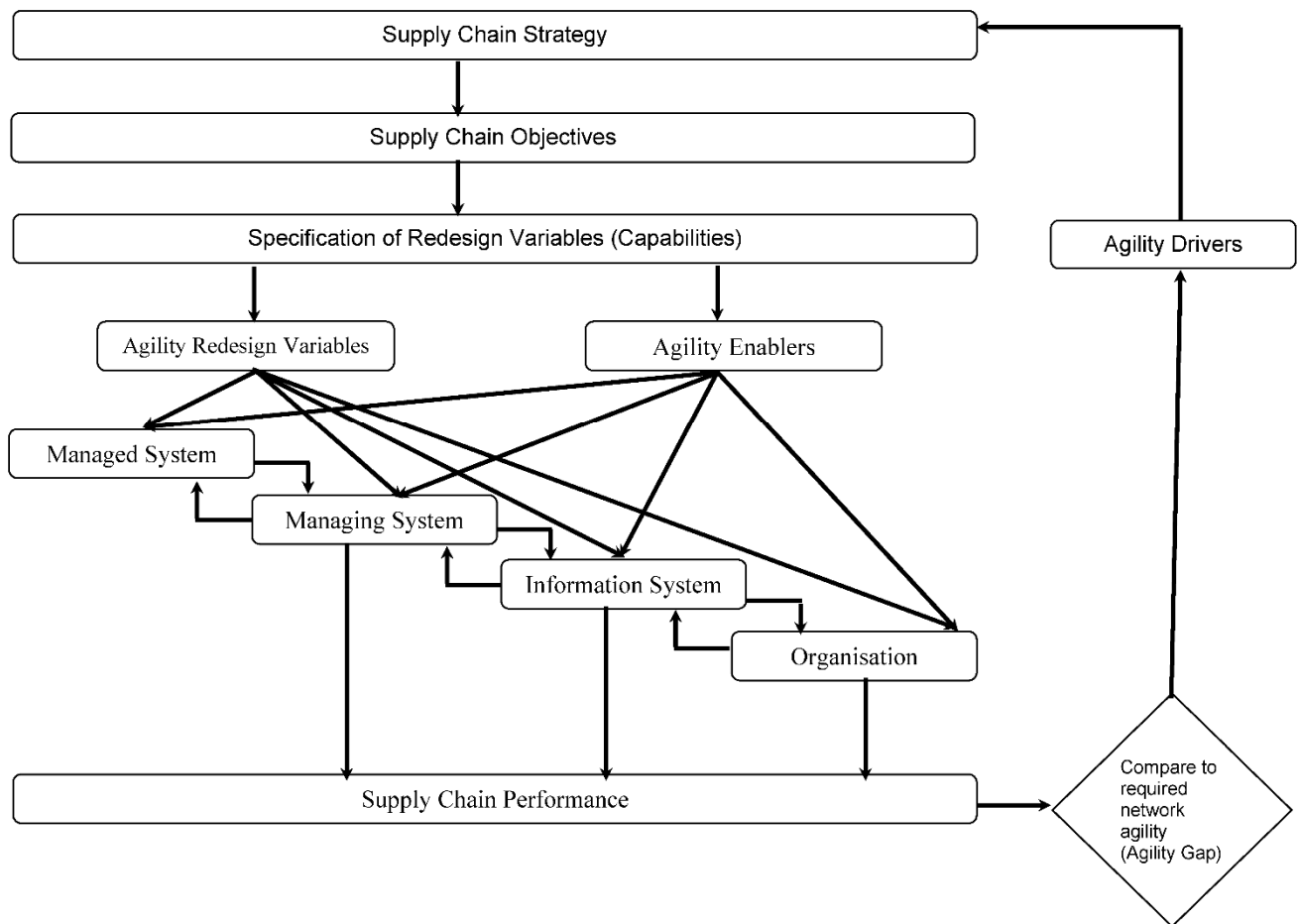


Figure 2. Conceptual Framework for Supply Chain Agility Analysis.

The framework operates in two steps: Firstly, it identifies the elements of the components of the supply chain that requires agility by identifying elements of component that actors of the chain find difficult in meeting or changing to meet in the supply chain. This is done through a questionnaire sent to actors in the supply chain with questions on the elements of the components shown in Table 2. Secondly, the questionnaire is then analysed for the Agility gap using an index interpreted and interventions prescribed.

The Agility Gap Index is adapted from the work of van Oosterhout et al. [70]. They developed a business Agility Gap index for which they argue that if businesses find it difficult to cope with major changes which go beyond their normal flexibility, they are termed to have faced an agility gap. The interview instrument for the framework interrogates strategic agility with a two-stage question approach. The first step asks the participant “To what extent are changes in the current business environment affecting supply chain elements in your business?” (Then, a list of the elements of the components follows). The items are scored on a Likert-5point scale anchored on 1 (Very low) to 5 (Very high). For items representing processes that score 4 or 5 (high and very high extent of

change, respectively) a follow-up question. Therefore, whole business entities, supply change actors and specific supply change processes could be termed to have an agility gap. The changes required are termed business change and the factors causing these are business environment change factors. In the second step, the degree of the impact due to the business environment change factor is measured with a follow-up question in the survey instrument for items representing processes that score 4 or 5 (high and very high extent of change, respectively) on a Likert-5point scale asking the participant to indicate the level of difficulty in having to cope with the change. The responses to the follow-up questions are also scored on a Likert-5point scale of difficulty anchored on 1 (Very low) to 5 (Very high). These are then computed as an Agility gap index score with a percentage. Therefore, Agility gap index scores can be computed for elements of the supply change components, an aggregate of the components in supply chains and whole supply chains [65,66]. The results are interpreted according to a scale developed by Oosterhout et al. [70]. The agility gap index calculated as a ratio in percentage is scaled to a number between 0% (no Agility gap at all) and 100% (largest Agility gap possible). These are classified as 'most urgent' gaps (ratios $\geq 60\%$), 'high urgency' gaps (ratios $> 50\%$ and $< 60\%$), 'lower level of urgency' gaps (ratios $> 40\%$ and $\leq 50\%$), 'Normal' gaps (ratios $< 40\%$) and 'No Gap at All' (ratios = 0) using a scale by van Oosterhout et al. [70]. The higher the agility gap index ratio percentage, the more urgent the agility gap. According to Oosterhout et al. [70] if businesses find it difficult to cope with major changes, which go beyond their normal level of flexibility, they are faced with an agility gap and need intervention. Therefore, the supply chain agility methodological framework has the potential as a potential panacea to identify components of the horticulture export supply chain for the development of a responsive strategy to resolve fresh produce export chain challenges in a turbulent (COVID-19) business environment.

3. Scenarios for Comparing the Applicability of Strategic Agility under Both Stable and Turbulent COVID-19 Business Environments

This review seeks to contribute to the knowledge of supply chain agility as a strategic alternative for developing country horticulture export supply chains. Thus, from the literature review and framework proposed, our research questions are that supply chain agility as a strategic alternative for fresh produce export supply chains from developing countries provides a better option for export organisations. Secondly, from the nuance of developing country fresh produce export supply chains, the framework proposed will be a potent tool for diagnosing, monitoring and evaluating the strategic options in both stable and turbulent business environments for fresh produce supply chains.

From the literature, Van der Heijden [74] posits that scenarios offer relevant language for strategic conversation as they allow differentiation in views. Earlier on, Porter [75] had defined a scenario as 'an internally consistent view of what the future might turn out to be'. Vorst [46] (p. 47) adds that this view refers to changes in the environment but also to the system itself and then defined a supply chain scenario as "an internally consistent view of a possible instance of the logistical supply chain concept, i.e., the managed, managing, and information systems and organisational structures in the supply chain". In addition, the literature defines a 'best practice' supply chain scenario as 'a feasible supply chain configuration and operational management and control for all supply chain stages that achieves the best outcome for the whole system' [46] and is considered to be about doing things in the most effective manner, usually focusing upon a specific activity or operation (a critical success factor) [76]. Caplice and Sheffi [77], define the effectiveness of a supply chain as 'the degree to which the objectives are realised'. The review, therefore, uses the conceptual framework for supply chain agility analysis scenarios of the stable environment (pre-COVID-19) and turbulent environment (post-COVID-19) of Ghana's pineapple export supply chain to provide an illustrative example of supply chain agility as a concept for developing mitigating strategies due to the disruptions of the COVID-19 pandemic.

3.1. Ghanaian Fresh Pineapple Supply Chain to Europe

In Ghana, supply chains of suppliers to the EU and UK markets are structured differently with different levels of sophistication. Most of the firms aggregate as export organizations and associations as actors in the supply chain to export mainly by sea. The main organisation for fresh pineapple exports is the Sea-Freight Pineapple Exporters of Ghana (SPEG). The Sea-freight Pineapple Exporters Association of Ghana (SPEG), formed in 1994, has about 30 export companies in good standing as members who account for over 80% by volume and close to 95% by value of the total Ghanaian pineapple exports to Europe (Data from SPEG). The organisation is made up of Exporters and Producers/Exporters of Ghanaian pineapples and their focus is to promote growth within the Ghanaian pineapple industry by providing sea-freight and other support services for the benefit of its members. SPEG ships fruits to Port Vado in Italy, Port Vendres in France and Antwerp in Belgium.

The Ghanaian fresh pineapple supply chain to Europe comprises mainly of these 30 firms from SPEG with six large producers-exporters members accounting for over 65% of total exports by volume. These major players are Jei River Farm, Golden Exotics, Koranco Farms, Volta River Estates, Hans Peter Werder (HPW), Prudent Farms and Bomarts Farms all belonging to the Sea-Freight Pineapple Exporters of Ghana. The pineapple sector is characterized by heterogeneous producers which vary in size, technical standards and export volume. Many producers involve small-holders, some involved in out-grower schemes, supplying pineapples to medium to small exporters and domestic market operators [23,73]. In 2018, the association exported 35,200 MT of fresh pineapples; 18,280 MT in 2019; 17,402 MT in 2020 and 16,500 MT in 2021. Each company employs a 50 to 550 workforce and an annual turnover of 40,000 USD to 500,000 USD (Data from the survey and verified with SPEG). Additionally, three pineapple processing companies (Blue Skies from the United Kingdom, Tonggu Fruits from The Netherlands and First Catering) export fresh-cut pineapple and other fruits to extraordinarily demanding European retailers such as Marks & Spencer and Sainsbury's. These companies produce and export pineapple fruits of Smooth Cayenne, MD2, organic, Fairtrade and a mix of other varieties. The flow of pineapples from Ghana to the EU and UK was depicted by Fold and Gough [23] from which we derived Figure 3.

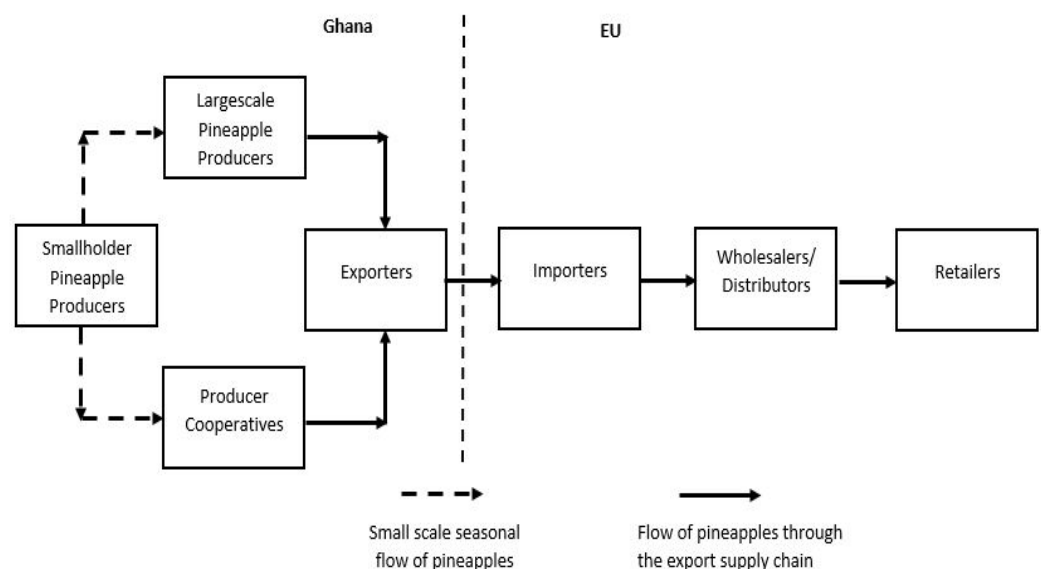


Figure 3. Pineapple Flows from Ghana to EU and UK.

3.2. Supply Chain Agility as a Methodological Framework in a Stable (Pre-COVID-19) and Turbulent (COVID-19) Business Environments

Under a stable (pre-COVID-19) business environment of the Ghana Pineapple Export Supply Chain scenario, Yawson and Aguiar [65] (p. 210) reported that their Agility Gap

framework is a valuable tool to understand international export supply chains for fresh pineapple export chains of Costa Rica, Ivory Coast and Ghana. The framework was found to be valid at the business level such as in the cases of Compagnie Fruitière (UK) Ltd (Dartford, UK). and Wealmoor UK Ltd (Greenford, UK). Therefore, this type of framework used to evaluate strategic supply chain agility could be employed in the supply chain of other subsectors of the economy and industries to guide managers in the identification of agility gaps to enhance competitiveness. As a tool, it also enables supply chain actors to identify and address supply chain strategic issues such as market channel selection, the conditions of market access, and current and future business environment conditions in fresh produce supply chains. This application, we expect when engaged in should improve supply chain agility, performance and competitiveness of the actors in the Ghana fresh pineapple exports.”

Alternatively, within the context of supply chain agility as a methodological framework in a turbulent (COVID-19) business environment the framework of the Ghana Pineapple Export Supply Chain scenario, we argue that all the four components (managed system, managing system, information system and organisation) come into sharp focus for intervention at various degrees (see [36,65,66]). It important to emphasise that despite the varied degree of relative intervention required, each component ought to be addressed with dispatch. There are therefore ample grounds to argue that the strategic agility framework offers an adaptable vehicle to serve as a panacea to fresh produce supply chain challenges in a stable (pre-COVID-19) as well as turbulent COVID-19 pandemic business environment. However, the configuration of the components under turbulent environments ought to be amendable for prompt deployment.

This first set of scenarios based on Yawson and Aguiar [66] presents the first step of the framework enabling the identification of the state of the pineapple export supply chain in the stable (pre-COVID-19) business environment and the state of the supply chain in turbulent (COVID-19) business environment. Secondly, the framework enables the identification of the components in the supply chain that needs strategic agility interventions and urgency. Thirdly, the two scenarios when compared show that the COVID-19 pandemic aggravated the need for strategic agility interventions in all four components of the supply chain. Fourth, to enable the recommendation of strategic agility interventions in the supply chain, there is the need for a reference to the scores of the elements in Table 2 reported earlier to identify the areas that need strategic agility interventions in the supply chain. We suggest that strategic agility challenges due to the turbulent environment caused by the COVID-19 disruption most likely affected the managed system, which is the need for the modification of the “Production infrastructure to make it more flexible to respond to high variations in demand in the supply chain. Additionally, other challenges for supply chain agility will mostly occur for “Field infrastructure for production, “External logistics infrastructure (e.g., shipping, air)”, and “Input suppliers (e.g., fertilizers, pesticides). These managed system elements challenges in the COVID-19 disruptions create strategic agility challenges for the Ghanaian Pineapple Export supply chain. This is in line with other research which argues for investment and innovation in fresh fruit supply chains to build resilience [7,58,78]. The disruptions certainly required improved communications in the supply chain for governance in the unpredictable environment. Therefore, Ghanaian exporters required increasing sophistication of Market Information Systems and an increasing need to improve the gathering of market information to importers to enable them to communicate with exporters and monitor demand and prevailing market conditions in the EU as suggested by [1,49]. Finally, addressing each of these elements provides a holistic strategic agility intervention to be followed with stakeholder consultation and participation in the implementation of the intervention.

3.3. Propositions

This review paper based on the above narratives recommends the following three research propositions to be empirically explored in future research:

Proposition 1. *The tactical and operational applicability of the agility framework under non-pandemic or stable international business environment as established by Yawson and Aguiar [66] as having potential strategic efficacy and diagnosing bottlenecks to enable the realignment of disrupted fresh produce supply chains under pandemic disrupted global business environment.*

Proposition 2. *The critical areas of focus to drive strategic agility framework application under turbulent or pandemic conditions are: flexibility of production infrastructure; amenability of external logistic infrastructure and effective strategic training programme across producer organisations.*

Proposition 3. *A diversification strategy in the form of developing a complementary premium local market channel alongside international markets holds stabilizing potential for the industry.*

4. Concluding Remarks and Contributions

In conclusion, the rapidly changing business environment due to the COVID-19 global pandemic presented an important organizational challenge to fresh produce export supply chains in exporting developing countries such as Ghana. This supply chain problem highlights the relevance of supply chain agility as a potent methodological framework to measure, monitor and evaluate these challenges in a stable as well as turbulent times. The framework derived in the research could be used to identify components and elements of horticulture supply chains at the strategic, tactical and operational levels to give a fast and easy way to enable the development of supply chain agility interventions to be proposed, implemented and monitored in stable and turbulent business environments.

4.1. Contribution to Practice

In addition, for practice the strategic agility methodology provides both operational and strategic insights on the managed system, managing system, information system and organisation structure components of the supply chain. Further, the review identifies important elements of the supply chain to make management decisions on strategic agility in the supply chain under stable as well as turbulent business environments. Thus, the review's arguments and propositions offers are relevant for practitioners to formulate and recommend alternative paradigms for the development of the supply chain and individual actors in the chain. There is ample coverage of critical information for the strategic decision for globalizing supply chain development in developing countries.

4.2. Implication for Research

In research, firstly, scholars will benefit from the application of the methodology guide for more development and validation of the three propositions. Secondly, this review paper presented another context apart from the Yawson and Aguiar's [65] application in which the framework was used to identify and evaluate interventions for strategic changes by actors and stakeholders in a horticultural export supply chain in a pre-test/post-test context to determine the effect of disruptions and to facilitate the redesign of the supply chain to improve the effectiveness, efficiency and strategies. Additionally, the framework could be employed to assess the impact of market trends, business environment policies, industry application of technology and legislation to enhance the strategic agility of supply chains using our approach. Thirdly, we acknowledge that this approach to assess strategic supply chain agility be considered as an initial step towards a generic framework that could be used to monitor and evaluate interventions in horticulture export supply chains with the ultimate aim of improving supply chain agility in developing countries. Additionally, for future research, we propose first the testing of the propositions in the paper, then the testing of the proposed framework in other developing countries, and thirdly, testing the framework in other developing country industry contexts such as other high-value export perishables.

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