


Concept Paper

Sustainable Agrifood Value Chain—Transformation in Developing Countries

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Abstract: To service high-value international markets, many agrifood value chains in developing countries are required to transform to meet the strict quality and safety standards. This transformation process has become further complicated by increased sustainability expectations. The key players in these countries, typically smallholders, are struggling to meet this new sustainability value focus. Economic drivers pervade in this context, whilst the lack of integration often decouples producers from the end market. To address these challenges, this paper develops a framework to enable sustainable agrifood value chain transformation in developing countries. A narrative review was used to analyse the major enablers and barriers in sustainable agrifood value chain transformation specifically in developing countries. The framework novelty lies in the synthesis and prioritisation of transformations actions, by integrating three central dimensions: sustainability, governance, and value addition. The incorporation of sustainability drivers into value chain governance provides a holistic approach that balances profit maximization with social and environmental impacts, thus enabling smallholders in developing countries to access higher value markets. The framework can assist these value chain actors in identifying their transformation trajectory and guide policymakers, along with the public sector, in prioritising their intervention to overcome barriers.

Keywords: value chain transformation; sustainability; smallholders; agrifood; developing countries



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1. Introduction

To increase income, many agrifood actors in developing countries are attempting to transform their value chains to access higher value markets [1,2]. Many of these actors are smallholder farmers, who are required to interact with multiple actors when transforming their practices to join complex high-value markets, including the global market [3,4]. These smallholders have been compelled to increase their income by shifting their focus towards the value drivers of the final market. Downstream global players are progressively targeting supply sources from developing countries in the high value food industry [5,6]. However, regardless of the profit opportunity, advancing smallholder practices into a high-value market is an area that requires further exploration.

High-value markets place increased expectations on food quality and safety, which contribute to the growing relevance of sustainability as a new component of ‘value’ [7,8]. To service higher value markets, smallholder’s goals are expanded from a singular profit agenda to include socially acceptable practices that also have minimal environmental impact. Transformation requires all value chain players to work towards an acceptable mutual outcome from production to consumption [9]. Global consumers’ preference have shifted into higher value, increasingly processed foods [10] that include additional attributes to price [11,12]. Wider stakeholder pressures from society, including the World Health Organization require value chain actors to embrace sustainable production and

consumption as a vital component of food security [13]. Therefore, the growing demand for sustainability practice further affects the transformation process to improve not only product quality and efficiency but also social–environmental considerations that enable the business environment [14].

Smallholders face several challenges when attempting to develop sustainable value chain practices. Prior studies have concluded that smallholder farmers in developing countries are often the weakest link during transformation, as they are typically trapped in a traditional system [1–15]. They have limited resources that constrain them from achieving high-value market requirements such as low productivity, inconsistent quality, limited education, and restricted access to market information [16–18]. Many of these barriers impede value chain participation in terms of governance and value addition [1]. For these reasons, smallholder farmers have limited power, dependent relationships, and are marginalized from more profitable markets [15].

Developing countries often undertake value chain transformation as part of a poverty alleviation strategy for smallholders [5–20]. Asia (i.e., Southeast Asia and South Asia) and Africa contain the highest concentration of developing countries with a significant proportion of smallholders in the agrifood value chains [6–21]. A poverty alleviation strategy often prioritises economic growth at the expense of social and environmental concerns [22]. In fact, smallholders, who generally have traditional practices, often lack the capacity to be fully engaged with the ideals of sustainability in high-value markets [8]. Enhanced value-adding activities by smallholders carry the potential to damage the environment and degrade social life. The agro–industrial revolution (through the development of tools, fertilizers, and planting technology) resulted in a substantial increase in land use and productivity [23]. Many of these activities have negative consequences such as overexploitation of natural resources, deforestation, and harmful waste [13].

Many studies have advanced the discussion on smallholder sustainability practice improvement in the high-value markets regarding global value chains [24,25]. Governance enhancement [15–26], higher value market linkage [27,28], and certifications [29] have been proposed as approaches to advance sustainable practice in developing countries in Asia and Africa. Most of these approaches list enablers without a clear structure, and often, they use a top–down lens to enable transformation, where lead firms design and dictate practices throughout the chain. As a consequence, many global players source from developing countries producers by controlling the value-adding activities [1–30]. This prevalent practice clearly demonstrates a marginal discrepancy in sustainable value chains, which minimizes smallholders' participation in enhancement initiatives. Moreover, most of these approaches view wider stakeholders (such as the government) as external, additional functions and overlook them as critical components. Conversely, it is widely acknowledged that stakeholders strongly influence the business environment and frequently enable smallholders' practice improvement [5–31]. While sustainable agrifood value chain transformation approaches have been insufficiently researched, the underlying enabling mechanisms remain unclear, and transformation trajectories have only been partially explored.

To address the aforementioned research gap, this paper aims to develop a framework for enabling sustainable agrifood value chain transformation in developing countries. The framework will assist actors to assess sustainability initiatives quantitatively and qualitatively [32]. The conceptual framework development in this paper uses a narrative review method. By using this method, a broad body of literature can be synthesised under an umbrella idea [33] and thus be able to support assumptions, identify research gaps, and establish integrated frameworks. A literature review, according to Snyder [34], provides the foundation for developing a new conceptual model/theory, and it can be useful to map the evolution of a particular research subject over time. Despite the fact that the narrative method heavily relies on the researcher's interpretation, the narrative structuring generally generates a perceptible pattern [35]. This type of review can be conducted through integrative review by discussing and summarizing the current state of knowledge,

noting areas of agreement and disagreement [36]. The literature discussion starts with the fundamentals of agrifood value chain transformation in developing countries. The following section investigates how to incorporate sustainability drivers in value chain thinking. Thereafter, the key elements that enable the transformation process (to balance the profit maximization and social environmental aspects) are synthesized into a holistic framework to operationalize the change process.

Sustainable value chain transformation in developing countries has sparked great interest in the agrifood sector recently. This paper contributes to a deeper understanding of the enabling mechanism in several ways. While previous studies focused on postulating various enablers for sustainable value chain transformation, this paper will advance literature via the prioritisation of actions depend on value chain maturity. This study provides a structured process to assess and advance the sustainability of agrifood value chains. Further, the framework provides practitioners with information on how to enable sustainability, manage the risks of transformation, and therefore gain access to high-value markets. Finally, this study will assist policymakers to provide tailored support by prioritizing interventions to address context specific barriers.

2. Agrifood Value Chain Transformation in Developing Countries

While agrifood value chain transformation has various definitions, a classical definition by Reardon [37] describes it as the process of reforming the agrifood sector through the procurement of modernized systems. The transformation of the agrifood sector has been triggered by various modernization factors such as globalization industrial structures, technology, and consumerism [12–38]. Miller and Jones [39] elaborated further, stating that the agrifood value chain progresses towards a modern system that delivers higher market value via increased processing and stringent quality and safety standards.

Previous studies have identified a range of value chain characteristics to evaluate agrifood transformation. Boehlje [40] proposed six codependent dimensions: process flow, product flow, financial flow, information flow, incentive, and governance. Subsequently, many scholars have focused on the central role of governance, as it drives the rest of chain's activity and determines a firm's interactions throughout the chain [17–41]. Governance describes market dynamics in arranging and organizing the chain's operational rules. It generally involves vertical and horizontal integration [19–37] and information exchange [19–27]. Governance may also include incentives and assistance such as loans, warranty, recognition programs, and financial assistance through contracts and agreements [42,43]. Going further, Hidayati et al. [1] argue governance activities also have a significant impact on the actual value added activities. Value addition underscores the sequential product transformation, including physical form, space, and time, with each stage potentially contributing value to the market offering [12–45].

Value chain transformation in developing countries generally starts from a traditional value chain state and progresses towards a modern domestic or modern global value chain [2–10]. Defining transformation states and vectors provides each value chain stage with clear boundaries and future orientations. Simultaneously, it indicates how agrifood value chains can progressively become market-oriented [46]. However, market orientation may not adequately describe many immature value chain transformation processes. This is because a significant gap remains in many developing countries' value chain practices, regardless of the market requirements. According to Gereffi [47], there have been variations of governance practice used by value chain actors, despite the development of global markets. Thus, to facilitate a better understanding of agrifood value chain transformation, Hidayati et al. [1] proposed three practice maturity levels by integrating governance and value addition attributes (shown in Table 1).

Table 1. Agrifood Value Chain Transformation in Developing Countries.

Dimension	Value Chain Transformation		
	Traditional	Managed	Best Practice
Governance	Limited Integrated	Formal Integration	Collaborative Integration
System	Informal, transactional	Structured, controlled	Orchestrated, aligned
Market	Local	Modern domestic	Modern global
Value Addition	Commodity based	More processing based	Branded and certified
Value	Raw	Processed	High
Quality and safety	Inconsistent	Standardised	Superior

Source: adapted from Hidayati et al. [1].

Maturity level evaluation facilitates an evolutionary assessment in terms of experience and practice quality [48]. Table 1 provides a means to assess the maturity of practice regarding governance and value addition. Once current status is determined, transformation routes can be identified to advance value chains to service high value global markets. Practice in developing countries necessitates the adoption of an integrative structure as the bases for directing the transformation process, as integration is a fundamental factor to determine the success of value chain operations [49]. The classification of integration structure to detect transformation direction aligns with Collins [12], who highlighted that value chain managerial takes progress through three key stages: traditional chain, managed chain, and best practice management.

Transforming value chains from traditional systems in developing countries is not a straightforward task that will undoubtedly face numerous challenges. To addresses this, barriers need to be identified prior to transformation and potentially be exploited to create opportunities [24]. While the discussion in this area is continuously evolving, most of the studies highlight the major barriers of value chain transformation in developing countries relate to smallholders' practice. Smallholders typically operate in a traditional mode, disjointed from advanced value chain systems [1–15]. The main barriers to advancing smallholders' practice are associated with their characteristics, which include low productivity, inconsistent quality, high transaction costs, limited skills, and limited access to market, best practice, and financial information [5–50]. These factors hinder the value chain integration via the disconnection of practices in terms of goal setting, planning, working cultures, and synchronization [51]. In addition to these barriers, several enablers have also been identified in the developing countries context. Table 2 synthesises the most pertinent barriers and enablers for agrifood value chain transformation in developing countries.

Table 2. Agrifood Value Chain Transformation Enablers and Barriers in Developing Countries.

Level (Stage)	Enablers and Barriers	Description	Sources
Niche (Farmers)	Collective action (i.e., farmer groups or cooperatives)	Collective action improves members' position and facilitates economies of scales (i.e., production, product aggregation, communication)	[5,20,27,52,53]
	Off-farm business support	Smallholders often rely on support from alternative sources of income	[54]
Meso (Buyers) and Potentially Macro (Government/NGO)	Access to service	Service access improves the opportunity to capture higher-value products (i.e., input, finance, technical expert, information sharing, production improvement)	[5,52,53,55]
	Access to market development	Many smallholders can be reached through the facilitation of market projects (establish contract terms, negotiation capacity, collaboration, standard arrangement)	[1,50,56,57]

Table 2. Cont.

Level (Stage)	Enablers and Barriers	Description	Sources
Meso (Buyers) and Potentially Macro (Government/NGO)	Capacity enhancement (i.e., financial, technical, human resources)	The capacity enhancement offers technological transfer activities to deal with smallholders' technical constraints	[15,20,37,52]
	Incentive (i.e., input, price, risk on buying warranty)	Incentives encourage smallholder participation in higher-value markets	[27,37,43,58]
Macro (Government)	Regulation within facilitation	Government policies and assistance to support smallholders (i.e., producer organization development, service, and market support)	[5,45,58,59]
	Infrastructure	Infrastructure impacts quality of high-value food, transaction costs, and information (i.e., transportation, telecommunication, etc.)	[2,43]
Macro (NGO)	Assistance from public sector	The public sector represents community responses and often provide assistance to meet their requirements (i.e., Networking, Capacity Building, Monitoring)	[21,59]

In transformational actions, setting the boundary is fundamental to clarify the enabling tasks. The key enablers and barriers of value chain transformation in developing countries are categorised into niche, meso, and macro levels in Table 2. By knowing which part drives the value chain transformation, the process can be managed appropriately based on the governance and facilitation requirements [5]. Therefore, transformation studies in the agrifood context increasingly require a Multilevel Perspective (MLP) to analyse transitions [60–62]. Within the MLP approach, value chain transformation in developing countries focuses on smallholder's perspective as the niche level, a value chain perspective at the meso level, and stakeholder's perspective as the macro level. Despite the differences in perspectives, these levels are not opposed to each other. Rather, these perspectives complement one another in terms of providing a consistent focus to enable transformation.

As stated earlier, the first critical investigation regarding value chain transformation is the smallholders' perspectives. The information pertains to smallholders' characteristics along with their intention to participate in the transformation process [28] and their capacity to scale up operations through horizontal coordination [52–63]. The attention then turns to the value chain stage perspective. Through a vertical coordination lens, the value chain perspective explores the relationship between smallholders and buyers. Due to the need to obtain consistent supply, buyers frequently combine buying processes with facilitation approaches to motivate smallholders to participate in the chain [58]. Finally, the last stage is to consider stakeholders' views in order to enable agrifood value chain transformation in a broader context.

Many stakeholders (such as government and NGOs) perceive agrifood value chain transformation as a strategy for reducing poverty in developing countries, which benefits global supply [5]. For this reason, transformation is often seen as the agenda of stakeholders, which often involves capacity enhancement and incentives [21–63]. While most assistances from stakeholders are advantageous, many of these have been associated as transient interventions and project-based operations [27–58]. Hence, despite stakeholders' interventions aimed at improving smallholders' practices [24–31], they are often considered as an additional, somewhat external player.

3. Agrifood Value Chain Sustainability

The most pressing challenge in the high-value food industry is sustainable practice. Value chain actors are required to refocus on 'value' from the multifunctionality elements of sustainability [7]. In general, Choudhury [64] introduced the sustainability concept as a global system that focuses on environmental, social, and economic elements, which fulfils the needs of current generations' whilst considering future generations' ability to

meets their needs. To respond to the urgency of sustainability in the agrifood sector, many scholars stress sustainability as a foundation for long term food security [55,65]. The World Health Organization (WHO) defines food security as economic and physical access of agrifood activities that adhere to sustainable production and consumption principles [13]. Aligned to this food security definition, sustainable value chains are defined in accordance with FAO [19] (p. 6):

‘The full range of farms and firms and their successive coordinated value-adding activities that produce particular raw agricultural materials and transform them into particular food products that are sold to final consumers and disposed of after use, in a manner that is profitable throughout, has broad-based benefits for society, and does not permanently deplete natural resources’.

Within the scope of food security, sustainability is not simply a set of indicators. Rather, sustainability is an integrated system of dimensions [54]. A value chain is perceived as an economic-based activity that accesses both social and environmental dimensions. The value chain combines resources such as natural capital, knowledge, and skills within the social structures to deliver products or services [66] in which the products also end up in the environment [67]. Based on this, the dimensions of sustainable agrifood value chains are seen as a layered system. For instance, according to Gidding et al. [67], the economic dimension exploits society and environment dimensions, and Raworth [68], who identified the social foundation and ecological ceiling as an embedded dimension, expressed as much through a doughnut economy approach. A layered or nested system, on the other hand, has a tendency to prioritise certain dimensions above others. Meanwhile, strong sustainability practice necessitates a more balanced interaction of practice. In other words, economy, ecology, and social dimensions are to be accounted for at each value chain stage [69].

A value chain is deemed economically sustainable if each stage’s activities generate value that leads to profit [19–54]. Being sustainable in the social dimension refers to a value chain that is both culturally and socially acceptable. However, assessing this social dimension continues to be a daunting task [70]. Higher levels of comprehensiveness and stringency in the social dimension can only be achieved by addressing foundations on standards within scope [71]; therefore, the social dimension direction should not be limited to social acceptability. Being socially engaged would strengthen connectedness and shared meanings with the community [72]. The third dimension, illustrated in Figure 1, is the environment that refers to the actor’s ability to minimize any negative environmental impacts from the value-adding activities and, if possible, have a positive impact [19–54]. To represent this practice, some scholars recommend the term ‘environmentally friendly’ [73,74]. However, an environmentally respectful practice better depicts the act of practicing in a responsible way by respecting the environment [54–75].

A fully sustainable value chain is only possible if all three dimensions are aligned. In a developing country’s context, this will be the compelling goal, yet the most difficult task. Enabling synergic incorporation of sustainability into a value chain is an area under intense research but has been incompletely explored in developing countries’ literature. In contrast, many sustainability studies have been broadly explored in developed countries [32–77]. The approach for sustainable agrifood value chain transformation has been extensively viewed from various perspectives such as the individual (farm or household), local, global (sector-specific), and plot (ex-post and ex-ante). Despite this, some fundamental principles from developed countries may serve as the foundation for this context. For instance, incorporating sustainability into agrifood value chains begins with emphasizing farm practices [74–78]. This stage plays a significant role that determines the subsequent stages’ performance. Farm practices are highly reliant on environmental sources [9], the production of perishable goods [45], and supplying the basic attributes of consumer’s value [12].

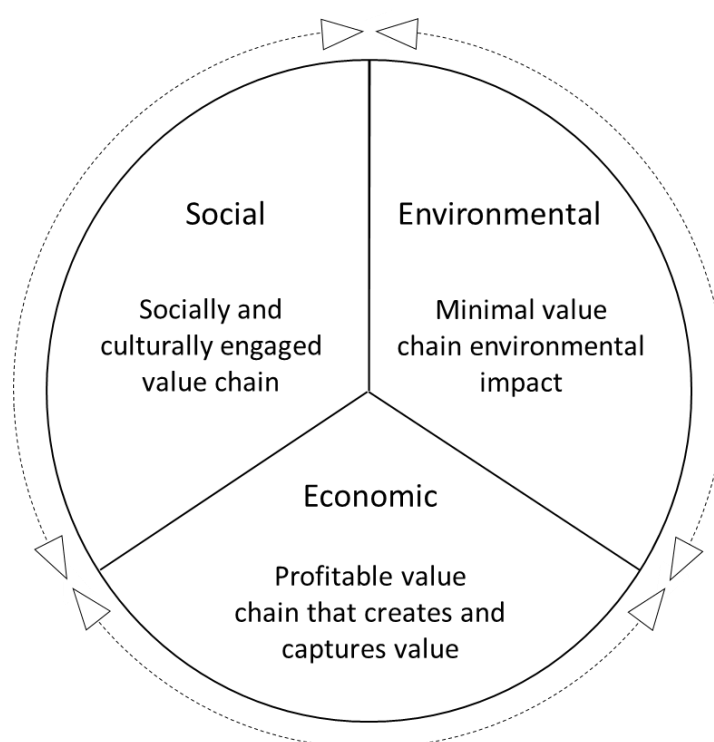


Figure 1. Sustainable Value Chain Dimensions.

The economy dimension is prioritised in developing countries [54–73]. Although the Economic for Common Good (ECG) perspective has also seen the rationale of using economic gain to tailor the other aspects [68], economic growth that jeopardizes nature and human life is no longer deemed acceptable. Nature is an asset priced beyond market value, and human life ultimately depends on the natural environment [79]. The interactions between the three dimensions can be considered as synergies, complementary, competitive, or in conflict [54–80]. To assess transformation directions, the two most contradictory routes can be consolidated as positive and negative. While the competition and conflict relationships can lead to a negative transformation, synergy and complementary relationships can help to achieve a positive transformation.

A positive economic transformation represents an improvement of profit, which can be achieved by enhanced activities such as new processes, products, or functions [75]; elimination of inefficient activities [81]; an increase of productivity [82]; and an expansion of market opportunities [69]. A positive and meaningful social transformation benefits both value chain actors and the wider society [81,83]. Value chains in the agrifood sector in developing countries are characterized by the presence of a multitude of individual smallholder farmers. Individual (or within-group) levels are determined by factors such as education, working conditions [84], farming skills, and experience [54]. However, more accurate social dimension indicators are obtained by observing social components of specific farming systems [71]. Meanwhile, a wider society level is often determined by employment, acceptable cultural practices, and the safety and quality of products and processes [84–86]. A positive environmental transformation results when natural resources are utilized in line with domestic and international regulations [83], waste handling [69], and ecosystem protection and restoration [64].

Negative transformation is the opposite of positive transformation, and value can be added or lost at each stage [19]. Value-adding often puts pressure on natural resources, resulting in environmental degradation and the eroding of social traditional norms [9]. In the same way, social conditions through the interaction of people and nature also influence ecological sustainability [87]. As a consequence, conflict can arise due to natural deterioration caused by a chain's activities [13–55]. Long-term consequences affect not only

the environment but also the economic foundations, as the food industry is highly reliant on nature for the supply of raw materials [50]. Table 3 incorporates sustainability into the agrifood value chain by identifying the major enablers and barriers.

Table 3. Key Enablers and Barriers to Incorporate Sustainability into Agrifood Value Chains.

Element	Positive (Enablers)	Scheme	Negative (Barriers)	Source
Plan	The plan leads to sustainability practice in terms of long-term survival within changing contexts (i.e., input, price, productivity, regulation, market demand).	[74,84]	No available plan or orientation will make farmers (and other VC actors) difficult to recognize and adjust any sustainability requirement.	[74,84]
Information Quality	Well-defined value addition and sharing (such as products' specification, logistics, and price) would encourage farmers to capture more sustainable value.	[70,88,89]	Poor information quality will leave farmers unaware of sustainability specification (either product or practices).	[1,88–90]
Effective communication	Effective communication information (in delivery, collecting, accessing, and digital tool use) between farmers and buyers would improve sustainability practice.	[26,40,54,73,91,92]	An ineffective communication method (asymmetrical sharing) results in poor and delayed decisions.	[26,91,92]
Incentives	Incentives (i.e., financial, subsidies, tools, and price) stimulate farmers to adopt and create sustainable value.	[73,91,93,94]	Lack of incentives hinders farmers' motivation to practice sustainability.	[23,50,95]
Sustainable market	Access to the sustainable market would encourage VC actors (especially smallholders) to practice sustainability.	[93,96]	Lack of access to sustainable markets hinder smallholder farmers' sustainable practice.	[93,95,96]
Behaviour	The socio demography (i.e., farm structure, behaviour, self-identity, and motivation) motivates farmers to adopt an ecological practice.	[73,74]	The socio demography (i.e., poor in farm structure, behaviour, self-identity, and motivation) affects farmers to adopt an ecological practice.	[73,74]
Government role	Regulation may provide fundamental tasks and pressure on sustainability adoption.	[13,19,27,58,91]	Indifferent regulation hinders the sustainability implementation by smallholder farmer.	[13,19,27,58,91]
Facilitation	Facilitation from the private or public sector will escalate sustainability concerns and practice.	[24,66,97–99]	Less facilitation will hinder the sustainability implementation by smallholder farmers.	[9,97,99,100]
Certification	Certification (i.e., GAP) helps to satisfy sustainable market requirements, create transparency, and guide smallholders to integrate into a high-value market.	[19,29,44,101]	Lack of certification degrades trust and evidence of sustainable practices, which hinders high-value market expansion.	[19,29,44,101]

Amidst the variation and complexities of enablers/barriers for a sustainable practice transformation shown in Table 3, more exploration of enabling mechanisms is urgently needed. The underlying method to transform value chain practice in line with sustainability is still far from clear. Many of the enablers may work in tandem or different ways and be applied by various actors without a clear structure. A discussion on a systematic structure to leverage the sustainability enablers has been overlooked to date. Structuring the activities will help provide a clearer view of the mechanisms and synergize between players [1]. It is critical to shed light on prioritizing each stage activity in order to portray

the precedence of goals while simultaneously eliminating irrelevant activities to avoid negative transformations.

Preventing detrimental transformation is the most challenging task; numerous studies have suggested the employment of sustainable value sharing as a key governance activity. Value sharing enables sustainable value inclusion into a value chain [100,102], which ultimately contributes to sustainable production and consumption [103]. The merit of sustainable value results from synergizing value chain actors (i.e., farmers and firms) in sharing their sustainability vision and willingness through a common sustainable strategy in order to avoid conflicts [70–103]. Value sharing requires further exploration to accurately capture the needs of developing countries' practice. Value sharing that exclusively focuses on value chain actors may limit the sustainability scope and overlook the critical role of wider stakeholders. Sharing activities in developing countries should address not only internal value chain actors but also external actors [69]. In the meantime, the use of the term 'external actor' for the government tends to disconnect its important function in affecting the business environments [104]. Government and/or NGOs play critical roles in determining value chain guidelines as part of the governance dimension [53]. Sustainable value creation is an ideal target, where all three sustainability dimensions are considered concurrently resulting in a commitment to delivering ecological, societal, and economical value addition [69].

4. Sustainability and Agrifood Value Chain Transformation in Developing Countries

Enabling sustainable agrifood value chain transformation is a burgeoning research area that is relatively underexplored in a developing countries context. Various approaches are often used to address the increased focus on sustainability in agrifood value chain transformation via a combination of variables as enablers. However, the persistent challenge in this area primarily lies in the enabling mechanism. In particular, how to manifest in a myriad of specific practices for smallholder actors of developing countries and convert their orientation towards sustainability requires addressing. Therefore, to advance the current state of knowledge, this paper synthesizes approaches of agrifood value chain transformation and sustainability. An organised and aligned structure of actions is indispensable to transform a value chain in developing countries [1]. The solution offered herein synthesizes three key constructs: sustainability, governance, and value addition, as shown in Figure 2. Incorporating sustainability orientation into value chain governance leads to an enhancement of value addition activities, resulting in a sustainable value chain.

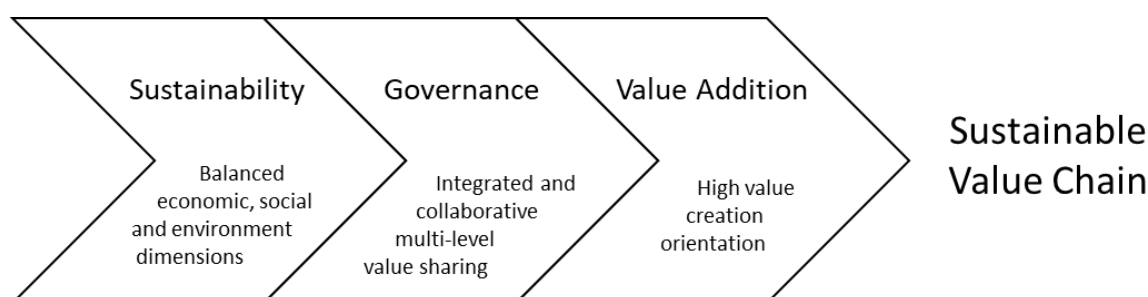


Figure 2. Sustainable Agrifood Value Chain Transformation Drivers.

The sustainability element draws attention to prior literature that highlights economic priorities in developing countries. This issue raises concern to balance the economic profit orientation with more social and environmental aspects to achieve sustainable practice. Being economically profitable is the first and primary orientation of smallholders in developing countries. Literature highlights that in order to create a profit, the enhancement activities contain a productivity increase, cost efficiency, premium pricing, and/or market opportunity [69–81].

Being socially engaged is the next important orientation to be embedded in developing countries. This dimension first considers the link between work and life quality [71]. After

making a profit from farm work, smallholders would generally enhance their individual well-being via education/knowledge, skill, lifestyle, and working conditions. Meanwhile, simultaneously, literature also suggests smallholders consider activities that have an impact on a wider society [84–86]. Smallholders' consideration for broader societal requirements is primarily concerned with product safety and quality, employment issues, and acceptable cultural practices.

Operating environmentally respectful practices is the last critical and most important orientation that completes the overall sustainability in developing countries. The most fundamental aspect of environmental orientation relates to natural resource management, waste handling, and preservation. It is also important to mention that the key actors in the production of raw commodity are farmers, who thus ultimately determine environmental sustainability [80]. Hence, transformation must focus on the needs of developing technologies and practices that have minimal adverse environmental effects, which are accessible and effective for farmers while also improving productivity [90]. Galdeano-Gómez et al. [80] further state that reducing pressures on natural resources link positively to economic and social elements. Another way to see this is that a long-term economic condition can be achieved at the cost of not only social considerations but also environmental pressures [54].

The governance dimension refers to the degree of multilevel value sharing in order to capture a comprehensive sustainable perspective that suits the developing countries' context. Value sharing starts at the smallholder stage (as a niche level) to establish the scope of the practices and motivation to transform. This level represents smallholders' typology in producing the basic value at the farm stage. Smallholders generally have a heterogeneous typology [29]. Therefore, farmers' demography (within farm characteristics) frequently influences their decision to join higher value markets [28]. Next, smallholders also need to scale up operations in order to transform into a higher value market. To do so, they can develop horizontal coordination by collectively acting as producer organizations (PO) [20–52]. Collective action not only strengthens the members' positions as smallholders but also opens up new opportunities to capture more of the value from high-value markets and improves access to both markets and services [27–63].

In order to further advance activities, value sharing progresses to the wider value chain domain (as meso level). This level highlights the activities between smallholders with key buyers in the chain who play a significant role in sourcing from smallholders [1]. The relationships between farmers and buyers generally comprise transaction terms, negotiation, collaboration, and standard arrangements [1–12]. This type of vertical coordination also often includes a sourcing strategy applied by buyers to enable smallholder farmers to produce commodities that are compatible with high-value-adding chains [27].

In line with the preceding literature review, sustainable value chains in the developing countries' context need to advance the value sharing activities by incorporating stakeholders as key governance actors. Value sharing is complete once stakeholders are included (as macro level). Stakeholders enable value sharing expansion to broader actors, who can become business influencers. For ease of interpretation, stakeholders are commonly classified according to their motivations. Most governmental actions are identified as being relevant to policy setting within program implementation [27–58]. Meanwhile, the public sector is often viewed to be concerned with nonprofit activities conducted by NGOs and aid organisations [5]. Despite the difference in motivation, many of these institutions undertake similar actions to facilitate the advancement of smallholders' activities. Typically capacity enhancement programs are most relevant to harvesting techniques, storage facilities, and financial skills [50]. Meanwhile, incentives are commonly interpreted as input-, price-, and risk-related elements [37].

The value addition dimension in developing countries has generally denoted orientation to create potential value that includes: commodity-based orientation, which indicates smallholder's focus to produce and sell raw material products with minimal treatment; processed-based orientation that indicates an expansion in value-adding by

smallholders via post-harvesting treatments; and branded/certified orientation, which indicates smallholders' orientation in optimizing value creation through branded and certified products.

In addition to ensuring the clarity of enabling mechanism, the direction of the dimensions should be aligned. The alignment of direction will be necessarily constructed progressiveness towards each dimension's goals. A more progressive direction in each dimension increases the possibility to achieve a sustainable value chain status [92] and vice versa. Thus, progression and regression can represent the alignment of sustainable value chain transformation.

The last alignment includes enablers and barriers, which are synthesized in Table 4. The integration of both approaches has generated four key enablers/barriers for sustainable value chain transformation. The literature contains many similarities between approaches, such as the demography within the typology of practices, information sharing, access of market and service, and facilitation. Meantime, there are horizontal coordination and certification elements, which symbolize the uniqueness of each approach. Agrifood value chain transformation approach emphasises the fundamental role of collective action, as smallholder actors are the major stumbling block [28,52], whereas certification is the ultimate goal that verifies sustainability practices [29,101].

Table 4. Sustainable Agrifood Value Chain Transformation Enablers/Barriers in Developing Countries.

Agrifood Value Chain Transformation	Enablers/Barriers	Sustainability
Characteristics	1. Demographic Typology	Behaviour
Collective Action	2. Horizontal Coordination	
	3. Vertical Coordination	
Information Sharing	a. Information sharing (information quality)	Information quality Effective communication
Access to market development	b. Access (market and service)	Sustainable market
Access to market service		
Incentives	4. Facilitation	
Capacity Enhancement	a. Incentives	Incentives Capacity Enhancement Government Role
Regulation within Facilitation	b. Advancement Practice Assistance	Facilitation (public/private)
Assistance from Public Sector	c. Certification	Certifications

Once the enablers/barriers are identified, the next stage is to identify who is best placed to drive the transformation. To do so, connecting enablers/barriers with the governance dimension clarifies the enabling mechanism in the sustainable value chain transformation. As illustrated in Figure 3, this starts with the smallholders, progresses into the value chain level, and concludes with stakeholder facilitation. The smallholder level covers the enabling tasks in regards to demography within the typology of farm stage practices. As smallholders' conditions are generally heterogeneous, they may necessitate group-specific support [29]. Meanwhile, the typology of practice encompasses their behaviour and initiatives to better participate and effectively distribute the value to subsequent stages. In addition to this, their initiative in connecting and obtaining resources with other smallholders is vital to scale up operations. Next, the value chain level focuses on vertical integration, which orchestrates information sharing along the chain and provides access and services to end markets. At this level, buyers' involvement is critical to enhancing smallholders' capacity for meeting the sourcing requirements. Finally, stakeholders facilitate the smallholders' transformation via incentives, practice advancement support, and certification.

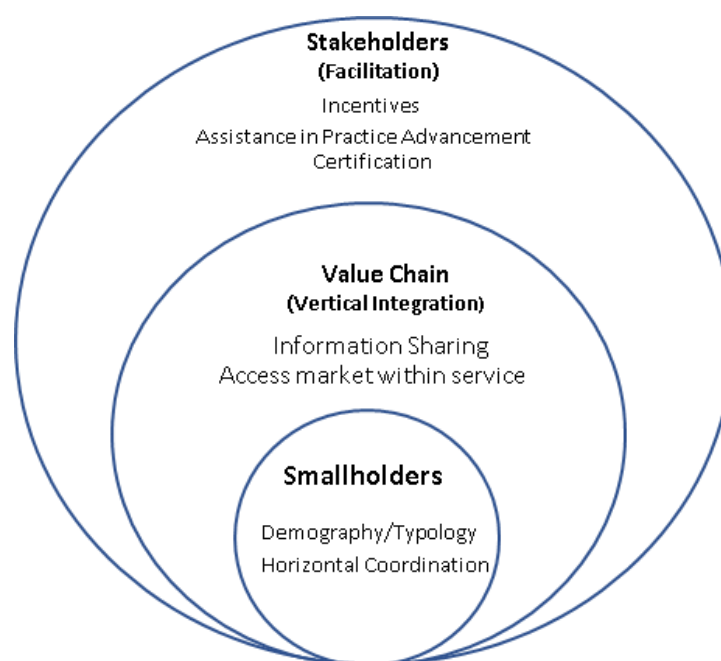


Figure 3. Sustainable Value Chain Transformation Governance.

5. Sustainable Agrifood Value Chain Transformation Operationalisation

Agrifood value chains in developing countries are aspiring to higher value markets and urgently need assistance to transform value chain practices sustainably. Smallholders are the ‘transformation agent’ in developing countries because they hold the majority role as produce suppliers and are responsible for the base value for any subsequent value chain stages. However, smallholders are the weakest actor in the value chain and are primary focuses on economic gains. Consequently, value chain transformation carries a high risk, as smallholder practices may conflict with social and environmental sustainability. A narrow short-term economic focus degrades the basic value produced at the farm stage, which further hinders full participation in the higher value markets [22–99]. Many social and environmental issues are under the care of government and NGOs as key agrifood value chain stakeholders [5–31]. Therefore, sustainability value has pressured the expansion of the transformational approach from ‘the business as usual’ in the value chain operation towards a holistic agenda.

The central contribution of this paper is the development of a framework to enable sustainable value chain transformation in the developing countries context. While previous research have focused on unearthing various enablers and barriers, e.g., [77–93], this paper focuses on the enabling mechanism of these factors in order to gain greater clarity on how to find effective transformation trajectories. Building on the preceding synthesis of literature, the development of the mechanism constitutes the structuring of the transformation process based around three major dimensions (sustainability, governance, and value addition) and transformation direction (progression or regression). Figure 4 integrates the three dimensions transformation states.

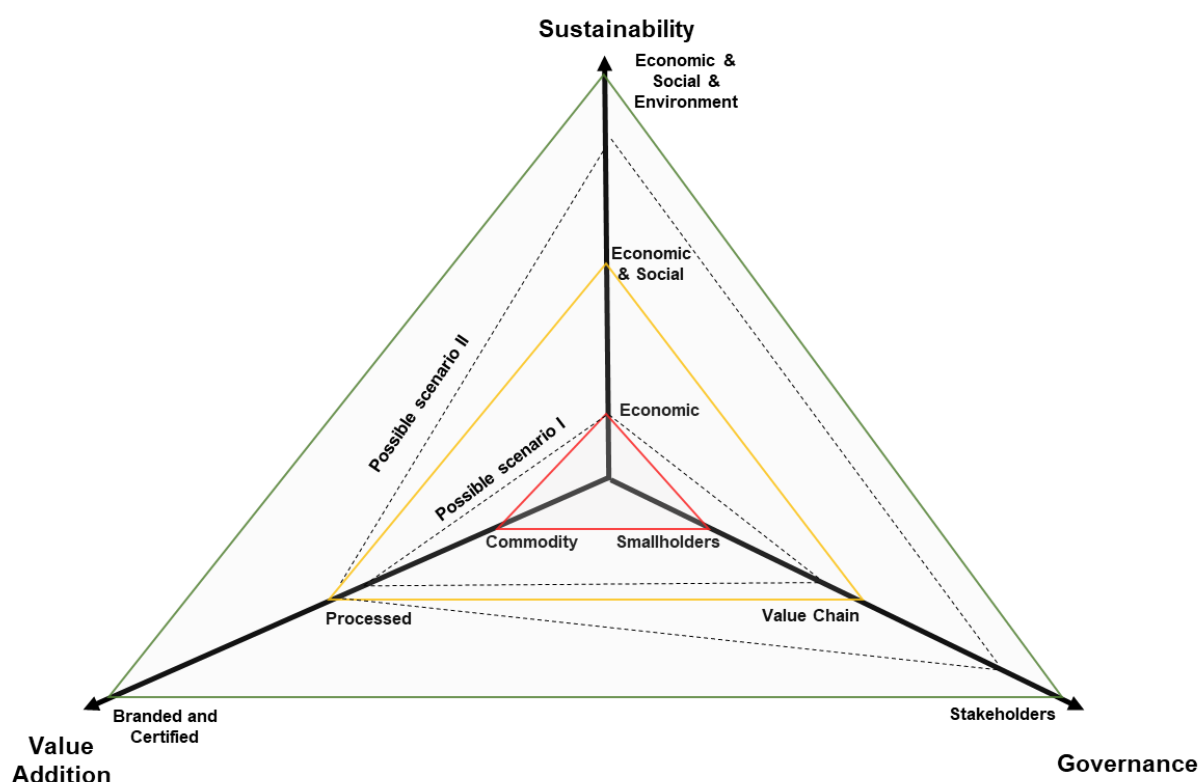


Figure 4. Sustainable Value Chain Transformation Framework for Developing Countries.

The trajectories reflect the sequential practice (in terms of sustainability, governance, and value addition) to transform into a sustainable value chain in the developing countries context. Generally, the current state of sustainable value chain practice in developing countries is assumed as smallholder-centric, with a restricted focus on pursuing their individual profitability resulting in being trapped as a commodity seller, as illustrated in the central red zone in Figure 4. Red is used to indicate this inner zone as a warning, with the lowest level of value chain sustainability. This traditional value chain state should be first transitioned into the yellow zone. Thereafter, to develop a sustainable value chain, the activities need to be shifted gradually into the green zone of Figure 4.

There is a high probability that transformation will not follow a linear stepwise path. Smallholders, for example, may have shifted their practice orientation towards a value chain perspective due to the influence of buyers, by performing more processing (shown in Figure 4 as possible scenario I). However, it is more than likely that they may continue to be driven by economic profit, putting social and environmental aspects at risk. In possible scenario II, smallholders, supported from buyers at the value chain stage and the government/NGO at the stakeholders' stage, expand their consideration towards social and environmental aspects. They might also move into more processing activities; if they are not interested in pursuing the branded and certified products, they will lose out on potential higher value markets.

To help pave the transformation path, sustainability orientation is incorporating into governance, which leads to value-adding activities required in a high-value market. Incorporating sustainability dimension into the value chain practice is fundamental by advancing the economic profit orientation towards a more socially engaged and environmentally respectful practice. To accomplish this, the sustainability dimension should be embedded via the governance dimension, with the smallholder level serving as the key initial stage in the value chain. Smallholders should progress their orientation from the farm stage towards the value chain stage and ultimately level up their orientation towards wider stakeholders. The use of a multiperspective approach is critical to appreciate the dynamics of the agrifood chain at the different scales in regards to power and the interplay of

relationships [105]. By doing so, smallholders are expected to progress their value-adding activities from purely commodity-based to processed-based and to eventually achieve the branded high-value certification. In short, progressive advancement of smallholders' practice in each dimension acts as a gateway in transforming the value chain into enhanced sustainability. As a practical guide, we can position the axis of any future transformation direction by using the detail indicators in Table 5.

Table 5. Operationalisation of Sustainable Agrifood Value Chain Transformation in Developing Countries. Bold is required to emphasis and distinguish between the key elements and the derivations aspects.

Dimension		Transformation		
Sustainability	Socially Engaged			
	Economically Profitable	1.	Individual wellbeing: improvement of education, experience/skill, lifestyle, and working condition	Environmentally Respectful
	1. Enhanced product and process			1. Input management
	2. Efficient costs			2. Waste handling
	3. Price increase	2.	Wide society: increase of employment, engaged with cultural practice, safe product, and process	3. Preservation
	4. Market expansion			
Governance	Smallholders (Niche Level)		Value Chain (Meso Level)	Stakeholders (Macro Level)
	1.	Demography and typology of practice	1.	Information communication
	a.	Demography: gender, age, family member, education, experience, farm size, plants, production	a.	Information quality: products specification, logistic, and price
	b.	Typology: input arrangement, farm cultivation, harvesting and labour using	b.	Effective methods: digital tool and reliable informant
	2.	Horizontal Coordination: farmer group membership, activities in farmer group (service for input, subsidy, credit, marketing, information)	2.	Access and service to market development: transaction term, negotiation, collaboration, standard arrangement)
Value Addition	Commodity-Based		Increased Processing	Brand Certified
	Raw material with minimal treatment		Post-harvest treatments	Branded and certified product

Providing a practical assessment will benefit both individual players and industries to independently evaluate their position and prioritise their transformation. Using the indicators in Table 5, each player can perform a detailed evaluation of their enablers and barriers. Once value chain players are aware of their enablers and barriers [31], they can develop their unique plan and find the most effective transformation route. This will assist value chain actors to respond and engage with the high-value market requirements. On a larger scale, industries could examine the common issues in their value chains and collectively rectify unsatisfactory and substandard practices. Overall, the development of enabling mechanisms constitutes a powerful framework to guide developing countries' players in attaining sustainability practice, managing the transformation risks, and building strong connection with the high-value market.

Policy makers can also use the framework to evaluate specific agrifood sectors and prioritise tailored assistance activities. Facilitation to smallholders is generally offered in various forms, such as capacity enhancement (in the form of training) and incentives (i.e., input subsidy, tool, financial support) and could be further prioritised based on the

urgency of each transformation case. Stakeholders need to stringently ‘hit the right button’ to intervene in smallholders’ actions in order to provide efficacious assistance. For this reason, facilitation should ultimately lead to certification. Although certification might seem to be a long-term goal in many developing countries [29–52], certification can create a tremendous difference on practice. Certification is very empowering for smallholders to securely participate in higher value markets. Subsequently, stakeholders can take control through policies or regulations to make positive changes [19].

The framework in this paper complements and advances the existing value chains frameworks. For instance, the DFID framework [9] aims to integrate the poor (including smallholders and traditional practices) into value chains using three tools: a general tool (value chain analysis and mapping value chain), a qualitative tool (governance, linkages–relationship–trusts, and upgrading demand), and a quantitative tool (margin, income, and employment distribution). While each tool provides detailed, practical, and informative analysis, it falls short in delivering a holistic and interconnected value chain view. Furthermore, the sustainability agenda is not explicitly expressed in these three tools.

In 2014, FAO [19] developed a sustainable value chain framework using vertical coordination (governance), broad commodities scope importance, and value added along with sustainability. In 2016, FAO [50] places more emphasis on developing countries and focuses on three main strategies: equity aspects, smallholders’ linkage, and policy along with public investment foundation. The framework developed herein advances the FAO approach by operationalising the actions required to advance and via the provision of transformation pathways.

To sum up, the framework represents transformational trajectories that involve a complex interaction between three primary sustainable value chain dimensions. Prioritization on one dimension at the neglect of the other two will detract from the overall achievement of sustainable value chain transformation. This framework represents the enabling mechanism, where the value given to the society takes wider environmental impacts into account [19].

6. Conclusions

This paper highlights the adversity developing countries’ value chains face when transforming to service higher value markets, given additional sustainability imperatives. The sustainable value chain transformation framework developed in this paper goes beyond previous works by synthesising governance, value addition and sustainability. The framework goes one step further by stressing the need for a distinctive approach to overcoming the major problems in developing countries’ transformations: the dominance of powerless actors (smallholders) and their economic orientation.

Theoretical and technical contributions are provided by the synthesised framework. Theoretically, the enabling mechanism for a sustainable value chain transformation approach is structured regarding three dimensions along with transformation trajectories. A systematic transformation approach allows developing countries’ value chains to optimally arrange actions and create effective routes for a positive transformation. Technically, the development of a practical guide in this paper assists both practitioners and policymakers to investigate transformation status and improvement trajectories. The guidelines enable practitioners to assess and self-determine their transformation path to fully align with higher value market requirements. Correspondingly, the guidelines assist policymakers in terms of delivering efficacious support for the transformation process by prioritizing and placing their interventions to address specific barriers.

To verify the framework and progress the investigation, empirical tests are proposed in the agrifood sector of developing countries. The empirical testing set for this framework will necessarily focus on high-value food produced mainly by smallholders and traded on the global market. This setting would help to depict the inevitable sustainable value chain transformation, which is currently the concern of the global agrifood industry. This paper focuses on the transformation mechanism that emphasizes the positive and negative

directions. These vectors and orientations require broader investigation, as trade-offs between activities on each dimension are empirically explored. Trade-offs sometimes are needed between the degree and rate for the sustainability achievement through vis-a-vis objectives [87]. For instance, it would be crucial to specifically distinguish the relationship between complementary, synergy, competition, and conflicts [54,55]. Thus, future exploration on each element's impacts between dimensions would be beneficial to verify sustainable value chain transformation mechanisms.

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