

Article

The Limits of Information: Coordinating Multiple Time Horizons in Sustainable Agricultural Value Chains

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Abstract

Sustainable agricultural value chains are increasingly governed through information infrastructures, such as traceability systems, certification schemes, auditing protocols, and verification mechanisms. This paper, however, argues that information and temporal coordination are distinct governance capacities. Drawing on a comparative interpretive analysis of twenty-seven sustainability-oriented agricultural value chain initiatives, supported by an iterative inductive–deductive coding matrix and cross-case synthesis, the paper examines how sustainability is rendered governable across public programs, corporate strategies, international development projects, supranational policy frameworks, and multi-stakeholder initiatives. It shows that contemporary initiatives consistently frame sustainability as a coordination problem and rely heavily on instruments that generate visibility and verification. Yet comparatively few mechanisms are devoted to sustaining alignment across the extended time horizons through which many sustainability outcomes emerge. The comparative analysis identifies a governance asymmetry in the document collection: it devotes extensive attention to mechanisms for making sustainability visible, while comparatively fewer mechanisms address the obligations, risks, rewards, and expectations of actors that unfold across ecological, institutional, financial, market, and livelihood timelines. The paper contributes to value chain governance and sustainability scholarship by conceptualizing sustainable agricultural value chains as systems that must address temporal coordination and by arguing that durable and resilient sustainability transitions require not only better information but also institutional capacities to coordinate across multiple time horizons.

Keywords: sustainable agricultural value chains; value chain governance; temporal coordination; traceability; verification; sustainability metrics; agrifood sustainability; resilience



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1. Introduction

Contemporary efforts to build sustainable agricultural value chains rely heavily on compiling information to make sustainability measurable, traceable, and verifiable, as evidenced by the rise in digital traceability platforms, sustainability metrics, blockchain-enabled monitoring systems, and transparency initiatives within governance architectures [1–4]. This emphasis reflects a broader transformation in agricultural economics and sustainability governance. Earlier value chain research often focused on efficiency, competitiveness, market access, transaction costs, and the organization of exchange [5,6]. More recent scholarship has substantially broadened these concerns in response to growing attention to climate change, biodiversity loss, resource scarcity, producer livelihoods, and food-system transformation [7,8]. Sustainable agricultural value chains are consequently

understood not merely as market arrangements but as governance systems that pursue environmental, economic, and social objectives. Questions of coordination, collective action, trust, standards, and institutional design have thus become central to understanding how sustainability outcomes are achieved [9–12].

The result has been the rapid expansion of informational infrastructures: traceability systems improve visibility across supply chains [2]; certification schemes strengthen the credibility of sustainability claims [13]; monitoring and reporting systems facilitate accountability [14]; and digital platforms create new opportunities for coordination and oversight [1]. Yet an important puzzle remains. Despite significant advances in measuring, monitoring, verifying, and communicating sustainability performance, many sustainability challenges remain stubbornly difficult to address due to the heterogeneous timescales involved. Soil regeneration often takes years or decades to materialize [15]. Biodiversity recovery unfolds gradually [16]. Producer transitions involve extended periods of uncertainty and risk [17]. Climate adaptation requires commitments that frequently outlast project cycles, procurement horizons, funding windows, and political administrations [18]. This observation suggests a potential limitation in how sustainable agricultural value chains are commonly conceptualized.

This paper examines how this limitation reflects the relative absence of what is termed temporal coordination: the capacity to sustain alignment among actors whose incentives, investments, obligations, ecological situatedness, and goals unfold across different temporal horizons. In this sense, temporal coordination is a form of cross-temporal governance. Existing governance arrangements have become increasingly effective at generating information about sustainability. They have been less attentive to the institutional work required to keep differently timed actors aligned long enough for sustainability outcomes to emerge. The paper investigates two related questions. First, how do contemporary sustainability initiatives conceptualize the governance problems facing agricultural value chains, including those related to temporality? Second, what kinds of governance capacities do they construct to address those problems?

Through a comparative interpretive analysis of 27 sustainability-oriented agricultural value chain initiatives, the study identifies a recurring governance asymmetry, suggesting that value chain governance cannot be understood solely as an information problem. The corpus spans the principal institutional settings that currently govern sustainable agricultural value chains, including public programs, corporate sustainability strategies, international development organizations, supranational policy frameworks, and multi-stakeholder initiatives. These initiatives were selected because they span the principal institutional arenas through which sustainable agricultural value chain governance is articulated: public funding programs, corporate sourcing strategies, international development frameworks, supranational policy agendas, and multi-stakeholder standard-setting or coordination platforms. The document collection, therefore, does not claim statistical representativeness, but it does provide analytic coverage of the major governance settings in which sustainability is defined, coordinated, and operationalized across agricultural value chains. By distinguishing informational capacity from temporal coordination, the paper reframes sustainable agricultural value chains as systems that must govern not only what actors know but also how commitments, risks, rewards, and obligations are maintained over time.

2. Literature Review

2.1. Sustainable Agricultural Value Chains as Governance and Coordination Problems

While earlier value chain scholarship tended to emphasize efficiency, market access, competitiveness, and the organization of production and exchange [5,6], more recent

attention has broadened this focus to grapple with concerns over phenomena like climate change, biodiversity loss, rural community livelihoods, and One Health [9,12,19–22]. As a result, sustainable agricultural value chains are now widely understood as governance systems rather than simply market arrangements [7,23].

This shift has spurred growing attention to governance mechanisms that align behavior among organizationally and geographically dispersed actors, including certification systems, cooperatives, multi-stakeholder arrangements, and hybrid public–private governance mechanisms [24–27]. Sustainability outcomes thus depend on coordinating these diverse actors operating across the domains of production, processing, distribution, retail, finance, and policy [10–12,28], and through the alignment of incentives, expectations, and responsibilities across interconnected systems [10,11,29]. Consequently, research on collective arrangements, governance structures, and institutional coordination has become central to understanding how sustainable value chains emerge and persist [12,30,31].

At the same time, growing attention to food-system resilience and transformation has complicated traditional accounts of coordination. Recent work emphasizes that value chains operate within broader social-ecological systems characterized by uncertainty, interdependence, systemic vulnerability, and uneven institutional capacity [22,32,33]. Coordination, therefore, involves not only organizing exchange but also managing increasingly complex relationships and seemingly irreconcilable tradeoffs among environmental, economic, social, and institutional processes [34].

2.2. Visibility, Traceability, and Verification in Sustainability Governance

One of the most significant developments in contemporary sustainability governance has been the rapid expansion of mechanisms to make sustainability visible. Certification schemes, monitoring frameworks, and sustainability metrics have become prominent across agricultural value chains [13,35–37]. This trend reflects a broader governance logic in which sustainability challenges are frequently understood as problems of information, accountability, and credibility. Governance interventions thus seek to reduce uncertainty by generating more reliable information about farming practices, sourcing relationships, labor conditions, and sustainability performance [35,38,39]. Consequently, visibility infrastructures are more than technical tools. They are governance mechanisms through which actors across value chains seek to stabilize claims, responsibilities, and expectations [40].

Recent scholarship documents the growing sophistication of these informational infrastructures. Digital traceability systems now incorporate blockchain technologies, IoT-enabled monitoring, digital twins, QR-code systems, and integrated reporting platforms designed to improve transparency and product visibility across complex supply chains [2,4,36,41,42]. Sustainability metrics similarly enable firms, sectors, and regions to benchmark performance and compare outcomes across organizational settings [43]. These developments—in heightened visibility, benchmarking, and monitoring—have substantially expanded the informational infrastructures available for sustainability governance.

Yet scholars caution that visibility does not automatically yield sustainability outcomes [44]. Transparency infrastructures may improve information flows while leaving broader governance challenges unresolved [44,45]. Traceability can enhance observability without necessarily addressing underlying questions of power, coordination, institutional commitment, or implementation capacity [39,46,47]. Thus, visibility is necessary but not sufficient for sustainability governance.

2.3. Temporal Challenges in Sustainability Governance

Alongside growing interest in governance and visibility, sustainability scholarship, broadly speaking, is paying greater attention to the temporality of sustainability chal-

lenges [45,48–51]. This shift is due in large part to numerous temporal mismatches, such as when ecological processes operate on timescales that differ from those of markets, projects, political cycles, and funding arrangements [22,33,52–55]. As others have argued, as climate variability intensifies, these temporal mismatches may become even more pronounced, producing agrarian desynchronization in which ecological, institutional, labor, and market rhythms increasingly diverge [49,55–57].

Work has begun to conceptualize time more explicitly within sustainability governance and business sustainability. For example, Bornemann and Strassheim [49] argue that sustainability governance not only operates in time but also actively organizes temporal orders through practices of governing time (e.g., defining planning horizons, transition pathways, and implementation timelines) and governing by time (e.g., using deadlines, milestones, targets, and reporting cycles to steer behavior). Their contribution is important because it shifts attention from time as a background condition to how governance arrangements actively structure temporal expectations and obligations. Weiser and colleagues [45] similarly argue that sustainability transformations require attention to temporal diversity across interconnected systems, sectors, and scales, since a long-term perspective alone is insufficient when system processes operate on different rhythms. In a recent literature review of what the authors describe as “business sustainability research,” Morales-Raya and Muñoz [51] detail how time has been conceptualized through temporal resourcing, temporal structuring, and temporal prospecting, but also note that the literature remains fragmented. These contributions establish the importance of temporality for sustainability governance, yet they leave open a more specific question: how is temporal coordination maintained across value chain actors whose obligations, incentives, risks, and rewards unfold on different timelines?

This literature points to an unresolved question. Although research has generated important insights into value chain governance, informational infrastructures, and the temporal dynamics of sustainability [10,11,26,27], it leaves the question of how governance arrangements sustain alignment when actors operate on different temporal rhythms comparatively underdeveloped [22,52,56]. Rather than assuming this challenge can be reduced to improved information, the analysis that follows examines how contemporary sustainability initiatives themselves construct coordination problems and which governance capacities they privilege in response.

3. Methods

3.1. Document Selection

The study analyzes institutional documents associated with initiatives that construct, govern, or coordinate sustainable agricultural value chains, using a comparative, interpretive document analysis approach [58]. This approach is motivated by the observation that sustainability governance increasingly occurs through diverse institutional arrangements spanning public agencies, international development organizations, corporate sustainability programs, supranational policy frameworks, and multi-stakeholder initiatives. The objective is therefore not to evaluate the effectiveness of individual programs or to provide a comprehensive inventory of sustainability initiatives. Rather, it is to examine how diverse organizations conceptualize sustainability challenges, define appropriate objects of intervention, and construct governance arrangements intended to coordinate sustainability transitions across agricultural value chains.

Figure 1 summarizes the analytic progression used in this study, beginning with corpus assembly, proceeding through iterative comparative coding and cross-case synthesis, and culminating in the comparative findings reported later. The figure is intended to make explicit the relationship between the document corpus, the coding matrix archived

in Zenodo (<https://doi.org/10.5281/zenodo.20646038>), and the interpretive synthesis presented in the paper.

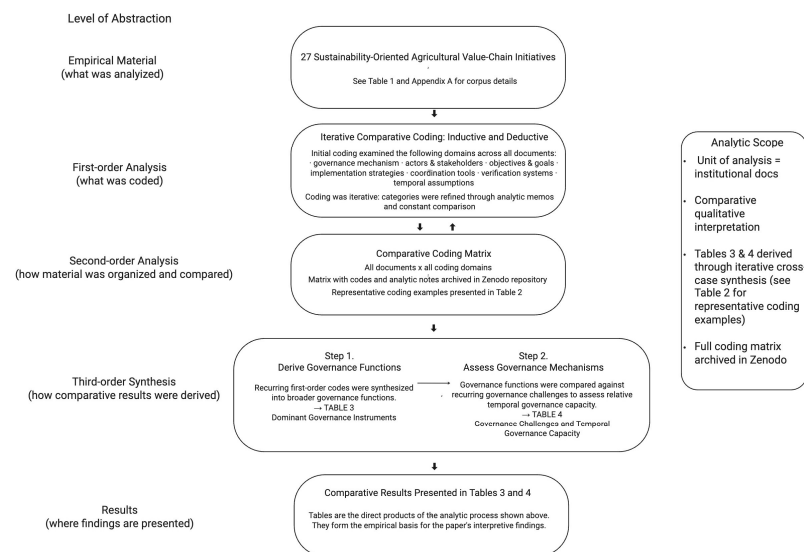


Figure 1. Analytic progression from document coding to comparative synthesis.

Because the study focuses on how sustainability is rendered governable, institutional documents are an especially appropriate source of evidence. Strategy reports, implementation frameworks, funding solicitations, evaluation documents, and policy guidance do more than describe initiatives; they articulate problem definitions, intervention logics, governance assumptions, and theories of change [59]. These documents reveal how organizations conceptualize sustainability challenges, identify appropriate objects of intervention, and specify the mechanisms by which desired outcomes are expected to emerge [60]. The analysis thus treats these materials not merely as administrative records but as institutional traces of contemporary sustainability governance [61].

The objective was not to provide exhaustive coverage of all sustainability initiatives. Rather, the selection aimed for analytic coverage of major institutional sites where sustainable agricultural value chains are currently being imagined, funded, governed, and evaluated. The resulting collection of documents captures a diverse range of influential actors shaping contemporary sustainability governance across public, private, hybrid, and international settings.

The corpus was constructed purposively. Documents were selected based on four criteria: (1) an explicit focus on sustainable agricultural value chains, climate-smart commodities, regenerative agriculture, or related transition initiatives; (2) the availability of substantive public documentation; (3) relevance to governance, coordination, market formation, resilience, or sustainability transitions; and (4) representation of multiple institutional settings. Selection continued until the corpus provided sufficient analytic coverage of the major institutional settings examined in the study, and additional documents no longer altered the core comparative patterns identified in the coding matrix, consistent with purposive sampling approaches oriented toward information-rich cases and analytic adequacy rather than statistical representativeness [62–64].

The resulting corpus comprised 27 documents across five major categories of initiatives: international development organizations, government programs, corporate sustainability initiatives, supranational policy frameworks, and multi-stakeholder initiatives—see Table 1. A complete inventory of documents, including document type, scale, year, organizational affiliation, and stable URL, is provided in Appendix A.

Table 1. Empirical corpus of sustainable agricultural value chain initiatives.

Institutional Category	Representative Cases	Documents (n)	Primary Governance Orientation
International development organizations	IFAD, FAO	5	Value chain development, smallholder inclusion, implementation and evaluation
Government programs	USDA Partnerships for Climate-Smart Commodities	6	Public-sector transition governance, incentive design, climate-smart market development
Corporate sustainability initiatives	General Mills, Unilever, PepsiCo, Nestlé	8	Sustainable sourcing, regenerative agriculture, climate commitments, supplier coordination
Supranational policy frameworks	EU Farm-to-Fork Strategy	3	Regulatory vision, food-system transformation, policy coordination
Multi-stakeholder initiatives	IDH Sustainable Trade Initiative, SAI Platform	5	Cross-sector coordination, standards alignment, transition support
Total	—	27	Twenty-seven documents across five institutional categories

An important feature of the document collection is its heterogeneity [58], which spans strategy reports, implementation guides, funding announcements, evaluation reports, policy frameworks, corporate sustainability materials, transition-support tools, and progress reports. This variation allows the analysis to empirically interrogate the governance field itself; after all, sustainable agricultural value chains are coordinated through multiple institutional forms, each of which produces distinct documentary traces [58]. Examining these materials together enables analysis of how sustainability is conceptualized, coordinated, and operationalized across diverse governance settings.

3.2. Coding

Documents were coded using an iterative inductive–deductive strategy, as detailed in Figure 1. Coding categories were revised throughout analysis as recurring governance mechanisms emerged across the corpus, with analytic memos documenting coding decisions and conceptual development. The resulting comparative coding matrix served as the basis for the cross-case synthesis reported later in Tables 3 and 4.

The coding matrix functioned not only as a data-management tool but also as an analytic device. Rather than relying on a fixed coding framework established prior to document review, coding categories were revised iteratively as recurring themes emerged across cases [62]. This iterative process created an explicit audit trail linking document review, coding decisions, and conceptual development [62]. The approach thus combined systematic comparison with inductive–deductive theory building, moving repeatedly between empirical materials and emerging analytic insights [62,65].

The analysis focused on identifying recurring governance patterns in how sustainability challenges were defined and addressed across initiatives. A governance pattern was treated as recurring when comparable governance mechanisms appeared across multiple institutional settings and document types, remained analytically robust through repeated comparison and memo writing, and continued to organize interpretation during the cross-case synthesis. Particular attention was devoted to how initiatives organized coordination among dispersed actors, how sustainability was rendered measurable and verifiable, and how governance arrangements sought to align incentives, responsibilities, risks, and future-oriented objectives. Through this process, sustainability repeatedly emerged as a problem

of coordination rather than solely of production, and differences in the distribution of governance mechanisms across coordination challenges became increasingly visible. These observations informed the findings presented below.

Because the objective was interpretive comparison rather than quantitative content analysis, the study does not report coding frequencies. The analytic purpose was not to determine how often particular governance mechanisms appeared, but to identify recurring governance logics that organized sustainability across diverse institutional settings. Frequency counts would risk implying a level of quantitative precision inconsistent with the interpretive design, particularly given the substantial variation in document type, length, purpose, and institutional context. Instead, the analysis emphasizes comparative patterns that remained stable across the corpus through iterative coding, memo writing, and cross-case synthesis.

To enhance transparency in the analytic procedure, Table 2 provides representative examples of how documentary excerpts were coded and incorporated into the comparative synthesis. The table is illustrative rather than exhaustive: individual first-order codes were repeatedly compared across the twenty-seven documents and grouped into higher-order governance categories through iterative cross-case analysis. These categories form the basis of Table 3, which synthesizes the dominant governance instruments identified across the corpus. Table 4 then presents a second-order comparative interpretation of the governance arrangements identified across the corpus by distinguishing how consistently particular mechanisms appear from how extensively those arrangements elaborate institutional support for temporal coordination. Together, the three tables show the progression from documentary evidence to coding and category development to the comparative findings reported in the analysis.

Table 2. Examples of the coding and analytic synthesis process.

Actual Documentary Quotation	First-Order Code	Higher-Order Governance Category	Comparative Interpretive Claim
"The term 'coordinated' here means that in VCs the governance structure moves beyond a series of traditional spot-market transactions." [66], p. 6	Value chain coordination	Partnerships and multi-stakeholder platforms	Sustainability governance increasingly depends upon coordination across multiple actors.
"We need all our suppliers working with us to achieve these goals." [67], p. 4	Supplier engagement	Partnerships and multi-stakeholder platforms	Sustainability transitions rely upon coordinated participation throughout value chains.
"By aligning on a definition, impact areas, outcomes, and metrics [...] we aim to reduce the multiplication of standards and schemes." [68], p. 2	Shared metrics and standards	Metrics and indicators	Sustainability governance relies on standardized measurement and common evaluative frameworks.
"Independent third-party verification bodies may be needed to report [...] performance claims." [69], p. 7	Third-party verification	Verification and certification	Sustainability governance institutionalizes credibility through verification and auditing mechanisms.
"...measure and validate the climate-smart advantages of camelina sativa..." [70], p. 15	Monitoring and verification	Verification and certification	Sustainability claims increasingly depend upon documented verification systems.
"This project will build markets and provide funding to farmers via outcome-based contracts..." [70], p. 1	Producer incentives	Financial incentives	Sustainability governance frequently encourages adoption through economic inducement and transition support.

Table 2. Cont.

Actual Documentary Quotation	First-Order Code	Higher-Order Governance Category	Comparative Interpretive Claim
“The Principles require the implementation of a process of change rather than the one-time adoption of a single set of practices.” [71], p. 19	Continuous improvement	Technical assistance and capacity building	Sustainability transitions are governed as ongoing learning processes rather than discrete interventions.
“Transitioning to regenerative agriculture is a long-term process and needs a long-term commitment and plan (at least 5–7 years).” [69], p. 12	Long-term commitment	Durability-oriented mechanisms	Sustainability governance devotes comparatively less institutional attention to mechanisms supporting long-term temporal coordination than to measurement and verification infrastructures.

Table 3. Dominant governance instruments across sustainable agricultural value chain initiatives.

Governance Function	Governance Instrument	Primary Function	Representative Examples from Corpus	Comparative Analytic Pattern
Making sustainability knowable	Metrics and indicators	Measure sustainability performance	Climate-smart outcomes, regenerative agriculture indicators, emissions accounting, sourcing metrics	Sustainability is rendered measurable and comparable
Making sustainability knowable	Verification and certification	Validate sustainability claims	Climate-smart verification, certification systems, ESG reporting, regenerative standards	Credibility is achieved through third-party validation and auditing
Making sustainability knowable	Traceability and transparency systems	Monitor products, practices, and outcomes across supply chains	Supply chain traceability, reporting platforms, digital monitoring systems	Governance increasingly relies on visibility infrastructures
Making sustainability achievable	Technical assistance and capacity building	Support adoption of desired practices	Producer training, transition support, extension-like services	Sustainability is treated as a learning and implementation challenge
Making sustainability achievable	Financial incentives and market premiums	Encourage participation and offset transition costs	Cost-share programs, premium markets, climate-smart incentives	Adoption is frequently governed through economic inducement
Making sustainability collective	Partnerships and multi-stakeholder platforms	Coordinate actors across the value chain	IDH, SAI Platform, USDA partnerships, corporate sourcing initiatives	Sustainability is framed as a coordination problem requiring collective action
Making sustainability collective	Standards and implementation frameworks	Align expectations and practices	Regenerative agriculture principles, Farm-to-Fork frameworks, supplier playbooks	Governance depends on standardization across diverse actors
Durability-oriented mechanisms	Long-term contracts, persistence requirements, etc.	Maintain commitments across extended time horizons	Long-term contracting, persistence requirements, post-project governance provisions	Present in several initiatives (e.g., long-term contracting, transition support), but comparatively less developed and less institutionalized than visibility and verification infrastructures

Table 4. Governance challenges, dominant responses, and temporal governance capacity across sustainable agricultural value chain initiatives.

Governance Challenge	Dominant Governance Response	Comparative Pattern Across Corpus	Temporal Coordination Capacity *
Information asymmetry	Metrics, indicators, reporting systems	Widespread	High
Credibility and trust	Verification, certification, auditing	Widespread	High
Visibility across supply chains	Traceability and transparency systems	Widespread	High
Adoption of sustainable practices	Technical assistance, incentives, premiums	Widespread	Moderate
Coordination among diverse actors	Partnerships, standards, multi-stakeholder initiatives	Widespread	Moderate
Long-term commitment persistence	Long-term contracting, persistence requirements, transition support	Consistent to Limited	Low
Post-project durability	Follow-on governance mechanisms, continuation funding	Limited	Low
Alignment of ecological, market, financial, and policy horizons	Explicit temporal coordination mechanisms	Rare	Low

* The “Temporal Coordination Capacity” provides a comparative interpretive assessment of the extent to which the governance arrangements documented in the corpus are institutionally elaborated within the documents analyzed to sustain alignment among actors operating across different temporal horizons. “High” indicates governance arrangements that are extensively and explicitly developed in the documents, including metrics, verification, and traceability infrastructure. “Moderate” indicates mechanisms that may support sustained coordination but do so indirectly, partially, or inconsistently, including technical assistance, incentives, partnerships, and standards. “Low” indicates areas where explicit institutional mechanisms for sustaining long-term alignment are comparatively limited, unevenly developed, or only sporadically articulated. The classifications describe documented governance architectures; they are not quantitative scores or evaluations of implementation effectiveness.

3.3. Generative AI Use Statement

Generative AI was used during the research process as a conversational aid to support analytic reflection and the development of interpretive memos. Specifically, it was used to discuss emerging patterns in the coded materials, explore alternative interpretations, and critically interrogate provisional findings and arguments. All document selection, document review, coding, category development, analytic interpretation, and final manuscript preparation were conducted by the author.

4. Findings

4.1. Sustainability as Coordination: Governance Instruments and Visibility Infrastructures

Across the documents, sustainability is consistently presented as requiring alignment among actors distributed throughout agrifood value chains. Diverse actors (producers, processors, retailers, financial institutions, etc.) are frequently described as interdependent participants whose decisions collectively shape sustainability outcomes. Development-oriented value chain programs emphasize coordination among producers, buyers, service providers, and supporting institutions. Corporate sustainability initiatives focus on aligning supplier practices with sourcing commitments, environmental targets, and reporting requirements. Public-sector programs seek to connect farmers, technical assistance providers, market actors, and verification systems. Multi-stakeholder initiatives likewise emphasize collaboration across organizational and sectoral boundaries. Although these initiatives differ substantially in scale, purpose, and institutional context, they share an underlying assumption: sustainability depends on the successful alignment of actors whose actions are interconnected yet not centrally controlled.

This coordination challenge is often treated not merely as an aspiration but as a distinct institutional problem. The Nigeria Value Chain Development Programme (VCDP), for example, identifies coordination across producers, processors, financial institutions, government agencies, and other value chain actors as a central governance task [72]. Through its Commodity Alliance Forums (CAFs) and Public–Private–Producer Partnerships (4Ps), the program seeks to strengthen “coordination among federal, state, and local institutions” while simultaneously enhancing smallholder participation in food-system governance [72] (p. 12). Yet project assessments also identify the long-term viability of these coordinating institutions as a persistent challenge, emphasizing the need for “strategic partnerships with public and private-sector actors, and linkages with financial institutions to maintain value chain operations beyond the program’s life” [72] (p. 5). Sustainability, in this sense, depends not only on promoting desirable practices but also on maintaining organizational arrangements capable of coordinating diverse actors, aligning incentives, and sustaining cooperation across time.

To examine how this coordination is pursued, Table 3 synthesizes the dominant governance instruments identified across the corpus. The table shows that these instruments cluster around four broader governance functions: making sustainability knowable, achievable, collective, and durable. It does not report raw coding frequencies; rather, it presents an interpretive synthesis of recurring governance mechanisms identified through iterative cross-case comparison. Together, these governance functions reveal an emerging asymmetry. Informational instruments receive the greatest institutional elaboration, whereas mechanisms for sustaining commitments across extended temporal horizons remain comparatively limited.

Although all five institutional settings rely heavily on informational governance, they exhibit distinctive emphases. Corporate sustainability documents devote comparatively greater attention to supplier coordination, sourcing commitments, implementation guidance, and reporting infrastructures designed to support internal sustainability targets. International development organizations place greater emphasis on institutional capacity building, producer inclusion, financing arrangements, and post-project implementation. Government initiatives focus more heavily on verification systems, incentive design, and market creation through public funding programs. Supranational policy frameworks focus on long-term regulatory vision and policy coordination. Meanwhile, multi-stakeholder initiatives emphasize alignment of standards and cross-sector collaboration. Despite these differences in institutional orientation, all five settings devote considerably more attention to making sustainability visible than to governing the long-term alignment of actors operating across divergent temporal horizons.

The USDA Partnerships for Climate-Smart Commodities program offers a particularly clear illustration of this governance architecture [73]. The original funding announcement required projects not only to implement climate-smart production practices but also to “measure/quantify, monitor and verify” associated greenhouse gas benefits and to “develop markets and promote the resulting climate-smart commodities” [73] (p. 1). Proposals were also required to provide plans to “quantify, monitor, report and verify climate results” while developing market opportunities [73] (p. 1). Coordination, in other words, was organized through a combination of implementation support, verification systems, and market-building mechanisms rather than any single governance instrument. The significance of this example is not that it is unusual, but that it makes especially explicit a pattern that appears throughout the broader corpus: sustainability is governed by infrastructures designed to align information, incentives, and participation among dispersed actors.

4.2. Temporal Coordination as a Governance Challenge: Beyond Visibility and Verification

Whereas Table 3 synthesizes the dominant governance instruments identified across the corpus, Table 4 shifts the analysis to governance capacity. Rather than cataloging what initiatives do, it compares where institutional effort is concentrated in response to recurring governance challenges. This second-order synthesis reveals a striking asymmetry in the governance capacities elaborated across the documentary corpus. The “Temporal Coordination Capacity” column does not measure implementation effectiveness or observed governance performance; rather, it presents a comparative interpretive assessment of how extensively the governance arrangements documented in the corpus elaborate institutional mechanisms to sustain coordination across differing temporal horizons. Moreover, the descriptors “widespread,” “consistent to limited,” and “rare” are comparative interpretive summaries of how consistently particular governance mechanisms appeared across institutional settings during cross-case synthesis; they are not quantitative frequency categories.

Table 4 shows that governance capacity is most developed where sustainability is framed as a problem of information, credibility, visibility, adoption, or actor coordination. Metrics, certification, traceability, technical assistance, incentives, partnerships, and standards are widespread across the corpus. Temporal coordination, by contrast, is less consistently institutionalized.

While the document collection contains numerous mechanisms for measuring sustainability performance and verifying sustainability claims, it is comparatively thin in mechanisms designed to sustain alignment among actors negotiating ecological, market, financial, policy, institutional, and livelihood temporal horizons. Long-term contracting provisions, persistence requirements, continuation funding arrangements, and transition-support mechanisms do appear in several initiatives—notably the SAI Platform’s transition guidance and aspects of IFAD’s value chain programming—but they remain comparatively less institutionally elaborated and more unevenly developed than the extensive infrastructures devoted to measurement, verification, and traceability. When such mechanisms do appear, they are often limited in scope, project-specific, or unevenly developed compared with the extensive infrastructure devoted to measurement and verification.

The European Union’s Farm to Fork Strategy, for example, sets objectives such as “preserving and restoring” natural resources, adapting to climate change, and “reversing the loss of biodiversity,” while organizing implementation through 2030 targets, legislative frameworks, financial incentives, procurement systems, and voluntary commitments [74] (p. 7). Yet the strategy provides comparatively little discussion of the institutional arrangements through which commitments, responsibilities, and support would be maintained beyond the 2030 horizon.

This tension is not from a lack of temporal awareness. Several initiatives explicitly recognized the temporal challenges faced. The SAI Platform, for example, characterizes regenerative agriculture as “a long-term process” requiring “a long-term commitment and plan” [69] (p. 12). In Nigeria’s Value Chain Development Programme (VCDP), substantial investments in coordination platforms, performance monitoring, and multi-stakeholder engagement strengthened collaboration among public agencies, producers, processors, and financial institutions [72]. Yet the program’s 2025 report also identified a different challenge: the “limited financial viability of CAF to cover operational and transactional costs beyond the project period” [72] (p. 5). Rather than recommending additional monitoring or reporting systems, the mission emphasized the need for strategic partnerships and financial linkages to sustain value chain operations after direct project support ended. The problem was not whether sustainability outcomes could be observed or coordinated in the present, but whether institutional arrangements could persist once funding and program support were withdrawn. This example illustrates an important comparative finding: coordination-

oriented mechanisms are present in parts of the corpus, but they occupy a much smaller and less institutionalized place within contemporary governance architectures than the extensive systems devoted to measurement, verification, auditing, and traceability.

The differences observed across institutional settings are also instructive. International development organizations generally devoted greater attention to post-project coordination, continuation arrangements, and institutional capacity, whereas corporate and government documents placed greater emphasis on reporting, verification, supplier implementation, incentive design, and market coordination. Supranational and multi-stakeholder initiatives, in turn, tended to emphasize long-range policy vision, standard alignment, and transition guidance. Nevertheless, across all five institutional settings, mechanisms explicitly devoted to sustaining alignment across heterogeneous temporal horizons remained less developed than informational infrastructures. The principal governance asymmetry revealed by the corpus, therefore, lies not in whether sustainability is coordinated but in where governance capacity is concentrated.

5. Discussion

5.1. From Coordination to Temporal Coordination

Existing value chain scholarship has largely conceptualized coordination as the alignment of actors, information, incentives, standards, and governance arrangements across dispersed production networks [9,24,47]. The comparative analysis presented here suggests that this account remains incomplete. Sustainable agricultural value chains must also sustain coordination among actors with substantially different temporal horizons. Producers, processors, retailers, governments, financial institutions, and ecological systems operate according to distinct rhythms of investment, accountability, ecological change, and institutional decision-making [49]. I refer to this governance capacity as temporal coordination: the capacity to sustain alignment among actors whose obligations, risks, rewards, and expected benefits unfold across different temporal horizons.

Temporal coordination differs from conventional accounts of coordination because the central challenge is not merely bringing actors into agreement at a particular moment. Rather, it is maintaining alignment when the relevant temporal horizons differ [16,52,75]. Farmers often incur transition costs immediately, while ecological benefits emerge years later; buyers operate according to procurement calendars and reporting cycles; governments according to electoral and budget cycles; financial institutions according to investment horizons; and ecosystems according to biological processes that frequently exceed all of these timelines [49,76]. Coordination, therefore, becomes a problem of governing asynchronous temporalities rather than merely coordinating organizational relationships.

The concept of temporal coordination therefore extends existing value chain governance theory in two respects. First, it identifies temporal coordination as a distinct governance problem rather than treating it as an implicit consequence of improved information or stronger incentives. Second, it shifts attention from coordinating actors alone to coordinating the temporal conditions under which cooperation remains viable throughout extended sustainability transitions. Across the document corpus, there was evidence that they devoted substantial institutional effort to metrics, verification, reporting, traceability, and implementation support, yet comparatively few mechanisms addressed the long-term alignment of actors operating across ecological, financial, market, institutional, and policy timelines.

5.2. Beyond Information-Based Accounts of Sustainability Governance

The governance asymmetry identified in Table 4 suggests that sustainability governance has become disproportionately tied to informational capacity. Existing scholarship

offers sophisticated accounts of governance through traceability, certification, auditing, metrics, reporting, and other visibility infrastructures that reduce uncertainty and strengthen accountability across value chains. The comparative analysis presented here suggests that these informational capacities represent only one dimension of governance. Information and temporal coordination are analytically distinct governance capacities: information coordinates what actors know, whereas temporal coordination governs whether actors operating on different ecological, financial, institutional, and political timelines remain aligned long enough for sustainability outcomes to emerge. Visibility infrastructures undoubtedly improve observability, accountability, and comparability. Yet they do not necessarily provide the institutional capacities needed to sustain coordination among actors with divergent temporal commitments. Temporal coordination thus emerges not as an extension of informational capacity but as a distinct governance accomplishment.

For example, information and temporal coordination diverge, as shown in recent work on sustainability disclosure—e.g., reporting infrastructures may remain stable even as commitments drift over time [44]. The IFAD evaluation illustrates this distinction empirically. Despite extensive monitoring systems, the 2025 evaluation identified a different problem: the financial viability of the coordinating institutions once project funding ended [72]. Rather than recommending additional monitoring or reporting systems, the mission emphasized the need for “strategic partnerships with public- and private-sector actors, and linkages with financial institutions to maintain value chain operations beyond the program’s life” [72] (p. 5). The issue was therefore not whether sustainability outcomes could be measured, but whether institutional arrangements could sustain commitments once project funding and direct program support were withdrawn. Temporal coordination, in this sense, is not an extension of visibility but a distinct governance accomplishment.

This distinction also clarifies the relationship between the argument developed here and longer-standing debates about discounting in ecological economics. Discounting and related valuation tools are important because they translate future costs and benefits into present decision-making [77,78]. They help make long-term ecological harms visible within current appraisal systems. Yet the findings suggest that the problem facing sustainable agricultural value chains is not only how future benefits and harms are valued in the present. It is also how the obligations, risks, investments, and responsibilities associated with those futures are carried forward institutionally. This, again, points to the challenge being not simply one of temporal valuation but of temporal coordination. A governance system may register the long-term value of soil regeneration, biodiversity recovery, or climate adaptation while still lacking the temporal architecture needed to sustain alignment among actors whose costs, benefits, and obligations emerge at different moments.

The challenge identified by the findings thus cannot be resolved simply through more information, better metrics, or more sophisticated verification systems. Nor is the answer exclusively in longer-term contracting arrangements, transition support mechanisms, and persistence requirements. The remaining discussion considers what governance arrangements might begin to address this limitation.

5.3. Beyond Incentives: Temporal Coordination as Reflexive Governance

The findings indicate that the sustainable value chain documents analyzed devote far more attention to visibility, verification, and implementation support than to sustaining alignment across divergent temporal horizons. The comparatively stronger cases are instructive because they show what temporal coordination can look like when it receives more explicit institutional support. IFAD’s discussion of warehouse receipts, microfactoring, embedded finance, medium- and long-term loans, and risk-mitigation tools illustrates how governance arrangements can reshape the timing of liquidity, investment, payment, and

risk [79] (pp. 50–51). These instruments matter not simply because they increase access to finance, but because they redistribute delays and obligations across value chain actors. They therefore point to a broader design principle: temporal coordination requires institutions that alter when costs are borne, when returns are realized, and which actors absorb risk during transition.

Private-sector documents articulate a similar logic, though at a greater level of abstraction. Unilever’s regenerative agriculture guide describes the regenerative transition as “a process of change rather than the one-time adoption of a single set of practices” [71] (p. 19), while also noting that “changes in farming systems will also need to be met with changes in market dynamics” because “farmers respond to market signals” [17] (p. 7). PepsiCo’s supplier playbook likewise links adoption to whether regenerative farming “creates value in the short, medium, or long term across the entire agricultural supply chain” [67] (p. 11). Together, these documents reinforce the point that temporal coordination requires more than future-oriented targets; it requires governance arrangements—including long-term procurement relationships, transition support, financing mechanisms, and market commitments—that make sustainability transitions economically and organizationally viable even as ecological benefits are still emerging.

These comparatively stronger cases provide a substantive test of the paper’s central claim rather than merely documenting variation within the corpus. If the argument were that contemporary sustainability initiatives neglect temporal coordination altogether, the mechanisms identified in IFAD, the SAI Platform, Unilever, and PepsiCo would constitute clear counterexamples. The argument, however, concerns the relative distribution of institutional attention and elaboration across governance capacities. These cases demonstrate that temporal coordination can be institutionally articulated through financing arrangements, transition support, longer-term market relationships, iterative implementation processes, and continuing organizational commitments. At the same time, even these comparatively developed cases remain within governance architectures that devote greater and more systematic attention to monitoring, verification, reporting, standards, and traceability. Their analytic significance is therefore twofold: they identify the institutional conditions under which temporal coordination becomes more developed, while also defining the limits of the broader governance asymmetry identified across the corpus. Because that asymmetry remains visible even among the strongest contrasting cases, it cannot be attributed simply to the selective inclusion of initiatives with weak temporal arrangements. The finding is thus neither that temporal coordination is universally absent nor that its underdevelopment is inevitable, but that it remains comparatively less elaborated and less institutionalized than informational governance across the documentary collection.

Importantly, temporal coordination should not be understood merely as extending commitments farther into the future. Several adjacent studies point to institutional arrangements that may help sustain it. Research on credible commitments emphasizes the conditions under which future-oriented promises become sufficiently believable to shape present action [80]. Adaptive governance and sustainability transitions scholarship similarly highlight institutions capable of learning, revising responsibilities, protecting emerging practices, and adjusting support as ecological, economic, and political conditions evolve [81–84]. Economic sociology further demonstrates how expectations about the future organize present investments under conditions of uncertainty [50,85]. This scholarship suggests that the central governance challenge is not simply whether actors value the future but whether institutions can keep differently timed actors aligned long enough for sustainability outcomes to emerge.

The comparative analysis suggests that future governance innovations should focus less on generating information and more on building institutions that maintain alignment

across heterogeneous temporal horizons. Temporal architectures, then, are not merely longer planning horizons but institutional arrangements that keep sustainability transitions viable as costs, benefits, obligations, and evidence emerge at different times. Long-term procurement agreements can stabilize demand; risk-sharing mechanisms can reduce the burden of transition periods; financing arrangements can bridge the gap between investment and return; and post-project governance mechanisms can prevent coordination from dissolving when funding cycles end. But these arrangements also require reflexive capacity. Because ecological, market, regulatory, and organizational rhythms change, temporal coordination depends on institutions that can periodically reassess goals, redistribute responsibilities, incorporate new knowledge, and adjust governance instruments without abandoning long-term commitments [45,81,82,86]. The point is not to lock actors into fixed futures but to build governance systems capable of sustaining alignment while revising what alignment requires.

6. Conclusions

Across the documentary corpus, sustainable agricultural value chain governance is strongly organized around information, measurement, traceability, transparency, verification, and reporting. These capacities matter. However, the analysis shows that making sustainability visible and sustaining alignment across multiple time horizons are distinct governance accomplishments. Although several initiatives include comparatively developed forms of transition support, persistence requirements, continuation arrangements, or post-project governance, these contrasting cases define rather than overturn the broader pattern: across the corpus, such mechanisms remain less systematically elaborated than the infrastructures devoted to measurement, verification, and traceability.

This observation has implications that extend beyond agricultural value chains. Across sustainability governance more broadly, informational infrastructures are often expected to solve collective-action problems by improving accountability, transparency, and decision-making [1,2,4]. While these capacities matter, the uneven distribution of governance capacity identified in this study highlights a limitation of information-centered approaches: information alone cannot resolve a central challenge of sustainability transitions, namely, maintaining alignment long enough for desired ecological and social transformations to materialize.

Recognizing temporal coordination as a distinct governance challenge also points to important directions for future research while highlighting the limits of the present analysis. This study examines institutional documents rather than implementation processes. These documents are governance artifacts: they articulate priorities, assumptions, intended mechanisms, and theories of change, but they also offer selective, often aspirational, and sometimes performative or incomplete representations of governance arrangements and implementation practice. Accordingly, the findings should be interpreted as identifying recurring patterns in how sustainability governance is conceptualized and institutionalized across contemporary initiatives, rather than as direct evaluations of implementation effectiveness. Future research should examine how temporal coordination is enacted in practice through interviews, organizational ethnography, longitudinal case studies, and mixed-methods research that follows governance arrangements over time. Such work could investigate the institutional mechanisms through which commitments are sustained, revised, or redistributed—including long-term contracting arrangements, continuation funding structures, transition-support programs, risk-sharing agreements, and post-project governance architectures—and compare how different value chain configurations allocate temporal risks and rewards across actors operating within different governance settings. Extending the analysis in these directions would deepen understanding of how governance

systems manage, or fail to manage, the temporal mismatches that characterize sustainability transitions.

The argument also has practical implications. If sustainability outcomes depend on maintaining alignment across multiple time horizons, governance design cannot focus exclusively on visibility. Policymakers, corporate sustainability programs, and multi-stakeholder initiatives should complement investments in measurement, traceability, and verification with institutional arrangements that coordinate different and often changing commitments over time. Designing sustainable agricultural value chains therefore requires attention not only to how sustainability is measured and monitored but also to how commitments are maintained, revised, and renegotiated as costs, benefits, risks, and rewards evolve.

As climate change, resource scarcity, ecological degradation, and food-system instability intensify, the ability to coordinate across multiple time horizons is proving to be as important as coordinating information. The future of sustainable agricultural value chains may therefore depend less on making sustainability visible than on building the institutional capacity to maintain alignment across multiple, uneven, and sometimes conflicting time horizons.

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Appendix A

Table A1. Corpus architecture of sustainable agricultural value chain initiatives.

Organization/ Lead Actor	Initiative	Full Document Title	Document Type	Scale	Year	Stable URL
International Fund for Agricultural Development (IFAD)	Commodity value chain development projects/ sustainable inclusion of smallholders	How to do Commodity value chain development projects: Sustainable inclusion of smallholders in agricultural value chains [87]	Practical guidance	Project design and imple- mentation; agricultural value chains in develop- ing/rural contexts	2014	https://www.ifad.org/documents/38714170/40311826/How+to+do+commodity+value+chain+development+projects.pdf (accessed on 7 July 2026)

Table A1. Cont.

Organization/ Lead Actor	Initiative	Full Document Title	Document Type	Scale	Year	Stable URL
IFAD Independent Office of Evaluation	IFAD pro-poor value chain development portfolio	IFAD's Engagement in Pro-poor Value Chain Development: Corporate-level Evaluation [79]	Corporate- level evaluation	Corporate portfolio evaluation across IFAD projects, 2007–2018; 77 projects in 29 countries reviewed	2019	https://www.ifad.org/documents/38714182/41260694/cle_valuechain.pdf (accessed on 7 July 2026)
IFAD/Federal Government of Nigeria	Nigeria Value Chain Development Programme (VCDP)	Nigeria Value Chain Development Programme Supervision Report [72]	Supervision report/ implementation review	National/ subnational programme across Nigerian states; rice and cassava value chains	2025	https://www.ifad.org/documents/48415603/50527856/NGA_1100001594_SUPERVISION_REPORT_DEC_2025_0024-811606050-2162_5743.pdf (accessed on 7 July 2026)
Nestlé S.A.	Nestlé EU Farm to Fork policy recom- mendations/ regenerative agriculture commitments	EU Farm to Fork Policy for Sustainable Food Systems: Nestlé Policy Recommendations [88]	Corporate policy recommenda- tion/advocacy document	EU policy and global corporate supply chain	2020	https://www.nestle.com/sites/default/files/2020-02/eu-farm-to-fork-policy-sustainable-food-systems.pdf (accessed on 7 July 2026)
European Parliament	EU Farm to Fork Strategy fact sheet	The Farm to Fork Strategy [89]	Policy factsheet/ explanatory brief	European Union food system and policy framework	2025	https://www.europarl.europa.eu/erpl-app-public/factsheets/pdf/en/FTU_3.2.9.pdf (accessed on 7 July 2026)
European Commission	Farm to Fork Strat- egy/European Green Deal	Farm to Fork Strategy: For a fair, healthy and environmentally friendly food system [74]	Official policy strategy/ communication brochure with action plan	European Union; global food-system influence	2020	https://food.ec.europa.eu/system/files/2020-05/f2f_action-plan_2020_strategy-info_en.pdf (accessed on 7 July 2026)

Table A1. Cont.

Organization/ Lead Actor	Initiative	Full Document Title	Document Type	Scale	Year	Stable URL
European Union/European Commission	Farm to Fork Strategy presentation	The Farm to Fork Strategy: European Green Deal—von der Leyen Commission [90]	Presentation/slide deck	EU food system; policy communication	2020	https://ldac.eu/images/Presentation_GreenDeal_EU_FarmtoFork_26May2020_MARE.pdf (accessed on 7 July 2026)
Unilever	Unilever sustainability goals/Climate & Nature Fund	Our sustainability goals [91]	Corporate sustainability goals dashboard/target framework	Global corporate value chain; agricultural sourcing; retail SMEs; natural ecosystems; packaging	n.d.	https://www.unilever.com/files/our-sustainability-goals.pdf (accessed on 7 July 2026)
Unilever	Unilever Climate Transition Action Plan (CTAP)	Climate Transition Action Plan: Updated 2024 [92]	Corporate climate transition plan/investor-facing strategy document	Global corporate operations and value chain; Scope 1, 2 and selected Scope 3 categories	2024	https://www.unilever.com/files/8b5df5f6-cb90-40fd-9691-38d06905d81d/unilever-climate-transition-action-plan-updated-2024.pdf (accessed on 7 July 2026)
Unilever	Unilever Regenerative Agriculture Principles/Lighthouse Programmes	The Unilever regenerative agriculture principles with Implementation Guides [71]	Corporate implementation guide/regenerative agriculture principles and metrics manual	Farm, crop, supplier, landscape, watershed and global supply chain programs	2021	https://www.unilever.co.uk/files/6214b484-7875-4042-90ed-30122b2bbf05/regenerative-agriculture-principles-and-implementation-guide-april-2021.pdf (accessed on 7 July 2026)
General Mills	Standing for Good/regenerative agriculture, climate action, no deforestation, water stewardship, responsible sourcing	Global Responsibility Report 2026 (Draft) [93]	Corporate global responsibility/sustainability report	Global corporate operations and value chains; priority supply sheds and watersheds; farm-to-fork	2026	Link no longer live (author has pdf)

Table A1. Cont.

Organization/ Lead Actor	Initiative	Full Document Title	Document Type	Scale	Year	Stable URL
General Mills	Standing for Good/ regenerative agriculture and climate action	Global Responsibility Report 2025 [94]	Corporate global respon- sibility/ sustainability report	Global corporate value chain; targeted supply sheds and watersheds; farm-to-fork	2025	https:// globalresponsibility. generalmills.com/ general-mills- global- responsibility-2025 .pdf (accessed on 7 July 2026)
General Mills	General Mills regenerative agriculture principles/ ecosystem processes framework	Regenerative agriculture: processes, principles and outcomes [95]	Infographic/ principles and outcomes framework	Farm ecosystem; ingredient supply; regenerative agriculture programming	2024	https:// globalresponsibility. generalmills.com/ general-mills- global- responsibility-2024 -45.pdf (accessed on 7 July 2026)
PepsiCo	PepsiCo Positive Agri- culture/pep+ Positive Ag supplier im- plementation	PepsiCo Positive Ag Supplier Playbook [67]	Supplier playbook/ implementation and reporting guidance	Supplier value chains; farms, supply sheds, rotational acres, adjacent/edge- of-field areas, landscapes	2023	https://www. sustainabilityaction. pepsico.com/ prod/s3fs-public/ 2023-09/positive- agriculture- supplier-playbook. pdf (accessed on 7 July 2026)
Danida/IDH Sustainable Trade Initiative	Catalyzing Private Sector Solutions for the SDGs; IDH partnership 2022–2025	Project Document: Catalyzing Private Sector Solutions for the Sustainable Development Goals [96]	Public-sector project docu- ment/donor partnership design	Global agro- commodity sectors; ODA countries; emphasis on Sub-Saharan Africa and deforestation hotspots	2022	https://um.dk/ media/dskbjnkz/ idh-project- document.pdf (accessed on 7 July 2026)
IDH Sustainable Trade Initiative	Food Crops and Ingredients Sustainability Initiatives	IDH Food Crops and Ingredients [97]	Sector/program brochure	Global sectors; specific examples in bananas, orange juice, spices, aquaculture, vanilla, nuts, fruits/ vegetables	2021	https://www. idhsustainabletrade. com/uploaded/20 21/02/FI- Brochure-2021.pdf (accessed on 7 July 2026)

Table A1. Cont.

Organization/ Lead Actor	Initiative	Full Document Title	Document Type	Scale	Year	Stable URL
IDH Sustainable Trade Initiative/ Mastercard Foundation partnership	Grains for Growth: Digital Services Partnership, Ghana	Request for Proposals: Digital Services Partnership: Grains Supply Chains, Ghana [98]	Request for proposals/ implementation procurement document	Northern Ghana; maize, rice, millet, sorghum, fonio supply chains; 3 premium off-takers, 12 SMEs, 20,000 smallholder farmers	2022	https://www.idhsustainabletrade.com/uploaded/2022/06/G4G-Digital-Platform-RFP-20220608_final.pdf (accessed on 7 July 2026)
SAI Platform	Regenerating Together	Regenerating Together: Transition Support Guide [69]	Transition support guide/ implementation guidance	Farm and supply shed level; global food and beverage industry framework	2024	https://saipatform.org/wp-content/uploads/documents/21714/sai-platforms-regenerating-together-transition-support-guide.pdf (accessed on 7 July 2026)
SAI Platform	Regenerating Together	Regenerating Together: A Global Framework for Regenerative Agriculture [68]	Global frame- work/industry alignment document	Global framework applied at farm/supply shed level	2023	https://saipatform.org/wp-content/uploads/2023/09/sai-platform-regenerating-together-september-2023-1.pdf (accessed on 7 July 2026)
FAO, author, Neven, D.	Sustainable Food Value Chain Development (SFVCD)	Developing Sustainable Food Value Chains: Guiding Principles [66]	Guidance handbook/ conceptual framework	Food value chains; primarily development contexts; national/ international markets	2014	https://openknowledge.fao.org/server/api/core/bitstreams/e47d2ad8-5910-435e-a6b4-92dda2367dc7/content (accessed on 7 July 2026)

Table A1. Cont.

Organization/ Lead Actor	Initiative	Full Document Title	Document Type	Scale	Year	Stable URL
USDA	Partnerships for Climate- Smart Commodities	Partnerships for Climate-Smart Commodities Project Summaries: September 2022, First Funding Pool [70]	Project sum- maries/award portfolio	National portfolio; multi-state commod- ity/value chain pilots	2022	https://www.usda.gov/sites/default/files/documents/partnerships-climate-smart-commodities-project-summaries.pdf (accessed on 7 July 2026)
USDA/ Mississippi FSA newsletter	Partnerships for Climate- Smart Commodities	USDA to Invest \$1 Billion in Climate Smart Commodities, Expanding Markets, Strengthening Rural America [99]	Press/news release	National an- nouncement	2022	https://www.fsa.usda.gov/sites/default/files/documents/NL_032022_rel.pdf (accessed on 7 July 2026)
USDA Natural Resources Conservation Service	Partnerships for Climate- Smart Commodities	Partnerships for Climate-Smart Commodities National Funding Opportunity [100]	Notice of Funding Opportu- nity/program design document	National funding architecture	2022	https://www.usda.gov/sites/default/files/documents/climate-smart-nfo-usda-nrcs-comm-22-nofo0001139-02062022-web-final.pdf (accessed on 7 July 2026)
USDA	Partnerships for Climate- Smart Commodities	Partnerships for Climate-Smart Commodities: Delivering Climate Solutions [101]	Progress report/ infographic	National program progress report	2024	https://www.usda.gov/sites/default/files/documents/october-2024-progress-report-pcsc.pdf (accessed on 7 July 2026)
USDA	Partnerships for Climate- Smart Commodities	Partnerships for Climate-Smart Commodities: \$1 Billion Funding Opportunity Factsheet [73]	Factsheet/ program an- nouncement	National funding opportunity	2022	https://www.usda.gov/sites/default/files/documents/usda-partnerships-climate-smart-factsheet-22.pdf (accessed on 7 July 2026)

Table A1. Cont.

Organization/ Lead Actor	Initiative	Full Document Title	Document Type	Scale	Year	Stable URL
USDA	Partnerships for Climate- Smart Commodities	Partnerships for Climate-Smart Commodities Overview Brochure [102]	Producer- facing overview brochure	National producer enrollment communica- tion	2024	https://www.usda.gov/sites/default/files/documents/partnerships-climate-smart-commodities-overview-brochure.pdf (accessed on 7 July 2026)

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