

Rethinking sweet potato (*Ipomoea batatas*) value chains in smallholder systems: A perspective from Zimbabwe

Peninjauan kembali rantai nilai ubi jalar (*Ipomoea batatas*) dalam sistem usahatani skala kecil: Perspektif dari Zimbabwe

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ABSTRACT

Sweet potato plays an important role in supporting food security, nutrition, and livelihoods in smallholder farming systems across sub-Saharan Africa. Despite its agronomic resilience and socio-economic potential, sweet potato often remains marginalised within local and regional agri-food systems. This article presents a perspective on sweet potato value chains in smallholder contexts, using Zimbabwe as an illustrative setting. Rather than reporting empirical findings, the paper reflects on structural and institutional challenges that constrain value chain performance, particularly weak coordination among actors, limited value addition, and the dominance of informal market arrangements. Drawing on practice-informed insights and existing literature, this perspective argues that conventional value chain interventions that prioritise production gains alone are insufficient. Greater attention is required to address coordination gaps, stakeholder linkages, and enabling environments that shape how value is created and distributed. The article concludes by outlining key considerations for rethinking value chain strategies aimed at enhancing the inclusiveness, resilience, and sustainability of sweet potato-based smallholder systems.

ABSTRAK

Ubi jalar memainkan peran penting dalam mendukung ketahanan pangan, gizi, dan mata pencaharian dalam sistem pertanian petani kecil di kawasan Afrika Sub-Sahara. Meskipun memiliki ketahanan agronomis yang tinggi serta potensi sosial-ekonomi yang signifikan, ubi jalar sering kali masih termarginalkan dalam sistem agri-pangan lokal dan regional. Artikel ini menyajikan sebuah perspektif mengenai rantai nilai ubi jalar dalam konteks pertanian skala kecil, dengan Zimbabwe sebagai latar ilustratif. Artikel ini tidak menyajikan temuan empiris, tetapi merefleksikan berbagai tantangan struktural dan kelembagaan yang membatasi kinerja rantai nilai, khususnya lemahnya koordinasi antara aktor, keterbatasan nilai tambah, serta dominasi pengaturan pasar informal. Dengan mengacu pada wawasan berbasis praktik dan telaah pustaka yang relevan, perspektif ini berargumen bahwa intervensi rantai nilai konvensional yang hanya memprioritaskan peningkatan produksi tidaklah memadai. Diperlukan perhatian yang lebih besar terhadap kesenjangan koordinasi, keterkaitan antarpemangku kepentingan, serta lingkungan pendukung yang membentuk cara nilai diciptakan dan didistribusikan. Artikel ini ditutup dengan menguraikan sejumlah pertimbangan kunci untuk menata ulang strategi rantai nilai yang bertujuan meningkatkan inklusivitas, ketahanan, dan keberlanjutan sistem pertanian ubi jalar berbasis petani kecil.

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INTRODUCTION

Sweet potato (*Pomoea batatas*) is increasingly recognised as a strategic crop for strengthening food security and livelihood resilience in smallholder farming systems, particularly in sub-Saharan Africa. Its adaptability to marginal conditions and relatively low input requirements make it relevant for regions facing climate variability and resource constraints. Recent synthesis work on sweet potato trends in sub-Saharan Africa underscores that, alongside agronomic improvement, the broader enabling environment—including seed systems, delivery mechanisms, and scaling pathways—remains decisive for realising impact beyond farm-level production (Lindqvist-Kreuze et al., 2023; Makhubu et al., 2024).

In parallel, the nutrition agenda has further elevated sweet potato's importance, especially through biofortified orange-fleshed sweet potato (OFSP) promoted to address vitamin A deficiency. Evidence and programming experience documented by HarvestPlus and partners highlight how biofortified staples can contribute to diet quality and public health goals when adoption and market pathways are supported (Kudita, 2023; Labarta et al., 2025). Moreover, the World Health Organization continues to emphasise vitamin A deficiency as a major public health issue, reinforcing the relevance of food-based and food-system strategies in complementary nutrition interventions (WHO, 2024; 2025).

Despite this potential, sweet potato often remains marginalised within local and regional agrifood systems, frequently traded as a low-value fresh commodity with limited upgrading. This is not unique to sweet potato; it reflects a broader pattern in smallholder-dominated agriculture where constraints arise from fragmented markets, weak logistics, limited processing capacity, and unequal access to services. Contemporary research on modern agricultural value chains increasingly stresses that the inclusion and upgrading of smallholders depend not only on productivity, but also on institutional arrangements, coordination, and market governance (Ma & Sexton, 2021; Ørtenblad et al., 2023).

Value chain frameworks are commonly used to diagnose such bottlenecks and design interventions. The FAO Sustainable Food Value Chain (SFVC) approach, for instance, conceptualises value chains as coordinated sequences of value-adding activities and explicitly links performance to inclusiveness and sustainability outcomes (FAO, 2021; 2023). Related guidance on responsible agricultural supply chains, developed through OECD-FAO collaboration, further emphasises that supply chain outcomes are shaped by risk management, standards, and accountability across actors—issues that often play out most sharply where informal transactions dominate and regulatory capacity is uneven (OECD & FAO, 2020).

However, practice and recent scholarship suggest that many "value chain interventions" remain overly production-oriented, assuming that yield gains will automatically translate into better market outcomes. A growing body of work instead highlights collaboration and coordination among stakeholders as a central determinant of value chain performance—particularly in developing-country contexts where transaction costs are high, information is imperfect, and trust-based informal arrangements can substitute for formal contracts. A recent scoping review on collaboration in agricultural value chains synthesises how coordination mechanisms (horizontal and vertical) can enable smallholder participation, but also documents recurring constraints such as weak institutions, limited incentives for cooperation, and asymmetric power relations (Mishra et al., 2024). These findings align with broader systems-oriented discussions showing that smallholder participation in modernising value chains is mediated by structural conditions rather than farmer effort alone (Ma & Sexton, 2021; Ørtenblad et al., 2023).

Zimbabwe provides an especially relevant setting for rethinking these issues. While sweet potato has clear agronomic and nutritional relevance, value chain development is often constrained by practical weaknesses in market organisation and post-harvest systems, alongside limited upgrading capacity. Recent Zimbabwe-focused work has examined sweet potato supply chain optimisation through modelling, reflecting growing interest in improving distribution and market dynamics under climate and systems pressures (Munyaka et al., 2024). In addition, programme documentation on nutrient-enriched staples in Zimbabwe underscores the need for clearer market mapping, standards/labeling readiness, and stakeholder coordination to move beyond small-scale dissemination toward sustained market integration (Kudita, 2023). Importantly,

Zimbabwe is used here as an illustrative and contextual example rather than as a formal empirical case study, reflecting broader coordination challenges observed across many smallholder-dominated sweet potato systems in sub-Saharan Africa.

Against this backdrop, this article adopts a Perspective format to rethink sweet potato value chains in smallholder systems, using Zimbabwe as an illustrative context. Rather than reporting empirical results, the paper draws on practice-informed insights and recent literature to argue that coordination failures—manifested in weak stakeholder linkages, limited upgrading pathways, and an enabling environment that does not adequately support value addition—are central bottlenecks in sweet potato value chain development.

Specifically, this Perspective advances current value chain debates by repositioning coordination—rather than productivity or technology adoption—as the primary constraint shaping value creation and inclusion in informal, root-and-tuber-based value chains. By foregrounding coordination and governance considerations, this Perspective aims to contribute actionable thinking for researchers, development practitioners, and policymakers seeking more inclusive and resilient sweet potato-based agrifood systems.

LIMITATIONS OF CONVENTIONAL VALUE CHAIN APPROACHES IN SMALLHOLDER AGRICULTURE

Value chain approaches have become a dominant framework in agricultural development over the past two decades, widely applied to diagnose constraints, design interventions, and promote market-oriented farming among smallholders. In principle, these approaches aim to improve coordination among actors, enhance value addition, and increase the efficiency and inclusiveness of agrifood systems (FAO, 2021; OECD & FAO, 2020). However, growing evidence suggests that the way value chain frameworks are operationalised in practice often falls short of these ambitions, particularly in smallholder-dominated contexts. This Perspective builds on this gap by arguing that coordination failures—rather than productivity shortfalls—constitute a primary constraint in informal, root-and-tuber-based value chains, where relational and institutional conditions shape market outcomes more strongly than technological performance alone.

A central limitation of conventional value chain interventions lies in their production-centric orientation. Many initiatives prioritise yield improvement, input access, and farm-level technologies under the assumption that productivity gains will naturally translate into better market outcomes. While such interventions can raise output, they frequently overlook downstream constraints related to aggregation, quality differentiation, logistics, and market power, resulting in limited upgrading beyond primary production (Stoian et al., 2016; Ola, 2020; Ma & Sexton, 2021). For crops such as sweet potato, which are highly perishable and commonly traded through informal channels, these downstream constraints can be more binding than on-farm productivity itself.

Another recurring weakness concerns the underestimation of coordination and governance challenges within value chains. Value chains are often presented as linear sequences of activities, yet in practice they are embedded in complex social, institutional, and relational contexts. Recent syntheses of agricultural value chain research emphasise that weak horizontal coordination among producers, combined with fragile vertical linkages between farmers, traders, and processors, undermines collective action and limits bargaining power (Mishra et al., 2024). Where formal contracts and standards are absent or weakly enforced, transactions tend to rely on spot markets and personal networks, reinforcing short-term exchanges rather than long-term upgrading pathways.

Importantly, coordination failures should be distinguished from market failures or institutional failures alone. While market failures relate to price signals and transaction costs, and institutional failures refer to formal rules and enforcement mechanisms, coordination failures arise from misaligned incentives, weak relational linkages, and the absence of mechanisms that connect actors across stages of the value chain. These failures can persist even where markets exist and institutions are formally in place, but are poorly aligned with smallholder realities.

Conventional value chain approaches also tend to underplay the role of informal institutions and power asymmetries. In many smallholder systems, informal traders and intermediaries play a central role in market access, yet are often portrayed simplistically as sources of inefficiency. Recent literature instead highlights that these actors can simultaneously provide essential services—such as liquidity, information, and risk absorption—while also shaping price formation and access in ways that disadvantage producers (Ørtenblad et al., 2023; Humphrey & Navas-Alemán, 2010). Ignoring these dynamics can lead to interventions that fail to engage with the realities of how value chains actually function.

Furthermore, value chain interventions frequently adopt template-driven models, replicating designs across crops and countries with limited contextual adaptation. Such approaches risk overlooking crop-specific characteristics, including perishability, seasonality, and consumption patterns, which are particularly salient for root and tuber crops like sweet potato. Reviews of root and tuber value chains in Africa underline that upgrading strategies effective for cereals or export-oriented cash crops are often poorly suited to crops primarily consumed locally and traded through informal markets (Lindqvist-Kreuze et al., 2023; Makhubu et al., 2024).

Taken together, these limitations point to a gap between the conceptual promise of value chain approaches and their practical outcomes in smallholder agriculture. Rather than abandoning value chain thinking, recent scholarship calls for a reorientation toward coordination, institutional embeddedness, and system-level interactions. This shift requires moving beyond narrow productivity metrics and engaging more explicitly with governance structures, incentives for cooperation, and enabling environments that shape how value is created, captured, and distributed across actors (Stoian et al., 2016; FAO, 2023).

A PERSPECTIVE FROM ZIMBABWE: COORDINATION AS THE MISSING LINK

From a smallholder systems perspective, the performance of sweet potato value chains in Zimbabwe is shaped less by agronomic potential than by how actors are connected, coordinated, and enabled to participate beyond primary production. Consistent with the perspective-based positioning of this paper, Zimbabwe is used here as an illustrative context rather than a formal empirical case, reflecting broader coordination challenges common across smallholder-dominated root and tuber systems in sub-Saharan Africa. Similar to many root and tuber systems in sub-Saharan Africa, sweet potato in Zimbabwe is predominantly produced and traded through informal arrangements, with limited standardisation, weak aggregation, and minimal processing. While such arrangements provide flexibility and immediate market access, they also constrain upgrading opportunities and the distribution of value across the chain (FAO, 2023; Lindqvist-Kreuze et al., 2023).

A recurring coordination challenge relates to horizontal organisation among smallholders. Weak producer organisation limits collective action in input procurement, quality control, aggregation, and price negotiation. Without effective farmer groups or cooperatives, individual producers face high transaction costs and remain dependent on spot markets and itinerant traders. This dynamic is evident in peri-urban and urban supply zones serving major markets such as Harare, where sweet potato producers typically sell individually and at short notice, limiting their ability to influence prices or negotiate quality-based differentiation. Recent analyses of smallholder participation in modernising agrifood value chains highlight that, in the absence of collective structures, productivity gains alone rarely translate into improved market positions or income stability (Ola, 2020; Ørtenblad et al., 2023). For sweet potato, where volumes per household are often small and harvests are seasonal, this lack of horizontal coordination is particularly constraining.

Vertical coordination between producers, traders, and processors represents a second critical gap. In Zimbabwe, as in many comparable contexts, linkages between farmers and downstream actors are typically short-term and transaction-based, rather than relational or contract-based. While informal traders play an important role in liquidity provision and risk absorption, the absence of clearer coordination mechanisms limits incentives for quality upgrading, investment in post-harvest handling, and value addition (Humphrey & Navas-Alemán, 2010; OECD & FAO, 2020). As a result, interactions

remain focused on volume and immediacy rather than longer-term relationships that could support processing, branding, or nutrition-oriented product development, despite growing interest in such market segments.

Seed systems and planting material supply further illustrate coordination challenges at the interface between formal and informal institutions. Although improved and biofortified sweet potato varieties have been promoted regionally, dissemination often relies on informal vine exchange networks. From a practice perspective, these systems are adaptive and accessible, yet they also pose risks related to disease transmission, varietal degeneration, and uneven access to quality planting material (FAO, 2021; Lindqvist-Kreuze et al., 2023). In Zimbabwe, programme experience with orange-fleshed sweet potato suggests that the absence of sustained coordination among research organisations, extension services, local multipliers, and market actors constrains both varietal diffusion and downstream market integration, limiting incentives for producers to invest in quality-oriented production (Kudita, 2023).

Post-harvest handling and processing represent another domain where coordination failures are evident. Sweet potato's perishability demands timely aggregation, storage, and processing, yet these functions are rarely coordinated across actors. Small-scale processors, where they exist, often operate in isolation from producers and face inconsistent supply and quality. Broader reviews of root and tuber value chains in Africa underscore that upgrading through processing requires not only equipment and skills, but also reliable supply arrangements, quality standards, and market linkages—conditions that depend fundamentally on coordination rather than technology alone (Makhubu et al., 2024; FAO, 2023).

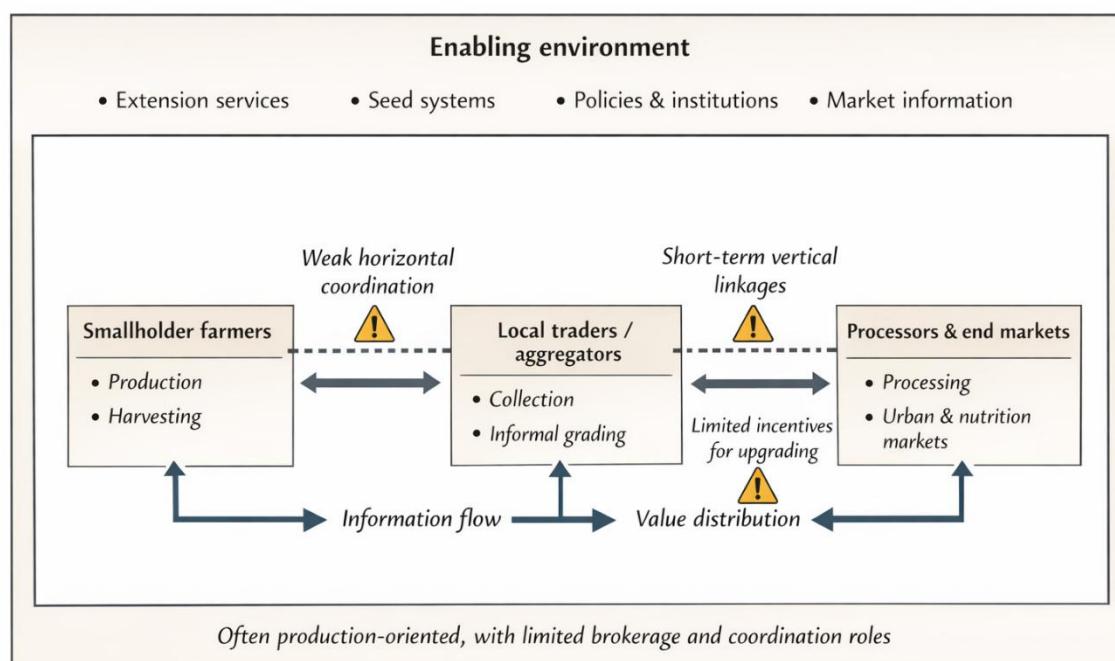


Figure 1. Conceptual illustration of coordination gaps shaping sweet potato value chain performance in smallholder systems.

Coordination challenges also intersect with gender dynamics within sweet potato value chains. Sweet potato is frequently characterised as a "women's crop" in smallholder systems, with women playing central roles in production and local marketing. However, reliance on informal, uncoordinated spot markets can disproportionately disadvantage female producers, who often face greater constraints in mobility, access to market information, and negotiation power. Weak

horizontal and vertical coordination therefore not only limits upgrading, but can also reinforce existing gender inequalities in value capture and decision-making within the chain.

Finally, enabling environments—including extension systems, market information services, and policy frameworks—play a mediating role in shaping coordination outcomes. In Zimbabwe, capacity constraints within public extension and limited integration with market-oriented services reduce opportunities for facilitating linkages across the chain. Contemporary value chain scholarship emphasises that extension functions increasingly need to move beyond production advice toward brokerage roles that support networking, trust-building, and institutional innovation (Stoian et al., 2016; FAO, 2021). Emerging digital platforms, such as mobile-based market information systems or digital aggregation tools, are often proposed as potential coordination mechanisms; however, their application in sweet potato systems remains limited and uneven, suggesting that digitalisation alone cannot substitute for broader institutional and relational coordination. Without such roles, coordination gaps persist even where technical solutions are available.

These observations suggest that the central bottleneck in Zimbabwe's sweet potato value chain is not the absence of actors or technologies, but the lack of effective coordination across horizontal and vertical dimensions. From this perspective, rethinking sweet potato value chains requires shifting attention from isolated interventions toward mechanisms that strengthen relationships, align incentives, and embed value chain activities within supportive institutional environments. Figure 1 provides a conceptual, perspective-based illustration of coordination gaps shaping sweet potato value chain performance in smallholder systems. The figure highlights how weak horizontal and vertical coordination among smallholder farmers, traders, processors, and support services constrains value creation and upgrading, without representing empirical results.

IMPLICATIONS FOR RETHINKING SWEET POTATO VALUE CHAIN INTERVENTIONS

Reframing sweet potato value chains in smallholder systems requires moving beyond intervention models that prioritise isolated technical fixes. From a perspective standpoint, the central implication of the preceding discussion is that coordination should be treated as a core design objective, rather than an assumed by-product of productivity growth. This shift has consequences for how value chain interventions are conceptualised, implemented, and evaluated in smallholder contexts, particularly in informal agrifood systems where relational and institutional conditions strongly mediate market outcomes.

First, value chain strategies need to place greater emphasis on horizontal coordination mechanisms among producers. Strengthening producer organisation—through farmer groups, associations, or other collective arrangements—can reduce transaction costs, improve aggregation, and enhance bargaining power. Recent value chain scholarship highlights that collective action is most effective when it is embedded in locally appropriate institutional forms, rather than externally imposed organisational templates (Ola, 2020; Ørtenblad et al., 2023). For sweet potato systems characterised by small volumes and seasonal production, such coordination is particularly important for linking farmers to downstream actors and enabling upgrading pathways. From a gender perspective, stronger horizontal coordination can also mitigate disadvantages faced by women producers, who often dominate sweet potato production but have more limited access to market information, negotiation spaces, and collective decision-making when operating individually.

Second, vertical coordination between producers, traders, processors, and retailers merits renewed attention. Rather than framing intermediaries solely as sources of inefficiency, a rethinking of value chain interventions acknowledges their role in liquidity provision, market access, and risk management. OECD-FAO guidance on responsible agricultural supply chains underscores the importance of aligning incentives and managing risks across actors, especially where formal contracting is limited (OECD & FAO, 2020). In sweet potato value chains, fostering more stable relational linkages—whether through informal agreements, facilitated brokerage, or gradual standard-setting—may be more realistic than

attempting to introduce fully formalised contracts. Such relational coordination mechanisms are particularly relevant in smallholder contexts where trust-based interactions often substitute for formal governance structures.

Third, the discussion points to the need for integrated approaches to seed systems and market development. Improved and biofortified sweet potato varieties can only contribute to income and nutrition outcomes if planting material systems are coordinated with downstream demand and quality requirements. FAO and CIP analyses emphasise that seed system strengthening should not be treated as a standalone intervention, but rather as part of a broader value chain strategy that connects research, extension, multiplication, and markets (FAO, 2023; Lindqvist-Kreuze et al., 2023). Without such integration, varietal improvement risks remaining confined to dissemination targets rather than translating into sustained value creation. This highlights the importance of aligning varietal promotion efforts with market incentives and coordination mechanisms that reward quality differentiation and consistent supply.

Fourth, implications extend to the role of support services and enabling environments. Extension systems, development programmes, and market information services increasingly operate at the interface between technical advice and market facilitation. Contemporary perspectives on agricultural extension suggest a gradual transition from production-focused advisory roles toward brokerage and coordination functions that help actors navigate relationships, standards, and opportunities along the value chain (Stoian et al., 2016; FAO, 2021). In the context of sweet potato, such roles may be critical for connecting smallholders with processors, nutrition programmes, and emerging urban markets. Digital tools—such as mobile-based market information systems, digital aggregation platforms, or traceability applications—are often promoted as potential coordination enablers; however, their effectiveness depends on complementary institutional support, user trust, and integration with existing informal practices rather than technology adoption alone.

Finally, rethinking value chain interventions also implies reconsidering how success is defined and measured. Traditional indicators—such as yield increases or adoption rates—provide limited insight into whether value chain coordination has improved or whether smallholders have gained more stable and equitable market positions. Recent systems-oriented work argues for broader performance lenses that capture relational outcomes, inclusiveness, and resilience alongside economic metrics (OECD & FAO, 2020; Ma & Sexton, 2021). From this perspective, progress in sweet potato value chains may be reflected as much in improved linkages and reduced vulnerability as in short-term income gains.

Table 1. Key coordination challenges and implications in sweet potato value chains within smallholder systems.

Value chain dimension	Typical coordination challenge	Implications for value chain performance
Horizontal coordination among farmers	Weak producer organisation and limited collective action	Low aggregation capacity, high transaction costs, and weak bargaining power
Vertical coordination with traders	Short-term, spot-market transactions dominate	Limited incentives for quality improvement and value upgrading
Linkages with processors and markets	Inconsistent supply and variable quality	Constrained processing development and unstable market access
Seed and planting material systems	Predominance of informal vine exchange networks	Uneven planting material quality and limited scaling of improved varieties
Post-harvest handling and logistics	Poor coordination in storage and transport	High post-harvest losses and reduced value retention
Support services and enabling environment	Extension services focused mainly on production	Weak brokerage functions and limited facilitation of market linkages

These implications suggest that strengthening sweet potato value chains in smallholder systems is less about introducing new components than about reconfiguring relationships and institutional arrangements. A coordination-centred perspective provides a basis for designing interventions that are more closely aligned with the realities of informal markets, diverse actors, and context-specific constraints that characterise sweet potato systems in Zimbabwe and similar settings. Table 1 summarises key coordination challenges and their implications for sweet potato value chain performance in smallholder systems.

CONCLUSIONS & OUTLOOK

This perspective has argued that the limited performance of sweet potato value chains in smallholder systems cannot be adequately explained by production constraints alone. Using Zimbabwe as an illustrative context, the discussion highlights coordination failures—across producers, intermediaries, support services, and institutions—as a central bottleneck shaping how value is created and distributed. While sweet potato possesses clear agronomic, nutritional, and livelihood potential, this potential remains underexploited where value chain relationships are fragmented and upgrading pathways are weakly developed.

By reframing sweet potato value chains through a coordination-centred lens, this article contributes to ongoing debates on the effectiveness of value chain approaches in smallholder agriculture. The analysis suggests that interventions focused narrowly on yields or technology adoption risk overlooking the relational and institutional dimensions that determine whether smallholders can engage meaningfully with markets. In contrast, approaches that foreground horizontal organisation, vertical linkages, and enabling environments are more likely to support inclusive and resilient value chains, particularly for perishable crops traded largely through informal systems.

Looking forward, this perspective points to several directions for future work. Empirical research could further examine how different coordination mechanisms—formal and informal—shape upgrading outcomes in sweet potato and other root and tuber value chains. Comparative studies across countries and crops may also help clarify which coordination strategies are transferable and which are context-specific. From a practice standpoint, development initiatives and policy frameworks would benefit from treating coordination not as an assumed outcome, but as an explicit objective embedded in programme design and evaluation.

In conclusion, rethinking sweet potato value chains in smallholder systems requires moving beyond linear, production-centric models toward more nuanced understandings of how actors interact within complex agrifood systems. A coordination-oriented perspective offers a useful foundation for designing value chain strategies that better reflect smallholder realities and support sustainable agrifood transitions in Zimbabwe and comparable settings.

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