



The ecosystem approach to agricultural value chain finance: A framework for rural credit

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ABSTRACT

In developing countries, smallholder farmers often lack long-lasting sources of credit. While traditional banking, microfinance, and cooperatives have addressed some financing gaps, Agricultural Value Chain Finance (AVCF) has attracted attention as it allows value chain actors to leverage social capital and satisfy their funding needs. To identify the driving factors for the development of AVCF, we analyze the role of non-farmer actors including banks, development organizations, agribusinesses, and academia using in-depth expert interviews. Following a Grounded Theory approach, we propose the Ecosystem Approach as a framework for establishing long-lasting AVCF schemes in developing countries based on three critical solutions: building financial platforms for value chain transaction records, implementing bundled services for the value chain, and evolving from a value chain to a value web approach. Our findings introduce six propositions that shed light on key factors for the development and longevity of financing schemes: i) the AVCF Ecosystem, ii) how AVCF schemes emerge, iii) social capital and value chain interactions, iv) culture and value chain characteristics, v) market risk, vi) transaction costs reduction. We find that AVCF can use social and trade capital to reduce transaction costs and mitigate risks related to quality, prices, and markets. In AVCF ecosystems, there are financial products for interlinked agricultural value chains with a balanced focus on all chain actors, no lock-in relationships between the lenders and the borrowers, and multiple benefits for participants. As the evolution towards an Ecosystem Approach offers a promising outlook for agricultural credit, future research should explore how policymakers and development agencies can support these schemes and how they can be used to increase financial access and equity in rural communities.

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1. Introduction

Value chains link the actors of value-adding activities that produce, process, and commercialize a product (Kaplinsky & Morris, 2000; Miller & Da Silva, 2007). To operate efficiently, value chain actors must continuously coordinate to optimize the flow of goods, information, and finance (Mentzer et al., 2001). After the financial crisis of 2008, the strong limitation of financial products and cash flows caused many firms from different industries (including agriculture) and their chain partners to search for alternative credit solutions (Jia, Blome, Sun, Yang, & Zhi, 2019). Value (or supply) chain finance emerged as an alternative to traditional financing, in which financial and product information are aligned to improve cash-flow management (Wuttke, Blome, & Henke, 2013).

In agriculture, smallholders from developing contexts face limited access to credit and also suffer scale limitations, higher trans-

action costs and higher price risks (Birthal et al., 2017). Adequate credit is key to increasing crop efficiency, liquidity, and market opportunities (Christen & Anderson, 2013; Mattern & Ramirez, 2017), however, too often international development projects do not take into account the physical, human, and financial resources needed to support credit project's longevity (USAID, 2018). Agricultural Value Chain Finance (AVCF)¹ refers to financial flows between chain actors and includes products, financing, and support services that alleviate financial constraints (Fries, 2007; Miller & Jones, 2010). It offers a systematic approach to finance in agriculture as it considers both lender-borrower relations and the collective set of processes, markets, and actors in a value chain (Miller & Da Silva,

¹ The terms Value Chain Finance and Supply Chain Finance are often used interchangeably in the development literature. However, in agriculture, the term value chain is considered more accurate since it emphasizes the idea of a set of interrelated activities used to create greater value. In contrast, supply chain focuses on the efficient integration of supply and production processes to minimize costs and is often used as a broader term in industrial chains (Mentzer et al., 2001; Miller, 2010).

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2007). As a complex set of interdependent institutions govern the agricultural sector, AVCF enables value chain actors to leverage social capital and coordinate their actions to meet the higher standards of agroindustries, improve efficiency and satisfy market demand for consistent quality and timely delivery (Meyer, 2007; Miller, 2013). Further, AVCF enables the design of value chain-tailored financial products and services, which is crucial for reducing transaction costs for banks and producers (Birthal et al., 2017; Chen, Joshi, Cheng, & Birthal, 2015; Kopparthi, 2012; Swamy & Dharani, 2016) and decreasing the financial risk to lenders (Chen et al., 2015). We explore its relevance in developing countries where farmers often have limited access to financial services and face high lending risks and a lack of collateral (Binswanger & Rosenzweig, 1986; Cuevas & Pagura, 2016; Mani, Joshi, & Ashok, 2017).

While previous research has assessed the implementation of AVCF schemes at regional levels through case studies (Angelucci & Conforti, 2010; Birthal et al., 2017; Kopparthi, 2012; Middelberg, 2017; Swamy & Dharani, 2016), there is a lack of cross-comparison among studies from different developing contexts and it has been difficult to identify common drivers for their development and financial sustainability. Moreover, as the operation of AVCF schemes is based on the interaction of multiple stakeholders at different points in time, the role of non-farmer actors, their interactions, and the decisions that lead to the building of AVCF schemes have been less studied.

However, the highly context-specific nature of value chain interventions poses a conceptual and practical challenge (Hainzer, Best, & Brown, 2018). As suggested by Ton, Vellema, and de Ruijter de Wildt (2010), the generation of external validity is still a crucial challenge for agricultural value chain interventions. While AVCF best practices are strongly linked to their context, many of these financing schemes are designed and coordinated by large donors, international finance institutions, and development organizations with a global reach. Thus, it is of crucial importance to understand which findings can be generalized and remain valid for other contexts and conditions. In this study, we identify the main drivers behind the development and financial sustainability of AVCF schemes in different developing contexts using Grounded Theory based on in-depth interviews with experts. We introduce the Ecosystem Approach to AVCF, which moves from supporting a single value chain to a holistic focus on satisfying different value chains simultaneously while improving the endurance and longevity of financing schemes.

The rest of the paper is structured as follows. Section 2 sets the theoretical basis for interrelating economic theory with the different approaches to financing agricultural value chains. Section 3 introduces the concept and applications of AVCF. Section 4 describes the Grounded Theory model, data collection, and the analytical approach. In Section 5, we examine the factors of development across different AVCF schemes and introduce the key features of the AVCF ecosystem approach. In Section 6, we discuss these findings in relation to traditional banking and microfinance, and in Section 7 we conclude with our key contributions.

2. Challenges and approaches to financing agricultural value chains

2.1. Challenges for financing agricultural value chains credit

The agricultural sector operates under a specific set of spatial and risk dynamics, which can complicate the provision of financial services (Binswanger & Rosenzweig, 1986). Farmers are usually highly dispersed over large areas and financial institutions face high transport and travel costs to reach them. Other costs (e.g., for information acquisition) pose barriers to rural finance availabil-

ity. Economic theory can explain the challenges associated with agricultural finance by assessing the role of the providers (financial institutions) and the borrowers (farmers).

On the supply side, economic challenges include information asymmetry and the principal-agent problem. According to (Hoff & Stiglitz, 1990), financial providers usually face three problems of asymmetries of information: (i) screening: borrowers have different likelihoods of default and it is costly to estimate the extent of this risk for each borrower, (ii) incentives: it is costly for the lender to ensure that the borrowers make repayments, and (iii) enforcement: the lender's difficulty of compelling the payment. In turn, uncertain expectations, information asymmetry, and the participants' self-interest lead to the "principal-agent problem", in which the incentives do not align for both parties. Furthermore, the lender needs to invest resources to determine whether the farmer is riskier than believed and whether the farmer will take on greater risks than originally anticipated (moral hazard problem) (Barry & Robison, 2001).

On the demand side, economic theory can explain challenges related to the farmers' lack of access to credit especially related to information asymmetry and transaction costs. When farmers apply for a loan, financial institutions often require a credit history, which many farmers lack as they have not been previously financed by a bank (Arráiz, Bruhn, & Stucchi, 2015). Information asymmetry also means that important rural currencies, such as social capital, are not considered in lending decisions. Social capital captures the idea that features of social organization, such as trust and networks, can improve coordinated actions (Putnam, 1993) and that repeated actions among individuals help build and maintain social capital over time (Kreps, Milgrom, Roberts, & Wilson, 1982). Participation in groups does not only help to measure an individual's or community's degree of economic cooperation but also as social interaction increases, informal risk-sharing can improve and default rates can be significantly reduced (Feigenberg, Field, & Pande, 2010). Further, as lenders cannot know the borrower's intention to repay the loan, they often use collateral² as a risk-sharing device. Nonetheless, collateral also entails significant transaction costs for financial institutions including verification that the asset has a registered title and is free of liens as well as the registration of the lien in favor of the lender (Guirkinge & Boucher, 2008). Such transaction costs play an important role in determining the outcome of loan applications and affect both providers and borrowers. When a farmer is given a loan, the transaction involves non-financial costs associated with drafting, negotiating, governing, safeguarding, and adapting contracts. These transaction costs lead to a discrepancy between the market price and the "true" price cost of the loan (Barry & Robison, 2001; Guirkinge & Boucher, 2008; Williamson, 1996). These costs are distributed among the participants depending on consumer preferences, changes in technology, financial regulations, and the internal efficiency of the financial institutions³ (Meyer & Cuevas, 1990).

Transaction costs can also be exacerbated by the seasonality and spatial distribution of the sector. As there is synchronic timing of crop growth cycles and agricultural operations, many traditional financial products and services do not reflect appropriate time scales and market linkages. Thus, credit needs to fill the gaps

² Collateral refers to assets that satisfy three basic conditions: appropriability, absence of collateral-specific risk, and accrual of the returns to the borrower during the loan period (Binswanger & Rosenzweig, 1986).

³ In agricultural finance transaction costs usually arise from the costs of mobilizing deposits (documentation, record-keeping, and issuing statements); and the costs of lending (processing, disbursing, monitoring, and recovering the loans) (Meyer & Cuevas, 1990).

between receipts and expenditures (Binswanger & Rosenzweig, 1986).

Transaction costs are also higher when financial products are not tailored to credit needs. In most agricultural settings, financial products offered by banks follow a simple credit risk assessment and do not adapt to the specific risks and cash flow patterns of the borrowers (Cuevas & Pagura, 2016; Konig, Da Silva, & Mhlanga, 2013). Under strict conditions for repayment, farmers must use other sources of income to repay their loans on time (Johnston & Richard Meyer, 2007).

New institutional economics describes the assumption that institutions form a large part of dealing with transaction costs (Coase, 1998). Thus, the enabling environment poses problems for rural credit, particularly related to institutional quality and financial sustainability. As agricultural value chains operate in politically charged environments, it is important to understand the types of policy measures, changes in government support, and their implications for the value chain (Cuevas & Pagura, 2016). The quality of institutions determines the economic performance of the actors and understanding how formal and informal institutions provide substitute mechanisms for transactions is critical (Meijerink, Bulte, & Alemu, 2014).

Furthermore, assessing the conditions that guarantee financial sustainability can strengthen the enabling environments. From a market-based perspective, longevity in financing schemes is closely linked with the generation of profit margins and growth in the value chain. Hence, as long as the value chain schemes generate profit for their actors, they are commercially sustainable and can endure over time (Miller & Jones, 2010). From a financial perspective, long-lasting financing schemes are those that effectively ensure the flow of products and financial services within the chain (Bank, 2013). Thus, longevity can be estimated by financial indicators, such as the return on assets (ROA) and operational self-sustainability (OSS)⁴ (Hartarska & Nadolnyak, 2007; Hartarska, 2005). From a policy perspective, the generation of longevity in value chain financing schemes is closely linked with development activities. Some criticism, however, has risen about the role of external finance in developing countries. For example, Modern Monetary Theory posits that if governments borrow money in the currency they issue, they can always repay those claims. For developing countries, this poses criticism of the traditional role of the monetary system and the fiscal operations in developing countries with a sovereign currency. Proponents believe that developing countries should mobilize resources by financing in local currencies as external financial flows, such as aid and foreign direct investment, may “drain” the economic surplus from developing countries (Samba Sylla, 2020).

Finally, from a social perspective, longevity is achieved when local actors and communities share power and material resources equitably so that they can meet their needs now and into the future (Allen, 2010). An example of the radical agrarian reform is the *food sovereignty* movement, which prioritizes local food consumption and production by ensuring that the rights to use and manage lands, water, biodiversity, seeds, and other resources are in hands of producers and not of the corporate sector (Schmidt, 2015). Further, it expands upon the concept of food security by

considering modes of production and acknowledging that cheap food may weaken local agricultural production and people (FAO, 2013).

2.2. Approaches to financing agricultural value chains credit

Table 1 compares the challenges associated with agricultural credit and how traditional banking, microfinance, AVCF, and cooperative financing address them. While traditional banks often avoid rural finance due to their perceived riskiness, microfinance institutions (MFI) have proven that low-income households are bankable. MFIs offer credit and savings with a social objective and orient their services to low-income or lower-middle-income households. Governments have also used microfinance as a market-based mechanism to redirect subsidies to enhance financial inclusion for small farmers (Chang, 2009; Morvant-Roux, 2011). However, recent studies suggest that microcredit is not as transformative as originally thought (Dahal & Fiala, 2020; Islam & O’Gorman, 2019; Rajbanshi, Huang, & Wydick, 2015). Little of the credit goes into agriculture and many MFIs focus on urban clients to increase their profit margins and leave rural households unattended (Chang, 2009). Moreover, in rural regions, farmers are encouraged to invest microcredit into new productive activities (Morvant-Roux, 2011). The high-interest rates charged by MFIs and the lack of financial products suited for agriculture have also been raised as important barriers to their further adoption in agriculture.

Financial Cooperatives (FCs) are another important provider of agricultural finance in developing countries. Acting as an intermediary between banks and smallholders, they support small-uncollateralized loans, savings mobilization, and financial literacy (Abate, Rashid, Borzaga, & Getnet, 2016). FCs generally use bilateral lending contracts. Usually, the liability for repaying the loan rests with the borrower and the co-signer, who must be a member of the same cooperative (Abate, Rashid, Borzaga, & Getnet, 2016).

AVCF entails an array of different financial instruments and products that include product financing (trader credit, input supplier credit, marketing company credit, lead firm financing), receivables financing (trade receivables, factoring, forfeiting), physical asset collateralization (warehouse receipts, repurchase agreements, financial leasing), risk mitigation products (insurance, forward contracts, futures), and financial enhancements (securitization instruments, loan guarantees, joint venture) (Miller & Jones, 2010). Compared to other financing approaches, AVCF allows: (i) reducing information asymmetries through partnerships with chain actors (Cuevas & Pagura, 2016); (ii) offering heterogeneous value chain approaches (Johnston, 2007; Zander, 2016); (iii) developing a set of financial instruments conceived with different objectives (Miller & Jones, 2010); (iv) reducing transaction costs by reducing time and resources spent on screening borrowers, conducting payments, and dealing with the seasonality of cash flows can be considerably reduced for financial institutions (Mattern & Ramirez, 2017); (v) and reducing risk by facilitating cooperation within the value chain (Gomm, 2010; Jia et al., 2019).

With the recent development in digital technologies, agricultural financing is evolving towards the provision of digital services. Digital technologies are now making deposits, withdrawals, payments, and lending more accessible to the unbanked population by leveraging alternative data sources (e.g., cell phone usage, device records, texting, airtime, etc.) (Benami & Carter, 2021; Hinson, Lensink, & Mueller, 2019). New business models, such as ‘digital microfinance’, ‘digital value chain finance’, and ‘digital cooperatives’ have emerged, but they are usually developed and provided by the different financing approaches here presented.

⁴ In a study on the longevity of different microfinance schemes, Hartarska (2007) show that Operational Self-Sustainability (OSS) is the most consistent indicator of financial performance in microfinance institutions (MFI) because institutional diversity and industry accounting practices make it harder to use other measures such as return to assets (ROA) or return to equity (ROE). MFIs may not track their ROA and ROE or may not make the necessary adjustments which makes these measures unsuitable for an industry-wide study. The OSS, in spite of not accounting for the level of subsidies for operating expenses, measures a manager’s ability to run the organization and to cover operating costs.

Table 1
Main underlying challenges and approaches to financing agricultural value chains credit.

Challenges in Agricultural Finance			Financing approach				
Category	Economic Theory	Attributes	Traditional banking	Microfinance	AVCF Buyer-driven	Producer-driven	Cooperative Financing
			<i>Commercial banks, development banks, rural banks with a wide range of financial services (bank accounts, debit/credit cards, loans, saving accounts, transfers)</i>	<i>Microfinance Institutions, Non-Bank Financial Institutions, and (Financial) NGOs that offer credit and saving services with a social objective</i>	<i>Agribusinesses, trading and processing companies that use finance as a way of facilitating and committing producers, processors, and other actors to sell to them</i>	<i>Producer associations provide technical assistance, marketing, inputs, and linkages to finance</i>	<i>Credit Unions, Savings and Credit Cooperatives and their Unions/Federations</i>
Supply and demand	Information asymmetry	Lack of credit history	No	Yes	Yes	Yes	Yes
		Lack of collateral	No	Yes	Yes	Yes	Yes
		Social capital	No	Yes	Yes	Yes	Yes
Transactions, financial products, and services	Principal-agent problem Transaction Costs	Screening of credit applicants	Yes	Yes	Yes	No	Yes
		Seasonality of credit needs	No	No	Yes	Yes	Yes
		Tailored financial products and services	No	No	Yes	Yes	Yes
		Linkages with market activity	No	No	Yes	Yes	Yes
		Institutions in the value chain	No	No	Yes	No	No
Enabling environment	New institutional economics	Longevity of schemes	No	No	No	No	No

Note: "Yes" indicates that the financing approach addresses this challenge, while "No" indicates that the financing approach does not address the challenge.

3. Conceptualizing agricultural value chain finance

Despite recent interest in AVCF, many of its components have long been applied. For example, financing from inside the value chain (i.e., provided by processors or traders to farmers) is common when financing institutions do not offer sufficient products for farmers (Chalmers, Wenner, Tiffen, & Galvez, 2007). However, these arrangements differ from AVCF in that previous contractual relationships were not consistently used to improve farmer creditworthiness for future financial transactions (Shwedel, 2007).

The financial instruments available within AVCF are organized in the literature in different categories based on the financial needs they aim to address. The most representative categories include product financing, receivables financing, physical asset collateralization, risk mitigation products, and financial enhancements (Miller & Da Silva, 2007; Miller & Jones, 2010). AVCF schemes are also classified into different categories, based on the driving actor of the scheme. Buyer-driven and producer-driven models are among the most commonly applied financing schemes in different rural contexts. In buyer-driven models, finance is used by the buyers to commit producers to sell to them under specific conditions (Cuevas & Pagura, 2016; Miller & Jones, 2010). International investors, banks, and certifiers promote these interventions to market-oriented agribusinesses and farmers. In our study, we present a case of buyer-driven AVCF through the case of Company A which is an Indian agribusiness that provides customized financial solutions to value chain actors. In comparison to traditional banks

and MFIs that provide finance on a borrower basis, Company A offers financial services to the whole ecosystem (e.g., two districts dependent on three major economic activities) in which borrowers operate. In practice, this application of AVCF focuses on a specific value chain to increase cash flows in the region, rather than only on individual borrowers. For example, milk production is important in India as it generates periodic cash flows for farmers and simultaneously impacts the cash flows of aggregators and local collection centers. As many farmers from several districts were working on dairy in different value chains, the company designed specific financial products for aggregators and farmers in the dairy value chain. Farmers received credit adjusted to the value of milk-producing animals and aggregators received larger credits if they were able to operate with more farmers and collection centers.

Further, contract farming is a common example of buyer-driven models. While contract farming has been lauded as a model to increase both farmers' and sponsors' income, there is mixed evidence of its impact on smallholder farmers. Some studies argue that contract farming can reduce transaction costs, increase efficiency, and enhance farm profitability and welfare (Ashraf, Giné, & Karlan, 2009; Bellemare, 2012; Grosh, 1994; Minten, Tamru, Engida, & Kuma, 2013). However, many are skeptical about its impacts on wealth inequality, dependency, and division of risk (Little & Watts, 1994; Porter & Phillips-Howard, 1997). Some studies suggest that buyers tend to contract with farmers that are the most likely to maximize profits, which may exclude smallholder farmers, and generate inequality among the rural population.

Contract farming may also lead to dependency as contract termination can affect property-right relationships. Producers may lose their productive autonomy to agri-corporations, especially as farmers incur debts with corporations (Korovkin, 2014). Moreover, it can generate control of cash flows into local communities resulting in monetization, changes in social behavior, and relations of reciprocity at the community level (Adams, Gerber, Amacker, & Haller, 2019). Finally, farmers can carry a disproportionate share of production and market risks compared to the sponsors and the distribution of benefits and costs largely depends on implications on land ownership, control, and labor rights (Adams et al., 2019; Korovkin, 2014). Hence, to assess the impact of buyer-driven models such as contract farming, it is important to look beyond the contractual conditions of smallholders included in the schemes and capture the impact of the new institutional setting on the local people and community land rights.

In producer-driven models, farmer associations provide small farmers with finance, marketing, technical assistance, and inputs (Cuevas & Pagura, 2016; Miller & Jones, 2010). As an example of a producer-driven model, we capture the experience of an AVCF scheme in Kenya and Tanzania that aimed at financing the adoption of Climate-Smart Agricultural technologies (see more details in (Wattel et al., 2019)). Here, most smallholder farmers operated in loose value chains in which village saving groups were the most common and trusted source of finance. In this model, village savings groups provided marketing, credits, and inputs but were sometimes associated with issues (e.g., barriers to subsidies, and leadership problems). Further, these village savings groups were not linked to higher financial circles.

4. Methodology

We explore the main drivers for the development and financial sustainability of AVCF schemes in different developing contexts. AVCF is still largely informal and quantitative data is usually scarce and difficult to access due to poor record-keeping in the rural sector as well as actors' unwillingness to share economic and financial data (Zander, 2016). Moreover, much of the knowledge generated from AVCF implementation comes from the experiences of financial institutions, development organizations, and agribusinesses, which are not always available in the form of written records. Given gaps in knowledge and data, we focus on the views of non-farmer chain actors through expert interviews and Grounded Theory following the Gioia Method (Gioia, Corley, & Hamilton, 2013). Expert interviews are a useful method that allows access to exclusive knowledge possessed by the interviewees. The expert plays the role of a guide who possesses certain valid pieces of knowledge that is not available to the researchers and that provide them with unique facts about their research question (Bogner & Menz, 2009).

4.1. Grounded Theory approach

We develop a theoretical construct based on Grounded Theory to generate new concepts in the AVCF framework. While previous literature has already explored the impact of AVCF at the local level from the farmers' perspective (Angelucci & Conforti, 2010; Birthal et al., 2017; Kopparthi, 2012; Middelberg, 2017; Swamy & Dharani, 2016), this study is based on expert interviews as this allows the generation of new concepts with a broad spectrum of application. In program theory, important knowledge comes from stakeholder groups, in particular program designers and implementers (Chen, 1994). Program designers and implementers usually have explicit or implicit knowledge of how interventions work (Leviton, 1994),

and constructing theory from this approach ties closely to the stakeholders' perspectives.

However, impact evaluation of value chain interventions is challenging as value chains are complex and multi-layered social systems in which interventions are highly context-specific (Ton et al., 2010). Policy makers are often interested in whether an intervention would hold across the many sites at which it would be implemented, which often results in a conceptual and practical challenge (Hainzer et al., 2018; Shadish & Cook, 2002). In social research, causal inferences come from a combination of Data-set Observations (DSOs), typically the result of surveys and time series, and Causal-Process Observations (CPOs), typically based on the results of qualitative methods (Brady & Collier, 2010). CPOs are particularly useful in constructing normative theories for impact evaluation and play a key role in refuting conventional ideas, developing new ideas, and testing new ideas (Brady & Collier, 2010; Chen, 1994). Within qualitative methods, Grounded Theory is an inductive and theory discovery methodology that allows researchers to develop a theoretical account of the general features of a topic by grounding it on empirical observations or data (Glaser & Strauss, 1967). In this regard, Sikolia et al. (2013) suggest that within the Grounded Theory method, internal validity corresponds to credibility and external validity corresponds to transferability. While the former can be attained using data triangulation, saturation, and peer debriefs, the latter can be enhanced through clear descriptions of the research, including the participants' diverse perspectives and experiences, and a clear interpretation of the results and emerging theory.⁵ Hence, as a theory development method, Grounded Theory aims at generalizing theory by generating concepts and processes that are based on specific observations but that can be structurally transferred across domains and contexts (Gioia et al., 2013). When using Grounded Theory, it is considered good practice to include formal or informal propositions in the results and discussion of studies using this method. This provides an opportunity to suggest a roadmap for future qualitative researchers to follow and bridge with quantitative researchers who can find good guidance in developing emergent concepts into measurable constructs (Gioia et al., 2013).

It is noteworthy, nevertheless, that while our study focuses on capturing the views of AVCF implementers and designers, the views of other value chain actors are extremely relevant. Due to the highly context-specific nature of value chain interventions, it is crucial for the further understanding and evaluation of the Ecosystem Approach, especially at the local level, that the views of farmers, middlemen, last-mile agents, and other local stakeholders are considered. In our study, we interviewed Agribusinesses in India and South Africa that have developed bottom-up approaches in which the close interaction with these actors is a cornerstone of their business models. In future applications of the Ecosystem Approach in specific contexts, the views of the local stakeholders can be a valuable means of improving the transferability of the propositions presented in Section 5.

4.2. Data collection and analysis

We implemented a qualitative approach following three steps: (i) AVCF expert identification from different institutional and developing contexts, (ii) in-depth semi-structured interviews,

⁵ Shadish and Cook (2002) suggest five principles to consider the external validity of policy recommendations, in particular about the 'policies that work'. For this, they propose to: (i) assess the apparent similarities between the study operations and the prototypical characteristics of the target of generalization; (ii) identify things that are irrelevant because they do not influence the generalization; (iii) clarify they key discriminations that limit generalization; (iv) explore the possibilities to apply results within and beyond the (sampled) range of observations; and (v) test and develop explanatory theories about the patterns of effect, causes and meditational processes.

and (iii) investigation of common themes through inductive coding.

(i) Expert identification:

For the first step, we selected experts following [Bogner and Menz \(2009\)](#) approach to expert knowledge as an analytic construction. This framework suggests that expert knowledge can be differentiated from traditional knowledge by three central dimensions: (1) *Technical knowledge*, which refers to expert knowledge as systematic and specific in content; (2) *Process knowledge*, in which the experts' knowledge comes from their practical experience and close relationship with the field of action; and (3) *Interpretative knowledge*, in which the experts' points of view and interpretations are displayed as heterogeneous constructs that allow the generation of theory. As displayed in [Table 2](#), in the context of AVCF, we identified four groups of experts that fulfill at least one of [Bogner and Menz \(2009\)](#) dimensions: (i) Academia, in which we accounted for scholars who addressed AVCF in their research through peer-reviewed publications, (ii) Development Organizations, which participated as donors, implementers or consultants for AVCF schemes, (iii) Financial Institutions, which implemented or funded AVCF schemes, and (iv) Agribusinesses which designed and implemented AVCF schemes in developing countries.

To allow for a global reach, we selected experts from seven different countries: Germany, the Netherlands, South Africa, India, the United States, Costa Rica, and Ecuador ([Table 3](#)). The 13 experts have leading roles and experience in designing and implementing AVCF schemes in different regions. [Table 4](#).

(ii) Interviews:

In the second step, after identifying and selecting experts on AVCF, we conducted in-depth semi-structured interviews. All interviews were held online and were recorded and fully transcribed. We divided the data collection process into three rounds in which all the above-mentioned groups of experts were represented. This allowed the generation of an iterative analytical process as subsequent interviews often focus on concepts emerging from previous interviews, which allows the generation of new concepts and relationships and the formulation of further questions ([Gioia et al., 2013](#)).

A sampling of new interviewees and interpretation activities were performed simultaneously until the “theoretical saturation” point was reached, that is, the inclusion of additional new data could no longer be expected to contribute further to theory development ([Glaser & Strauss, 1967](#)). We continued coding interviews in this manner until we could not ascertain any more distinct, shared patterns among informants. We also paid extraordinary attention to following the interview protocol to ensure that it did not contain any leading questions.

(iii) Data analysis:

Using the data structure depicted in [Figure 1](#), we present the emergent categories and themes that describe the key factors for AVCF schemes' development and financial sustainability. To ensure qualitative rigor, we followed the Grounded Theory articulation formulated by [Gioia et al. \(2013\)](#). In this methodological approach, data is divided into two rounds of analysis:

(i) *First-order categories*: following an inductive approach, we let codes (labeled segments of text that allow the creation of themes) emerge progressively during data collection ([Miles, Huberman, & Saldaña, 2014](#)). We adhered to the

interviewees' terms and did not distill categories to maintain an explorative and open focus on the research issue. [Table A1](#) in the Appendix offers a detailed description and example of the codes selected for the first-order categories.

(ii) *Second-order themes (code clustering)*: based on individual codes, we built extended thematic statements based on commonality. Following [Gioia et al. \(2013\)](#), we focused particularly on nascent concepts without adequate theoretical referents in the existing literature. We sought similarities and differences among the codes created in (i), which reduced the germane categories to 6 parent codes and 24 subcodes. The detail of the text segments coded under each category can be seen in [Table A2](#) in the Appendix. In total, we coded 201 segments of text from the interviews that were relevant to answering the research question.

(iii) *Codebook development*: following [Miles et al. \(2014\)](#), who suggested that inductive coding allows for better empirically grounded research, we elaborated a codebook to ensure a consistent application of the codes throughout the collected data. We used the codebook to estimate the intercoder reliability (ICR) between two different coders. ICR is a numerical measure of the agreement between different coders regarding how the same data is coded and it is frequently recommended as good practice in qualitative analysis ([O'Connor & Joffe, 2020](#)). If agreement about some of the codes was low, we revisited the data and engaged in a discussion to arrive at a consensual interpretation. Our final ICR was 82.35 %.⁶

5. Results

We propose the Ecosystem Approach as a framework for establishing long-lasting AVCF schemes in developing countries. The Grounded Theory emergent model depicted in [Figure 2](#), presents a processual view of how the five core factors of AVCF development are linked to the three critical solutions for AVCF financial sustainability. In this section, we present the six propositions derived from our Grounded Theory model.

5.1. AVCF Ecosystem

Proposition 1. *To be long-lasting, AVCF schemes need to evolve towards an 'Ecosystem Approach', which integrates the institutional and financial needs of all the value chain actors.*

AVCF schemes can solve some of the farmers' financial needs in the short run. However, in the long run, they do not always sustain overtime (ID 1, 2). As AVCF schemes are often implemented by NGOs and international donors, they can create dependency on external funding in the long run. Thus, AVCF must evolve to be financially sustainable. Based on the solutions proposed by experts, we conceptualized the “Ecosystem Approach” to AVCF (ID 1, 2, 6, 7), which offers the opportunity to increase outreach and longevity based on three critical solutions.

5.1.1. Building a financial platform for transaction records

The Ecosystem Approach requires the creation of a platform, which stores high-quality data about the smallholders' production and credit histories (ID 1). On the demand side, it is critical that “all linkages from the value chain receive equal attention” (ID 6). While financing often focuses on farmers, financial sustainability must address the financing needs of the other value chain linkages (e.g., pre-production, post-harvest, processing) (ID 6). On the sup-

⁶ [Miles et al. \(2014\)](#) suggest a standard of 80% agreement on 95% of codes.

Table 2
Type of experts on Agricultural Value Chain Financing.

Dimensions	Academia	Development Organizations	Financial Institutions	Agribusinesses
1. Technical knowledge	✓	✓	✓	
2. Process knowledge		✓	✓	✓
3. Interpretive knowledge		✓		
Total Interviews: 13	3	4	3	3

Source: Adapted from Bogner and Menz (2009).

Table 3
Identification and background of the interviewees.

Interviewee ID	Institution	Country	Position	Region of expertise
1	Development Organization	United States	Financial Sector Specialist	Africa
2	Development Organization	United States	Financial Sector Specialist	Africa, South Asia
3	Academia	South Africa	Associate Professor	Africa
4	Academia	United States	Assistant Professor	Africa
5	Agribusiness	South Africa	General Manager	Africa
6	Agribusiness (Company A)	India	CEO	India
7	Agribusiness	India	CEO	India
8	Financial Institution	Netherlands	Agribusiness director	Africa, Latin America
9	Development Organization	Germany	Consultant	Asia
10	Financial Institution	Netherlands	Manager of Agribusiness	Africa, Asia, Latin America
11	Academia	Netherlands	Policy Researcher	Africa, Latin America
12	Financial Institution	Ecuador	Consultant	Latin America
13	Development Organization	Costa Rica	Technical Specialist	Latin America

Table 4
Mitigation strategies for market risk in AVCF.

Mitigation strategies	Sources of risk		
	Quality	Price	Market
Ensuring market linkages	Medium	Medium	High
Budget for side selling	Low	Medium	High
Quality standards	High	Low*	Medium*
Auctions	High	High	High

*In some cases, standards can increase side selling. If farmers see their net income decrease due to compliance with stricter requirements, they might decide to side-sell even if the market price is lower, as long as they are not asked to comply with complicated quality requirements (ID 12).

ply side, an Ecosystem Approach does not rely on a single financial institution but rather includes a variety of financial providers to increase competition in price and quality (ID 1). This prevents “lock-in relationships” (ID 2), which promote high information asymmetry as a single financial institution owns the farmers’ credit history. Developing AVCF data platforms where farmers, agribusinesses, and financial institutions can compile financial and market data could be a “game-changer” especially if such information is digitized and can be used by the different actors to build a credit history that is accessible for actors from inside and outside the value chain (ID 4).

5.1.2. Bundled services for the value chain

The Ecosystem Approach also requires bundled services. This means that lenders do not only focus on credit provision but also offer critical extension and management services (ID 10). Bundled services have allowed financial institutions to reach smallholder farmers by offering high-quality inputs, seeds, and extension services (ID 10), or training farmers in the use of digital tools (ID 3). This allows them to provide technical knowledge to the farmers and create a monitoring mechanism (ID 7). Thus, the Ecosystem Approach enhances integral funding that increases incentives for participation as well as increases lender outreach and long-lasting credit schemes.

5.1.3. From value chains to value webs

While AVCF spreads risk among actors, risk can still be high as financial products are developed around the production and processing of a single product (ID 12). Traditionally, agricultural value chains are built around a specific product which implies that risks arising from climate, production, market, and personal tend to affect most of their actors. To mitigate risk, agribusinesses in India have developed financial products that cater to the two to three major economic activities that determine the cash flow of entire geographies (micro-ecosystems) rather than focusing on a single crop (ID 6). As farmers produce multiple outputs (e.g. livestock, vegetables, summer crops, winter crops), financial institutions must work beyond a single value chain. Thus, the Ecosystem Approach reframes value chains as value webs: “Value chains do not exist the way we want them to exist, so we created this 360-degree approach” (ID 7). The Ecosystem Approach can begin by offering financial services for one value chain and then expand to additional financial products. For example, agribusinesses focusing on the dairy value chain realized that milk quality was low due to low-quality feed. As a result, they provided short-term capital loans to improve livestock feed. These innovative models become profitable when they can aggregate different actors from the same micro-ecosystem (e.g. a group of villages) and identify value webs to distribute their costs and risk: “If the ecosystem is performing well, the chances of smaller farmers also performing well is high in comparison to traditional lending” (ID 7).

5.2. How are AVCF schemes established?

Proposition 2. AVCF schemes vary in their contextual settings, yet there are common characteristics about the motivations for their implementation, the enabling elements that trigger their potential, and the setup factors that contribute to their development and financial sustainability.

AVCF schemes often arise as the needs of the value chain evolve (Figure 3). Specifically, agribusinesses may need to customize financing (bottom-up approach) or incentivize technology adop-

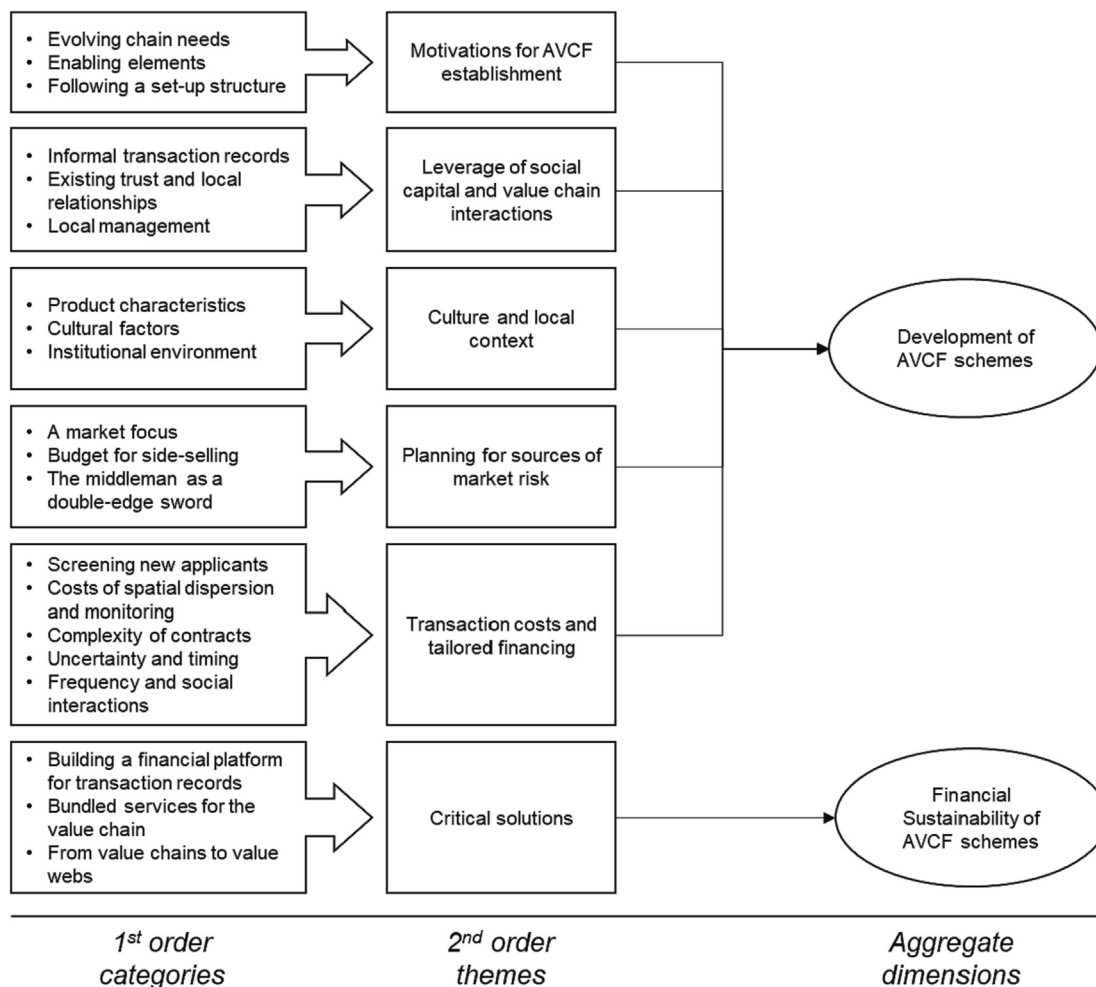


Figure 1. Data structure.

tion. For example, an Indian agribusiness used AVCF to customize financial products for dairy actors (ID 6) while a scheme in Zambia used it to incentivize Climate Smart Agriculture practices (ID 3). AVCF schemes commonly evolve towards “for-profit operation” (ID 4) as farms see it as “their only way to scale” (ID 4). Similarly, financial institutions engage in AVCF given its “profitable business case” (ID 10) with proven returns on investments and reduced transaction costs. In Uganda, financial institutions only needed one relationship with the trader instead of many relationships with each borrower (ID 4). In South Africa, agribusinesses linked cooperatives with small farmers to aggregate production, which reduced costs of collection and improved farmers’ marketing power (ID 5). Thus, using the Ecosystem Approach, AVCF schemes can generate economies of scale and logistic solutions.

Two institutional enabling elements can motivate actors to implement AVCF. First, financial institutions must understand the agricultural sector (ID 8, 10) and go the “extra mile” to establish AVCF schemes (ID 8). Second, resilient AVCF schemes use existing networks to include all actors with a commercial interest. When actors have “skin in the game”, the risk is spread and prevents financial institutions from assuming all risk (ID 10).

Regarding the AVCF scheme structure, farmers play a central role but are rarely the driving force. Thus, the Ecosystem Approach is characterized by a lead actor (e.g., agribusiness) who identifies a financing gap, conceptualizes the AVCF scheme, and integrates the different actors (ID 3, 5, 6, 7). AVCF schemes with agribusinesses tend to present higher longevity when there is stability in prices,

standardized quality, and well-established marketing linkages. Furthermore, developing AVCF schemes around a “safe product” is a common strategy. In the South Asian context, dairy is considered a “safe product” because it generates constant financial flows (ID 6).

5.3. Social capital and value chain interactions

Proposition 3. *Despite the importance of increasing formal contracts within the AVCF framework, social capital is key for leveraging networks and ensuring credit in weak institutional environments.*

While AVCF is often applied to enhance contract enforceability through instruments such as tripartite agreements,⁷ transactions are often informal and institutions lack structure. As a result, enforceability remains a challenge: “[Transactions] are definitely informal in 95 % of the cases. This is not something where you can go to the courts and reclaim the money if somebody doesn’t honor his side of the contract” (ID 9).

⁷ Tripartite agreements refer to formal and informal contracts between farmers, lead firms and financial institutions. One of its most common applications is the warehouse receipt system, in which a warehouse issues receipts for stored commodities, the farmer acquires the receipt to use as collateral, and a financial institution accepts the receipt as collateral and provides loans against the receipt (Miller, 2010).

Table 5
The effects of traditional banking, microfinance, and AVCF on Transaction Costs (TC) attributes.

Attributes	Effect on TC	Traditional Banking		Microfinance		AVCF		Cooperative Financing	
		Providers	Customers	Providers	Customers	Providers*	Customers	Providers	Customers
Screening	<i>The more difficult it is to estimate the reliability of the customer, the higher the TC</i>	High TC as FIs lack information on the farmers' credit history	High TC as time and resources are spent on loan applications	Low TC as MFIs use social capital	Low TC as customers leverage their social capital	Low TC as previous transactions are leveraged to develop a transaction record	Low TC as social and trade capital is leveraged to generate a transaction record	Low TC as Cooperatives use social capital	Low TC as customers leverage their social capital
Spatial dispersion and Monitoring	<i>The more dispersed the customer demand, the higher the monitoring costs and the TC</i>	High TC as farmers are dispersed and FIs are far from the farmers	High TC as farmers need to travel long distances to contact the FIs	Low TC as MFIs operate at the village level, but High TC to monitor	Low TC as farmers do not need to travel long distances	Low TC as providers can channel and monitor loans through different VC actors	Low TC as farmers do not always travel long distances	Low TC as Cooperatives operate at the village/local level, but High TC to monitor	Low TC as farmers do not need to travel long distances
Complexity	<i>The more complex the contract, the higher the TC</i>	Low TC as contracts are generic	No TC Effect, but lower likelihood of receiving loans	Low TC as contracts are generic	High TC, as financial products are not always suited for agriculture	High TC as tripartite contracts are costly and context-specific	High TC as farmers do not always comply with tripartite contracts	Low TC as financial products tend to be similar for all the cooperative members	No TC Effect, but higher likelihood of receiving loans
Uncertainty	<i>The more uncertain, the higher the TC</i>	High TC as FIs rely only on collateral	No TC Effect, but lower likelihood of receiving loans	Low TC as there is constant monitoring	Not affected	Low TC as loan repayment is automatic via transaction proceeds	Low TC as farmers can rely on financing and marketing contracts	High TC as default rates can be high Low TC as trust is high between members and providers	No TC Effect, but higher likelihood of receiving loans
Frequency	<i>The more frequent the loan services are, the more trust can be built and the lower the scope for opportunism, therefore, the lower the TC</i>	High TC as there is limited interaction and trust between FIs and farmers	No TC Effect, but lower likelihood of receiving loans	Low TC as MFIs meet weekly/monthly with customers	Low TC as farmers get progressive lending based on clean repayment record	Low TC as FIs leverage previous relations between VC actors	Low TC as farmers receive finance from VC actors with whom they have pre-established trust ties	Low TC as Cooperatives have close relations with their members	Low TC as farmers receive finance from a cooperative with whom they have pre-established trust ties

*In AVCF, providers are not limited to Financial Institutions (FIs), but can also include Agribusiness, Export Firms, and other actors from agricultural value chains.

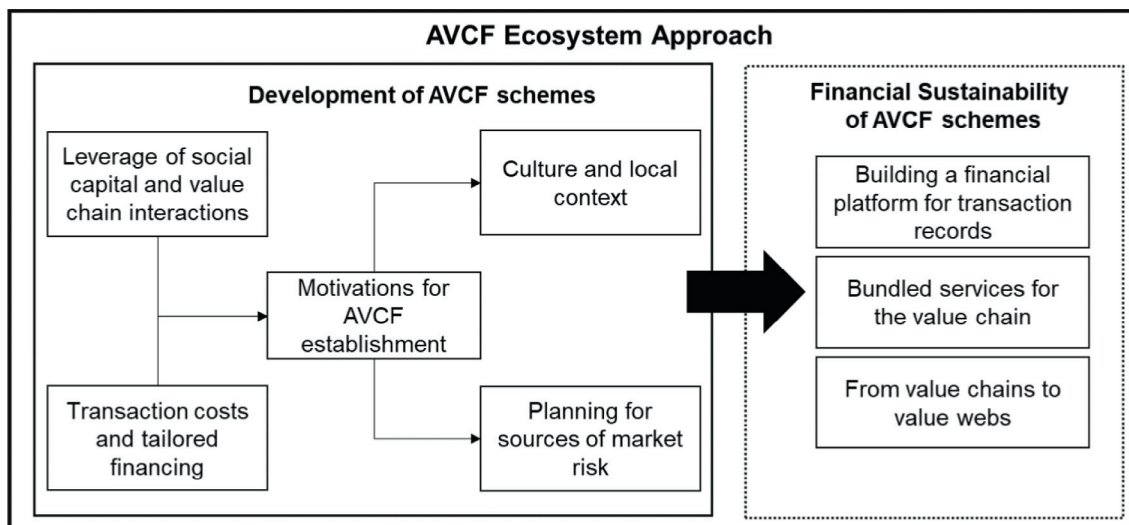


Figure 2. Organizing framework of the AVCF Ecosystem Approach.

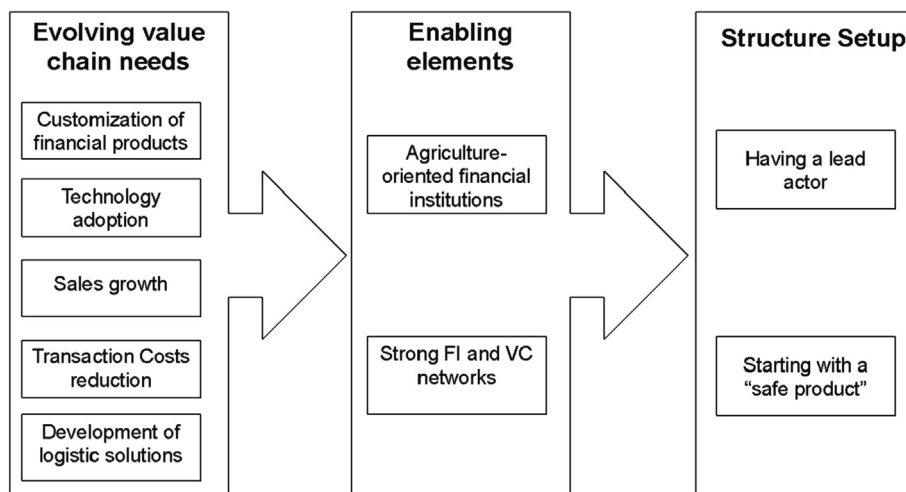


Figure 3. The key drivers behind the establishment of AVCF schemes.

Thus, “trust prevails over contracts” (ID 4) and social capital can bridge the gap between AVCF and informal finance. As shown in Figure 4, leveraging trust and local relationships allows AVCF schemes to increase transparency and gain access to the informal financing schemes’ “invisible” information about transactions. This can improve the screening process of potential clients (e.g., develop transaction records, credit scores), despite weak enabling environments.

Transparency encompasses two underlying concepts: i) a value chain is transparent if all the linkages of the chain are acknowledged and identified, and ii) a value chain is transparent if it delivers symmetrical access to information to its actors. To increase

transparency, AVCF schemes can leverage local management. When financial institutions or agribusinesses involve local people in sales, financing, and management, AVCF schemes have sufficient exposure at the community and village level and enhance the creation of networks. Further, as agribusinesses and traders link marketing and credit in global value chains, their role is to increase transparency by explaining to farmers how prices and quality standards are established (ID 5). If schemes are unclear to the farmers, they are unlikely to endure over time (ID 8).

While financial institutions need additional information to screen and rate their potential customers, financial information (especially digital) is scarce and costly (ID 1). Agribusinesses in

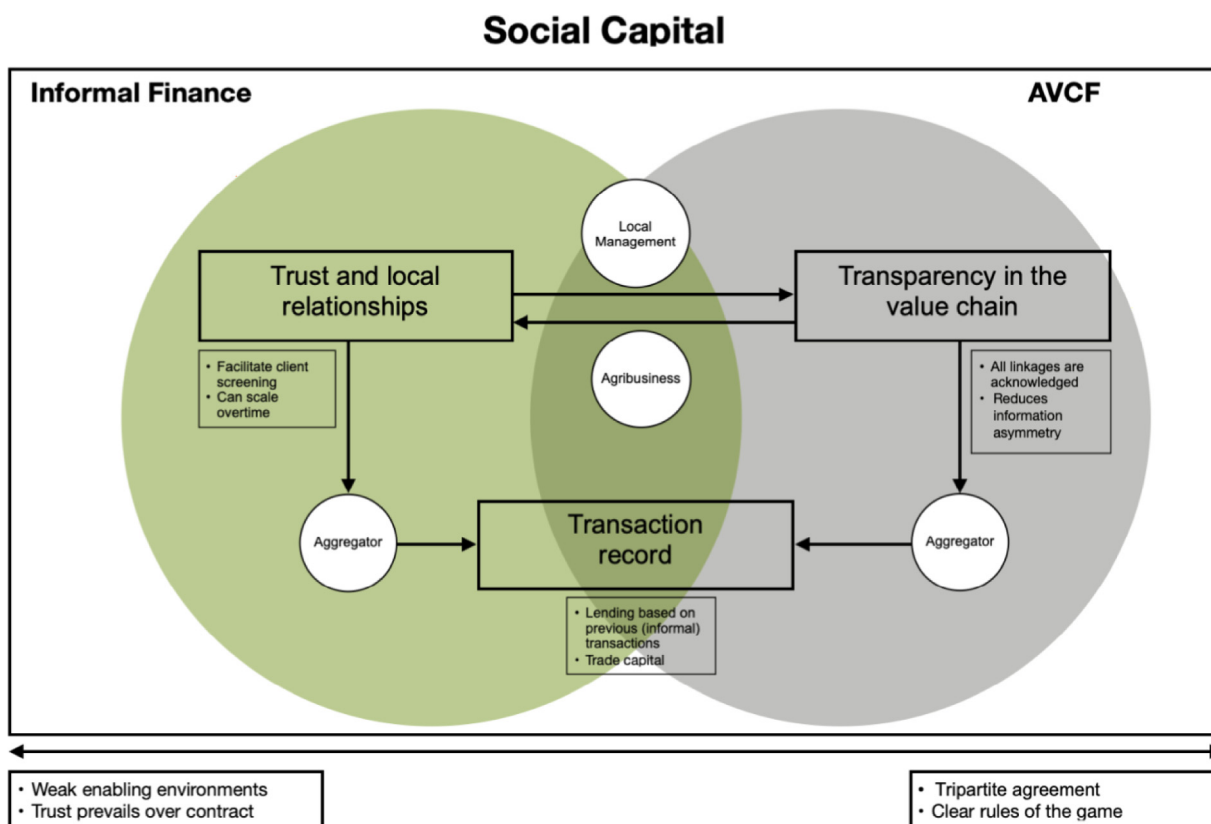


Figure 4. The role of social capital in Agricultural Value Chain Finance.

India have progressed beyond social capital to *trade capital*, which refers to farmers, aggregators, and traders vouching for each other when procuring finance. When an aggregator is looking for borrowers, he asks other community members to recommend those who are creditworthy. The group guarantee depends on aggregators, who record informal transactions to create a transaction history. Thus, in the Ecosystem Approach, social capital becomes a mechanism for tracking transaction histories (ID 6).

5.4. Culture and value chain characteristics

Proposition 4. *AVCF schemes require a context-tailored approach, which accounts for product and value chain characteristics as well as cultural factors.*

In the Ecosystem Approach, AVCF schemes must consider how the characteristics of the product (e.g., perishability and processing intensity) can determine the degree of contract fulfillment (ID 8). The risk of side-selling increases for non-perishable goods if farmers have more time to solicit alternative offers. The processing intensity of a product also affects contract fulfillment. In processing-intensive chains (e.g. sugar cane, tobacco), there are a large number of producers and a limited number of buyers, which reduces the risk of side-selling and generates closer connections between them. In contrast, farmers with non-perishable products with looser value chains (e.g. paddy) can sell their products to different buyers, which reduces relationship development and the longevity of AVCF schemes.

The development of AVCF schemes can also depend on cultural factors. Experts from financial institutions and academia explained that repayment culture can vary by region depending on poverty levels and long-term mentalities: *“In survival environments, these schemes do not work because you need discipline and discipline needs a long-term view”* (ID 8). The challenge is that culture itself may be linked to an individual’s business prowess, entrepreneurial mindset, and risk aversion. Specifically, experts argue that AVCF schemes are more promising for farmers with an entrepreneurial mindset and previous business experience (ID 3). In contrast, small farmers may struggle to integrate into AVCF schemes as many are unwilling to scale up their production while they are in *“survival mode”* (ID 8). However, experts also caution that it is important to refrain from deterministic conclusions about repayment culture (ID 12).

While financial institutions prefer strong enabling environments and enforceable collateral, AVCF can succeed in weak ones if certain factors are considered. Successful AVCF schemes rely on an off-taker who can convince banks to finance their suppliers and, in turn, *“the banks are sometimes willing to go the extra mile and set up an AVCF scheme for those farmers”* (ID 7). Financial institutions need to evaluate the commitment of the stakeholders, the risk of side-selling, and the level of relationships between the chain actors. The farmers’ business orientation and product characteristics provide valuable information on financing potential.

5.5. Planning for sources of market risk

Proposition 5. *Promoting market stability through formal agreements, budgeting for side selling, and identifying the role played by middlemen are critical for risk planning.*

While financing is a fundamental driver for agricultural productivity, marketing linkages ensure that farmers will be able to sell their products and pay back their credit. Nonetheless, the market-

ing pillar is not always considered in the design of AVCF schemes, which can hinder financial sustainability. For financial institutions, this is an important obstacle:

“Many projects already have the product and have nowhere to sell, and that is worse because you have invested a lot in providing them with machinery, inputs, training” (ID 12).

Agribusinesses believe that the financial sustainability of AVCF can be attained through market stability. In livestock value chains in South Africa, auctions have facilitated stability as farmers can sell their products through formal marketing systems and develop a better understanding of how quality can influence the final price of livestock (ID 5). However, even when marketing linkages are included as part of the AVCF design, financing schemes can still be vulnerable to two underlying sources of risk. As shown in Table 5, we find that AVCF actors can use market linkages, budgeting for side selling, quality standards, and auctions to reduce risks arising from quality, price and market sources. The different strategies suggested by the interviewees allow AVCF schemes to considerably reduce risk exposure (high mitigation), contribute to reducing risk exposure (medium mitigation), or have a limited contribution to reducing risk exposure (low mitigation).

For example, despite increasing transparency, agribusinesses note that side-selling is a permanent barrier to AVCF schemes: *“We [budget] for about 10 % of side selling”* (ID 7). Moreover, as more value chain actors are included in the scheme, ensuring product quality can be particularly challenging. For example, in the dairy value chain, promoting clear quality and hygienic standards is essential to ensure marketing stability: *“If you have ‘one lemon’ in the group and the milk is mixed with the others, the payment of all the others in the group may be compromised”* (ID 9).

A pivotal figure in combining finance with marketing is the middleman,⁸ who buys, consolidates, and sells agricultural products from farmers in local and regional markets and, as an additional service, offers credit to farmers to be paid upon harvest in kind or cash. However, the relationship between farmers and the middleman can be characterized as a *“double-edged sword”* (ID 7): While it can be *“tempting to vilify the middleman”* (ID 1) for their exploitation of farmers, they also *“take on a lot of risk”* (ID 2). For example, in Sri Lanka *“10 % [of the traders] go bankrupt because they are forced to extend their finance”* (ID 9). Thus, traders are key to making AVCF function for lower-income farmers in the Ecosystem Approach: *“The lowest income segments of the farmers are the ones that really use these advanced loans from the traders. Nobody loans to people with such a low profile income”* (ID 9).

5.6. Transaction costs and tailored financing

Proposition 6. *When compared with traditional banking and micro-finance, AVCF schemes allow providers and customers to reduce transaction costs arising from screening, spatial dispersion, uncertainty, and frequency.*

The experts suggest that many financing schemes often focus on delivering financial solutions while ignoring climate risks, lack of access to inputs, access to markets, transportation, and logistics (ID 2). Based on the interviews, we identified five attributes that affect transaction costs and compared them to traditional banking and microfinance (Table 5).

⁸ Different terms were used to refer to the same actor: middleman, trader, intermediary, offtaker, and aggregator.

5.6.1. Screening

Both microfinance and AVCF can reduce the providers' and customers' screening transaction costs. While microfinance uses the information gathered from group lending and social capital, AVCF goes one step further and enables farmers to leverage previous transactions with other value chain actors to generate a transaction record. Financial institutions can not only use social capital but also apply trade capital (see section 5.3).

5.6.2. Spatial dispersion and monitoring

High transaction costs result from the operation and outreach over large areas: "[Farmers] tend to be in big geographies and the loan values are small and the reach from any rural branch would be an average of 30 km" (ID 7). Microfinance institutions reduce transaction costs arising from spatial dispersion by operating at the village or household level, but permanent monitoring is key to high repayment rates. This results in high transaction costs as monitoring occurs up to several times per month. We find that in AVCF schemes, finance providers reduce their transaction costs by relying on monitoring from different actors including traders (middlemen), input providers, processors, and extensionists (ID7).

5.6.3. Complexity

AVCF offers heterogeneous financial products, which generates high transaction costs for providers and customers as tripartite and loan contracts involve different stakeholders and multiple services (finance, marketing, and extension services): "Implementation is really costly, plus time-consuming" (ID 10). Providers should aim to scale up finance by including as many actors as possible: "If you just do it for smallholders, it's just too small, too difficult, too complex" (ID 8).

5.6.4. Uncertainty

As mentioned in Section 5.3, collateral is not enforceable in many developing contexts. AVCF schemes increase transparency and institutionality through the implementation of tripartite contracts. This reduces uncertainty as loan repayment is automatically linked to transaction proceeds: "The tripartite agreement says that the off-taker is obliged to first pay or to set up a debt obligation and the interest against the proceeds" (ID 8). However, the reduction of these transaction costs strongly depends on the enabling environment.

5.6.5. Frequency

Higher frequency tends to emerge in contexts of repeated interactions that require stakeholders to maintain reputation over time. In AVCF schemes, stakeholders rely on mutual frequent interactions to have access to finance and increase their credits overtime: "[AVCF schemes] work if [stakeholders] trust the individual they work with, and they have previous relationships. Then, they build that relationship over time and offer more and more credit" (ID 4). The more interactions, the more trust and the lower incentive for opportunistic behaviors (Section 5.3).

6. Discussion

In this paper, we explored the main development factors for AVCF and present the Ecosystem Approach as a framework for long-lasting rural credit. We assessed the conditions, interactions, and framework that need to be implemented to allow AVCF schemes to achieve their goal of increased access to finance for different value chain actors across the globe. The findings highlight the importance of the Ecosystem Approach to promote financial sustainability based on six propositions.

6.1. Leveraging the success factors of AVCF schemes

We showed that, in agreement with previous research (Swamy & Dharani, 2016), value-chain-based financial interventions should not be directed solely on the production stage, but also on other segments. The development of financial products in the AVCF framework must provide incentives and consider the needs of all the value chain actors (beyond farmers). Moreover, as development organizations, financing institutions, agribusinesses, and academia are often "lead actors" in the development of AVCF, their insights allowed us to identify externally valid solutions across different developing contexts.

The Ecosystem Approach offers financial institutions several tools to address the lack of credit history, the lack of collateral, and the principal-agent problem. One of the most important characteristics of AVCF is that it strongly relies on the existing networks within the value chain, and not only on the borrower-lender relationships. By incorporating social capital and trade capital into their business strategies, finance providers can grasp the full potential of AVCF and have access to value chain information that is usually overlooked by traditional banks or even microfinance institutions (Proposition 3). Leveraging the trust and local relationships that already exist in a value chain, by including local aggregators and agribusinesses in the financing scheme and local actors at different levels of the management, addresses the agency problem and increases transparency in the value chain. Furthermore, using available information on the value chain in terms of social capital and trade capital enables the development of transaction records for farmers without a credit history and collateral.

While previous research argues that AVCF schemes have the potential to reduce transaction costs, they have not assessed how to reduce them and their effect on lenders and borrowers. Moreover, the attributes of the transactions in the AVCF framework have not been compared to other institutions or governance structures, which is a critical point in the New Institutional Economics framework. We filled this gap of knowledge by suggesting five different attributes affected by the provision of financial services in the agricultural sector and analyzing their performance in four different institutional settings (traditional banking, microfinance, AVCF, and cooperative financing). Against this backdrop, we suggest that AVCF schemes can reduce transaction costs arising from screening, spatial dispersion, uncertainty, and frequency. As argued by Miller and Da Silva (2007), AVCF does not only consider the lender-borrower relations, but also the rest of the actors involved in the value chain. As a result, AVCF can reduce the transaction costs for providers as it allows them to better estimate the reliability of the customers (reduces screening costs), channel and monitor loans through the value chain actors (reduces monitoring and spatial dispersion costs), automatize loan repayments through tripartite agreements (reduces uncertainty), and leverage previous relations between the value chain actors (increases trust).

6.2. Increasing the longevity of financing schemes

Our results indicate that AVCF Ecosystems require specific conditions and institutions to operate. As presented in sections 5.2 and 5.4, the financial sustainability of AVCF schemes strongly relies on "for-profit operations" from the value chain actors. Financial institutions, agribusinesses and other lead actors only engage in AVCF when they identify profitable business cases in the value chain, which suggests that AVCF requires chain actors to operate with a business mindset. Although the Ecosystem Approach offers small and subsistence farmers the possibility to generate transaction records, the lack of profitable operations by the farmers is a barrier that can potentially hinder the longevity of these schemes. Moreover, to be sustainable, AVCF ecosystems must entail equity and

justice for their participants. Food systems cannot be assumed to be socially just, and increasing equity requires dedicated engagement by all actors (Allen, 2010). We suggest that in addition to leveraging social capital for customized credit provision (Proposition 3) and ensuring market stability (Proposition 5), justice goals and processes should be prioritized in AVCF schemes. Participatory democracy of all actors is needed to guarantee that credit schemes meet the needs of the parties and that social sustainability is attained. While our study focuses on generating theory based on expert knowledge, the understanding of equity in AVCF schemes and its implications at the local level is still a remaining gap in the literature. We strongly suggest that future research further explores its implications for different value chain actors, especially small farmers, informal institutions, and marginalized groups. In terms of environmental sustainability and increasing risks associated with climate change, it is likely that additional credit is needed to cope with climatic shocks and adapt to climate change. For example, credit may be needed to improve adaptation strategies (Ojo, Adetoro, Ogundej, & Belle, 2021).

Our results also suggest that one of the most important challenges to AVCF schemes is side-selling. The social and economic structures around the value chain are key determinants of the propensity to side-sell. In buyer-driven AVCF schemes (e.g., contract farming), both the firm and the grower can honor the contract or renege on it by side-selling. This is influenced by social capital, price volatility, and legal institutional arrangements (Bellemare & Bloem, 2018). Moreover, the characteristics of the value chain itself considerably influence the presence of side-selling: *“the more structured the value chain is, the less chance you have for side-selling and the more quickly you can establish a solid long-term relationship”* (ID 9). To assess the risks of side-selling, one must understand the negotiating power, equity, and mutual dependency of actors (Miller & Jones, 2010). In AVCF producer-driven models, cooperatives can play a pivotal role in the accumulation of social capital (Bateman, 2007) and foster greater trust, security, and fairness in the value chain. For example, in Bosnia, the establishment of a producer-driven model for raspberry production between a local cooperative and a processor was pivotal to the establishment of sustainable livelihoods in a previously disadvantaged community (Bateman, 2007). It is noteworthy, however, that to be critical actors in the value chain, producer organizations must be reliable, operate with local financial institutions, and continuously build their capacity (Miller & Jones, 2010).

Our study assumes that long-lasting credit from financial institutions is a key challenge for agricultural value chains in developing countries. However, one might also consider the interactions and policy approaches that generate credit gaps in countries from the Global South and whether government support is necessary. Particularly in light of ongoing policy discussions about Modern Monetary Theory which suggest that many development problems have a monetary source. Production possibilities are tightly linked to the amount of credit made available by the banking system and productive structures are influenced by how money is distributed among economic sectors and groups (Koddenbrock & Sylla, 2019). Thus, to allow for a sustainable and autonomous development policy, countries from the Global South could finance their development strategies in local currency by manoeuvring their fiscal policy instead of relying on international financial institutions and avoid “draining” the national economic surplus with external credit (Samba Sylla, 2020). More radical approaches, such as the food sovereignty movement, suggest that policies should directly support farmers and facilitate food sovereignty and the prioritization of local food consumption and production (Schmidt, 2015). While these approaches offer insightful approaches to understanding the dynamics of credit and financialization from a macroeconomic perspective, our framework is not intended as a solution

to all financing problems in countries from the Global South, but a conceptual construct that focuses on microeconomic and budget-constrained agents (household, agribusinesses, value chains) and how the key propositions can increase financial sustainability in AVCF schemes and rural finance. As the food sovereignty movement emphasizes the importance of modes of production and the effects of agricultural production on the local level, our propositions are valuable for understanding means of continuing to finance all members of agricultural value chains, including local small-scale producers.

At the same time, the Ecosystem Approach is also vulnerable to shocks in agriculture and the financial sector. For example, during the COVID-19 pandemic, lockdowns decreased household incomes, especially among low-income populations (Kesar, Abraham, Lahoti, Nath, & Basole, 2021). This generated a fourfold effect on rural financial service provision in developing countries including reduction of borrow repayment capacity, development, and cultivation of trusting relationships, interactions among actors, and availability of banking in small and medium segments of the rural sector (Czura, Englmaier, Ho, & Spantig, 2022; Malik et al., 2020). Based on these conditions, we recommend that credit schemes estimate the ecosystem participants’ (not only lender and borrower) vulnerability towards external sources of risk. This would allow prioritizing when, to whom and how credit should be provided to maintain the financing flows through the entire ecosystem.

7. Conclusion

Value chains are highly heterogeneous in nature. The type of crop being produced and traded, the geographical and climate conditions, and the social and economic context are just some of the many factors that have a direct impact on how and why stakeholders interact the way they do. Credit is just one of the different flows that take place within an ecosystem in which the value chain plays an essential role in connecting different actors. In this regard, the Grounded Theory method that results in the Ecosystem Approach aims to generate concepts and processes based on representative observations from different geographical areas and types of expertise with a broad spectrum of applications. Given the specificities of value chain interventions, the Ecosystem Approach is not a set of practices that can or should be applied in any context. Rather, the Ecosystem Approach is a first step to deepening the understanding of how agricultural value chain financing is evolving to match the needs of stakeholders. Our six propositions aim to create a roadmap for further qualitative and quantitative research on the generated concepts. In this regard, transferability of the results is possible by evaluating the six propositions in light of the five principles of external validity: surface similarity, ruling out irrelevancies, making discriminations, interpolation and extrapolation, and causal explanation. To expand this knowledge, future research should focus on testing and exploring each of the propositions (see Table A3 in the Appendix).

Our results show that some of the propositions included in the Ecosystem Approach are already being successfully implemented by pioneering agribusinesses and financial institutions in different regions. In the last years, AVCF instruments have evolved to allow value chain actors to have access to more tailored financial products, improve the mitigation strategies for market risk, and advance the screening process. However, the integration of other important components of the Ecosystem Approach such as the consolidation of financial platforms for value chain transaction records and the evolution towards a value-web approach for agricultural finance, are just in their infancy.

For financial institutions and development organizations implementing financing schemes in agriculture, this framework offers

insights into the key factors that stimulate financial sustainability and consider the health of the entire system. As the implementation of financial platforms for transaction records in value chains and the evolution towards a value-web approach offers a promising outlook for agricultural finance, it may be valuable to assess how these innovations could enhance the potential of social capital and reduce the need for collateral.

CRedit authorship contribution statement

Roberto Villalba: Conceptualization, Methodology, Investigation, Formal analysis, Writing - original draft. **Terese Venus:** Conceptualization, Methodology, Formal analysis, Supervision, Writing - original draft. **Johannes Sauer:** Writing - review & editing, Supervision, Project administration, Funding acquisition.

Data availability

The authors do not have permission to share data.

Table A1
Representative Quotes Underlying Second-Order Themes.

1st order category	2nd order themes
Evolving value chain needs	Motivations for AVCF implementation If the bank wanted to work with multiple brands it had to establish a relationship with Brand 1 and Brand 2, etc., whereas now the distributor can be the one to form those relationships with multiple suppliers and the bank has a relationship with this distributor. (ID 4)
Enabling elements	You need to team up with off-takers, anchor clients, with champions in the chain to create a profitable model. So it's an approach, starting with low-hanging fruits if any. (ID 10)
Following a set-up structure	What we found is they need a lead actor that would take responsibility and would take the lead in applying for finance. (ID 3)
Informal transaction records	Leverage of social capital and value chain interactions There's a transaction that's happening, farmers are not meeting just for social gatherings. They are meeting to buy and sell something so there is a transaction history that is available. (ID 6)
Existing trust and local relationships	Relationships were trust-based because there was very little faith in the institutions. If a deal went bad or even if they had a contract in place, there was no faith that they were going to be able to hold that contract. (ID 4)
Local management	You need to have locals at all levels of the organization. In sales, in the middle management, and upper management to really understand what's going on and be able to create those relationships up and down the supply chain and then across companies as well. (ID 4)
Product characteristics	Context-tailored approach AVCF works particularly well with perishable goods. With non-perishable goods, it is much easier to side-sell. (ID 8)
Cultural factors	In Ecuador, you can see that those from the highlands are much better payers than those from the coast. These are cultural aspects, but you can't say that all people from the coast are bad payers. (ID 12)
Institutional environment	If you are a bank and you want to do business with farmers, you need to be creative. You look at farmers that maybe don't have perfect collateral, but are built into solid structures with off-takers. Sometimes banks are willing to go the extra mile and set up an AVCF scheme for those farmers. (ID 8)
A market focus	Planning for sources of market risk Many projects already have the product and have nowhere to sell, and that is worse because you have invested a lot in providing them with machinery, inputs, and training (ID 12).
Budget for side-selling	We provide for about 10 % of side selling. It has to be budgeted, you can't do without side selling. Side selling is always going to be there. (ID 7)
The middleman as a double-edge sword	It's very tempting to vilify the middle man but they are providing a service. Maybe they are speculative and try to squeak out the most profit that they can, but they play a very important role in the value chain, they are taking on a lot of the risk. (ID 1)
Screening new applicants	Transaction cost reduction for providers and customers As a bank, you look at the history and the data that the processor or the off-taker has on its farmers. So, you want first to have an understanding of the performance risk and the credit standing of those farmers. (ID 8)
Costs of spatial dispersion and monitoring	Customers tend to be in big geographies and the loan values are small and the reach from any rural branch would be an average of 30 Km. (ID 7)
Complexity of contracts	AVCF implementation is really costly, plus time-consuming (ID 10)
Uncertainty and timing	The tripartite agreement says that the off-taker is obliged to first pay or to set up debt obligation and the interest against the proceeds (ID 8).
Frequency and social interactions	If the bank trusts the company, and the company trusts the farmers, then you have a model. Then you don't necessarily need a trustworthy interface between the bank and the farmers because the company has its way to organize the farmers in an effective way (ID 11)
Building a financial platform for transaction records	Sustainability of AVCF schemes It is key to develop a platform approach to AVCF. Developing competition where you have multiple buyers and you have multiple financial institutions, all with access to quality data on smallholders' production and credit histories. (ID 1)
Bundled services for the value chain	A lot of these AVCF approaches maybe solve a short-term problem, but long term they are not necessarily getting the depth of financial inclusion needed. Long term, creating an ecosystem approach where you bring multiple players and you are competing on price and quality of service should be the goal. (ID 1)
From value chains to value webs	Most farmers do multiple crops, that's how they hedge themselves from prices, and climate. If you choose one value chain, you probably touch about 10 %-15 % of the farmers' output. (ID 7)

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix

Table A2
Summary of Coded Segments by parent codes and subthemes and types of experts.

Parent codes and subthemes	Experts				
	Agribusinesses	Financial Institutions	Development Organizations	Academia	SUM
Establishment of AVCF models					
Evolving chain requirements	2	1	1	12	16
Enabling elements	3	10	0	4	17
Following a setup structure	7	3	0	6	16
Social capital and VC Interactions					
Trust and local relationships	4	2	2	7	15
Transparency in the VC	4	0	8	1	13
Transaction record through trade capital	7	2	2	0	11
Culture and local context					
Product characteristics	2	1	1	0	4
Characteristics of VC actors	1	4	0	5	10
Enabling environments	1	7	1	1	10
Planning for sources of market risk					
A market focus	1	2	1	0	4
Budget for side-selling	3	1	3	0	7
Middlemen as a double-edged sword	3	2	15	0	20
Transaction costs and tailored financing					
Screening	0	1	0	0	1
Spatial dispersion and monitoring	4	0	1	0	5
Complexity	0	1	0	0	1
Uncertainty	0	3	0	0	3
Frequency	0	0	0	1	1
AVCF Ecosystem					
Sustainability	0	0	3	1	4
Risk mitigation	0	8	1	2	11
Integral Funding	1	2	1	1	5
VC tailored	3	2	2	1	8
Lower brackets	1	0	3	0	4
Sanctioning mechanisms	0	0	3	0	3
Value Web Approach	6	6	0	0	12
SUM	53	58	48	42	201

Table A3
Future research questions derived from the AVCF Ecosystem Approach.

Proposition	Future Research Avenues
<p>Proposition 1: To be long-lasting, AVCF schemes need to evolve towards an 'Ecosystem Approach', which integrates the institutional and financial needs of all the value chain actors.</p>	<p>Financial transactions, inclusion, and equity:</p> <ul style="list-style-type: none"> ● To what extent is data about farmer financial transactions available and to whom? ● Which types of value chains have the best financial documentation? ● From a policy perspective, how can financial data be better recorded and protected? ● What are the implications of improved financial data for financial inclusion and equity? ● To what extent are the financial interests of actors (especially small and marginalized farmers) considered in different value chains? ● How are financial services bundled with other services (extension, marketing) for farmers? What impact does this have on-farm performance and equity? ● If farmers operate in different value chains, how can the Ecosystem Approach to financing fulfill their financial needs?
<p>Proposition 2: AVCF schemes vary in their contextual settings, yet there are common characteristics about the motivations for their implementation, the enabling elements that trigger their potential, and the setup factors that contribute to their success and sustainability.</p>	<p>Customization</p> <ul style="list-style-type: none"> ● To what extent do agribusinesses customize financial products? ● How do schemes reduce transaction costs for different actors (farmers, banks, agribusinesses, intermediaries)? ● Are most financial institutions involved in the scheme agriculture-oriented? ● Is there a value-chain internal lead actor?
<p>Proposition 3: Despite the importance of increasing formal contracts within the AVCF framework, social capital is key for leveraging networks and ensuring credit in weak institutional environments.</p>	<p>Social capital and actor dynamics</p> <ul style="list-style-type: none"> ● Are all/the main actors from the chain involved in the scheme? ● Are the scheme's conditions clear to all the actors? ● Can social capital be used to improve the screening? ● Does the scheme involve local people? ● Are there alternatives to obtaining transaction histories using social capital?
<p>Proposition 4: AVCF schemes require a context-tailored approach, which accounts for product and value chain characteristics as well as cultural factors</p>	<p>Structure of value chains</p> <ul style="list-style-type: none"> ● How prone to side-selling is the value chain, based on the product? ● Are farmers business-oriented? ● Is the value chain loose or tight?

(continued on next page)

Table A3 (continued)

Proposition	Future Research Avenues
<p>Proposition 5: Promoting market stability through formal agreements, budgeting for side selling, and identifying the role played by middlemen are critical for risk planning</p>	<p>Marketing, standards, and risk planning</p> <ul style="list-style-type: none"> ● Does the scheme offer marketing linkages? ● Are quality standards clear? ● Is there a good link with the aggregator? How can this be measured? ● Does the involvement of the middleman lead to equity implications for small and marginalized farmers?
<p>Proposition 6: When compared with traditional banking and microfinance, AVCF schemes allow providers and customers to reduce transaction costs arising from screening, spatial dispersion, uncertainty, and frequency</p>	<p>Transaction costs</p> <ul style="list-style-type: none"> ● Under what conditions, does leveraging other VC actors improve screening? ● Do monitoring costs decrease when different VC actors track them? ● Does the scheme reduce the complexity of accessing financial services? ● Do the scheme conditions reduce the uncertainty for repayment? ● Does more frequency in transactions involve lower scope for opportunism?

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