

**A Framework for Analyzing Coordination in African Agricultural Value Chains:
Evidence from Cereal Markets in Mali**

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MOTIVATION

Context



Supply and demand drivers are restructuring agrifood systems around the world.

This creates potential market opportunities for African smallholder farmers, but these actors face unique constraints in coordinating themselves to emerging segments.

Objectives

Identify value chain governance structures that can coordinate African farmers with emerging market segments, and to examine the conditions under which each is appropriate.

- Develop a framework for understanding vertical and horizontal governance structures in agricultural value chains.
- Apply the framework to case studies of cereal value chains in Mali.

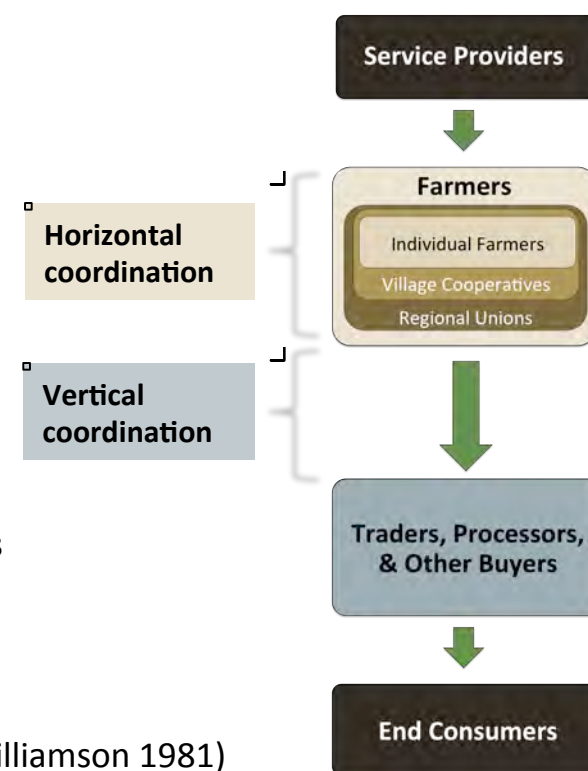
Literature

Economic coordination – alignment of incentives, quantity, quality, and other terms of exchange.

Transaction Cost Economics approach – matching transaction characteristics to cost-minimizing governance structures.

Contributions:

- Expansion of current vertical coordination frameworks** (Sartorius & Kirsten, 2007; 2005; Peterson, Wysocki & Harsh, 2001; Williamson, 1981)
- Develop farmer horizontal coordination framework** (Chaddad, 2012; Poulton & Lyne, 2009; Staatz, 1987; Williamson 1981)



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FRAMEWORK

Transaction Characteristics: Independent Variables

Four interacting factors determine the magnitude of transaction costs for farmers and buyers and, thus, predict governance structure choice (Williamson, 1981):

- Asset specificity:** extent to which an investment has limited alternative value outside the contractual relationship for which it has been made.
- Frequency:** transaction frequency between a given buyer and its suppliers.
- Uncertainty:** unanticipated changes in the circumstances and behavior surrounding a transaction.
- Externalities:** when one party's actions impose costs or benefits on the other party.



Governance Structures: Dependent Variables

As transaction characteristics vary, a continuum of horizontal and vertical governance structures emerge to cost-effectively coordinate exchange among farmers and between farmers and buyers, respectively. Structures vary in coordination competencies and internal governance costs. Thus, different structures will dominate in various transaction cost situations.

Horizontal Coordination Choice: The Farmers' Perspective

	Individual Farmers	Bargaining Association	Marketing Cooperative	New Generation Cooperative	Investor-Owned Farm
Intensity & Mechanisms of Control	Price	Minimal Equity	Medium Equity	High Equity	Hierarchy
Asset Specificity	Very Low (1)	Low (2)	Intermediate (3)	High (4)	Very High (5)
Frequency	Very Low (1)	Low (2)	Intermediate (3)	High (4)	Very High (5)
Uncertainty	Very Low (1)	Low (2)	Intermediate (3)	High (4)	Very High (5)
Externalities	Very Low (1)	Low (2)	Intermediate (3)	High (4)	Very High (5)

Vertical Coordination Choice: The Buyers' Perspective

	Spot Markets	Specification Contracting	Alliances	Vertical Integration
Intensity & Mechanisms of Control	Price	Planning & Specification	Relationship	Equity
Asset Specificity	Very Low (1)	Low (2)	Intermediate (3)	High (4)
Frequency	Very Low (1)	Low (2)	Intermediate (3)	High (4)
Uncertainty	Very Low (1)	Low (2)	Intermediate (3)	High (4)
Externalities	Very Low (1)	Low (2)	Intermediate (3)	High (4)

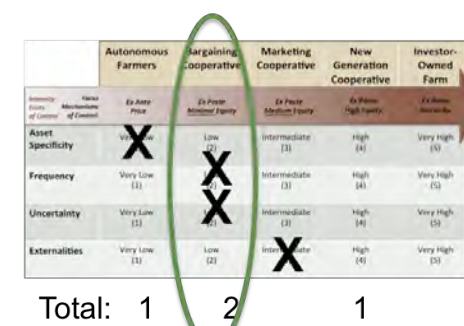
Hypotheses (H): In an agricultural commodity transaction, as the vector of asset specificity, uncertainty, transaction frequency, and externality problems increase for a (1) buyer and (2) farmer-suppliers, they will seek to increase control over transactions through the use of different (1) vertical and (2) horizontal coordination governance structures, respectively.

Testing the Framework

A case study approach is used to test the hypotheses because there are limited observations and quantitative data, contextual variables cannot be easily controlled, and because the objective is to develop theory (Sterns, et. al. 1998).

The framework is applied to a transaction case by classifying and scoring the transaction characteristics (on a five-point scale), then matching each score to the corresponding structure in the framework (example on right).

The governance structure with the highest score is predicted to dominate for that situation (Sartorius and Kirsten, 2005).



CEREAL MARKETS IN MALI

Case Study Data

Fifteen cases of Malian cereal farmers transacting with wholesalers, industrial and semi-industrial processors, and institutional buyers.



In-depth interviews with farmers, buyers, and input/service providers were conducted in 2014 and 2015, and were supplemented by document collection (e.g. contracts).

Transaction Characteristics Analysis: Scores & Illustrative Issues

Asset Specificity

Rice Farmers	3
Maize Farmers	2
Millet/Sorghum Farmers	3
Wholesalers	2
SME Rice Processors	3
SME Maize Processors	3
SME Millet/Sorghum Processors	4
Industrial Rice Processors	3
Industrial Maize Processors	3
Institutional Buyers	2



Farm assets have low specificity (left and center), while processors (right) have difficulties meeting supply needs through spot markets.

Frequency

Farmers Supplying SME Maize & Millet/Sorghum Processors	2
Farmers Supplying SME Rice Processors, Wholesalers	3
Farmers Supplying Indus. & Institution. Buyers	4
Wholesalers	3
SME Rice Processors	3
SME Maize Processors	2
SME Millet/Sorghum Processors	2
Industrial Rice Processors	4
Industrial Maize Processors	4
Institutional Buyers	4



Crucial factor is asymmetric scale between the low marketed volumes of dispersed farmers (left and center), and the larger optimal scale of buyers (right).

Uncertainty

Rice Farmers	3
Maize Farmers	3
Millet/Sorghum Farmers	3
Wholesalers	3
SME Rice Processors	4
SME Maize Processors	3
SME Millet/Sorghum Processors	3
Industrial Rice Processors	2
Industrial Maize Processors	2
Institutional Buyers	2



Supply uncertainty is caused by erratic rainfall (left), unreliable access to credit to buy improved inputs (center), and technical break-downs (right).

Externalities

Rice Farmers	2
Maize Farmers	1
Millet/Sorghum Farmers	2
Maize Wholesalers	2
SME Rice Processors	3
SME Maize Processors	2
SME Millet/Sorghum Processors	3
Industrial Rice Processors	3
Industrial Maize Processors	2
Institutional Buyers	3



Negative externalities include farm-level quality debasement, such as when trucks are used to thresh grains (left), weight reductions along the value chain (center), and poor maintenance of rice irrigation structures by 3rd parties (right).

RESULTS & IMPLICATIONS

Actual & Predicted Governance Structures

	ACTUAL Horizontal Structure	PREDICTED Horizontal Structure	Case*	ACTUAL Vertical Structure	PREDICTED Vertical Structure
INDIVIDUAL FARMERS		Bargaining	M1	RESOURCE	Resource
Village BARGAINING ASSOCIATIONS		Bargaining	M2	MARKETING	Marketing
Village MARKETING COOPERATIVES		Marketing	R1	RESOURCE & RELATIONSHIP	Relationship
Regional MARKETING COOPERATIVES		Marketing	R2	MARKETING & RESOURCE	Resource
Service Provider MARKETING COOPERATIVES		Marketing	M3	MARKETING	Resource
		Marketing	MS1	MARKETING	Resource
		Marketing	MS2	MARKETING	Resource
		Marketing	MS3	SPOT & MARKETING	Resource
		Marketing	R3	SPOT & MARKETING	Resource
		Marketing	MS4	MARKETING	Resource
		Marketing	M4	SPOT & MARKETING	Marketing
		Marketing	M5	SPOT & MARKETING	Marketing
		Marketing	M6	SPOT & MARKETING	Marketing
		Marketing	R4	MARKETING	Resource
		Marketing	R5	MARKETING	Resource

*Key: R = Rice; M= Maize; MS= Millet/Sorghum

Actual governance structures used in cases:

- Marketing Cooperative** is the dominant horizontal structure, with some variation in size and and core activities.
- Marketing Contract** is the dominant vertical structure, with some variation in timing, form, pricing, and specifications.

Framework performance:

- In its prediction of **horizontal structures**, framework is **correct in 11/15 cases**, **partially correct in 1/15 cases**, and **incorrect in 3/15 cases**. Thus, the data generally supports H1.
- In its prediction of **vertical structures**, the framework is **correct in 2/15 cases**, **partly correct in 5/15 cases**, and **incorrect in 8/15 cases**.

Results show that horizontal and vertical structures may be substitutes in addressing transaction cost problems shared by farmers and buyers, suggesting that farmers' and buyers' structures choices may be inter-dependent.

Implications

Policy should reduce transaction costs in cereal markets through more stable policies, improved access to credit and insurance, a stronger contract enforcement regime, and better market information systems.

Farmers should analyze transaction costs relevant to reaching a market and confirm that prices can cover governance costs of creating and maintaining farmer organizations.

Buyers should consider existing horizontal structures— and associated costs that farmers bear— when selecting suppliers and negotiating the vertical structure/purchase terms.

Future research :

- Incorporate counterpart structure choice as a fifth explanatory variable in framework, plus consideration of time/evolution of structures, and social incentives.
- Test the framework on other value chains and countries.