

Financial and Institutional Pathways for Climate-Smart Irrigation:

Smallholder perceptions and collective action in Timau, Kenya

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1. Background and rationale

Climate-smart irrigation technologies (CSITs) can strengthen productivity, climate resilience and water-use efficiency, but their high upfront costs remain a major barrier for smallholders. Conventional agricultural credit is often constrained by collateral requirements, transaction costs and production risks. Collective financial arrangements may offer an alternative by allowing farmers to pool resources and share guarantees or liabilities, but their feasibility depends on trust, reciprocity and confidence that other members will fulfil their obligations. Moreover, financing needs differ substantially across irrigation technologies.

Aim: to understand both farmers' willingness to participate in collective finance and which institutions they consider suitable for different CSIT investments, for identifying locally viable financing pathways.

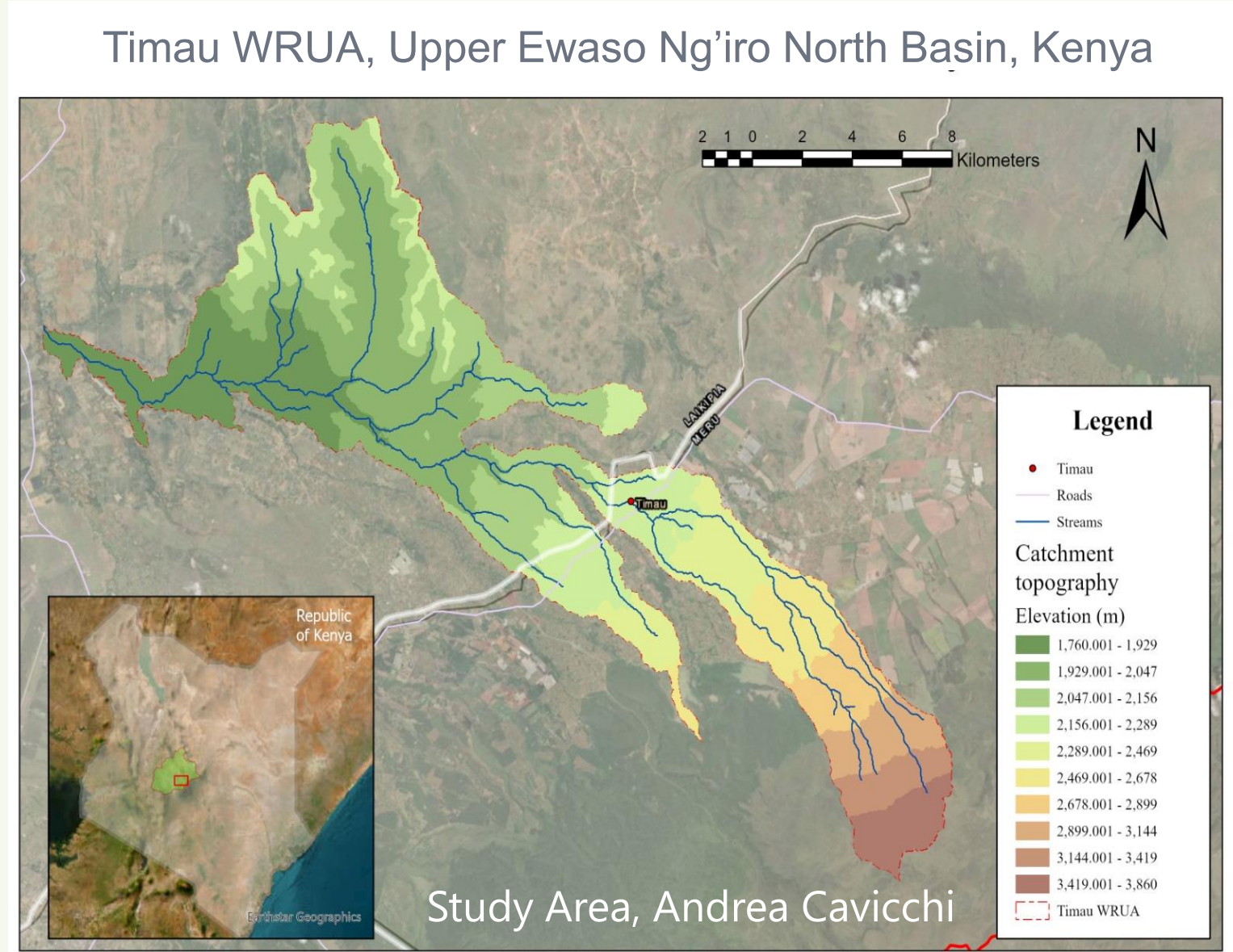
2. Research Questions

RQ1: Which financial providers are perceived as suitable for different CSITs?

RQ2: Are farmers willing to join shared-guarantee arrangements, and what shapes willingness?

RQ3: Which barriers may hinder implementation of collective financing and shared guarantees?

3. Study area & sample



154

surveyed households

34

CWPs covered

3

watershed zones

5

CSITs assessed

Disproportionate stratified sampling: 91 upstream · 33 midstream · 30 downstream.

4. Analytical approach

Provider suitability

(6 financial providers)

Friedman tests · Kendall's W · Wilcoxon post-hoc

Willingness to participate

Socio-economic and spatial controls, organisational credit experience, trust and perceived investment risk

Parsimonious cumulative-logit ordinal regression + sensitivity analyses

Perceived barriers

(socio-institutional, production, technical and environmental risks)

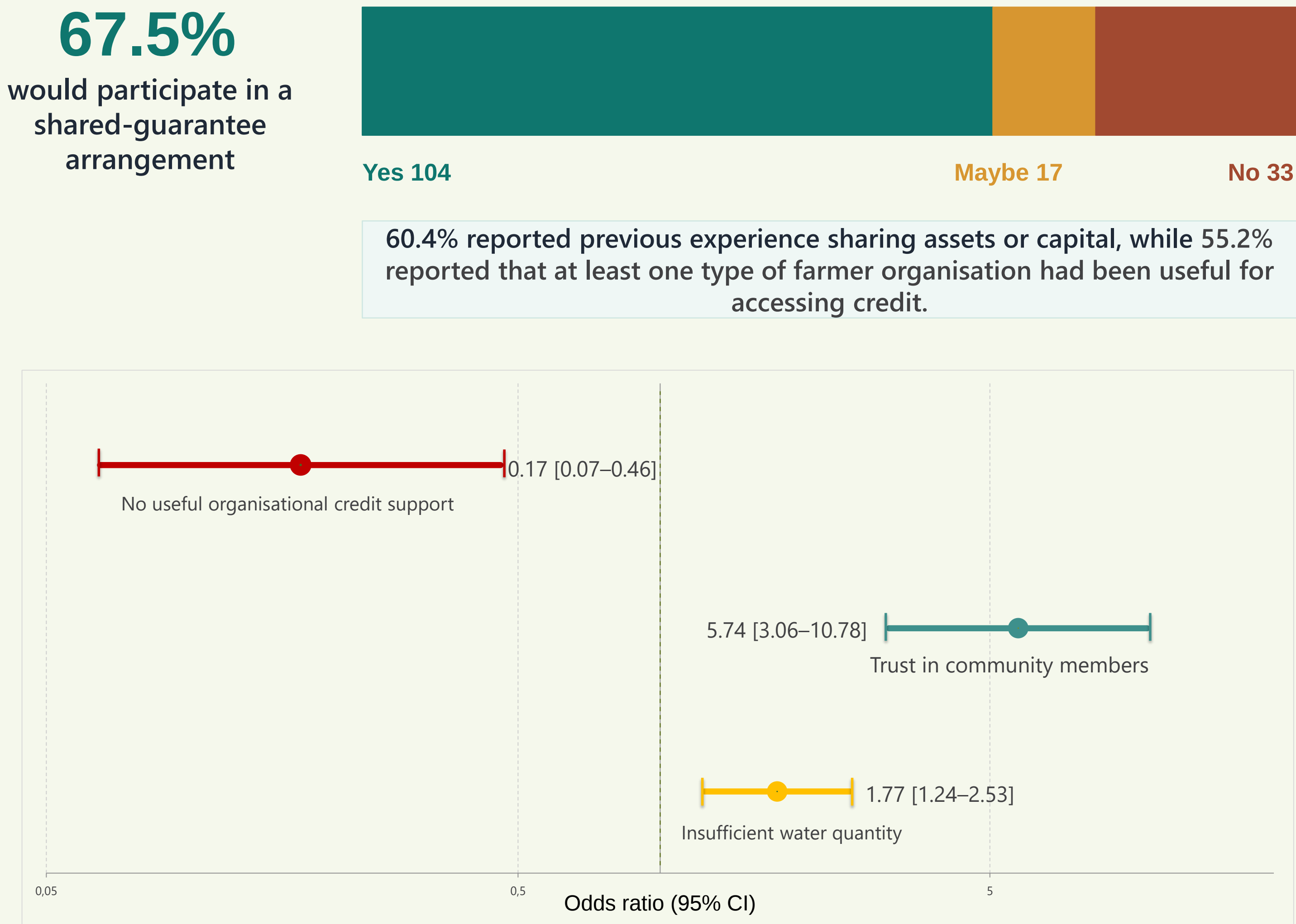
Multiple-response ranking + exploratory factor analysis

5. Results I – Perceived providers' suitability for each CSIT investment

	FG/ VSLA	SACCO	Bank	MFI	Service provider	Govt. support
RWH storage	3.27	3.64*	2.51	3.29	2.67	1.85
RWH collection infrastructure	3.38	3.59*	2.24	3.05	2.39	1.71
Sprinklers	3.85*	3.06	1.61	2.50	2.27	1.38
Drip Lines	2.14	3.09	2.62	3.47*	2.96	1.53
Solar pumps	1.84	2.83	2.68	3.46*	2.94	1.47

Perceived suitability of providers for financing climate-smart irrigation technologies (mean rating; 1 = not suitable, 5 = very suitable). * Highest mean suitability rating for each technology.

6. Results II – Factors affecting willingness to join shared guarantees



Primary ordinal model: adjusted associations with higher willingness to participate.

8. Preliminary conclusions

Collective finance appears socially plausible: 67.5% expressed willingness to participate, with higher trust and useful organisational credit experience associated with greater willingness. **Financing preferences are technology-specific:** SACCOs, farmer groups/VSLAs and MFIs occupy different perceived niches across CSITs. **Governance remains critical:** repayment risk, poor leadership and misuse of funds highlight the need for monitoring, accountability and credible risk-sharing arrangements.

Overall: viable CSIT finance requires matching institutions to technologies while building collective arrangements around trust and credible governance.

9. Reference

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