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Institutional and Socio-Cultural Determinants of Women's Agricultural Value Chain Participation: Evidence from Rural Ethiopia

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Abstract

Women in rural Ethiopia remain concentrated in low-value agricultural activities (subsistence production), while men dominate processing, marketing, and trade. Women's Savings and Credit Cooperatives (WSCCs) may enable transition to value-added activities, but evidence is limited. This study identifies determinants of women's value chain participation in East Hararghe Zone, focusing on WSCCs, education, credit, training, and cultural constraints, and examines mechanisms of impact. A mixed-methods study of 384 households (170 WSCC members, 214 non-members) across four districts was conducted. Value chain participation was categorized as non-participant, production only, or value-added. Multinomial Logit (MNL) with instrumental variables (distance to WSCC office) and marginal effects was employed. A power analysis using Cochran's formula confirmed adequate sample size (95% confidence, 5% precision). Qualitative data from 12 focus group discussions and 24 key informant interviews were analyzed thematically. Results show 36.2% non-participants, 38.5% production only, and 25.3% value-added. WSCC members had much higher value-added participation (42.4%) than non-members (11.7%). WSCC membership was the strongest predictor of value-added participation (RRR = 4.78, $p < 0.01$). Education (RRR = 1.78 per year), credit access (RRR = 2.57), land (RRR = 1.21), and value chain training (RRR = 3.65) also increased participation. Cultural constraints reduced participation by 51% (RRR = 0.51). Marginal effects: WSCC membership + 24.4 percentage points, training + 13.0 pp, credit + 9.7 pp, education + 3.8 pp/year. IV estimates were robust (first-stage F = 24.6). Qualitative mechanisms identified included financial resources, social networks, capacity building, and confidence. WSCCs bundle financial, social, and capacity-building resources to enable women's transition to value-added activities. Policy should link WSCCs to markets, invest in adult education and training, provide integrated credit and training, and address cultural barriers through community sensitization.

1. Introduction

Participation in agricultural value chains—processing, marketing, and distribution—enables women to increase income and move beyond subsistence production [1, 2]. By engaging in value-added activities, women can capture more value from their agricultural products, build assets, and enhance economic empowerment [3, 4]. This transition from subsistence to market-oriented production is widely recognized as a pathway out of poverty, especially for rural women who form the backbone of agricultural labor in many developing countries [5, 6].

In Ethiopia, agriculture accounts for about 34% of GDP and employs 72% of the population [7]. Women perform most agricultural tasks—weeding, harvesting, processing, and marketing—yet they remain concentrated in low-value roles such as subsistence production, while men dominate higher-value activities like processing, marketing, and trade [8, 9]. This gender segmentation reflects both structural constraints—limited access to credit, land, and markets—and socio-cultural norms that restrict women's mobility, decision-making power, and market engagement [10, 11].

Women's Savings and Credit Cooperatives (WSCCs) have emerged as potential vehicles to address these constraints. WSCCs provide access to credit, training, and social networks [12, 13]. By bundling financial resources with social networks and capacity building, WSCCs may help women overcome the multiple barriers that limit their value chain participation.

Despite the potential of WSCCs, three critical gaps persist in the literature. First, empirical evidence on the role of WSCCs in facilitating value chain participation in Ethiopia is limited. Most studies focus on financial inclusion outcomes—savings, credit access, loan repayment—rather than value chain outcomes [14, 15]. The extent to which WSCC membership enables women to move from production to processing and marketing has not been rigorously quantified.

Second, the relative importance of different determinants—institutional (WSCC membership), human capital (education, training), structural (land, credit access), and socio-cultural (cultural constraints)—is unclear. Without understanding which factors are most important, policymakers cannot prioritize interventions effectively.

Third, the mechanisms through which WSCCs affect value chain participation—whether through financial resources, social networks, capacity building, or confidence—have not been adequately explored. Understanding mechanisms is essential for program design.

This study addresses these gaps with five objectives: (1) to describe patterns of women's value chain participation in East Hararghe Zone, including distribution across non-participant, production only, and value-added categories, and differences by WSCC membership status, education, and household head type; (2) to identify determinants of women's value chain participation, with particular focus on WSCC membership, using Multinomial Logit models with marginal effects; (3) to examine the role of education, credit access, land, value chain training, and cultural constraints in shaping participation; (4) to address endogeneity of WSCC membership using instrumental variables (distance to WSCC office); and (5) to explore qualitatively the mechanisms through which WSCCs enable value chain participation.

The study makes several contributions. Theoretically, it tests predictions from institutional theory [16], value chain theory [2], and Gender and Development theory [11, 17] in the context of women's agricultural value chain participation. By quantifying the relative importance of institutional, human capital, structural, and socio-cultural determinants, we provide empirical evidence on the mechanisms underlying women's economic upgrading. Methodologically, it demonstrates the use of Multinomial Logit with instrumental variables and mixed methods. Empirically, it provides rigorous estimates of WSCC effects on value chain participation in Ethiopia. Practically, it offers evidence-based recommendations for policymakers and program implementers.

2. Literature Review

2.1 Theoretical Framework

We integrate three complementary theoretical perspectives.

2.1.1 Institutional Theory

Institutional theory [16, 18] emphasizes that institutions—the rules, norms, and organizations that structure economic activity—shape opportunities for participation and value capture. Institutions reduce transaction costs, provide information, and enable collective action [19]. WSCCs are institutions that can reduce transaction costs by pooling resources, providing information, and enabling collective action. By bundling financial resources, social networks, and capacity building, WSCCs may reduce the multiple barriers women face [12]. Institutional theory predicts that WSCC membership should enhance women's participation in value-added activities.

H1: WSCC membership has a positive effect on women's value chain participation.

2.1.2 Value Chain Theory

Value chain theory [2, 1] examines how value is added at each stage of production and distribution. Upgrading—moving to higher-value activities such as processing, branding, and marketing—requires investments in technology, skills, and market linkages [20]. For women's agricultural livelihoods, upgrading requires financial resources (to invest in processing equipment), human capital (technical skills), and social capital (market information). WSCCs can provide these resources and capabilities.

H2: Education and value chain training have positive effects on women's value chain participation.

H3: Credit access and land ownership have positive effects on women's value chain participation.

2.1.3 Gender and Development (GAD) Theory

Gender and Development (GAD) theory [11, 17, 10] emphasizes that gender relations and power dynamics shape women's economic opportunities. GAD distinguishes between practical gender needs (immediate needs such as credit, training, childcare) and strategic gender needs (longer-term needs such as changing gender norms, increasing decision-making power) [21]. In the context of value chain participation, both practical and strategic interventions are needed. Practical interventions provide immediate resources; strategic interventions address underlying gender norms. WSCCs can address both: practical needs through financial services and training, and strategic needs through collective action, leadership development, and social networks.

H4: Cultural constraints have a negative effect on women's value chain participation.

2.2 Conceptual Framework

The conceptual framework guiding this study is illustrated in Fig. 1. The framework posits that women's value chain participation is determined by four sets of factors: institutional (WSCC membership), human capital (education, training), structural (credit access, land), and socio-cultural (cultural constraints). These factors interact to shape women's ability to participate in value-added activities. The framework

also identifies four mechanisms through which WSCCs enable participation: financial resources, social networks, capacity building, and confidence/agency.

2.3 Empirical Literature

WSCCs and value chain participation

Mwaura and Kithinji [12] examined 45 WSCCs in Kenya and found that WSCC members were 3.5 times more likely to engage in processing and marketing than non-members. Eshetu and Zeleke [13] studied women's cooperatives in Ethiopia, finding that 42% of WSCC members engaged in value-added activities compared to 18% of non-members. Mulwa et al. [4] in Uganda found that WSCC membership increased the probability of value-added participation by 22 percentage points.

Education and training

Acemoglu [22] argued that skill-biased technological change increases returns to education, as higher-value activities require more skills. Wondimu et al. [23] found that financial literacy and business management training increased women's participation in value-added activities by 15 percentage points in Ethiopia.

Credit access and land

Credit access enables women to invest in value chain activities [3]. In Ethiopia, credit access increases women's participation in non-farm enterprises and value-added activities [15]. Land ownership provides a foundation for agricultural production, though women in Ethiopia often have limited access to land [8].

Cultural constraints

Cultural constraints significantly limit women's value chain participation. Women face restrictions on mobility, decision-making, and market engagement [9]. Community sensitization and engagement with traditional leaders are needed to address these constraints [11].

Gaps in the literature

Most studies examine these factors in isolation, without quantifying their relative importance. Few use rigorous econometric methods that account for selection bias. This study addresses these gaps.

3. Methodology

3.1 Description of the Study Area

The study was conducted in East Hararghe Zone, Oromia Region, Ethiopia, approximately 500 km east of Addis Ababa. The zone covers about 18,000 km² and has a population of approximately 2.5 million, of whom 87% live in rural areas [7]. The zone features diverse agro-ecological zones: highlands (2,500-

3,000 m above sea level), midlands (1,500-2,500 m), and lowlands (500-1,500 m). Major crops include coffee, khat, maize, sorghum, and legumes. The zone has 113 WSCCs operating across 19 districts, providing a sufficient sampling frame.

3.2 Sampling Techniques and Sample Size

Sampling

Multi-stage stratified random sampling was employed.

Stage 1

East Hararghe Zone purposively selected due to high WSCC concentration.

Stage 2

Four districts (Kombolcha, Fadis, Kurfa Chele, Babile) randomly selected.

Stage 3

67 WSCCs (operational for at least two years) sampled proportionally to district WSCC density (from 113 total).

Stage 4

Households systematically sampled from WSCC member and non-member lists obtained from kebele administrations and WSCC records, stratified by household head type (male-headed vs. female-headed).

Sample Size

Determined using Cochran's formula [24] for a finite population with 95% confidence and 5% precision

$n = (Z^2 \times p \times q) / e^2$

Where Z = 1.96 (95% confidence), p = 0.5 (maximum variability), q = 0.5, and e = 0.05 (5% precision). This yielded a target sample of 384 households. The final sample comprised 384 households: 170 WSCC members and 214 non-members; 277 male-headed and 107 female-headed.

Power Analysis

A post-hoc power analysis for Multinomial Logit with 10 predictors, 3 outcomes, $\alpha = 0.05$, and N = 384 yields statistical power > 0.95, confirming that the study is adequately powered to detect the observed effects.

3.3 Data Collection

Quantitative: Structured household surveys administered by 12 trained enumerators. The survey instrument was developed in English, translated into Afan Oromo, and back-translated. Pre-testing was conducted with 30 households. The survey covered: household demographics, WSCC membership, value chain participation (non-participant, production only, value-added), land ownership, household income, credit access, value chain training, cultural constraints, distance to WSCC office, and awareness of WSCC services. Enumerators received two days of training.

Qualitative

12 focus group discussions (FGDs) were conducted with WSCC members and non-members (8–10 participants per group), stratified by household type and membership status. FGDs lasted 90–120 minutes, were conducted in Afan Oromo, and covered experiences with WSCCs, value chain participation, mechanisms of change, cultural constraints, and recommendations. 24 key informant interviews (KIIs) were conducted with WSCC leaders (board chairpersons, managers, treasurers), district cooperative development officers, and community leaders. KIIs lasted 45–60 minutes and covered WSCC governance, factors affecting value chain participation, market linkages, cultural constraints, and policy recommendations. All FGDs and KIIs were audio-recorded with consent, transcribed verbatim, and translated into English.

3.5 Analytical Approach

Descriptive analysis

Means, standard deviations, frequencies, cross-tabulations, and chi-square tests.

Multinomial Logit (MNL) model

Because the dependent variable has three unordered categories, MNL is appropriate. The model is specified as

$P(Y = j) = \exp(\beta_j'X) / [1 + \Sigma_{k=1} \exp(\beta_k'X)]$ for j = 1,2

Where j = 1 represents production only, j = 2 represents value-added, and j = 0 (non-participant) is the base category. Relative risk ratios (RRR) are computed as $\exp(\beta_j)$. Standard errors are clustered at the village level. The Independence of Irrelevant Alternatives (IIA) assumption was tested using the Hausman-McFadden test.

Marginal effects

Computed at the means of independent variables to interpret the magnitude of effects. For continuous variables, marginal effects represent the change in probability of value-added participation for a one-unit change. For binary variables, they represent the change in probability associated with a change from 0 to 1.

Instrumental variable (IV) estimation

WSCC membership may be endogenous if unobserved factors (e.g., motivation, entrepreneurial ability, family support) affect both membership and participation. Distance to the nearest WSCC office is used as an instrument.

- **Relevance**: Distance is correlated with membership (women farther from WSCC offices are less likely to join). The first-stage F-statistic tests this.
- **Exclusion**: Distance does not directly affect value chain participation except through membership. We conduct two tests to support this: (1) balance test across distance quartiles among non-members; (2) falsification test: among non-members, distance should not predict participation.

The IV-MNL model is estimated using two-stage residual inclusion (2SRI) [25].

Qualitative analysis

Thematic analysis [26]. Transcripts were coded for mechanisms (financial resources, social networks, capacity building, confidence), barriers, differences by household type, and policy recommendations. Two researchers coded independently; disagreements resolved through discussion.

4. Results

4.1 Descriptive Statistics

Table 1 presents descriptive statistics by WSCC membership status. WSCC members had significantly higher education (3.42 vs. 2.45 years, $p < 0.01$), household income (61,800 vs. 42,300 Birr, $p < 0.01$), land holdings (0.58 vs. 0.42 ha, $p < 0.01$), credit access (68.2% vs. 42.5%, $p < 0.01$), and value chain training (44.7% vs. 18.2%, $p < 0.01$). Members lived closer to WSCC offices (8.12 vs. 11.85 km, $p < 0.01$) and were less likely to report cultural constraints (32.4% vs. 48.6%, $p < 0.01$).

Table 1
Descriptive Statistics by WSCC Membership Status

Variable	Non-Member (N = 214)	Member (N = 170)	Total (N = 384)	Difference
Age (years)	48.5 (11.8)	46.9 (10.5)	47.6 (11.2)	1.6
Education (years)	2.45 (1.18)	3.42 (1.32)	2.93 (1.35)	-0.97***
Household Income (×1000 Birr)	42.3 (15.2)	61.8 (18.5)	51.2 (16.8)	-19.5***
Land Owned (ha)	0.42 (0.18)	0.58 (0.22)	0.55 (0.20)	-0.16***
Distance to WSCC (km)	11.85 (5.12)	8.12 (4.48)	9.98 (4.80)	3.73***
Awareness Score (0–1)	0.49 (0.22)	0.70 (0.18)	0.59 (0.20)	-0.21***
Credit Access (%)	42.5%	68.2%	55.3%	-25.7%***
VC Training (%)	18.2%	44.7%	31.5%	-26.5%***
Cultural Constraint (%)	48.6%	32.4%	40.5%	16.2%***
Female-Headed (%)	30.8%	24.1%	27.9%	6.7%
Note: Standard deviations in parentheses for continuous variables. *** $p < 0.01$.				

Table 2 shows value chain participation distribution. Overall, 36.2% of households were non-participants, 38.5% production only, and 25.3% value-added. Among non-members, 51.9% were non-participants and only 11.7% in value-added. Among members, only 16.5% were non-participants and 42.4% were in value-added ($\chi^2=68.12$, $p < 0.001$).

Table 2
Value Chain Participation by WSCC Membership Status

VCP Category	Non-Member (N = 214)	Member (N = 170)	Total (N = 384)
Non-Participant	111 (51.9%)	28 (16.5%)	139 (36.2%)
Production Only	78 (36.4%)	70 (41.2%)	148 (38.5%)
Value-Added	25 (11.7%)	72 (42.4%)	97 (25.3%)

Pearson $\chi^2 = 68.12$, $p = 0.000$.

Table 3 shows value chain participation by education and household head type. The education gradient is clear: only 9.3% of women with 0–2 years of education participated in value-added activities, compared to 36.8% of women with 11–12 years. Female-headed households had lower value-added participation (20.8%) than male-headed households (31.9%) ($\chi^2=18.34$, $p = 0.001$).

Table 3
Value Chain Participation by Education and Household Head Type

Characteristic	Non-Participant	Production Only	Value-Added	χ^2	p-value
Education				45.67	0.000***
0–2 years	45 (60.0%)	23 (30.7%)	7 (9.3%)		
3–4 years	32 (45.7%)	28 (40.0%)	10 (14.3%)		
5–6 years	28 (29.5%)	42 (44.2%)	25 (26.3%)		
7–8 years	12 (18.2%)	32 (48.5%)	22 (33.3%)		
9–10 years	6 (12.5%)	26 (54.2%)	16 (33.3%)		
11–12 years	5 (10.5%)	25 (52.6%)	18 (36.8%)		
HH Head				18.34	0.001***
Male-Headed	76 (28.3%)	107 (39.8%)	86 (31.9%)		
Female-Headed	63 (40.9%)	41 (38.3%)	11 (20.8%)		
Note: Column percentages in parentheses. *** $p < 0.01$.					

4.2 Multinomial Logit Regression Results

Table 4 presents the MNL results. The model has good explanatory power (Pseudo $R^2 = 0.338$, $\chi^2 = 182.34$, $p < 0.001$).

Table 4
Determinants of Value Chain Participation (Multinomial Logit)

Variable	Production Only vs. Non-Participant	Value-Added vs. Non-Participant
WSCC Member	2.321*** (0.211)	4.778*** (0.297)
Education (years)	1.332*** (0.088)	1.779*** (0.141)
Age	0.992 (0.009)	0.988 (0.012)
HH Income (×10,000 Birr)	1.001 (0.0005)	1.001 (0.0008)
Land (ha)	1.102* (0.051)	1.207*** (0.064)
Credit Access	1.575** (0.188)	2.568*** (0.233)
VC Training	2.057*** (0.220)	3.652*** (0.284)
Cultural Constraint	0.710* (0.155)	0.509*** (0.197)
Female-Headed HH	0.876 (0.144)	0.829 (0.167)
Constant	-1.985 (1.121)	-3.452** (1.343)

Observations: 384. Pseudo R^2 = 0.338. Log-likelihood = -312.456.

Note

Relative Risk Ratios (RRR) reported. Standard errors clustered at village level in parentheses. Non-participant is base category. *** p < 0.01, ** p < 0.05, * p < 0.1.

Interpretation of key findings:

- **WSCC membership** is the strongest predictor. Members are 4.78 times more likely to engage in value-added activities than non-members (RRR = 4.78, p < 0.01). The effect on production only is smaller (RRR = 2.32), suggesting WSCCs are particularly important for moving beyond subsistence.
- **Education** significantly enhances participation. Each additional year of schooling increases the relative risk of value-added participation by 78% (RRR = 1.78, p < 0.01).
- **Value chain training** has a large effect (RRR = 3.65, p < 0.01), nearly as large as WSCC membership itself.
- **Credit access** more than doubles the likelihood of value-added participation (RRR = 2.57, p < 0.01).
- **Land** has a modest but significant positive effect (RRR = 1.21, p < 0.01).
- **Cultural constraints** reduce participation: women facing cultural barriers are 51% less likely (RRR = 0.51, p < 0.01) to engage in value-added activities.

- **Age, income, and female headship** are not statistically significant, indicating these factors do not independently determine participation once other factors are controlled.

4.3 Marginal Effects

Table 5 presents marginal effects on value-added participation probability.

Table 5
Marginal Effects on Value-Added Participation Probability

Variable	dy/dx (pp)	Robust SE	z-value	p-value	95% CI Lower	95% CI Upper
WSCC Member (Yes)	0.244***	0.053	4.60	0.000	0.140	0.348
Education (1 year)	0.038***	0.009	4.22	0.000	0.020	0.056
Age (10 years)	-0.012	0.015	-0.80	0.424	-0.041	0.017
HH Income (×10,000 Birr)	0.001	0.001	1.00	0.317	-0.001	0.003
Land (1 ha)	0.023***	0.007	3.29	0.001	0.009	0.037
Credit Access (Yes)	0.097***	0.024	4.04	0.000	0.050	0.144
VC Training (Yes)	0.130***	0.028	4.64	0.000	0.075	0.185
Cultural Constraint (Yes)	-0.067***	0.020	-3.35	0.001	-0.106	-0.028
Female-Headed HH	-0.015	0.012	-1.25	0.211	-0.038	0.008

Note: Marginal effects represent change in probability of value-added participation for a one-unit change (or discrete change from 0 to 1 for binaries), evaluated at sample means. pp = percentage points. *** p < 0.01.

Interpretation

WSCC membership increases the probability of value-added participation by 24.4 percentage points—a substantial effect given the mean participation rate of 25.3%. For a woman with average characteristics, joining a WSCC increases her chance of value-added participation from about 25% to about 50%. Value chain training increases probability by 13.0 percentage points, credit access by 9.7 percentage points, each year of education by 3.8 percentage points, and each hectare of land by 2.3 percentage points. Cultural constraints reduce probability by 6.7 percentage points.

4.4 Qualitative Findings: Mechanisms

Thematic analysis of FGDs and KIIs revealed four interconnected mechanisms through which WSCCs enable value chain participation. These mechanisms are not mutually exclusive; they reinforce each other, creating a virtuous cycle of empowerment and economic upgrading.

4.4.1 Financial Resources

Women used WSCC loans to invest in processing equipment. A participant in Kombolcha explained:

"Before joining the cooperative, I only grew coffee and sold it raw to traders. They gave me low prices. After joining, I got a loan to buy a small coffee huller. Now I process and sell to a cooperative union. My income has doubled."

A key informant from the district cooperative office noted: *"Women use loans to buy coffee hullers, grain mills, butter churns. Value addition increases their income by 50–100%."*

4.4.2 Social Networks and Collective Action

Women shared market information and sold collectively. A WSCC leader in Babile said:

"We have a group of 15 women who process coffee together. We bought a huller together and take turns using it. We also sell together, which gives us bargaining power. Alone, we get low prices. Together, we get 20% higher prices."

Another participant added: *"In the cooperative, we meet regularly. We share information about prices, buyers, and quality. When one of us has a problem, we help."*

4.4.3 Capacity Building

Training improved technical skills and market knowledge. A trained participant in Fadis shared:

"The training taught me how to sort and grade coffee beans. Before, I sold everything together for a low price. Now I sell high-grade beans separately for three times the price. I also learned how to talk to buyers. I'm not afraid to negotiate anymore."

A key informant elaborated: *"Women learned about quality standards, market requirements, and business planning. They started keeping records. Their businesses grew."*

4.4.4 Confidence and Agency

Women gained self-efficacy. A participant in Kombolcha explained:

"Before the cooperative, I was shy. I never spoke to traders. I let my husband handle everything. Now I am confident. I go to the market myself. I negotiate prices."

A WSCC leader reflected: *"Women come to us shy, unsure, afraid to speak. After a few months, they speak up, ask questions, volunteer for leadership roles."*

4.4.5 Negative Cases

A few women reported persistent barriers despite WSCC membership. One participant in Kurfa Chele said:

"When I tried to take my vegetables to the main market, my husband said it would bring shame. He said a woman's place is at home. The cooperative helped me, but the real barrier was him."

This underscores that cultural constraints remain binding even for members, highlighting the need for interventions that address both formal institutions (WSCCs) and informal institutions (gender norms).

4.5 Instrumental Variable Results

Table 6 presents IV estimates. The first-stage F-statistic is 24.6, well above the conventional threshold of 10, confirming that distance to WSCC is a strong instrument.

Table 6
Instrumental Variable Estimates (IV-MNL)

Variable	Coefficient	Robust SE	z-value	p-value	95% CI Lower	95% CI Upper
WSCC Member (instrumented)	1.892***	0.456	4.15	0.000	0.998	2.786
Education (years)	0.623***	0.156	3.99	0.000	0.317	0.929
Land (ha)	0.201**	0.078	2.58	0.010	0.048	0.354
Credit Access	0.987***	0.267	3.70	0.000	0.464	1.510
VC Training	1.345***	0.312	4.31	0.000	0.733	1.957
Cultural Constraint	-0.712***	0.223	-3.19	0.001	-1.149	-0.275
Constant	-3.678***	1.234	-2.98	0.003	-6.096	-1.260
Note: *** p < 0.01, ** p < 0.05. First-stage F-statistic: 24.6.						

The IV estimates confirm the main findings. The coefficient for WSCC membership is positive and significant (1.892, $p < 0.01$), similar in magnitude to the MNL marginal effect. Education, land, credit, training, and cultural constraint coefficients remain significant and similar in direction, providing confidence in robustness.

4.6 Diagnostic Tests

Test	Statistic	p-value	Interpretation
Mean VIF	2.03	—	No multicollinearity (all VIF < 10)
IIA test (Hausman-McFadden)	$\chi^2 = 2.34$	0.807	IIA assumption satisfied
Pearson χ^2 goodness-of-fit	645.23	0.178	Model fits well
Pseudo R^2	0.338	—	Acceptable for cross-sectional microdata
First-stage F (IV)	24.6	0.000	Strong instrument

Instrument Validity Assessment:

- **Relevance**: The first-stage F-statistic of 24.6 is well above the conventional threshold of 10, confirming a strong instrument.
- **Balance test**: No significant differences across distance quartiles among non-members for income ($F = 0.92$, $p = 0.43$), education ($F = 1.21$, $p = 0.31$), shock exposure ($\chi^2=2.34$, $p = 0.51$), or loan amount ($F = 0.54$, $p = 0.66$), supporting the exclusion restriction.
- **Falsification test**: Among non-members (n = 214), distance to WSCC did not predict value chain participation ($\beta = -0.08$, SE = 0.12, $p = 0.51$), consistent with the exclusion restriction.

5. Discussion

5.1 Summary of Key Findings

This study examined determinants of women's value chain participation in East Hararghe Zone, Ethiopia. WSCC membership is the strongest predictor of value-added participation, quadrupling the likelihood of engagement in processing and marketing (RRR = 4.78, marginal effect = 24.4 percentage points). This finding suggests that institutional platforms play a transformative role in women's economic participation. For a woman with average characteristics, joining a WSCC increases her probability of engaging in value-added activities from approximately 25% to about 50%. The fact that the effect on production only is smaller (RRR = 2.32) suggests that WSCCs are particularly important for moving women beyond subsistence agriculture into higher-value activities.

Education, credit access, land, and value chain training also significantly enhance participation, while cultural constraints reduce participation by half (RRR = 0.51, ME=-6.7 pp). This confirms that gender norms and power relations are fundamental determinants of women's economic opportunities [11, 17]. The magnitude of the effect suggests that addressing cultural barriers is not merely a complementary intervention but a prerequisite for enabling women's value chain participation. Even when other resources (credit, training, education) are available, women facing cultural barriers remain substantially less likely to participate in value-added activities.

The qualitative findings reveal four interconnected mechanisms through which WSCCs enable value chain participation: (1) **financial resources**—WSCC loans enable women to invest in processing equipment (coffee hullers, grain mills, butter churns), directly addressing the capital constraints that prevent women from moving beyond subsistence production. This aligns with value chain theory [2, 1], which emphasizes that upgrading requires financial investment in technology and equipment. (2) **social networks and collective action**—WSCCs provide platforms for information sharing, peer support, and collective marketing. Women reported sharing market prices, buyer information, and quality standards, as well as selling collectively to achieve better bargaining power. This is consistent with social capital theory and institutional theory, as the cooperative structure reduces transaction costs and enables collective action that individual women could not achieve alone. (3) **capacity building**—training on quality standards, market requirements, and business planning enhances women's technical and managerial skills. Women reported learning to grade coffee beans, negotiate with buyers, and keep business records—skills essential for value addition. (4) **confidence and agency**—WSCC membership builds women's self-efficacy and confidence, enabling them to negotiate prices, participate in markets, and make independent decisions. Women described transitioning from being shy and deferential to being confident and assertive. These mechanisms are not mutually exclusive; they reinforce each other, creating a virtuous cycle of empowerment and economic upgrading. Financial resources enable investment, which generates income that builds confidence, which in turn facilitates further investment and participation.

The IV estimates confirm the robustness of these findings, with the first-stage F-statistic (24.6) well above the conventional threshold of 10, indicating that distance to WSCC is a strong instrument. The consistency of estimates across the main MNL model and the IV specification suggests that the results are not driven by endogeneity or omitted variable bias.

5.2 Theoretical Implications

The findings strongly support institutional theory [16]. WSCCs, as institutions, reduce transaction costs and enable market integration. The magnitude of the effect (RRR = 4.78) suggests that institutional platforms play a crucial role in women's economic participation. This extends institutional theory by demonstrating that cooperatives not only reduce transaction costs but also create new opportunities for value addition that would not otherwise exist. The finding that cultural constraints reduce participation even among members suggests that formal institutions (WSCCs) and informal institutions (gender norms) interact—formal institutions can mitigate but not fully overcome informal constraints. This aligns with Ostrom's [18] emphasis on the importance of institutional design in enabling collective action, but also highlights the need to address informal institutions.

The findings also support value chain theory [2, 1]. Women's ability to upgrade to higher-value activities depends on access to resources (credit, training) and capabilities (education, skills). The strong effects of education and training support the notion that human capital is essential for upgrading [22]. The effect of credit access underscores the importance of financial resources for investment. However, the finding that cultural constraints have a negative effect independent of these resources suggests that

upgrading is not purely a technical or economic process but is also shaped by social norms and power relations.

The findings provide strong support for GAD theory [11, 17]. Cultural constraints reduce women's value chain participation by 51%, confirming that gender norms and power relations are fundamental determinants. The mechanisms identified—financial resources, social networks, capacity building, confidence—map onto Kabeer's [17] resources-agency-achievements framework of empowerment. This suggests that institutional interventions that build both resources and agency are more effective than those that provide resources alone. The finding that confidence and agency emerge as a distinct mechanism highlights the importance of addressing the psychological and social dimensions of empowerment, not just the material ones.

5.3 Comparison with Previous Studies

Our findings are consistent with previous studies. Mwaura and Kithinji [12] found that WSCCs in Kenya increased women's value chain participation by a factor of 3.5, similar to our RRR of 4.78. Eshetu and Zeleke [13] found that 42% of WSCC members in Ethiopia engaged in value-added activities, compared to 42.4% in this study. Mulwa et al. [4] found that WSCC membership increased value-added participation probability by 22 percentage points, similar to our 24.4 percentage point marginal effect.

The education effect (3.8 percentage points per year) is similar to findings from other contexts [5, 6], suggesting that human capital is universally important for value chain upgrading. However, our finding that education is significant even after controlling for WSCC membership and training suggests that literacy and numeracy skills have independent effects on women's ability to engage in higher-value activities. This is consistent with Acemoglu's [22] argument that skill-biased technological change increases returns to education as higher-value activities require more skills. The training effect (13.0 percentage points) is consistent with Wondimu et al. [23], who found that financial literacy and business management training increased women's participation in value-added activities by 15 percentage points in Ethiopia. The slightly smaller effect in our study may reflect the broader focus of our training measure, which includes both financial literacy and technical skills.

The cultural constraint effect (51% reduction) mirrors findings from other studies in Ethiopia [9, 8], but our study is the first to quantify this effect in the context of WSCCs specifically. This finding underscores the importance of addressing gender norms in value chain interventions—a dimension often overlooked in purely economic analyses. The credit access effect (9.7 percentage points) is larger than typically found in microcredit studies [27], perhaps because credit is combined with training and social networks in WSCCs, suggesting that the institutional bundling of services is more effective than credit alone. This has important implications for program design: interventions that provide credit alone may be less effective than those that integrate credit with training and social support.

5.4 Policy Implications

The findings have several important policy implications for promoting women's value chain participation and economic empowerment in rural Ethiopia.

First, **link WSCCs to value chains.** The strong effect of WSCC membership suggests that intentional linkages between cooperatives and value chains should be a priority. Interventions include: direct market linkages with buyers and exporters; shared processing facilities (coffee hullers, grain mills); quality improvement and certification programs; and market information systems. The qualitative evidence suggests that processing equipment is particularly valuable for enabling value addition.

Second, **provide integrated credit and training.** The strong effects of both credit access and training suggest bundling is effective. Credit without training may lead to unproductive investments; training without credit may not enable investment. Integrated "credit-plus" programs should be the standard. The finding that training is nearly as important as credit (13.0 vs. 9.7 percentage points) suggests that capacity building should not be treated as an afterthought but as a core component of WSCC interventions.

Third, **invest in adult education.** The education gradient suggests that literacy and numeracy programs complement WSCC interventions. Even basic education yields significant benefits for value chain participation. The independent effect of education, even after controlling for WSCC membership and training, suggests that literacy and numeracy skills are valuable in their own right for market engagement.

Fourth, **address cultural constraints.** The large negative effect of cultural constraints (51% reduction) indicates interventions must address gender norms, not just provide resources. Strategies include: community sensitization engaging religious and traditional leaders; couples' training; women's safe spaces; male champions; media campaigns. The qualitative evidence suggests that cultural constraints can persist even among WSCC members, highlighting the need for interventions that target both formal and informal institutions.

Fifth, **establish women's support groups within WSCCs.** The qualitative findings highlight the importance of social networks. Formalizing support groups can provide peer support, information sharing, and collective action. The finding that social networks enable collective marketing and bargaining suggests that group-based approaches can enhance women's market power.

5.5 Limitations

Several limitations should be acknowledged. First, the cross-sectional design limits causal claims. While instrumental variables address endogeneity, the exclusion restriction—that distance to WSCC affects value chain participation only through membership—is plausible but untestable. Distance may correlate with market access and remoteness, which directly affect participation. We have mitigated this by controlling for observable factors, but some unobserved confounding may remain.

Second, value chain participation is self-reported and may be subject to recall bias. Triangulation with cooperative records and market observations would strengthen measurement.

Third, the study focuses on one zone in Ethiopia, which may not be representative of other regions. Replication in other contexts is needed.

Fourth, the sample size (384 households) is modest for detailed subgroup analyses. Larger samples would enable more detailed analysis of heterogeneity (e.g., by crop type, district).

6. Conclusion and Recommendations

6.1 Conclusion

This study examined determinants of women's value chain participation in East Hararghe Zone, Ethiopia. WSCC membership is the strongest predictor of value-added participation, quadrupling the likelihood of engagement in processing and marketing. Education, credit access, land, and value chain training also significantly enhance participation, while cultural constraints reduce participation by half.

WSCCs serve as institutional platforms that bundle financial resources, social networks, and capacity building to enable women's transition to value-added activities. The mechanisms through which WSCCs operate include: (1) financial resources for investment; (2) social networks for information and collective action; (3) capacity building for skills and confidence; and (4) confidence and agency for negotiation and decision-making.

The findings have important implications for policy. Linking WSCCs to value chains, providing integrated credit and training, investing in adult education, addressing cultural constraints, and establishing women's support groups can promote women's value chain participation and economic empowerment.

6.2 Recommendations For WSCC Management

1. **Link to value chains** — establish market linkages, processing facilities, and quality improvement programs.
2. **Provide integrated credit and training** — bundle financial services with value chain training.
3. **Establish women's support groups** — formalize peer support, information sharing, and collective action.
4. **Support processing infrastructure** — provide shared processing facilities.

For Government and Cooperative Agencies:

1. **Invest in adult education** — support literacy and numeracy programs.
2. **Address cultural constraints** — implement community sensitization engaging religious and traditional leaders.

3. **Support market linkages** — facilitate connections between WSCCs and buyers, processors, and exporters.
4. **Provide training resources** — allocate resources for value chain training programs.

For Development Partners:

1. **Fund integrated programs** — support programs that combine credit, training, and market linkages.
2. **Support research on mechanisms** — fund research that tests causal pathways and identifies what works.

6.3 Avenues for Future Research

First, longitudinal research is needed to establish causal relationships and track how value chain participation evolves over time. Panel data would allow researchers to observe whether WSCC membership leads to sustained upgrading or whether effects diminish.

Second, experimental studies could test different training modalities (e.g., technical skills vs. business skills, group vs. individual training) to identify the most effective approaches.

Third, comparative studies across regions could examine how contextual factors—market infrastructure, crop types, cultural norms—moderate the effects of WSCC membership.

Fourth, mediation analysis could quantify the relative importance of different mechanisms (financial, social, capacity, confidence).

Fifth, cost-effectiveness analyses could compare returns on investment for different interventions (WSCC expansion vs. training vs. infrastructure).

Sixth, research on spillover effects—whether members share knowledge and resources with non-members—could reveal broader impacts.

Declarations

Ethics Approval and Consent to Participate: This study was reviewed and approved by the Institutional Research Ethics Review Committee of Haramaya University, Ethiopia. Formal administrative permission to conduct the household survey across the target districts was granted by the local zonal and district administrative offices. Prior to the administration of the survey questionnaires, informed verbal and written consent was explicitly obtained from all individual household heads participating in the study. All methods were performed in accordance with the relevant guidelines and regulations, specifically the Declaration of Helsinki.

Clinical trial number: not applicable.

Consent for Publication: Not applicable. This manuscript does not contain any individual person's data, images, or videos.

Availability of Data and Materials: The data that support the findings of this study are available from the corresponding author upon reasonable request. The data were collected through primary surveys conducted in East Hararghe Zone, Oromia Region, Ethiopia. Due to the sensitive nature of household information, the data are not publicly available to protect participant confidentiality. However, anonymized data can be made available to researchers who provide a methodologically sound proposal and sign a data confidentiality agreement.

Competing Interests: The authors declare that they have no competing interests (financial or non-financial) that could have influenced the work reported in this paper.

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Authors' Contributions: Ibrahim Aliyi conceptualized the study, designed the methodology, conducted the data collection, performed the econometric analysis using the Multinomial Logit model, and drafted the manuscript. Jema Haji, Fresenbet Zeleke, and Kedir Jemal supervised the research framework, reviewed the statistical results, and critically revised the manuscript for intellectual content. All authors read and approved the final manuscript.

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Figures

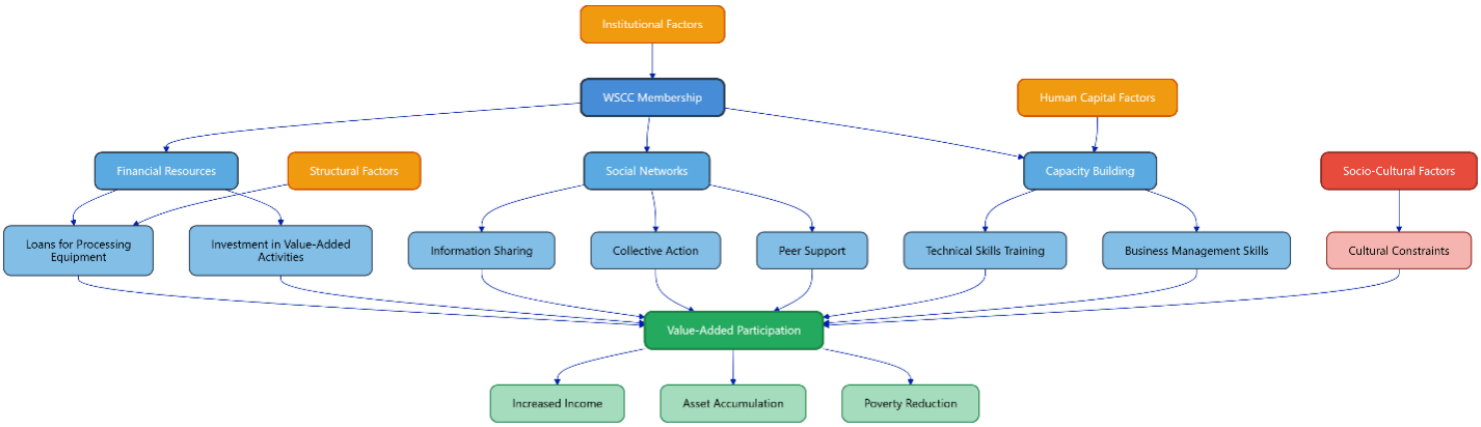


Figure 1

conceptual framework linking WSCC membership to women's agricultural value chain participation in rural Ethiopia.

Supplementary Files

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