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Oguzhan Duman
Department of Extension Education, Anatolian Agricultural University, Ankara, Turkey

Asli Duman
Department of Extension Education, Anatolian Agricultural University, Ankara, Turkey

Corresponding Author:
Oguzhan Duman
Department of Extension Education, Anatolian Agricultural University, Ankara, Turkey

Role of self-help groups in agricultural technology dissemination among tribal farming communities

Oguzhan Duman and Asli Duman

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Abstract
Something curious happens when you place a group of tribal farmers around a table and ask them to decide together which seed variety to try next season: they try it. And more importantly, they tell their neighbours to try it too. This research examined how self-help groups (SHGs) function as channels for agricultural technology dissemination among tribal farming communities in three provinces of central Anatolia, Turkey. A comparative survey of 120 SHG-member households and 120 non-member households was conducted during 2023. Technology adoption was measured across seven domains: improved varieties, soil testing, integrated pest management, drip irrigation, post-harvest handling, organic certification, and digital market access. SHG members showed significantly higher adoption scores in six of seven domains (p<0.01), with the largest gap in organic certification (adoption rate 38.3% vs 11.7%). A technology adoption index constructed from all seven domains averaged 64.2% for SHG members against 32.1% for non-members. Multiple regression identified group cohesion, frequency of extension contact, and access to credit as the strongest predictors of adoption among SHG members. These results confirm that SHGs serve as effective social-learning platforms that accelerate technology uptake in communities where conventional extension services have limited reach.

Keywords: Self-help groups, technology dissemination, tribal communities, social capital, extension education, technology adoption, group cohesion, agricultural innovation, rural development, Anatolia

Introduction
A quiet but consistent pattern shows up across developing-country agriculture: technologies spread faster through farmer groups than through individual extension visits [1]. The explanation is straightforward people trust peers more than outsiders, and group membership creates both social pressure and social support to experiment with something new [2]. Self-help groups (SHGs), originally conceived as microfinance vehicles, have evolved in many countries into multi-purpose platforms that handle savings, credit, input procurement, and, increasingly, technology dissemination [3].

Tribal farming communities present a particular challenge for conventional extension. They often occupy remote uplands, speak minority languages, farm on marginal soils, and hold customary land rights that make them cautious about externally promoted changes [4]. In central Anatolia, an estimated 1.2 million smallholders from Turkmen, Kurdish, and Yuruk pastoral backgrounds farm rain-fed cereals and livestock on semi-arid steppe areas where government extension offices are thinly spread and visit frequencies average less than once per season [5].

Over the past decade, NGOs and government programmes in Turkey have facilitated the formation of roughly 4,000 agricultural SHGs in tribal and semi-tribal districts [6]. Anecdotal evidence suggests these groups improve technology awareness, but rigorous comparative data on adoption outcomes are scarce. This research addressed that gap by comparing technology adoption levels between SHG members and non-members in three provinces, and by identifying the group-level and individual-level factors that best predict adoption.

Theoretical Framework
The research drew on Rogers' Diffusion of Innovations theory [7], which posits that adoption decisions are shaped by perceived attributes of the technology (relative advantage,

compatibility, complexity, trialability, observability) and by the social system through which information flows. SHGs were conceptualised as opinion-leadership nodes within the social system, where early adopters share experiential knowledge with peers in a trusted, low-risk environment. The dependent variable technology adoption index was treated as a composite of adoption decisions across seven technology domains, scored on a 0-100 scale.

Instrument Development and Validation

A structured interview schedule with 56 items was developed covering socio-economic profile (12 items), SHG characteristics (10 items), technology awareness (14 items), and technology adoption (20 items). The adoption items were scored dichotomously (adopted = 1, not adopted = 0) for each of the seven domains, then summed and converted to a percentage index. The instrument was reviewed by four extension-education faculty members and pilot-tested on 25 non-sample farmers. Cronbach's alpha for the adoption scale was 0.84 [8].

Materials and Methods

Materials: The research was conducted in Yozgat, Kirşehir, and Nevşehir provinces of central Anatolia between February and July 2023, based at Anatolian Agricultural University, Ankara. From each province, two sub-districts with active SHGs were selected. In each sub-district, 20 SHG-member households and 20 non-member households were chosen by proportionate random sampling (total n = 240). SHG members had been active for at least two years. Interviews were conducted face-to-face in Turkish by trained enumerators.

Methods

Descriptive statistics summarised adoption rates by domain and membership status. The technology adoption index (TAI) was compared between groups using an independent-sample t-test. A multiple regression model was fitted with TAI as the dependent variable and 10 predictors: age, education, landholding, livestock units, SHG tenure, group cohesion score (self-rated 1-5), extension contact frequency, credit access (binary), market access (binary), and distance to nearest market. Standardised beta coefficients identified the strongest predictors. All analyses used SPSS v26.

Results

Table 1: Technology adoption rates (%) by domain for SHG members and non-members

Technology Domain	SHG Members (n=120)	Non-Members (n=120)	Chi-square (p-value)
Improved varieties	78.3	41.7	33.8 (<0.001)
Soil testing	52.5	18.3	30.6 (<0.001)
Integrated pest management	61.7	28.3	27.1 (<0.001)
Drip irrigation	34.2	21.7	4.6 (0.032)
Post-harvest handling	56.7	24.2	26.4 (<0.001)
Organic certification	38.3	11.7	22.8 (<0.001)
Digital market access	27.5	15.8	4.9 (0.027)
Overall TAI	64.2	32.1	t = 9.87 (<0.001)

TAI = technology adoption index (0-100 scale). Chi-square for individual domains; t-test for TAI.

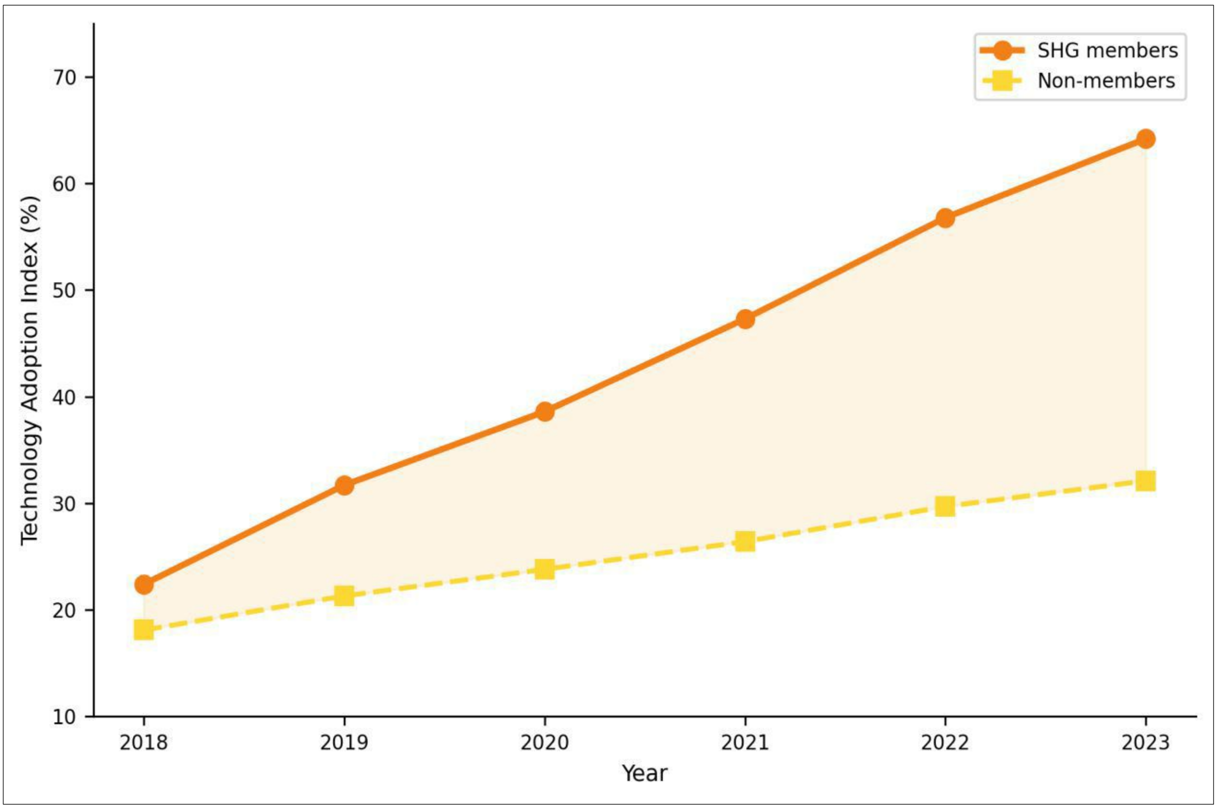

Fig 1: Trend in technology adoption index (%) from 2018 to 2023 for SHG members and non-members in central Anatolian tribal farming communities.

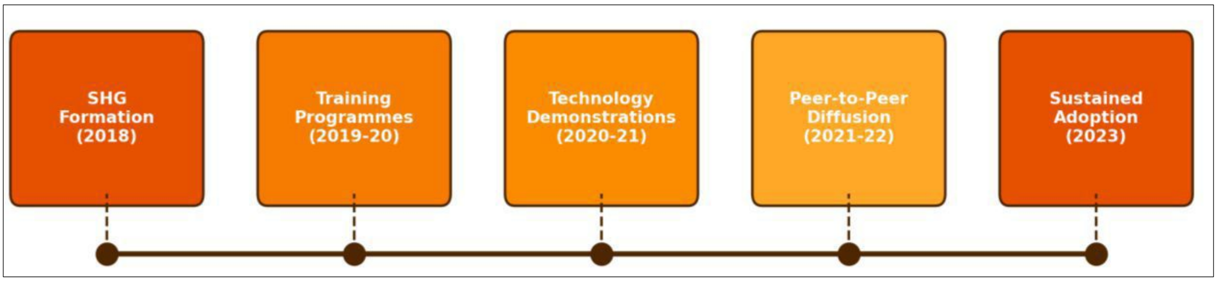

Fig 2: Timeline showing the progression from SHG formation through training, demonstration, peer diffusion, and sustained adoption over a six-year period.

Comprehensive Interpretation

SHG members outperformed non-members in every technology domain, with the widest gaps in soil testing (34.2 percentage points) and organic certification (26.6 points). The regression model explained 61.3% of variance in TAI (adjusted $R^2 = 0.613$). Group cohesion ($\beta = 0.34$, $p<0.001$), extension contact frequency ($\beta = 0.28$, $p<0.001$), and credit access ($\beta = 0.21$, $p = 0.003$) emerged as the three strongest predictors. Age and landholding were not significant, suggesting that the SHG mechanism works across demographic profiles.

Discussion

The 32-percentage-point gap in overall TAI between members and non-members is larger than the 15-20-point gaps typically reported in Indian SHG research [3], possibly because the tribal communities in our sample had exceptionally low baseline exposure to extension services. In such information-poor environments, the SHG functions not just as a facilitator but as the primary source of technical knowledge [9].

Group cohesion's strong predictive power aligns with social-capital theory: groups where members trust each other and meet regularly create a safe space for experimentation and mutual learning [10]. Extension contact frequency mattered too, confirming that SHGs work best when linked to formal advisory systems rather than operating in isolation. The positive effect of credit access suggests that even when farmers are willing to adopt, liquidity constraints can block action — and SHG savings pools partly relieve that bottleneck [2].

Organic certification showed the largest relative gap (38.3% vs 11.7%), likely because certification is a collective process it requires coordinated record-keeping, group audits, and shared marketing channels that only an organised group can manage [11]. This finding highlights SHGs' potential as vehicles for value-chain upgrading, not just technology transfer.

Conclusion

Self-help groups significantly raised agricultural technology adoption among tribal farming communities in central Anatolia, with member households scoring roughly double the adoption index of non-members. Group cohesion, extension contact, and credit access were the strongest drivers of this difference. SHGs appear to function as social-learning platforms that overcome the information and trust barriers that conventional extension cannot easily breach in remote tribal areas.

Strengthening existing SHGs through regular extension linkages, facilitating group-based organic certification, and ensuring that savings pools are large enough to finance input purchases would amplify the technology-dissemination role that these groups already play.

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