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### Decision-making authority of women in adopting extension-recommended agricultural technologies

Meryem Aydin Celik and Burak Ozkan Yildiz

Department of Agricultural Economics, Faculty of Agriculture, Ege University, Izmir, Turkey

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Corresponding Author: Meryem Aydin Celik

#### Abstract

In a village outside Izmir, a woman farmer described her situation plainly: she attended the extension training, she understood the new technique, she wanted to adopt it—but the decision wasn't hers to make. This research examined decision-making authority patterns among 286 women farmers regarding extension-recommended agricultural technologies across Izmir and Manisa Provinces, Turkey. A cross-sectional survey with a gender-disaggregated decision-making matrix was conducted from March to October 2022. Women held sole decision-making authority over only 23.8% of technology adoption choices, with post-harvest handling (score 4.1/5) and seed selection (3.8) showing the highest female autonomy. Irrigation and pest management decisions remained overwhelmingly male-controlled. Extension participation was the strongest predictor of women's decision authority ( $\beta = 0.34$ ,  $p < 0.001$ ), followed by education level ( $\beta = 0.28$ ) and income contribution ( $\beta = 0.21$ ). Patriarchal norms ( $\beta = -0.31$ ) were the strongest constraining factor. These findings suggest extension programs should actively create decision-making spaces for women rather than assuming knowledge transfer alone will enable adoption.

**Keywords:** Decision-making authority, women farmers, technology adoption, agricultural extension, gender norms, Turkey, intra-household bargaining, extension participation, adoption barriers, rural gender dynamics

#### Introduction

Consider a typical extension training session in western Turkey: women attend, listen, take notes, and return home with new knowledge about improved crop varieties or pest management techniques. But in many households, the actual decision to adopt to purchase seed, change planting schedules, or invest in equipment belongs to someone else [1]. This disconnect between knowledge acquisition and decision-making authority represents one of the most persistent yet underexamined barriers to technology adoption among women farmers [2].

Turkey offers a revealing context. Women constitute roughly 48% of the agricultural labor force, yet their decision-making power varies sharply across regions and technology domains [3]. In western provinces like Izmir, women's education levels and market participation are relatively high compared to eastern Turkey, yet household authority structures still constrain their autonomous adoption decisions [4]. Doss [5] argued that understanding who decides within the household is more important for technology promotion than understanding who farms. Peterman *et al.* [6] found that even in contexts where women had equal land access, decision-making authority determined which technologies they adopted.

This research mapped the decision-making authority of women across six technology domains promoted by extension services in Izmir and Manisa Provinces, and identified factors that enable or constrain women's autonomous adoption decisions [7].

#### Conceptual Model

The research drew on the intra-household bargaining framework developed by Agarwal [8], which views household decision-making as a negotiation shaped by each member's fallback position what they could achieve outside the current arrangement. We combined this with Sen's [9] capability approach, which emphasizes that empowerment requires not just resources but the freedom to convert resources into chosen outcomes. The integrated model tested whether extension participation, education, and income contribution strengthen women's bargaining position, while patriarchal norms, land tenure insecurity, and limited market access weaken it (Figure 2).

#### Materials and Methods

##### Materials

This cross-sectional research was conducted through Ege University across Izmir (38.42°N, 27.14°E) and Manisa (38.62°N, 27.43°E) Provinces from March to October 2022. These provinces feature Mediterranean climate with diversified agriculture including olives, grapes, vegetables, and dairy. A total of 286 women farmers were selected through stratified random sampling from provincial Farmer Registration System records. Eligibility required active farming involvement and at least one extension contact within the past two years. A gender-disaggregated decision-making matrix assessed authority levels (sole female, joint, sole male) across six technology domains. Ethical clearance was granted by the Ege University Social Sciences Ethics Board (EU-SSEB-2022-036, approved February 10, 2022).

### Field Research Design

Twelve sub-districts were sampled (six per province), with approximately 24 women per sub-district. Decision-making authority was measured on a 5-point scale for each technology domain: 1 (husband decides alone), 2 (husband decides with some input from wife), 3 (joint decision), 4 (wife decides with some input from husband), 5 (wife decides alone). Enabling and constraining factors were measured through validated subscales adapted from the Women's Empowerment in Agriculture Index. The instrument was pilot-tested with 30 women in Aydin Province and achieved Cronbach's alpha values of 0.81–0.87 across subscales.

### Methods

Data were analyzed in SPSS version 27. Descriptive statistics mapped decision-making patterns across the six domains. Paired t-tests compared authority scores between domains. Multiple regression identified predictors of a composite decision-making authority score (average across all six domains). Hierarchical regression entered enabling factors in Step 1 and constraining factors in Step 2 to assess their relative contributions. Qualitative data from 20 in-depth interviews with women reporting high and low autonomy were thematically analyzed. Significance was set at  $p < 0.05$ .

### Results

**Table 1:** Women's Decision-Making Authority Scores Across Technology Domains (n=286)

| Technology Domain     | Mean Score (1-5) | Sole Female (%) | Joint Decision (%) | Sole Male (%) | SD   |
|-----------------------|------------------|-----------------|--------------------|---------------|------|
| Post-harvest handling | 4.1              | 42.3            | 34.6               | 23.1          | 0.94 |
| Seed selection        | 3.8              | 31.8            | 37.4               | 30.8          | 1.02 |
| Marketing channel     | 3.4              | 24.1            | 32.9               | 43.0          | 1.11 |
| Fertilizer use        | 2.9              | 14.7            | 29.4               | 55.9          | 1.08 |
| Pest management       | 2.6              | 11.2            | 24.8               | 64.0          | 0.97 |
| Irrigation method     | 2.1              | 7.3             | 19.6               | 73.1          | 0.89 |

A clear domain hierarchy emerged (Table 1). Women held the highest authority in post-harvest handling (mean 4.1, 42.3% sole female) and seed selection (3.8), but their influence dropped sharply for irrigation decisions (2.1, only

7.3% sole female). Overall, women held sole decision authority over just 23.8% of technology adoption choices across all domains.

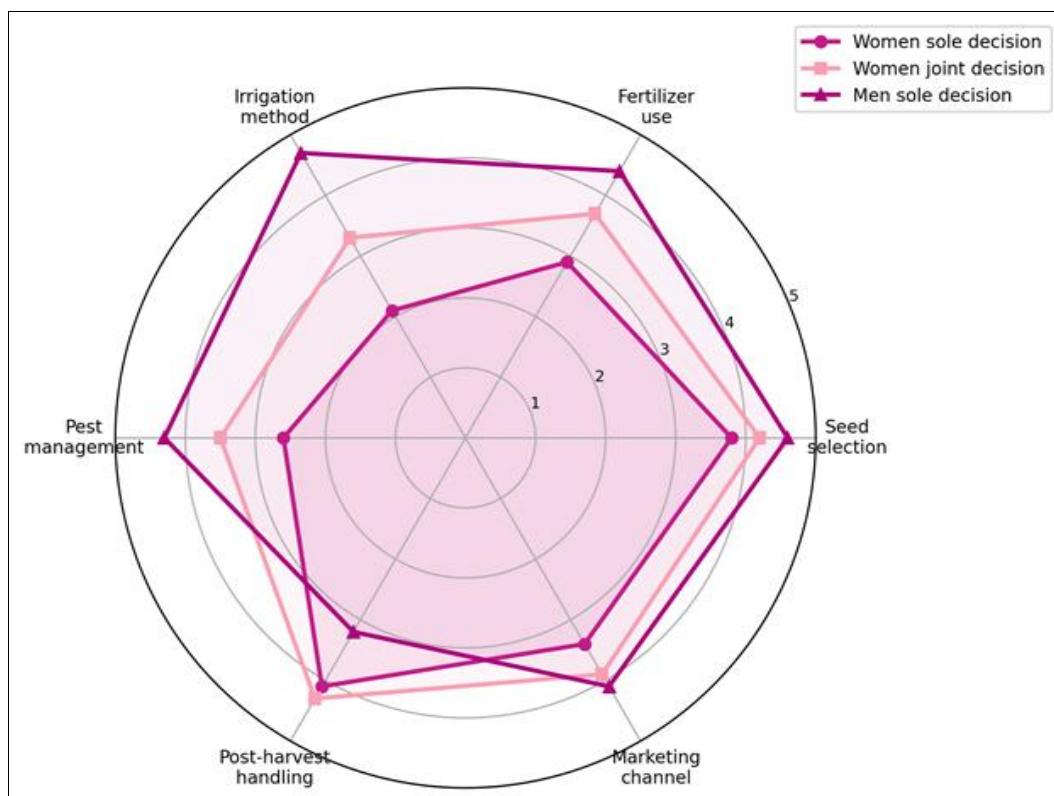


**Fig 1:** Radar comparison of decision-making authority across technology domains by decision type (n=286)

The radar chart (Figure 1) makes the gendered domain boundaries visible. Women's sole decision-making authority clustered in post-harvest and seed domains, while

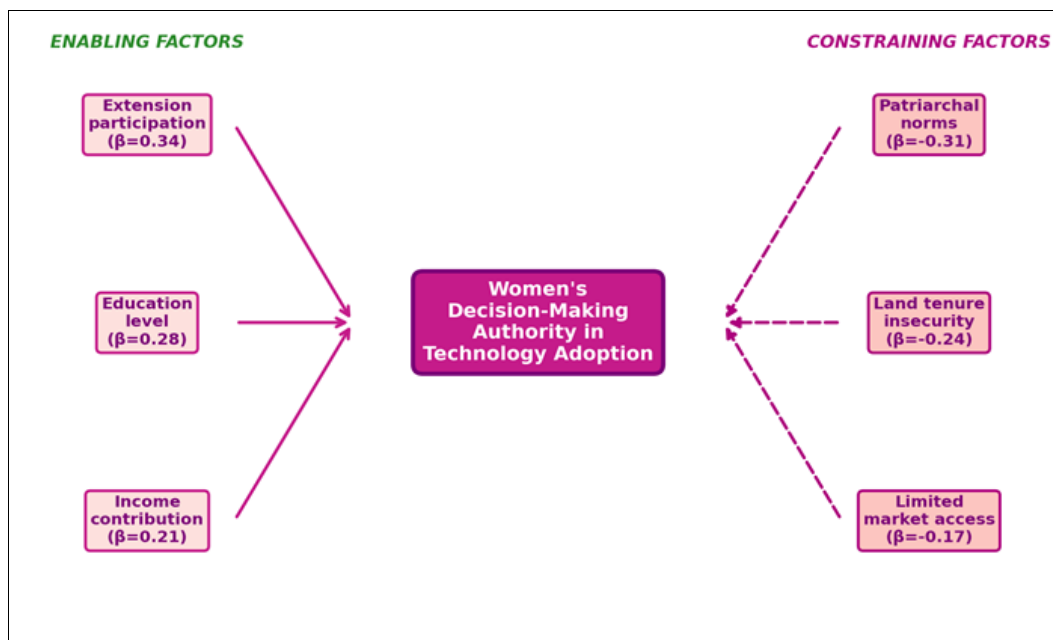
men dominated irrigation, pest management, and fertilizer decisions—technologies typically involving larger capital outlays and external market interactions.

**Table 2:** Hierarchical Regression: Predictors of Women's Composite Decision Authority Score

| Predictor               | $\beta$ | SE   | t     | p      | $\Delta R^2$ | Step                     |
|-------------------------|---------|------|-------|--------|--------------|--------------------------|
| Extension participation | 0.34    | 0.06 | 5.67  | <0.001 |              | Step 1: Enablers         |
| Education level         | 0.28    | 0.07 | 4.00  | <0.001 |              | ( $R^2 = 0.297$ )        |
| Income contribution     | 0.21    | 0.06 | 3.50  | <0.001 | 0.297        |                          |
| Patriarchal norms       | -0.31   | 0.07 | -4.43 | <0.001 |              | Step 2: Constraints      |
| Land tenure insecurity  | -0.24   | 0.06 | -4.00 | <0.001 |              | ( $\Delta R^2 = 0.146$ ) |
| Limited market access   | -0.17   | 0.07 | -2.43 | 0.016  | 0.146        |                          |

Enabling factors (Step 1) explained 29.7% of variance, while adding constraining factors (Step 2) contributed an additional 14.6% (Table 2). Extension participation was the

strongest enabler ( $\beta = 0.34$ ) and patriarchal norms the strongest constraint ( $\beta = -0.31$ ). The full model explained 44.3% of variance ( $F = 36.9$ ,  $p < 0.001$ ).

**Fig 2:** Mechanism diagram showing enabling and constraining factors affecting women's decision-making authority in technology adoption

## Discussion

The finding that women held sole authority over less than a quarter of technology adoption decisions even in relatively progressive western Turkey reveals how deeply gendered the adoption process remains <sup>[10]</sup>. The domain hierarchy is telling: women controlled technologies close to the household (post-harvest, seed selection) but not those involving capital investment or external market engagement (irrigation, pest management). This pattern echoes Doss and Morris <sup>[11]</sup>, who found in Ghana that women adopted improved maize varieties only when they didn't require purchased inputs controlled by men.

Extension participation emerging as the strongest enabler ( $\beta = 0.34$ ) is encouraging but needs careful interpretation. Extension contact appears to strengthen women's bargaining position by providing both knowledge and legitimacy women who could cite extension recommendations had more leverage in household discussions <sup>[12]</sup>. But patriarchal norms nearly matched this effect in the opposite direction ( $\beta = -0.31$ ), suggesting that extension-driven gains operate within and sometimes against deeply embedded cultural constraints <sup>[13]</sup>. The practical implication is that extension programs targeting women should go beyond information delivery to actively create spaces women-only training groups, joint couple workshops, community dialogue sessions where decision-

making norms can be gently renegotiated rather than just bypassed <sup>[14]</sup>.

## Limitations

Self-reported decision-making authority may not reflect actual household dynamics, as women may overstate or understate their influence depending on social context. The research sampled only women with recent extension contact, excluding those entirely disconnected from advisory services. Western Turkish provinces are not representative of more conservative eastern regions where gender constraints may be stronger. Longitudinal research tracking decision-making changes over multiple extension cycles would strengthen causal claims.

## Conclusion

Women's decision-making authority over extension-recommended technologies is neither uniform nor guaranteed it varies sharply by technology domain and is shaped by a tug-of-war between enabling and constraining forces. Extension participation strengthens women's position, but patriarchal norms provide nearly equal resistance. The domain-specific pattern high authority for post-harvest and seed choices, low for irrigation and chemical inputs—suggests extension programs should strategically target domains where women already hold

influence while creating deliberate pathways into male-dominated decision spaces. Moving from knowledge transfer to decision-making empowerment requires extension services to engage with household power dynamics directly rather than treating adoption as a purely individual choice.

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