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GENDER DISCRIMINATION AND WOMEN'S DECISION-MAKING IN SUSTAINABLE AGRICULTURE: EVIDENCE FROM ECUADOR

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ABSTRACT

This study analyses the barriers affecting women's participation in sustainable agricultural decision-making in Ambato, Ecuador. Its aim is to quantify the relative impact of discriminatory constraints versus gender-responsive institutional support on women's agency. Using a quantitative approach, we estimated a covariance-based structural equation model (SEM) based on primary survey data from 105 female farmers. The model specifies and tests the structural relationships among discrimination barriers, gender-responsive institutional factors, and women's participation in decision-making processes. The findings indicate that, although perceived discrimination is significantly associated with constraints on women's decision-making ($\beta = 0.292$, $p = .012$), the positive effects of gender-responsive institutional factors, such as access to training and secure land tenure, are considerably stronger and more decisive ($\beta = 0.853$, $p < .001$). The overall model fit is satisfactory (CFI = 0.946, RMSEA = 0.062), supporting the validity of the results. Theoretically, the evidence supports feminist arguments that transforming institutional structures is the primary pathway to empowerment. Practically, the findings suggest prioritizing institutional capacities such as targeted training, inclusive extension services, and participatory governance to strengthen women's decision-making power and foster a more equitable agricultural system.

Keywords: *Gender inequality, sustainable agriculture, discrimination, women's decisionmaking*

1. INTRODUCTION

Agriculture is an essential foundation for economic development, poverty reduction, and food security, particularly in developing countries, where it accounts for more than 30% of gross domestic product (GDP) and employs nearly two-thirds of the workforce (Hidalgo García, 2010, p. 93). However, this sector faces growing challenges associated with climate change, unsustainable production practices, economic pressures, and the degradation of arable land (Pertuz-Guzmán et al., 2024, p. 2; Acuña Alvarado, 2020, p. 171; Ojo & Baiyegunhi, 2023, p. 2).

In this context, the participation of rural women is critical, as they represent a substantial share of the agricultural workforce and play a central role in household and community food systems (Hidalgo García, 2010, p. 93; González Lazalde et al., 2025, p. 5; Tesafa et al., 2025,

p. 1). Nevertheless, their contribution is constrained by persistent gender disparities in access to land, credit, technology, information, and education (Hidalgo García, 2010, pp. 94, 101; González Lazalde et al., 2025, p. 5; Acuña Alvarado, 2020, p. 164; Ojo & Baiyegunhi, 2023, p. 2; Mohd Ruslan et al., 2025, p. 58). These inequalities not only limit women's empowerment but also negatively affect agricultural productivity, crop diversification, and household food security (Schling & Pazos, 2021, p. 1; Tesafa et al., 2025, p. 1). According to estimates by the Food and Agriculture Organization of the United Nations (FAO), equal access to productive resources could increase agricultural output by 20–30% and reduce global malnutrition by 12–17% (Hidalgo García, 2010, p. 94).

Although these dynamics are well documented at the international level, their manifestation in specific territorial contexts remains insufficiently explored, particularly about how discrimination shapes women's participation in agricultural decision-making and the adoption of sustainable practices (Mastilo et al., 2026). Empirical evidence shows that gender gaps in sustainable agriculture follow common patterns, while also being mediated by sociocultural and economic contexts. In Africa, productivity is lower on plots managed by women in Nigeria (Kawarazuka et al., 2022; Ojo & Baiyegunhi, 2023), decision-making constraints and food insecurity persist in Ethiopia (Tesafa et al., 2025), and productivity gains are associated with improved access to agricultural information in Zambia (Mwalupaso et al., 2019). In Latin America, women's land ownership in Peru has been shown to promote crop diversification and strengthen food security (Schling & Pazos, 2021), while in Costa Rica, women's participation remains limited despite legal reforms aimed at gender equality (Acuña Alvarado, 2020). Similarly, in Mexico, women producers often exhibit higher educational attainment yet continue to face disadvantages in land tenure and access to productive capital (González Lazalde et al., 2025).

This body of evidence highlights that, despite contextual variation, women farmers consistently experience structural barriers that limit their access to resources and their effective participation in decision-making processes. These patterns underscore the need to examine the local dynamics of gender discrimination and agricultural governance in specific territories such as Ambato. In Ambato, these disparities are reflected in women's limited participation in decisions related to agricultural production, particularly with respect to sustainable practices. Such gaps raise critical questions regarding equity, efficiency, and the long-term sustainability of the local agricultural system.

Therefore, the objective of this study is to analyse the discriminatory barriers affecting women's participation in decision-making within sustainable agriculture in Ambato, Ecuador, by identifying their underlying causes, consequences and potential mitigation strategies aimed at strengthening equity and resilience in the agricultural sector.

Although the international literature extensively documents the existence of gender gaps (Ojo & Baiyegunhi, 2023; Tesafa et al., 2025), this study makes a distinct analytical contribution. First, rather than analysing barriers in isolation, it specifies and tests a structural equation model that directly contrasts the constraining effect of discrimination with the empowering effect of gender-responsive institutional mechanisms. Second, by providing robust empirical evidence from the Andean region a context underrepresented in a literature often focused on Africa and Asia it offers a basis for broader generalization. We argue that the finding that proactive, capability-expanding governance is a more decisive lever for change than merely mitigating constraints is applicable to other rural contexts facing similar structural inequalities. Thus, this study provides a novel, quantifiable model for understanding the competing forces that shape women's agency in agriculture.

2. REVIEW OF LITERATURE

2. 1. CONTEXT OF AGRICULTURE IN ECUADOR

Agriculture in Ecuador, as in many other developing countries, has been strongly shaped by development paradigms that prioritize productivity gains per hectare, often at the expense of broader sustainability considerations. In this regard, the Green Revolution (GR), characterized by the intensive use of agrochemicals, mechanization, irrigation technologies, and the development of high-yielding varieties (HYVs), has been the dominant approach since the 1960s for increasing agricultural output, particularly in crops such as maize, rice, and wheat (Bonilla & Singaña, 2019, p. 71; Phillips, 2014; Wu & Butz, 2004; Evenson, 2015; Moseley, 2015).

In Ecuador, public policies such as the High-Yield Seed Plan (PSAR) have aligned with this paradigm by promoting improved seeds and chemical inputs among small- and medium-scale farmers (Bonilla & Singaña, 2019, pp. 70, 80). While these policies have contributed to increases in output, they have also generated structural tensions related to sustainability, resource distribution, and social inclusion.

2. 2. AGRICULTURAL PRODUCTIVITY AND SUSTAINABILITY

Although GR-based programs have sought to substantially increase productivity, the effects of agricultural public policy cannot be assessed solely through output indicators expressed in tons per hectare (Bonilla & Singaña, 2019, pp. 70, 72). This study adopts a broader perspective, recognizing that a one-dimensional focus on productivity entails significant trade-offs for other dimensions essential to sustainability.

These dimensions include biodiversity, land concentration, associativity, and the role of women in agricultural production (Bonilla & Singaña, 2019, pp. 70, 72). For example, the intensive use of chemical inputs can degrade soil fertility and reduce genetic diversity, while the dominance of monoculture systems under the Green Revolution has diminished varietal diversity and increased vulnerability to pests and diseases (Bonilla & Singaña, 2019, p. 71).

Agrobiodiversity therefore emerges as a key criterion for sustainability, contributing to pest control, soil nutrition, and long-term resilience (Bonilla & Singaña, 2019, p. 80). From this perspective, sustainable agriculture requires an integrated evaluation of multiple criteria rather than a singular emphasis on short-term productivity gains.

2. 3. GENDER GAPS AND AGRICULTURAL SUSTAINABILITY

Within this sustainability framework, the role of women in agricultural production and decision-making becomes a critical factor (Bonilla & Singaña, 2019, p. 72). Empirical evidence from Ecuador, based on data from the Continuous Agricultural Production Area and Production Survey (ESPAC), reveals a gender productivity gap: Agricultural Production Units (UPAs) in which women hold decision-making authority exhibit lower average yields (Bonilla & Singaña, 2019, p. 76; Ali et al., 2016). In rice cultivation, for instance, productivity is approximately 5.2% lower when women are responsible for production decisions (Bonilla & Singaña, 2019, p. 76).

However, interpreting this gap requires a broader conception of sustainability. UPAs managed by women tend to display higher levels of biodiversity, and women have been found to place greater value on conserving native seeds and traditional practices (Ballara et al., 2012; Bonilla & Singaña, 2019, p. 76). These strategies, while often associated with lower yields per hectare, contribute to long-term ecological sustainability.

Consequently, women's production decisions frequently reflect a trade-off between short-term

productivity and long-term sustainability, with a greater inclination toward conservation-oriented practices. This tension highlights the limitations of conventional productivity metrics when evaluating agricultural performance in gender-differentiated contexts.

2. 4. IMPLICATIONS OF AGRICULTURAL DECISIONS AND PRACTICES

Agricultural decision-making extends beyond seed selection to encompass input intensity and cultivation practices. Studies in Ecuador indicate that chemical fertilizers and pesticides often exhibit diminishing marginal returns; improper application can reduce, rather than enhance, productivity (Bonilla & Singaña, 2019, pp. 76, 78, 80; Huang et al., 1993; Shaikh et al., 2016; Zhang et al., 2015). Excessive irrigation similarly undermines productivity by affecting nutrient efficiency (Bonilla & Singaña, 2019, p. 76; Nakano et al., 2013). In this context, women's preference for biodiversity and native seeds may be more closely aligned with agroecological approaches that minimize dependence on external inputs and enhance system resilience (Bonilla & Singaña, 2019, p. 76). The limited statistical significance attributed to biodiversity in productivity-focused analyses suggests that yield-centered indicators may obscure critical sustainability risks, including the loss of agrobiodiversity (Bonilla & Singaña, 2019, pp. 76, 80).

2. 5. DECISION-MAKING AND THEORETICAL FOUNDATIONS

Beyond gender gaps, land concentration and associativity also influence agricultural decision-making. Evidence from Ecuador indicates that medium-sized farms may exhibit lower average productivity than smallholdings, challenging GR assumptions regarding scale efficiency in extensive crops (Bonilla & Singaña, 2019, p. 76; Nakano et al., 2013). Similarly, while associativity is central to rural development and social cohesion, it has been linked to lower yields per hectare in hard maize production (Bonilla & Singaña, 2019, pp. 79–80).

These findings reveal a tension between individual productivity objectives and the social and collective benefits of cooperative organization (Houtart, 2016; Bonilla & Singaña, 2019, p. 80). To the extent that gender gaps constrain women's participation in organizations or limit their influence over land-related decisions, decision-making becomes a key mechanism through which inequality is reproduced.

Addressing these dynamics requires a theoretical framework that transcends conventional economic models. Feminist theory conceptualizes gender as an analytical and critical category that exposes power relations and structural subordination within patriarchal systems (García-Granero, 2020). From this perspective, women experience systemic constraints that shape their roles, choices, and agency in agricultural contexts.

This critique extends to the dominant economic assumption of the self-interested, autonomous maximiser (*homo economicus*), which has been challenged for its implicit male bias (Herfeld, 2022). Such models tend to naturalize the gendered division of labour and obscure the structural constraints affecting women's decision-making.

Complementarily, the Social Identity Model of Collective Action (SIMCA) explains how group identification, perceived injustice, and beliefs in collective efficacy drive social change (Louis et al., 2020). SIMCA highlights how structural ideologies, such as system justification, can either mobilize or demobilize collective action, thereby shaping women's capacity to challenge discriminatory arrangements and participate effectively in decision-making processes.

This study uses its empirical findings to provide concrete and quantitative implications for the theoretical frameworks of feminist theory and the Social Identity Model of Collective Action (SIMCA). For feminist theory, which conceptualizes gender as a category that reveals structural subordination (García-Granero, 2020), our model provides empirical support. It quanti-

fies the statistical weight of patriarchal constraints (the "discrimination barriers" factor) and mechanisms of empowerment (the "gender in agriculture" factor), thereby moving beyond theoretical critique. Our finding that institutional support has a substantially larger positive effect than the constraining effect of discrimination provides empirical evidence for the feminist argument that transforming institutional structures is the most effective pathway to achieving gender equity.

For SIMCA (Louis et al., 2020), our study clarifies the institutional conditions that enable collective action. The "gender in agriculture" factor, representing access to training, extension, and participatory governance, can be interpreted as the creation of institutional spaces in which group identification and collective efficacy, both central to SIMCA, can be established. Thus, our model suggests that gender-responsive governance is a key structural precursor to mobilizing the collective action described by SIMCA.

3. METHODOLOGY

This study adopted a quantitative approach to gain a thorough understanding of the discrimination barriers women face and how these barriers influence decision-making processes in sustainable agriculture in Ambato, Ecuador. A contextual review of local agricultural dynamics, together with expert consultation, informed the research design and supported the development of the quantitative survey instrument.

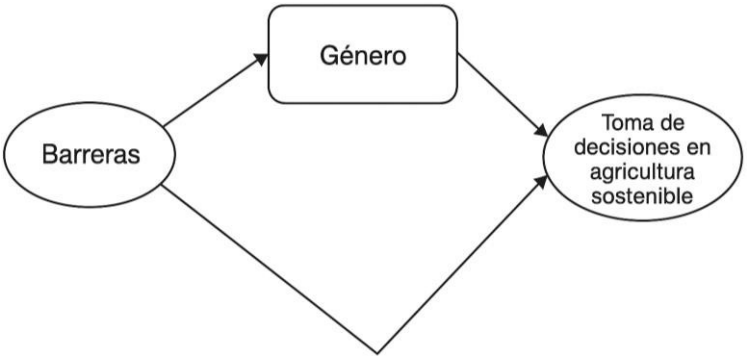
The quantitative phase relied on primary data collected through a structured survey administered to individuals engaged in agricultural activities. A total of 150 questionnaires were initially collected; however, in line with the objectives of the study, only responses from women were retained, resulting in a final sample of 105 valid observations.

The survey instrument was structured around four latent constructs: discrimination barriers, gender in agriculture, women's participation in decision-making, and sociodemographic characteristics. All latent constructs were measured using five-point Likert-type items ranging from 1 (strongly disagree) to 5 (strongly agree). Content validity was ensured through expert review to assess item relevance and clarity.

The data were cleaned in SPSS and analysed in JASP (v0.95.04). A covariance-based SEM (CB-SEM) was estimated, as it is appropriate for theory testing and the evaluation of overall model fit.

The specified measurement and structural model is presented in Figure 1.

Figure 1. Conceptual model of equations



Source: Own elaboration (2025)

SEM specification: PM =~ PMD + BDIS + BCR; BF =~ FCO + FRS + FMER + FMAO + FFA; GA =~ BPR + BCA; PM ~ BF + GA, where PM represents women's participation in decision-making, BF denotes the discrimination barriers factor, and GA corresponds to the

gender in agriculture factor. The observed indicators include participation in community decision-making (PMD), discrimination (BDIS), barriers to access to credit (BCR), lack of technical knowledge (FCO), lack of economic resources (FRS), lack of market access (FMER), lack of labour (FMAO), lack of family support (FFA), barriers to land ownership (BPR), and barriers to access to training (BCA).

Participation in the study was voluntary, and respondents were informed about the purpose of the research. Anonymity and confidentiality of the information provided were guaranteed, and the data were analysed exclusively for academic purposes.

Hypothesis H1: Discrimination barriers have a negative and statistically significant effect on women's participation in decision-making within sustainable agriculture, with gender-related factors mediating this relationship.

Measurement refinement and sensitivity: During the initial confirmatory factor analysis, the indicator for participation in community decision-making (PMD) exhibited a very low and non-significant factor loading ($\lambda \approx 0.141$; $p = .175$). In line with best practices for valid reflective measurement models, this indicator was removed before estimating the final structural model presented in the Results section. Removing this indicator improved the construct validity of the "participation in decision-making" factor and enhanced model parsimony. The reported substantive conclusions do not depend on this indicator.

4. RESULTS

4. 1. MODEL FIT AND MEASUREMENT VALIDATION

The overall model fit was evaluated using established SEM criteria. As shown in Table 1, the model exhibits a solid global fit. The key incremental fit indices are high (CFI = 0.946; TLI = 0.924; IFI = 0.947), indicating that the specified structure adequately reproduces the observed covariance matrix. The absolute fit index (RMSEA = 0.062, 90% CI = 0.046–0.079) falls within the acceptable range, and the SRMR value of 0.077 meets the conventional threshold of less than 0.08. Parsimony-sensitive statistics (PNFI = 0.745) and overall fit indices (GFI = 0.978; MFI = 0.932) further confirm that the model is well specified and sufficiently parsimonious for testing the hypothesized relationships. Table 2 provides a complementary assessment of the model's stability under hypothetical changes in sample size. Although these diagnostic indices suggest some sensitivity, they should be interpreted alongside the primary global fit indices reported in Table 1, which support the validity of the model.

Table 1. SEM Model Fit Indices

Index	Value obtained	Recommended criterion	Evaluation
Comparative Fit Index (CFI)	0.946	≥ 0.90 acceptable; 0.95 excellent	Very good fit
Tucker–Lewis Index (TLI)	0.924	≥ 0.90	Good fit
Bentler–Bonett NNFI	0.924	≥ 0.90	Good fit
Bentler–Bonett NFI	0.904	≥ 0.90	Adequate
Parsimony Normed Fit Index (PNFI)	0.745	≥ 0.50	Suitable
Bollen's Relative Fit Index (RFI)	0.865	≥ 0.80	Acceptable
Bollen's Incremental Fit Index (IFI)	0.947	≥ 0.90	Very good fit

Index	Value obtained	Recommended criterion	Evaluation
Relative Noncentrality Index (RNI)	0.946	≥ 0.90	Very good fit
RMSEA	0.062	≤ 0.08 acceptable ≤ 0.05 very good	Adequate fit
RMSEA 90% CI	0.046 – 0.079	Interval < 0.08	Complies
RMSEA p-close	0.022	> 0.05	No close fit (acceptable)
SRMR	0.077	≤ 0.08	Good fit
Hoelter's N (.05)	102.7	> 200 ideal > 50 acceptable	Acceptable
Hoelter's N (.01)	118.7	> 200 ideal > 50 acceptable	Acceptable
Goodness of Fit Index (GFI)	0.978	≥ 0.90	Excellent
McDonald Fit Index (MFI)	0.932	≥ 0.90	Very good fit
Expected CrossValidation Index (ECVI)	0.456	Lower is better	Adequate

Source: Prepared by the author (2025) using JASP 0.95.4.0 software

Table 2. T-size Fit Indices of the SEM Model

Index	CFI	RMSEA
Estimate	0.877	0.139
Poor–fair limit	0.781	0.118
Fair–close limit	0.858	0.094

Source: The T-size table is reported for diagnostic completeness; it should be interpreted alongside global fit indices.

4. 2. ROBUSTNESS AND JUSTIFICATION OF THE ANALYTICAL APPROACH

A key step in ensuring the robustness of the model is confirming the validity of its measurement components. To ensure that the indicators of each latent construct meaningfully represent their respective factors, the factor loadings were examined. Table 3 shows that lack of economic resources (FRS) and lack of technical knowledge (FCO) are the most robust indicators of the "Discrimination Barriers" (BF) factor. Similarly, Table 4 shows strong loadings for the "Gender in Agriculture" (GA) factor, with barriers to training (BCA) emerging as the strongest indicator. Finally, after the removal of the non-significant PMD indicator, Table 5 confirms that barriers to access to credit (BCR) and discrimination (BDIS) are the strongest indicators of the "Participation of Women in Decision-Making" (PM) factor. Taken together, these tables support the convergent validity of the measurement model, which is a prerequisite for assessing the robustness of the structural paths.

The confirmatory factor analysis indicates that most indicators load significantly ($p < .001$), thereby supporting convergent validity. For the discrimination barriers factor (BF), lack of economic resources (FRS) and lack of technical knowledge (FCO) show the strongest loadings, while lack of market access (FMER) also contributes adequately. The indicators for lack of labour (FMAO) and lack of family support (FFA) show weaker factor loadings, at 0.380 and 0.370, respectively. Although these values fall below the conventional threshold of 0.40, both indicators were retained in the final model for theoretical reasons. These variables represent

important social and relational barriers discussed in feminist literature on agriculture. Removing them would have narrowed the theoretical scope of the "discrimination barriers" construct. Their weaker loadings are likely consistent with contextual heterogeneity; however, they were considered theoretically necessary to ensure full representation of the construct.

Table 3. Factor Discrimination barriers

Indicator	Load	Interpretation
FRS (0.876)	Very high	Most robust indicator; strongly explains the construct.
FCO (0.742)	High	Contributes significantly to the BF factor.
FMER (0.502)	Adequate	Contributes, but with less weight.
FMAO (0.380)	Low	Weak indicator; should be reviewed.
FFA (0.370)	Low	Also weak, possible noise or poor formulation.

Source: Prepared internally (2025) with the help of JASP 0.95.4.0 software

Table 4. Gender factor in agriculture

Indicator	Load	Interpretation
BCA	0.762	Very strong indicator of GA
BPR	0.594	Contributes well to the factor

Source: Prepared internally (2025) with the help of JASP 0.95.4.0 software

Table 5. Factor Participation of Women in Decision-Making

Indicator	Load	Interpretation
BDIS	0.569	Acceptable indicator.
BCR	0.683	Best indicator of the PM factor.
PMD	0.141 (p = .175)	Does not contribute to the construct; should be eliminated.

Source: Prepared internally (2025) with the help of JASP 0.95.4.0 software

4. 3. MEASUREMENT MODEL

After validating the measurement components and the overall model fit, we estimated the structural relationships between the latent factors. The regression coefficients for the direct paths in the structural model are presented in Table 6. The table shows a positive and statistically significant path from "Gender in Agriculture" (GA) to "Participation in Decision-Making" (PM), with a standardized estimate of 0.853 ($p < .001$). The path from "Discrimination Barriers" (BF) to "Participation in Decision-Making" (PM) is also positive and significant, with a standardized estimate of 0.292 ($p = .012$). These coefficients provide the primary statistical evidence for the structural relationships specified in the model and are interpreted in the subsequent section.

Given the sample size ($n = 105$), a series of checks was conducted to ensure the robustness of the results. First, the choice of covariance-based structural equation modelling (CB-SEM) over variance-based approaches, such as partial least squares structural equation modelling (PLS-SEM), was deliberate. CB-SEM is more appropriate for theory testing and hypothesis validation, which are the primary objectives of this study. Although CB-SEM is more sensitive to smaller samples, its rigorous model-fit requirements provide greater confidence in the validity of the identified structural relationships.

Second, to address potential sensitivity related to sample size, a bootstrapping procedure with

5,000 resamples was performed to generate more stable standard errors and confidence intervals for the path coefficients. As shown in Table 6, the key path coefficients for both discrimination barriers (BF → PM) and gender in agriculture (GA → PM) remain statistically significant ($p < .05$), even under these robust estimation procedures. This confirms that the main findings are not merely statistical artifacts of the sample size.

Finally, although some fit indices, such as the RMSEA p-close test ($p = 0.022$), suggest that the model fit is not perfect, the primary incremental and absolute fit indices (CFI = 0.946, GFI = 0.978, and SRMR = 0.077) all meet or exceed the conventional thresholds for good model fit. Taken together, these checks provide confidence that the specified model is robust, theoretically sound, and suitable for supporting the conclusions presented.

Table 6. Regression Coefficients

Outcome	Predictor	Std. estimate	Std. error	z-value	p	95% CI Lower	95% CI Upper
PM	BF	0.292	0.116	2.510	.012	0.064	0.520
PM	GA	0.853	0.158	5.416	< .001	0.545	1.162

Source: Own elaboration (2025) with the help of JASP 0.95.4.0 software

4. 4. STRUCTURAL RELATIONSHIPS AND DISCUSSION

Table 7 summarizes the total effects of the exogenous factors on women's participation in decision-making. These coefficients represent the sum of all direct and indirect pathways from a predictor to the outcome variable and, in this model specification, are identical to the direct effects. As the table shows, Gender in Agriculture (GA) has the strongest positive association with women's participation in decision-making (PM) ($\beta = 0.853$, $p < .001$). This result highlights the importance of institutional support, access to training, and productive autonomy. Discrimination Barriers (BF) also show a positive and statistically significant association with participation ($\beta = 0.292$, $p = .012$). This coefficient should not be interpreted as indicating a desirable effect of discrimination; rather, it likely reflects adaptive and mobilizing responses in contexts where women face structural constraints, such as seeking a voice in decision-making arenas as barriers intensify. The contrast in magnitude between GA and BF indicates that capability-expanding, gender-responsive governance is the most effective lever for shifting decision-making dynamics.

Table 7. Total Effects

Relationship	Std. estimate	Std. error	z-value	p	95% CI Lower	95% CI Upper
BF → PM	0.292	0.116	2.510	.012	0.064	0.520
GA → PM	0.853	0.158	5.416	< .001	0.545	1.162

Source: Prepared internally (2025) using JASP 0.95.4.0 software

One theoretically significant finding is the positive and statistically significant association between discrimination barriers (BF) and women's participation in decision-making processes (PM) ($\beta = 0.292$, $p = .012$). This counterintuitive result requires careful interpretation. It should not be understood as evidence of a desirable effect of discrimination. A technical review of the model confirmed that this result is not an artifact of scale coding or multicollinearity. Instead, one plausible interpretation is that the coefficient reflects a "reactive mobilization" effect, a phenomenon documented in the social and political sciences. This interpretation suggests that, in contexts of heightened and explicitly perceived injustice, women may become more motivated to seek an active voice and contest their exclusion from decision-making arenas as an adaptive response. This interpretation is consistent with the Social Identity Model of Collec-

tive Action (SIMCA), according to which the perception of shared injustice can serve as a powerful catalyst for collective action and participation (Louis et al., 2020).

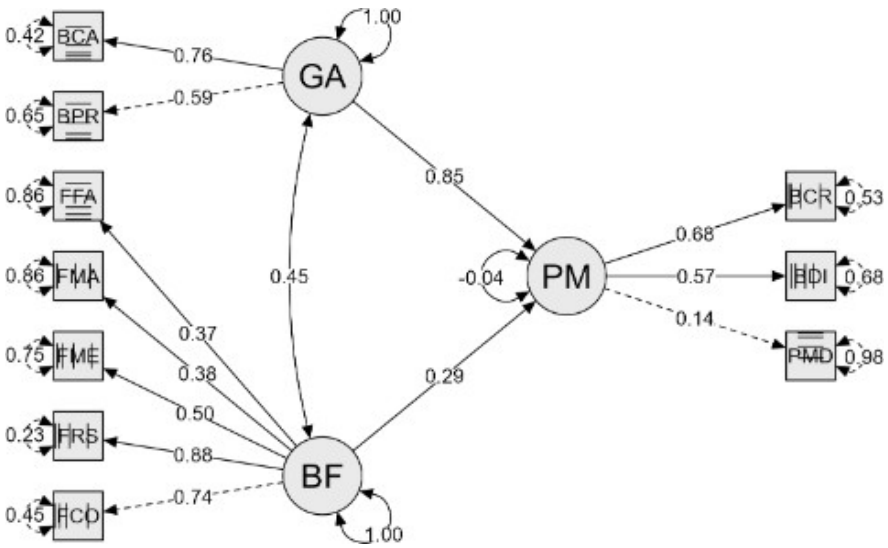
However, alternative explanations must also be considered. For example, this coefficient may reflect a measurement issue whereby women who are more engaged in decision-making processes are also more aware of, and therefore more likely to report, discrimination barriers. Under this interpretation, causality would run in the opposite direction, from participation to the perception of barriers. Although our cross-sectional data do not allow for a definitive test of causality, the contrast in magnitude between the coefficients for institutional support (GA: $\beta = 0.853$) and discrimination barriers (BF: $\beta = 0.292$) remains the most important finding. This suggests that, although a reactive response to discrimination may play a minor role, the proactive and capability-expanding effect of gender-responsive governance is the most effective and reliable lever for strengthening women's decision-making power. Therefore, this finding should be interpreted with caution; however, it does not alter the study's main conclusion that institutional inclusion is the primary pathway to empowerment.

By contrast, the effect of gender in agriculture on decision-making shows a substantially larger coefficient ($\beta = 0.853$; SE = 0.158; $z = 5.416$; $p < 0.001$; 95% CI [0.545, 1.162]), indicating that institutional and organizational mechanisms that promote inclusion, technical training, and productive autonomy are the most influential determinants of strengthening women's participation.

This result suggests that the provision of agricultural extension services, formal participation in community associations and committees, and access to strategic information play a critical role in reducing gender gaps and enabling women to assume more active roles in the planning, management, and adoption of sustainable practices. The magnitude of the coefficient reflects a robust and cross-cutting impact, indicating that policies aimed at strengthening rural governance have the potential to transform long-standing structures of inequality.

Taken together, these findings confirm that discrimination is a verifiable obstacle to women's empowerment in sustainable agriculture; however, they also reveal that institutional action, through participatory and inclusive governance models, can not only mitigate this effect but also substantially offset it. The empirical evidence supports the need to design comprehensive interventions that combine the reduction of discriminatory practices with the strengthening of institutional capacities and participatory spaces to promote a more equitable, resilient and socially inclusive model of sustainable agriculture in Ambato.

Figure 2. Simultaneous equation model (SEM)



Source: Prepared by the author (2025) with the help of JASP 0.95.4.0 software

Consistent with Figure 2, the results indicate that Gender in Agriculture (GA) has a strong and statistically significant positive association with women's participation in decision-making ($\beta = 0.853$, SE = 0.158, $z = 5.416$, $p < 0.001$). Discrimination Barriers (BF) also exhibit a positive and statistically significant association, although the effect is notably smaller in magnitude ($\beta = 0.292$, SE = 0.116, $z = 2.510$, $p = 0.012$; 95% CI [0.064, 0.520]). The moderate positive covariance between BF and GA ($\varphi = 0.45$) suggests an important relationship between these latent dimensions, indicating that more gender-inclusive agricultural contexts tend to be associated with lower perceived barriers, depending on the coding direction.

In the measurement model, most indicators display robust standardized loadings above 0.60 for both BF and GA, supporting the reliability of these constructs. One indicator of the participation factor (PM), however, showed a low loading (approximately 0.14) and was therefore subjected to sensitivity analysis. Overall, the model provides consistent evidence that gender-responsive agricultural support mechanisms are the most influential factor in strengthening women's participation in sustainable agricultural decision-making in Ambato, while discrimination barriers remain relevant but comparatively less decisive.

5. DISCUSSION

The results of this study provide important insights into the mechanisms that shape women's participation in agricultural decision-making. The main finding that gender-responsive institutional support (GA) substantially enhances women's decision-making capacity ($\beta = 0.853$), while discrimination barriers are also significantly associated with it ($\beta = 0.292$) offers robust quantitative support for a capability-expansion model of empowerment. Although the literature extensively documents how structural barriers constrain women's agency (Ojo & Baiyegunhi, 2023), our findings suggest that the proactive creation of opportunities is a more powerful lever for change than the mere reduction of constraints. This interpretation is consistent with evidence from both Latin America and Africa. For example, studies in Peru and Zambia have shown that women's access to agricultural information and formal land ownership plays a crucial role in strengthening food security and promoting crop diversification (Schling & Pazos, 2021; Mwalupaso et al., 2019). Our study confirms this conclusion in the Andean context, demonstrating that institutional mechanisms are central to women's empowerment.

The strong effect of the institutional factor (GA) can be explained by its direct influence on women's agency and autonomy. Its key indicators access to training (BCA) and secure land tenure (BPR) should be understood not merely as inputs, but as foundational assets that strengthen women's capacity to act independently and effectively. Technical training builds human capital by increasing women's confidence and competence in making complex agricultural decisions. Secure land tenure provides the economic and psychological security necessary for long-term investment in sustainable practices. This perspective moves beyond critiques of conventional economic models (Herfeld, 2022) by showing that when women possess both knowledge and asset security, their involvement in decision-making becomes central rather than peripheral. In this light, the positive coefficient on discrimination barriers (BF) may reflect a process of reactive mobilization, whereby more empowered women become increasingly visible and more willing to challenge the discrimination they encounter.

These findings also contribute to the theoretical frameworks of feminist theory and the Social Identity Model of Collective Action (SIMCA). Within feminist theory, which highlights structural subordination in patriarchal systems (García-Granero, 2020), our model provides empirical support by quantifying the relative weight of constraints and empowerment pathways. The dominant effect of the gender-based institutional factor (GA) offers concrete evidence that transforming institutional structures is the most effective strategy for advancing gender equity.

In relation to SIMCA, which posits that collective efficacy is a key driver of social change, our results help clarify the institutional conditions that make such efficacy possible. The GA factor captures access to training and participation and, in doing so, reflects the spaces in which group identification and shared confidence for collective action can emerge. Accordingly, our model suggests that gender-responsive governance is a key structural precondition for mobilizing the collective agency described by SIMCA.

6. CONCLUSION AND POLICY RECOMMENDATIONS

The findings of this study demonstrate that sustainable agricultural decision-making in Ambato is strongly shaped by gender dynamics. Although discrimination barriers significantly constrain women's agency, the most decisive factor in strengthening their empowerment is the presence of gender-responsive institutional mechanisms. Access to training, extension services, and secure land tenure can substantially offset the effects of discrimination. The primary contribution of this study lies in the empirical validation of a dual-strategy approach: policies must work to reduce discriminatory practices and, more importantly, to strengthen institutional capacities that empower women.

From a policy perspective, the evidence suggests that promoting sustainable agriculture in Ambato requires a dual strategy. First, policies should explicitly target the reduction of discriminatory practices that restrict women's access to resources, information, and decision-making arenas. Second, public and community interventions should prioritize the strengthening of participatory institutional capacities, particularly those related to training, extension, and organizational inclusion, given their greater impact on women's participation.

The articulation of gender equity, collective action, and sustainability thus emerges not only as a normative objective but also as a practical requirement for developing more efficient, resilient, and inclusive agricultural systems. By providing empirical evidence from a local context, this study contributes to the applied economic literature and supports the design of gender-responsive policies aimed at closing decision-making gaps and fostering sustainable rural development in Ecuador.

Finally, the limitations of this study must be acknowledged. Because the research is based on cross-sectional data, it is not possible to establish causality definitively. The interpretation of the positive association between discrimination barriers and decision-making as a "reactive mobilization" effect is theoretically grounded, but reverse causality cannot be ruled out. This finding should therefore be interpreted with caution. Future research using longitudinal panel data or experimental designs capable of disentangling the causal pathways between the perception of injustice and the mobilization of women's agency in agricultural decision-making is needed to test this mechanism more robustly.

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REFERENCES

Acuña Alvarado, M. (2020). The gender gap in access to land: a look at agricultural policy aimed at rural women in Costa Rica. *Yearbook of the Center for Research and Political Studies,* 11, 162–194. https://doi.org/10.15517/aciep.v0i11.43257

Ali, D., Deininger, K., & Goldstein, M. (2016). Investigating the gender gap in agricultural productivity: Evidence from Uganda. *World Development,* 87, 152–170. https://doi.org/10.1016/j.worlddev.2016.06.006

Ballara, M., Damianovi, N., & Valenzuela, R. (2012). Women, agriculture, and food security: A look at strengthening public policies in Latin America. *BRIDGE*. https://bit.ly/2StQXeP

Bonilla, A. B., & Singaña D. T. (2019). Agricultural productivity beyond yield per hectare: analysis of rice and hard corn crops in Ecuador. *La Granja: Revista de Ciencias de la Vida,* 29(1), 70-83. https://doi.org/10.17163/lgr.n29.2019.06

Evenson, R. (2015). The scientific origins of the green and gene revolutions. In H. Beladi & K. Choi (Eds.). *Frontiers of economics and globalization,* 465-496. Elsevier Science Ltd. https://doi.org/10.1016/S1574-8715(07)00014-0

García-Granero, M. (2020). The problem of the depoliticization of "gender" for feminist theory. *Araucaria. Ibero-American Journal of Philosophy, Politics, Humanities, and International Relations*, *22*(44). https://dx.doi.org/10.12795/araucaria.2020.i44.09

González Lazalde, I., Lechuga Nevárez, M. del R., & Galván Ismael, M. Q. (2025). Rurality and gender gaps in agricultural activity. *Ciencia Latina Multidisciplinary Scientific Journal,* 9(1), 1–19. https://doi.org/10.37811/cl_rcm.v9i1.16129

Herfeld, C. (2022). Revisiting the criticisms of rational choice theories. *Philosophy Compass*, *17*(1), e12774. https://doi.org/10.1111/phc3.12774

Hidalgo García, M. del M. (2010). The role of women in food security. In The role of women in food security, 93–107. FAO. https://dialnet.unirioja.es/servlet/articulo?codigo=4229912

Houtart, F. (2016). The challenge of peasant farming for Ecuador. In F. Houtart (Ed.), Manifesto for peasant and indigenous family farming in Ecuador, 167–178. IAEN. https://books.google.com/books?id=ZDIkD0F-Sj0C

Huang, Hansen & Uri (1993) Huang, W.-Y., Hansen, L., & Uri, N. D. (1993). The timing of nitrogen fertilizer application: the case of cotton production in the United States. *Applied Mathematical Modelling,* 17(2), 89–97. https://bit.ly/2RVCPpv

Kawarazuka, N., Doss, C. R., Farnworth, C. R., & Pyburn, R. (2022). Myths about the feminization of agriculture: Implications for global food security. *Current Opinion in Environmental Sustainability,* 33, 100–107. https://doi.org/10.1016/j.gfs.2022.100611

Louis, W., Thomas, E., McGarty, C., Lizzio-Wilson, M., Amiot, C., & Moghaddam, F. (2020). The volatility of collective action: Theoretical analysis and empirical data. *Advances in Political Psychology*. https://doi.org/10.1111/pops.12671

Mastilo, Z., Puška, A., Štilić, A. (2026). An Assessment of the Potential of Artificial Intelligence Applications for Sustainable Development in Southeastern European Countries. *Ekonomski horizonti, 28*(1), 3-18. https://doi.org/10.5937/ekonhor2601003M

Mohd Ruslan, R. A., Abd Rashid, I. M., Shafiai, S., Fianto, B. A., & Mohd.Yusof , A. (2025). The Relationship between Islamic Microfinancing, Energy Supply Adequacy and Performance of Agriculture Microenterprises. *Economics - Innovative and Economic Research Journal, 13*(2), 55-69. https://doi.org/10.2478/eoik-2025-0030

Moseley, W. G. (2015). Food security and 'green revolution. In J. Wright (Ed.), International encyclopedia of the social & behavioral sciences (pp. 307-310). Elsevier. https://bit.ly/2DC8uY3

Mwalupaso, G. E., Wang, S., Rahman, S., Alavo, E. J.-P., & Tian, X. (2019). Agricultural Informatization and Technical Efficiency in Maize Production in Zambia. *Sustainability,* 11(8), 2451. https://doi.org/10.3390/su11082451

Nakano et al. (2013) Nakano, Y., et al. (2013). The Possibility of a Rice Green Revolution in Large-Scale Irrigation Schemes in Sub-Saharan Africa. In K. Otsuka & D. Larson (Eds.), *An African Green Revolution,* 43–70. Springer Dordrecht Heidelberg. https://link.springer.com/chapter/10.1007/978-94-007-5760-8_3

Ojo, T. O., & Baiyegunhi, L. J. S. (2023). Gender differentials on productivity of rice farmers in south-western Nigeria: An Oaxaca-Blinder decomposition approach. *Heliyon*, 9(11), e22724. https://doi.org/10.1016/j.heliyon.2023.e22724

Pertuz-Guzmán, D. L., Chams-Chams, L. M., Valencia-Jiménez, N. N., Arrieta-Díaz, J., & Luna-Carrascal, J. (2024). Understanding food insecurity in rural families: a case study in Pueblo Nuevo (Córdoba, Colombia). *Primary Care,* 57(7), 103109. https://doi.org/10.1016/j.aprim.2024.103109

Phillips, R. L. (2014). Green revolution: Past, present, and future. In N. K. Van Alfen (Ed.). *Encyclopedia of agriculture and food systems,* 529-538. Academic Press. https://bit.ly/2SvJls7

Schling, M., & Pazos, N. (2021). Effective Land Ownership, Female Empowerment, and Food Security: Evidence from Peru. Inter-American Development Bank. https://doi.org/10.1016/j.worlddev.2024.106680

Shaikh et al. (2016) Shaikh, S., et al. (2016). Determinants of Rice Productivity: An Analysis of Jaffarabad District-Balochistan (Pakistan). *European Scientific Journal,* 12(13), 41–50. https://doi.org/10.19044/esj.2016.v12n13p41

Tesafa, F., Mulugeta, M., & Tsehay, S. (2025). Women empowerment, efficiency and food security nexus in rural Ethiopia: A generalized structural equation modeling. *Heliyon,* 11(1), e41273. https://doi.org/10.1016/j.heliyon.2024.e41273

Wu, F., & Butz, W. (2004). The future of genetically modified crops: Lessons from the green revolution. *RAND Corporation*. https://goo.gl/AqQ7Ub

Zhang et al. (2015) Zhang, C., et al. (2015). Productivity effect and overuse of pesticide in crop production in China. *Journal of Integrative Agriculture*, 14(9), 1903–1910. https://doi.org/10.1016/S2095-3119(15)61056-5