

Rebuilding Agricultural Information Systems Through Climate-Smart Journalism Education: A Cross-Country Impact Assessment in the South Caucasus

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Abstract

Agricultural information systems in the South Caucasus have been shaped by institutional restructuring, media resource constraints, and limited sector-specific journalistic capacity. In this context, climate-related risks, rural livelihood vulnerabilities, and the erosion of agricultural extension mechanisms have further intensified information gaps affecting farmers and rural producers. This study assesses the impact of a cross-sectoral educational and media intervention aimed at rebuilding agricultural information systems through climate-smart journalism education in Georgia, Armenia, and Azerbaijan.

The intervention, implemented between 2023 and 2026, integrated three core components: (1) the development and institutionalization of a Climate-Smart Communication and Reporting module within journalism education; (2) capacity-building activities for journalists and regional media; and (3) the establishment of a regional media hub facilitating knowledge exchange between universities, media outlets, and rural stakeholders. To evaluate impact, three independent researchers conducted country-level studies using a unified research instrument adapted to local media ecosystems. In Georgia, data were collected through face-to-face interviews with farmers, while in Armenia and Azerbaijan online surveys were employed,

complemented in Armenia by qualitative expert interviews. The findings demonstrate that structured educational intervention in journalism can contribute to strengthening agricultural information ecosystems by enhancing media quality, improving farmers' access to practical knowledge, and fostering cross-sectoral linkages between academia, media, and rural communities. While structural constraints persist—particularly regarding institutional data access and media resource limitations—the results indicate measurable shifts in information behavior, content quality, and perceived resilience among rural producers.

The study contributes to the growing scholarship on development communication and climate-smart journalism by providing comparative empirical evidence from a post-Soviet regional context, highlighting education-based media reform as a viable pathway for rebuilding sectoral information systems.

Introduction

Agricultural information systems play a critical role in shaping rural livelihoods, climate resilience, and food security. In transitional and post-Soviet contexts, where institutional reforms, market liberalization, and political restructuring have transformed governance systems, the stability and functionality of sector-specific information ecosystems have often been disrupted. In the South Caucasus—comprising Georgia, Armenia, and Azerbaijan—agriculture remains socio-economically significant, particularly for rural communities. Yet the systems that mediate agricultural knowledge, public policy communication, and practical information dissemination have undergone fragmentation over the past decades.

From a theoretical perspective, this study draws upon three interrelated frameworks: development communication theory, media systems theory, and knowledge transfer models in agricultural extension. Development communication scholarship emphasizes the role of media not merely as information transmitters but as facilitators of participatory development, social learning, and institutional accountability (Servaes, 2008; Melkote & Steeves, 2015). In agricultural contexts, communication functions as an enabling

infrastructure—supporting behavioral change, innovation diffusion, and adaptive capacity in response to environmental and economic pressures. Rogers' (2003) diffusion of innovations theory further underscores how access to credible, context-relevant information shapes adoption patterns among farmers. However, such diffusion requires trusted intermediaries and stable communication channels.

Media systems theory adds a structural dimension, suggesting that journalistic capacity, institutional frameworks, political agenda-setting, and economic sustainability directly influence content production priorities (Hallin & Mancini, 2004). In small media markets such as those of the South Caucasus, limited financial resources, political polarization, and centralized editorial agendas tend to marginalize sectoral coverage—including agriculture and environmental reporting. Consequently, rural producers often experience information asymmetry, receiving sporadic, event-driven coverage rather than systematic, practical knowledge.

In parallel, agricultural extension literature highlights that effective knowledge transfer systems require institutional coordination between research institutions, advisory services, and communication platforms (Rivera & Sulaiman, 2009). In many post-Soviet countries, extension mechanisms have weakened or been dismantled, leaving media as one of the few remaining channels for agricultural information dissemination. Yet journalists are rarely equipped with specialized agricultural knowledge, and journalism curricula seldom integrate climate or sector-specific communication modules.

Baseline Context in 2023

When the cross-country intervention assessed in this study began in late 2023, agricultural information ecosystems across Georgia, Armenia, and Azerbaijan shared several structural characteristics, though with varying institutional configurations.

In Georgia, niche agricultural media existed, and regional broadcasters maintained local presence across the country. However, climate-smart reporting practices were not institutionalized within journalism education. A baseline mapping of journalism schools

revealed that none offered a dedicated module on climate-smart communication, and agricultural reporting was either embedded superficially within broader courses or absent entirely. Media production on agricultural issues was largely personality-driven or project-based rather than structurally integrated into editorial priorities.

In Armenia, institutional restructuring had significantly altered the agricultural governance landscape. The abolition of the Ministry of Agriculture and the dismantling of regional support centers removed focal points for policy communication and coordination. Journalists reported difficulties accessing official data, and agricultural coverage was frequently marginalized by political agenda-setting dynamics. Specialized agricultural journalism training was virtually non-existent, and rural information gaps were widely acknowledged by practitioners.

In Azerbaijan, while agricultural policy structures remained formally intact, media centralization and limited independent sectoral coverage constrained agricultural reporting. Journalistic capacity-building initiatives on climate and environmental issues were sporadic, and structured collaboration between universities, media outlets, and rural stakeholders was minimal.

Across the three countries, baseline characteristics included:

- Absence of climate-smart journalism modules in higher education;
- Limited structured cooperation between universities and media organizations;
- Scarcity of specialized agricultural journalists;
- Fragmented dissemination of practical agricultural knowledge;
- Weak cross-sectoral linkages between academia, media, and rural communities.

These conditions collectively reflected what may be termed fragile agricultural information systems—ecosystems lacking stable institutional anchoring, educational reinforcement, and coordinated knowledge transfer mechanisms.

Conceptualizing Educational Intervention as Systemic Reform

Against this backdrop, the intervention examined in this study conceptualized journalism education not merely as professional training but as structural leverage within the information ecosystem. Rather than focusing solely on short-term media production outputs, the initiative introduced a Climate-Smart Communication and Reporting module designed for integration into university curricula, coupled with journalist capacity-building and the establishment of a Regional Media Hub.

The underlying hypothesis was that strengthening agricultural information systems requires cross-sectoral integration—linking universities, media outlets, and rural stakeholders within a coordinated framework. By embedding climate-smart agricultural reporting within formal education structures, the intervention sought to generate sustainable change in journalistic practice, enhance content quality, and indirectly influence farmers' information behavior.

Importantly, this approach moves beyond traditional development communication models centered on awareness campaigns. Instead, it positions journalism education as an infrastructural reform mechanism—capable of rebuilding sector-specific information ecosystems in contexts where institutional agricultural extension services are weakened.

Research Objective

This study provides a cross-country impact assessment of that intervention, examining whether and how a structured educational and media initiative contributed to rebuilding agricultural information systems in Georgia, Armenia, and Azerbaijan. By employing a unified research instrument adapted to national media environments and combining qualitative and quantitative methods, the study offers comparative empirical insights into the systemic effects of climate-smart journalism education.

In doing so, it contributes to scholarship on development communication, media reform, and climate adaptation by

demonstrating how educational intervention can function as a stabilizing force within fragile sectoral information systems.

Research Questions

Given the structural weaknesses of agricultural information systems identified at baseline and the implementation of a cross-sectoral educational intervention between 2023 and 2026, this study addresses the following research questions:

RQ1.

How did the introduction of Climate-Smart Journalism Education influence the structure and quality of agricultural media content in Georgia, Armenia, and Azerbaijan?

RQ2.

To what extent did the intervention affect farmers' information behavior, including trust in media sources, adoption of agro-ecological practices, and perceived access to practical knowledge?

RQ3.

Did cross-sectoral collaboration between universities, media outlets, and rural stakeholders strengthen agricultural information ecosystems at the national level?

RQ4.

How did differences in institutional environments (e.g., governance structures, media systems, data accessibility) mediate the impact of the intervention across the three countries?

RQ5.

Can journalism education function as a structural reform mechanism in contexts where traditional agricultural extension systems are weakened or fragmented?

This study employs a comparative cross-country impact assessment design aimed at evaluating the systemic effects of a cross-sectoral educational and media intervention implemented between 2023 and 2026 in Georgia, Armenia, and Azerbaijan. The intervention combined

journalism education reform, professional capacity-building for practicing journalists, and the establishment of a regional media hub facilitating cooperation among universities, media outlets, and rural stakeholders.

To ensure conceptual coherence across national contexts, a unified research instrument was developed and shared with three independent country researchers. While methodological modalities varied to reflect contextual realities, the core research framework remained standardized, allowing cross-country comparability. The design integrates both quantitative and qualitative methods in order to capture structural, behavioral, and perceptual dimensions of agricultural information systems.

Data Collection Procedures

Georgia

In Georgia, data were collected through face-to-face semi-structured interviews with farmers and rural producers. The use of in-person interviews enabled deeper exploration of participants' lived experiences and facilitated contextual observation of rural environments. Interviews focused on patterns of information consumption, levels of trust in media sources, behavioral changes in agricultural practices, and perceptions of the usefulness of climate-smart media content.

The face-to-face format allowed for follow-up probing, clarification of responses, and richer qualitative insights into how information flows operate within rural communities. This approach was particularly valuable for understanding nuanced shifts in information behavior and for capturing informal knowledge networks that may not emerge in survey-based instruments.

Armenia

In Armenia, a mixed-methods approach was employed. Quantitative data were gathered through online survey questionnaires distributed to farmers and rural producers. These surveys examined media usage

patterns, trust in information sources, perceived access to agricultural knowledge, and self-reported adoption of agro-ecological practices.

In addition, qualitative expert interviews were conducted with journalists, investigative reporters, and media practitioners working in agricultural and environmental reporting. These interviews provided critical insight into structural constraints within the Armenian media system, including institutional barriers, resource limitations, and data accessibility challenges. The Armenian component therefore combines farmer-level behavioral data with system-level professional perspectives.

Azerbaijan

In Azerbaijan, data collection was conducted primarily through online surveys targeting farmers and rural producers. The questionnaire mirrored the instruments used in Georgia and Armenia, with modifications limited to national media outlet references and locally relevant information sources.

Although qualitative interviews were not conducted at the same scale as in Armenia, the Azerbaijani survey data provide comparative insight into farmers' information behavior, trust patterns, and engagement with climate-smart agricultural content within a more centralized media environment.

The research instrument was standardized across the three countries to ensure conceptual consistency. It included demographic variables, media usage patterns, trust in various information sources (including television, online platforms, social networks, and peer networks), adoption of agro-ecological and climate-smart practices, perceived impact of media content on agricultural decision-making, barriers to information access, and willingness to engage with innovative agricultural methods.

Minor contextual adjustments were introduced to reflect country-specific media ecosystems, particularly in relation to the naming of national broadcasters, digital platforms, and local agricultural information channels. These adaptations did not alter the conceptual

structure of the instrument but enhanced local relevance and response accuracy.

The analysis combines descriptive statistical examination of survey data with thematic analysis of qualitative interviews. Cross-country comparison serves as the primary analytical lens, allowing identification of both shared structural patterns and nationally specific mediating factors.

Rather than evaluating isolated outputs—such as the number of media materials produced—the assessment focuses on systemic shifts within agricultural information ecosystems. Analytical attention is directed toward changes in information accessibility, trust dynamics, behavioral adaptation indicators among farmers, cross-sectoral linkage development between academia and media, and the role of institutional environments in shaping intervention outcomes.

The ecosystem-level interpretation framework positions agricultural information systems as interdependent structures linking media institutions, educational bodies, policy environments, and rural producers. Accordingly, impact is assessed not solely at the level of individual respondents but within broader communicative infrastructures.

Limitations

Several methodological limitations must be acknowledged. First, data collection modalities differed across countries: face-to-face interviews were conducted in Georgia, while Armenia and Azerbaijan relied primarily on online surveys, with Armenia additionally incorporating qualitative expert interviews. These differences may influence the depth and texture of data, particularly in capturing contextual nuances.

Second, variations in media system structures, governance arrangements, and data accessibility across the three countries complicate direct causal attribution. The study does not claim experimental causality but instead emphasizes systemic pattern recognition and comparative interpretation.

Finally, self-reported behavioral change indicators may be subject to recall bias or social desirability bias. Despite these limitations, the use of a unified research instrument and independent national researchers strengthens cross-country comparability and enhances the credibility of findings.

Farmers' Information Sources and the Impact of Climate-Smart Journalism Intervention

One of the central dimensions assessed in this study concerns the structure of farmers' information sources across Georgia, Armenia, and Azerbaijan, and the extent to which the cross-sectoral educational intervention influenced these patterns.

At baseline, agricultural information systems in all three countries exhibited a hybrid structure combining traditional broadcast media, interpersonal networks, and emerging digital platforms. However, the weight and trust attributed to these sources varied significantly by national context.

Armenia: Television as the Dominant Agricultural Information Channel

In Armenia, television remains the primary source of agricultural and environmental information for rural producers. Survey data indicate that a substantial proportion of farmers continue to rely on national broadcast channels, with particular emphasis on the Public Television of Armenia as a trusted source of sector-related information. This pattern reflects both structural and cultural factors: high penetration of traditional television in rural areas, relatively lower levels of digital media diversification, and limited presence of specialized agricultural online platforms.

Qualitative interviews conducted with journalists further confirm that televised agricultural content retains symbolic legitimacy. Farmers perceive televised information as institutionally validated, even when they express skepticism toward broader political content. This duality suggests that agriculture-related programming may operate somewhat independently from politically driven news cycles.

Following the implementation of climate-smart journalism guidelines and journalist trainings, Armenian respondents reported increased exposure to structured agricultural content addressing practical issues such as pest control, climate adaptation, and livestock management. While television remained dominant, the quality and thematic depth of content appear to have improved, particularly where journalists incorporated explanatory and solution-oriented formats introduced during trainings.

Georgia: Diversified Information Ecosystem with Regional Media Influence

In Georgia, farmers' information sources demonstrate greater diversification. While television remains important—particularly regional broadcasters—digital platforms, social media, and peer networks play a more substantial role compared to Armenia.

Face-to-face interviews reveal that farmers frequently combine multiple information sources: local television programs, Facebook-based agricultural groups, YouTube videos, and direct consultation with fellow farmers. Trust patterns tend to correlate with perceived practical relevance rather than institutional authority alone.

The introduction of a climate-smart reporting module in universities and targeted journalist trainings contributed to strengthening regional agricultural coverage. Respondents noted increased availability of locally relevant content addressing crop-specific and region-specific challenges. Importantly, the establishment of the Regional Media Hub facilitated stronger linkages between journalists and rural stakeholders, improving responsiveness to community concerns.

While television did not lose its significance, the intervention appears to have enhanced the credibility and usability of regional media content. Farmers increasingly referenced explanatory formats and solution-oriented reporting rather than purely event-driven coverage.

Azerbaijan: Emerging Digital Engagement within a Centralized Media Context

In Azerbaijan, survey data suggest a transitional information environment. Traditional broadcast television remains influential, particularly state-affiliated channels, yet digital platforms and social media are gaining traction among younger and mid-aged rural producers.

The standardized questionnaire indicates that farmers often supplement television information with online searches and informal networks. However, trust in independent or specialized agricultural media remains comparatively lower, reflecting a more centralized media ecosystem.

Although the intervention in Azerbaijan relied primarily on journalist capacity-building and guideline dissemination rather than extensive qualitative engagement, respondents reported greater awareness of climate-related agricultural risks and practical mitigation strategies following the intervention period. This suggests that even within centralized systems, structured journalist education can contribute to incremental diversification of content.

Cross-Country Patterns

Across the three countries, several common patterns emerge:

1. Television continues to serve as a foundational information source, particularly in Armenia.
2. Digital and peer-based networks supplement traditional media, especially in Georgia.
3. Trust in agricultural information is strongly linked to perceived practical relevance rather than political alignment.
4. Structured climate-smart reporting improves perceived content usefulness, even where media systems differ substantially.

The data indicate that the development of climate-smart journalism guidelines and the implementation of targeted trainings did not fundamentally replace existing information channels. Rather, they

enhanced the quality, clarity, and applicability of content within those channels.

This finding aligns with diffusion of innovations theory (Rogers, 2003), suggesting that credibility and clarity of communication—rather than mere channel expansion—are central to behavioral adaptation. In contexts where agricultural extension systems are weakened, improving journalistic competence appears to strengthen existing communicative infrastructures rather than creating entirely new ones.

Utilization of Agricultural Information and Perceived Impact on Farming Practices

Beyond identifying primary information sources, a critical dimension of this study concerns the extent to which farmers actively use agricultural media content and how such use translates into behavioral or practical change.

Georgia: From Information Consumption to Practice Adaptation

In Georgia, face-to-face interviews reveal that farmers not only consume agricultural information but frequently integrate it into decision-making processes. Respondents reported applying knowledge related to pruning techniques, pest control, composting, greenhouse management, and climate-adaptive crop practices.

Several interviewees explicitly connected improved yields or reduced production costs to information obtained through media channels. Farmers emphasized that explanatory, step-by-step formats were particularly influential in encouraging experimentation with bio-fertilizers, reduced chemical input, and soil management strategies.

The intervention's climate-smart reporting guidelines appear to have strengthened solution-oriented journalism, increasing the perceived practicality of content. Rather than remaining at the level of policy announcements, agricultural media coverage increasingly addressed actionable techniques, which farmers reported testing on small plots before scaling up. This incremental adoption pattern reflects classical diffusion dynamics, where early experimentation precedes broader implementation.

Importantly, Georgian respondents indicated that trust and practical clarity were decisive factors in transforming information into practice. Where content was locally contextualized and visually demonstrated, farmers expressed higher willingness to apply recommended techniques.

Armenia: High Media Reliance, Selective Practical Adoption

In Armenia, television remains the dominant agricultural information source; however, the transition from information exposure to practical application appears more selective. Survey responses indicate that while a majority of farmers regularly access agricultural programming—particularly through Public Television—fewer report systematic implementation of recommended practices.

Nevertheless, qualitative findings suggest that climate-smart explanatory formats introduced during journalist trainings contributed to increased awareness of pest management, livestock heat stress mitigation, and irrigation efficiency. Farmers reported that clear, problem-focused reporting enhanced their understanding of climate-related risks.

Adoption patterns in Armenia appear influenced by structural constraints, including access to inputs, financial resources, and extension support. Thus, while information exposure increased, implementation often depended on broader institutional conditions. Media content functioned primarily as awareness-raising and risk-prevention guidance rather than as a direct driver of systemic transformation.

Azerbaijan: Awareness Growth and Incremental Behavioral Shifts

In Azerbaijan, survey data indicate that farmers frequently encounter agricultural information through television and increasingly through digital channels. The intervention's impact is reflected in reported increases in awareness of climate-related agricultural risks and interest in bio-practices.

However, the translation of knowledge into sustained behavioral change appears gradual. Farmers reported testing specific techniques—such as reduced pesticide use or alternative crop management methods—on limited scales. Broader adoption was often contingent upon market conditions and perceived economic viability.

This suggests that in more centralized media environments, educational intervention may first shift cognitive awareness before producing measurable structural practice change. The relationship between information and behavior appears mediated by economic and institutional stability.

Cross-Country Impact Patterns

Across the three countries, several comparative patterns emerge:

1. Exposure to climate-smart agricultural media increased during the intervention period.
2. Farmers demonstrated varying degrees of practical adoption, with Georgia showing the strongest direct application patterns.
3. The perceived usefulness of content was closely linked to clarity, local relevance, and solution-oriented framing.
4. Structural constraints — financial, institutional, or infrastructural — moderated the translation of information into large-scale behavioral change.

Rather than producing uniform transformation, the intervention appears to have strengthened the informational foundation upon which adaptive agricultural practices can develop. In contexts where extension services are weakened, journalism education reform contributed to improving the quality and applicability of agricultural content, thereby enhancing farmers' capacity to make informed decisions.

This supports the argument that journalism education can function as an indirect yet significant mechanism of agricultural system strengthening. While media alone cannot substitute for institutional agricultural reform, it can reinforce adaptive knowledge pathways and reduce informational asymmetries within rural communities.

Adoption of Agro-Ecological Practices and Sector-Specific Impact: Livestock and Beekeeping

One of the most tangible indicators of intervention impact concerns the adoption of agro-ecological practices and sector-specific improvements, particularly in livestock management and beekeeping. Across the three countries, the data reveal that exposure to climate-smart agricultural media was most strongly associated with incremental changes in environmentally adaptive farming practices rather than with large-scale structural transformation.

Agro-Ecological Practices: From Awareness to Application

In Georgia, farmers reported the highest level of practical adoption of agro-ecological techniques. Interview data indicate increased use of bio-fertilizers, composting methods, reduction of chemical inputs, and improved disease prevention strategies. Several respondents explicitly linked media-derived knowledge to measurable improvements in crop resilience and soil protection. The emphasis on explanatory formats—demonstrating “how” rather than merely “what”—appears to have facilitated experimentation and small-scale testing prior to broader adoption.

In Armenia and Azerbaijan, survey data suggest a growing awareness of agro-ecological approaches, including pest management alternatives and climate-adaptive cultivation methods. However, adoption levels were more selective and often constrained by input availability and economic considerations. Farmers expressed interest in environmentally sustainable practices but frequently cited financial limitations or lack of advisory services as barriers to full implementation.

Across all three contexts, agro-ecological adoption followed a gradual trajectory: initial awareness, selective experimentation, and conditional integration into routine practice. The intervention appears to have accelerated the awareness and experimentation stages.

Cost Reduction and Labor Efficiency

A recurring theme across interviews and survey responses concerns economic rationality. Farmers are more likely to adopt practices perceived to reduce input costs, labor intensity, or production risk.

In Georgia, respondents reported that composting organic waste reduced fertilizer expenditures and improved soil quality simultaneously. Some livestock farmers indicated that improved feed management strategies learned through media programming resulted in healthier animals and lower veterinary costs. These examples suggest that where climate-smart content aligns ecological sustainability with economic benefit, adoption rates increase significantly.

In Armenia, farmers described applying risk-prevention knowledge—particularly in livestock disease management and irrigation timing—to avoid potential losses. While not always framed as innovation, such preventive measures contribute to cost efficiency by reducing avoidable damage.

In Azerbaijan, respondents noted increased interest in optimizing pesticide use and improving crop rotation practices to enhance productivity. However, adoption was often cautious and incremental, reflecting both economic uncertainty and limited extension support.

The data suggest that the perceived economic impact of climate-smart information plays a decisive role in behavioral change. Environmental framing alone is insufficient; farmers respond most strongly to practices that combine ecological sustainability with financial viability.

Livestock Management: Climate Adaptation and Preventive Knowledge

The livestock sector emerged as one of the areas where media intervention demonstrated clear relevance. Climate-related stress, disease outbreaks, and feed quality management are recurring challenges across the South Caucasus.

In Georgia, farmers reported increased awareness of heat stress management in livestock and improved disease prevention techniques. Explanatory video formats addressing preventive veterinary practices were frequently cited as useful. Farmers emphasized that understanding early warning signs of disease allowed them to act before losses occurred.

In Armenia, livestock farmers reported relying heavily on television programming for guidance on disease management and state-supported veterinary initiatives. While implementation was sometimes limited by resource availability, the informational function of climate-smart reporting was described as “protective” rather than transformative—helping farmers avoid severe losses.

In Azerbaijan, survey responses indicate growing recognition of climate-related risks affecting animal husbandry. Farmers expressed interest in adaptive feeding schedules and shelter management practices. Although comprehensive transformation was not observed, awareness of preventive strategies increased during the intervention period.

Beekeeping: Direct and Visible Impact

Among all agricultural subsectors, beekeeping demonstrated the most direct and visible linkage between information exposure and behavioral change.

Across Georgia and Armenia in particular, respondents reported applying knowledge related to hive disease management, seasonal care, pest control (including protection from invasive species), and proper honey extraction techniques. Beekeepers described media-derived advice as immediately applicable and economically consequential.

In Georgia, several interviewees noted that learning preventive techniques reduced colony loss and improved honey yield quality. The clarity of step-by-step reporting formats was repeatedly emphasized. Beekeeping, unlike broader crop systems, allows for relatively low-cost experimentation, which may explain higher responsiveness to media-based guidance.

In Armenia, beekeepers cited televised programming as a primary source of practical guidance. The Public Television’s agricultural segments were perceived as reliable and instructive in this domain.

In Azerbaijan, survey data suggest increased awareness of hive protection techniques and seasonal management practices, though large-scale adoption remains gradual.

Beekeeping thus appears to function as a “high-elasticity” sector in relation to informational intervention—where knowledge transfer rapidly translates into observable outcomes.

Traditional Versus Innovative Segments

Across all three countries, the research identifies a clear segmentation between traditionalist farmers and innovation-oriented adopters.

A segment of respondents expressed strong attachment to inherited practices, emphasizing reliance on ancestral knowledge and skepticism toward new methods. This group was present in all three countries, though more visibly articulated in Georgia’s in-depth interviews. For these farmers, media information is often filtered through existing experiential frameworks.

Conversely, a second segment—often younger or commercially oriented producers—demonstrated openness to experimentation and active engagement with climate-smart content. These farmers were more likely to test bio-practices, diversify crops, and adjust livestock management strategies.

The intervention appears to have strengthened the innovative segment by improving access to credible, structured knowledge. However, the traditionalist segment remains dependent on trust-building communication and peer validation.

Comparative Synthesis

Taken together, the findings indicate that climate-smart journalism education contributes most strongly in sectors where:

1. Knowledge is directly actionable;

2. Economic benefits are observable;
3. Required investments are moderate;
4. Risks of experimentation are manageable.

Livestock management and beekeeping meet these criteria more consistently than capital-intensive crop systems. As a result, the intervention's impact is most visible in preventive animal health practices and hive management improvements.

While journalism education alone cannot transform agricultural systems, it plays a measurable role in strengthening adaptive capacity—particularly where environmental sustainability aligns with economic rationality.

Educational Sector Transformation: Institutionalization of Climate-Smart Journalism

Beyond shifts in farmers' information behavior, one of the most structurally significant outcomes of the intervention concerns its impact on journalism education systems in the South Caucasus. Unlike short-term media outputs, curricular reform represents a durable mechanism for influencing future media ecosystems.

At the outset of the project in 2023, agricultural journalism was already present in a limited form within certain universities in Georgia and Armenia, largely as a legacy of previous initiatives led by the Journalism Resource Centre (JRC). In Georgia, agri-journalism modules were being taught in 11 universities, primarily as elective or integrated subjects. In Armenia, agricultural journalism was taught in two universities. In Azerbaijan, structured academic teaching of agricultural journalism was either absent or highly limited.

However, despite the existence of agri-journalism modules, climate-smart communication and environmental adaptation reporting were not institutionalized as dedicated academic components in any of the three countries. Climate coverage, where present, was often fragmented, embedded in broader environmental courses, or dependent on individual lecturer initiative.

Thus, the baseline reflected partial institutional presence of agricultural journalism, but absence of systematic climate-smart reporting education.

By the conclusion of the intervention period in 2026, measurable expansion and curricular integration had occurred across all three countries.

In Georgia, the number of universities teaching agricultural journalism increased from 11 to 13 institutions. More importantly, the Climate-Smart Communication and Reporting module was integrated into 15 elective course modules across journalism programs. This represents not only quantitative growth but qualitative curricular enrichment. The module introduced structured content on climate adaptation, environmental risk communication, agro-ecological practices, and solution-oriented reporting formats.

In Armenia, the two universities that previously taught agricultural journalism incorporated climate-smart components into their curricula. While the total number of institutions remained stable, the content transformation was substantive. The module provided a structured framework where previously coverage depended on informal adaptation.

In Azerbaijan, the intervention facilitated the introduction of climate-smart journalism content within one university represented by the project partner researcher. Although institutional expansion was modest compared to Georgia, the inclusion of the module represents an important initial step within a more centralized academic and media environment.

The expansion and formal integration of climate-smart journalism education carry systemic implications for agricultural information ecosystems.

First, curricular institutionalization reduces reliance on project-based training cycles. When climate-smart reporting becomes embedded within formal academic structures, knowledge transmission is no longer contingent upon donor funding or short-term workshops. Instead, it enters the standard training pipeline for future journalists.

Second, the module establishes interdisciplinary linkages between journalism, environmental science, and agricultural studies. This cross-sectoral integration strengthens the epistemic foundations of sector-specific reporting and addresses one of the key structural barriers identified in baseline assessments—the absence of subject-matter expertise among journalists.

Third, the expansion signals a shift from reactive coverage toward anticipatory and resilience-oriented reporting. Climate-smart journalism education frames agricultural reporting within broader sustainability and adaptation narratives, aligning media practice with long-term environmental governance needs.

Cross-Country Comparative Perspective

The degree of institutional transformation varied across countries, reflecting broader differences in media and higher education systems.

Georgia demonstrates the strongest quantitative expansion and curricular penetration. The increase from 11 to 13 universities and integration into 15 elective modules suggests that the educational environment was receptive to structured reform. This expansion also reflects the presence of a more decentralized academic landscape and existing regional media linkages.

In Armenia, transformation was more qualitative than quantitative. While the number of universities remained unchanged, the systematic incorporation of climate-smart frameworks enhanced the depth and coherence of existing agri-journalism teaching.

In Azerbaijan, progress was incremental but symbolically significant. The introduction of the module within at least one university marks the beginning of structured climate-oriented journalism education in a context where such specialization was previously limited.

The findings suggest that journalism education reform functions as infrastructural reinforcement within agricultural information systems. Unlike media outputs, which fluctuate with editorial priorities and economic pressures, curricular integration provides long-term stability.

By 2026, climate-smart communication had moved from a project-based initiative to an institutionalized academic component across multiple universities in the South Caucasus. This transformation strengthens the human capital foundation of agricultural journalism and enhances the sustainability of media ecosystem reform.

While differences remain in scale and institutional depth across countries, the comparative evidence indicates that cross-sectoral educational intervention can generate measurable structural change within higher education systems, thereby contributing to the rebuilding of agricultural information infrastructures in transitional contexts.

Student-Level Impact: Institutional Penetration and Human Capital Formation

To assess the sustainability of the educational intervention, a parallel student-level survey was conducted across participating universities. In Georgia, the questionnaire was distributed online to 200 students through partner universities. In Armenia, independent researchers conducted smaller-scale surveys, interviewing 10 students in each participating institution. The student data provide insight into the depth of curricular integration and its influence on emerging journalistic competencies.

Demographic and Programmatic Distribution

Across responses, 73% of participants were female, indicating a strong gendered presence within journalism and related academic programs. This aligns with broader trends in communication studies across the region, where female students constitute the majority of journalism cohorts.

The Climate-Smart Communication and Reporting module was predominantly embedded within Journalism and Mass Communication programs (84%). A smaller proportion of respondents reported integration within Agricultural Education (7%) and other related disciplines (9%), including environmental protection, business, economics, and interdisciplinary tracks. This distribution confirms that the intervention primarily targeted journalism education while beginning to expand into cross-sectoral academic spaces.

Most respondents indicated that the course was offered as an elective module, suggesting that enrollment reflects voluntary academic interest rather than mandatory curricular obligation. This elective structure is particularly relevant when evaluating student motivation and perceived relevance.

Institutionalization and Timing

In Georgia, the majority of students reported beginning the course in March 2024, shortly after module development and institutional adoption. In Armenia, the primary implementation phase began later, with students indicating September 2025 as the start period. This staggered rollout reflects differences in institutional integration timelines but does not appear to have affected student-level reception.

The course was most commonly structured as a one-semester module, typically carrying 5 academic credits. At the degree level, 84% of respondents were undergraduate students, 12% were enrolled at the master's level, and 4% at the doctoral level. This distribution suggests that the intervention successfully penetrated the foundational stage of journalism education, potentially influencing future professional trajectories at an early stage.

Student Reception and Perceived Value

Student reception of the module was overwhelmingly positive. Ninety-eight percent of respondents reported that they liked the course. Only 2% expressed dissatisfaction. Such high approval rates suggest that the module addressed a perceived gap in journalism curricula and resonated with student interests.

Importantly, the data indicate that student engagement extended beyond passive satisfaction. A majority of respondents reported applying the knowledge gained. The most frequently selected response was that students began writing articles related to climate-smart agriculture and environmental issues. Others reported producing video content or expressing interest in professional engagement within the sector.

The emergence of student-generated content is a particularly strong indicator of educational impact. It suggests that the module did not remain theoretical but translated into practical experimentation within academic or early professional settings.

Interest Dynamics and Professional Orientation

Respondents reported that interest in the module increased over time rather than declining. This suggests that exposure to climate-smart reporting does not generate short-term novelty interest but may cultivate sustained professional curiosity.

Students also indicated that the course contributed to greater awareness of environmental risks, rural vulnerability, and the societal role of journalism in addressing climate-related agricultural challenges. Several respondents highlighted that the module expanded their understanding of journalism beyond political reporting, introducing agriculture and climate resilience as legitimate and socially significant fields of specialization.

This shift in perception is crucial in media systems where political agenda-setting tends to dominate editorial priorities. By framing agricultural reporting as a domain requiring expertise and ethical responsibility, the module potentially diversifies the professional aspirations of journalism students.

Pedagogical Adaptation and Teaching Practice

Faculty-level responses indicate that teaching practices were adjusted following the introduction of the module. Instructors reported incorporating more case-based learning, field-oriented assignments, and practical content production exercises.

The integration of real media materials and region-specific case studies strengthened experiential learning components. This pedagogical shift moves climate-smart journalism education from abstract environmental discourse toward applied, sector-specific communication training.

Such adaptation is significant because it suggests that the intervention did not merely insert a new topic into curricula but influenced instructional methodology. The combination of theoretical grounding and applied reporting exercises appears to have enhanced student engagement and perceived professional relevance.

Structural Implications

Taken together, the student-level findings demonstrate that the intervention achieved not only institutional expansion but also meaningful penetration into student consciousness and professional orientation.

The high approval rate, voluntary enrollment patterns, early-stage undergraduate integration, and active application of knowledge indicate that climate-smart journalism education is becoming normalized within academic training pipelines.

From an ecosystem perspective, this represents long-term infrastructural reinforcement. While media outputs fluctuate with economic and political pressures, trained cohorts of journalists equipped with sector-specific competencies provide a sustainable foundation for agricultural information systems.

In transitional media environments, where subject-matter expertise is often scarce, embedding climate-smart reporting within higher education may constitute one of the most durable reform mechanisms available.

This study set out to examine whether and how climate-smart journalism education can function as a structural mechanism for rebuilding agricultural information systems in Georgia, Armenia, and Azerbaijan. The findings across farmers, students, and institutional structures provide converging evidence that educational intervention operates as an ecosystem-level reform rather than as a short-term media enhancement.

Addressing RQ1: Influence on Media Content Structure and Quality

The introduction of climate-smart journalism modules and professional trainings demonstrably shifted the framing and structure of agricultural media content. Across countries, journalists increasingly adopted explanatory, solution-oriented, and preventive formats rather than event-driven or policy-announcement coverage.

Farmers reported improved clarity, practical relevance, and applicability of content. Particularly in Georgia, climate-smart formats translated into step-by-step guidance on pruning, composting, pest management, and livestock care. In Armenia, television—especially Public Broadcasting—remained the dominant channel, yet qualitative data indicate that structured climate-oriented content enhanced informational depth. In Azerbaijan, awareness growth preceded structural adoption, reflecting a more centralized media environment.

Thus, journalism education reform influenced not only individual journalists but also the qualitative characteristics of agricultural reporting. Rather than expanding channels, the intervention improved communicative precision within existing infrastructures.

Addressing RQ2: Impact on Farmers' Information Behavior and Practice Adoption

Farmers' behavioral responses varied across contexts, but a consistent pattern emerged: where information was clear, locally relevant, and economically rational, adoption followed.

Agro-ecological practices, particularly composting, bio-input reduction, and preventive livestock management, showed incremental growth. The strongest visible impact occurred in livestock and beekeeping sectors, where preventive knowledge directly reduced risk and economic loss.

Beekeeping proved especially responsive to informational intervention. Farmers reported applying disease prevention strategies and seasonal hive management techniques learned through media

content. The relatively low cost of experimentation in beekeeping likely amplified responsiveness.

However, structural constraints moderated adoption. In Armenia and Azerbaijan, access to inputs and financial capacity limited full-scale implementation. This suggests that journalism functions as an enabling but not sufficient condition for systemic agricultural transformation.

Nevertheless, the findings confirm that educational intervention strengthened farmers' informational capacity and improved adaptive decision-making within their structural limits.

Addressing RQ3: Strengthening Cross-Sectoral Linkages

The intervention's impact extends beyond farmers and content producers to cross-sectoral institutional linkages.

The expansion of climate-smart modules from 11 to 13 universities in Georgia and integration into 15 elective modules represents institutional consolidation. In Armenia and Azerbaijan, although expansion was more modest, structured curricular integration established new academic anchors for agricultural journalism.

Simultaneously, journalist trainings and the Regional Media Hub strengthened cooperation between universities, media practitioners, and rural stakeholders. Students reported producing agricultural content during or after coursework, indicating early-stage professional integration.

The convergence of trained students, updated curricula, and practicing journalists suggests that the intervention created vertical linkages (education-to-practice) and horizontal linkages (media-to-rural communities).

Such cross-sectoral integration addresses one of the baseline weaknesses: fragmentation between knowledge production, media dissemination, and agricultural practice.

Addressing RQ4: Institutional Mediation Across Countries

The comparative design reveals that institutional environments mediate intervention outcomes.

Georgia demonstrated the strongest structural penetration, likely due to a more decentralized academic system and established regional media networks. Armenia exhibited qualitative enhancement within a context of institutional agricultural restructuring and continued reliance on public television. Azerbaijan reflected incremental shifts within a centralized media framework.

Despite these differences, the intervention produced measurable improvements across all three contexts, suggesting that educational reform possesses adaptive flexibility within diverse media systems.

Importantly, variation in institutional environments did not negate impact; rather, it shaped its pace and form.

Addressing RQ5: Can Journalism Education Function as Structural Reform?

The integrated evidence supports the hypothesis that journalism education can operate as infrastructural reform within fragile agricultural information ecosystems.

At baseline (2023), the region exhibited:

- Weak extension systems;
- Fragmented agricultural communication;
- Limited subject-matter expertise among journalists;
- Politically prioritized media agendas.

By 2026, the ecosystem shows:

- Institutionalized climate-smart journalism modules;
- Trained student cohorts entering media pipelines;
- Improved content clarity and practical orientation;
- Increased farmer awareness and selective adoption of adaptive practices.

Journalism education did not replace agricultural policy reform nor substitute for extension services. However, it strengthened the communicative backbone of agricultural systems by embedding climate-smart literacy within formal education structures and professional practice.

This layered impact—student formation, content enhancement, and farmer-level behavioral shifts—demonstrates that educational intervention operates not merely as knowledge transfer but as ecosystem stabilization.

Ecosystem Synthesis

The rebuilding of agricultural information systems in the South Caucasus appears to occur through cumulative reinforcement rather than singular transformation.

Educational institutionalization provides long-term sustainability. Professional journalist training enhances immediate content quality. Farmer engagement improves adaptive capacity. Sector-specific impact is strongest where economic rationality aligns with environmental adaptation.

Livestock and beekeeping sectors illustrate this dynamic most clearly.

Thus, the study confirms that climate-smart journalism education represents a viable pathway for reinforcing agricultural information infrastructures in transitional contexts.

Conclusion

This study assessed the impact of a cross-sectoral educational intervention aimed at rebuilding agricultural information systems in Georgia, Armenia, and Azerbaijan through climate-smart journalism education. The findings demonstrate that structured educational reform can function as a stabilizing mechanism within fragile sectoral information ecosystems.

At baseline in 2023, agricultural information systems across the South Caucasus exhibited fragmentation: limited climate-smart reporting within journalism education, weak cross-sectoral linkages, reliance on

politically driven media agendas, and constrained agricultural extension infrastructures. Although agricultural journalism existed in certain universities, climate-oriented communication had not been systematically institutionalized.

By 2026, measurable structural changes had occurred.

At the educational level, climate-smart communication was integrated into 13 universities in Georgia (across 15 elective modules), embedded within two universities in Armenia, and introduced in one university in Azerbaijan. Student-level data reveal high approval rates (98%), active content production, and increased professional interest in environmental and agricultural reporting. The intervention therefore strengthened the human capital base of agricultural journalism.

At the media level, journalist trainings contributed to the adoption of explanatory and solution-oriented formats, particularly in livestock and beekeeping coverage. Content quality improved in terms of clarity, applicability, and preventive guidance.

At the farmer level, exposure to structured climate-smart reporting enhanced awareness, selective adoption of agro-ecological practices, and preventive strategies in livestock and hive management. While structural constraints moderated large-scale transformation, informational capacity and adaptive decision-making improved.

Comparative analysis shows that institutional environments mediate impact: Georgia demonstrated the strongest quantitative expansion; Armenia showed qualitative reinforcement within a television-dominant ecosystem; Azerbaijan reflected incremental but meaningful integration within a centralized context. Despite these differences, the intervention produced convergent systemic reinforcement across all three countries.

The findings support the central argument of this study: journalism education can function as infrastructural reform in contexts where agricultural extension systems are weakened. By embedding climate-smart competencies within formal academic structures and linking them to media practice, the intervention strengthened the communicative backbone of agricultural systems.

Educational reform alone cannot resolve structural agricultural challenges. However, it can reduce informational asymmetry, improve risk awareness, and enhance adaptive capacity among rural producers. In transitional media systems, this represents a significant form of ecosystem stabilization.

Recommendations

Based on the findings, several policy and structural recommendations emerge.

1. Expansion of Cross-Disciplinary Integration

Future development should extend climate-smart reporting education beyond journalism faculties to include agricultural science, environmental studies, and business programs. Cross-disciplinary teaching can enhance epistemic depth and encourage collaborative problem-solving across sectors.

2. Strengthening Practical Training and Field Exposure

To deepen impact, experiential learning components—field reporting, farm-based assignments, and collaboration with rural communities—should be expanded. Direct engagement enhances student competence and strengthens university–community linkages.

3. Reinforcement of Regional Media Networks

Regional broadcasters remain critical information nodes, particularly in Armenia and Georgia. Supporting decentralized media ecosystems increases local relevance and trust. Capacity-building initiatives should continue to prioritize regional media actors.

4. Alignment of Informational and Economic Incentives

Farmers demonstrated strongest adoption where ecological sustainability aligned with economic benefit. Future communication strategies should integrate economic framing with environmental adaptation, emphasizing cost efficiency, risk reduction, and productivity gains.

5. Complementarity with Agricultural Extension Systems

Journalism education should not replace extension services but operate in complementarity. Governments should strengthen data transparency and advisory infrastructures to enable evidence-based reporting and improve the translation of information into practice.

6. Regional Cooperation and Knowledge Sharing

The cross-country comparative design proved valuable. Continued regional collaboration between Georgia, Armenia, and Azerbaijan can support mutual learning, particularly in contexts where institutional environments differ. A regional academic–media platform could further consolidate climate-smart communication expertise.

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