



Status of Extension and Advisory Services in the Crop Sector of Mongolia

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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Abstract

Aims: To assess the current status of extension and advisory services (EAS) in Mongolia's crop sector by mapping the institutional and policy landscape, characterising the services and capacities of providers, analysing farmers' access to and satisfaction with services, and identifying systemic challenges, opportunities, and policy options.

Study Design: A mixed-methods study combining documentary research, key informant consultations, and two anonymous structured surveys, interpreted through the "best-fit" framework for agricultural advisory services.

Place and Duration of Study: Mongolia, covering all 21 aimags (provinces) and Ulaanbaatar, in early 2024, under the AFACI-funded Improvement of Rural Agricultural Technology Extension System in Asia (RATES) project.

Methodology: Online surveys of 72 EAS providers and 290 farmers were combined with documentary analysis and consultations with national and local institutions.

Results: Mongolia's EAS has evolved into a pluralistic landscape comprising public agencies, research institutions, farmer associations, private enterprises, and development partners, though systematic coordination remains limited. The public system extends from the Ministry of Food, Agriculture and Light

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Industry through departments in 21 provinces to divisions in 330 districts, with approximately 370 extension staff positions, many of which remain vacant. Among farmers, 58% receive professional advice once a year or less, 90% desire more frequent engagement, and 53% rate system performance as poor. Providers identify financial constraints, lack of equipment, and insufficient training facilities as primary limitations, rather than lack of expertise or motivation. Five interconnected challenges emerge: insufficient human resources, inadequate financing, weak coordination, limited research–extension integration, and gaps in service coverage and content.

Conclusion: Strengthening EAS requires institutionalising extension in the forthcoming Law on Agriculture, reinforcing the coordinating mandate of the Research and Development Centre, filling vacant positions, securing stable financing, rebuilding research–extension linkages, and expanding digital advisory platforms and farmer-association delivery channels.

Keywords: Agricultural extension; advisory services; crop sector; Mongolia; pluralistic extension system; farmer survey; institutional analysis; AFACI; RATES.

1. Introduction

Agriculture contributes 7.3% of Mongolia's GDP and employs 22.5% of the economically active population (National Statistics Office of Mongolia [NSO], 2025a). The crop sector has gained increasing strategic importance as Mongolia pursues food self-sufficiency, economic diversification, and rural development. However, the sector faces formidable challenges: a growing season of only 95 to 120 days, low and erratic precipitation, extreme temperature fluctuations, and soil degradation affecting most cultivated land. Climate change is intensifying these difficulties through rising temperatures, more frequent droughts, and more extreme weather events (Ministry of Environment and Tourism [MET], 2024).

Extension and advisory services (EAS) are essential for addressing these challenges. Through EAS, farmers access knowledge, technologies, and advice to improve production practices, manage risks, and participate effectively in markets. Mongolia's EAS system has undergone significant evolution since the transition to a market economy beginning in 1990. The dissolution of socialist-era agricultural support structures was followed by efforts to establish new extension institutions, initially through donor-supported initiatives and subsequently through government programmes (Chuluunbaatar et al., 2017). Today, EAS are delivered through a pluralistic institutional landscape comprising public-sector agencies, research institutions, farmer associations, private-sector actors, and international development projects. This trajectory mirrors the international shift from unified public extension toward pluralistic advisory systems in which multiple public, private, and civil-society actors deliver services under diverse financing arrangements (Birner et al., 2009; Norton & Alwang, 2020). Cross-country evidence indicates that the performance of such pluralistic systems depends less on any single “best practice” model than on the fit between governance structures, provider capacities, and advisory methods on the one hand and the specific agroecological, institutional, and market context on the other (Birner et al., 2009; Davis et al., 2020). This “best-fit” perspective informs the present assessment.

Despite this institutional development, significant gaps persist between the advisory support farmers need and what they actually receive. Previous assessments highlighted challenges, including insufficient human resource capacity, inadequate funding, weak coordination, and limited integration of research and extension (Lee et al., 2020). This paper presents key findings from a comprehensive assessment of EAS in Mongolia's crop sector, conducted within the framework of the AFACI-funded Improvement of Rural Agricultural Technology Extension System in Asia (RATES) project, implemented by the Research and Development Centre for Food, Agriculture and Light Industry (RDC) under the Ministry of Food, Agriculture and Light Industry (MOFALI) in collaboration with the Association for Sustainable Rural Development.

The overall aim of the study was to provide a comprehensive, empirically grounded assessment of EAS in Mongolia's crop sector as a basis for system strengthening. Specifically, the study pursued four objectives: (1) to map the institutional landscape and the policy and legal framework governing EAS in the crop sector; (2) to characterise the services delivered by EAS providers and to assess their capacities and constraints; (3) to analyse farmers' access to, use of, and satisfaction with EAS, as well as their advisory needs and preferences; and (4) to identify systemic challenges and emerging opportunities and to derive recommendations for policy and practice.

This paper is organised as follows: Section 2 provides an overview of Mongolia's crop sector. The methodology adopted for the study is given in Section 3. Results and Discussion are provided in Section 4, including their implications for strengthening EAS in the country. The paper concludes with Section 5, which presents the study's conclusions.

1.1 Overview of the Crop Sector

Mongolia's crop production operates within severe environmental constraints. The continental climate is characterised by extreme temperature fluctuations, annual rainfall of 250–350 mm in main cropping areas, and a hydrothermal coefficient of 0.7–1.0 during the growing season, indicating persistent drought stress (MET, 2024). Arable land comprises approximately 1.1 million hectares—less than 1% of total land area—of which 636 thousand hectares were cultivated in 2024 (Table 1). Crop farming is concentrated in the north-central region, with over 65% of sown areas in Selenge, Tuv, and Bulgan aimags.

Soil quality presents a significant constraint. Studies by the Institute of Plant and Agricultural Sciences (IPAS) found that approximately 50% of cropland has a humus content below 2%, with nitrogen deficiency affecting 60% of cropland and over 60% of cropland being classified as heavily eroded (Baast, 2019). Despite these challenges, Mongolia achieved near self-sufficiency in wheat and potatoes in 2024, though self-sufficiency in vegetables remains lower, at 69% (NSO, 2025b).

Table 1. Key crop sector statistics, 2024

Indicator	Value
Total arable land (1,000 ha)	1,128.6
Total sown area (1,000 ha)	635.9
Wheat	317.7
Potato	19.6
Vegetables	20.2
Rapeseed	131.2
Fodder crops	100.8
Wheat harvest (1,000 tons)	397.3
Potato harvest (1,000 tons)	251.4
Vegetable harvest (1,000 tons)	282.3
Farming households	16,189
Agricultural enterprises	1,511
Self-sufficiency: wheat (%)	89.9
Self-sufficiency: potato (%)	98.9
Self-sufficiency: vegetables (%)	69.3
Share of crop sector in GDP (%)	2.9

Source: NSO (2025a).

The crop sector includes 1,511 registered enterprises and 16,189 farming households, though unofficial estimates put the total at around 30,000 (Asian Development Bank [ADB], 2020). Wheat dominates with 50% of cultivated area, followed by rapeseed—driven by Chinese demand and rising 163% between 2020 and 2024—and fodder crops. Greenhouse production has expanded by 31% since 2021, reaching 380 hectares, reflecting growing interest in import substitution of high-value vegetables.

2. Material and Methods

The assessment employed a mixed-methods approach combining documentary analysis, key informant consultations, and two structured surveys. The design was guided by the “best-fit” framework for analysing agricultural advisory services (Birner et al., 2009), which structures assessment around the governance of advisory systems, the capacity and management of providers, and the methods of service delivery within their country-specific context; these dimensions informed the selection of documents, the topics of the key informant consultations, and the content of the survey instruments.

Documentary analysis encompassed relevant laws, government resolutions, policy documents, programme reports, and previous studies on Mongolia's agricultural sector and extension system. Statistical data on crop production, land use, trade, and farm structure were obtained from the National Statistics Office of Mongolia (NSO, 2022; NSO, 2025a) and the General Administration of Customs (Customs General Administration [CGA], 2025). Key informant consultations with officials from MOFALI, RDC, aimag and soum administrations, research institutions, and farmer associations provided insights into institutional arrangements, current initiatives, and perspectives on system performance. Table 2 summarises the categories of key informants consulted and the main themes covered.

Table 2. Categories of key informants consulted and main topics covered

Category of key informants	Institutions consulted	Main topics of consultation
Central government	Ministry of Food, Agriculture and Light Industry (MOFALI): Department for Coordination of Crop Policy Implementation; Division for Sectoral Inspection	Policy frameworks, institutional arrangements, and current initiatives in the crop sector
National extension coordination	Research and Development Centre for Food, Agriculture and Light Industry (RDC)	EAS coordination, extension programming, implementation of the Atar-4 campaign
Research and higher education	Institute of Plant and Agricultural Sciences (IPAS); Institute of Plant Protection (IPP); Mongolian University of Life Sciences (MULS)	Research priorities, variety development, technology transfer, education–extension linkages
Specialised public agencies and state-owned entities	Plant Protection Agency (PPA); Agricultural Corporation	Plant protection services, input supply systems, farmer advisory activities
Local government	Aimag Departments of Food and Agriculture (DFA); Soum Divisions of Agriculture	Local service delivery, staffing, financing, coordination with national bodies
Farmer associations	Mongolian National Crop Farmers' Association (MNCFA); Mongolian Farmers' Association for Rural Development (MFARD); Green Way Association of Vegetable Growers (GWAVG); Mongolian National Association of Fruits and Berries	Grassroots EAS provision, member services, on-farm trials
Private sector	Input suppliers, machinery dealers, and processing companies	Commercially motivated advisory services and farmer support

Two anonymous surveys—a provider survey and a farmer survey—were conducted in January–February 2024 using digital questionnaires on the Google Forms platform. Both questionnaires were developed by the authors, drawing on previous assessments of Mongolia's extension system, and were pilot-tested with small groups of extension professionals and farmers, respectively; the questions were refined based on the pilot feedback before full deployment.

Survey data were analysed using descriptive statistics appropriate to the largely categorical nature of the data. Open-ended responses were reviewed qualitatively and used to contextualise the quantitative findings. Offline versions of the full questionnaires (in Mongolian) are available from the corresponding author upon request.

The provider survey targeted professionals whose work involves providing information, advice, and professional support to crop and horticultural farmers. The questionnaire consisted of two parts: the first addressed the respondents' organisations and the services they provide, while the second addressed the individual respondents' advisory activities, experiences, and views on agricultural extension. The link to the questionnaire was sent to 96 employees of MOFALI, Mongolian University of Life Sciences (MULS), IPAS, Institute of Plant Protection (IPP), RDC, Aimag Departments of Food and Agriculture (DFA), farmer

associations, and agribusiness companies, including machinery dealers, input suppliers, and processors. The survey yielded 72 responses, corresponding to a response rate of 75%.

The farmer survey questionnaire consisted of 40 questions structured in seven thematic parts: (1) respondents and their farms, (2) access to and quality of professional information, (3) access to and quality of training, (4) topics, methods, and providers of extension services, (5) effectiveness of extension services, (6) service fees, and (7) requirements for extension services. The questionnaire combined single- and multiple-answer questions, subjective ranking statements, and two open questions. The link was disseminated to approximately 350 crop and horticulture farmers through the extension staff of DFAs in 21 aimags, who shared it via local farmer networks. The survey yielded 290 responses. As participation was voluntary and based on self-selection, the sample is not a probability sample of Mongolia's farming population; however, the achieved sample covered 20 of 21 aimags and the capital city and included diverse farm types, sizes, legal forms, and production orientations, providing broad coverage of the country's crop and horticulture producers. This dissemination strategy was adopted because Mongolia lacks a comprehensive, up-to-date sampling frame of crop and horticulture farmers from which a probability sample could be drawn, and because the winter survey period ruled out farm visits across the country's vast territory; distribution through DFA extension staff and local farmer networks was therefore the most feasible way of reaching farmers in all regions. The reliance on self-selection and self-reported perceptions may nevertheless introduce response bias, and the results could not be triangulated against administrative performance records, which are not systematically maintained for EAS in Mongolia; these implications are examined further in the Limitations section.

In both surveys, some respondents answered only a portion of the questions; most questions returned 66 to 68 responses in the provider survey and 270 to 280 responses in the farmer survey. The number of responses (n) is therefore reported separately for each result.

2.1 Ethical Considerations

Participation in both surveys was voluntary and anonymous. The introductory section of each questionnaire informed respondents about the purpose of the study and the intended use of the data, and completion and submission of the questionnaire was taken as informed consent. No personally identifying information was collected, and individual responses cannot be traced to respondents. The study involved no experimental intervention and no collection of sensitive personal data. In Mongolia, non-interventional anonymous surveys of this kind do not require formal approval.

3. Results and Discussion

3.1 Institutional Landscape of Eas

3.1.1 Structure of the public EAS System

The public EAS system extends from MOFALI and RDC at the national level, through DFAs in 21 aimags and Ulaanbaatar, to Divisions of Agriculture in 330 soums (districts) and Divisions of Food, Trade and Services in nine districts of Ulaanbaatar (Fig. 1). This structure provides approximately 370 extension staff positions at subnational levels dedicated to crop and horticulture production. At the aimag level, the DFA typically has two to four professionals delivering crop and horticulture EAS, including the aimag agronomist and inspectors. At the soum level, one of the two to three officers is designated as the crop extension officer. However, many positions remain vacant due to shortages of qualified personnel, with approximately 300 officers currently active according to the key informant consultations conducted in early 2024.

A critical feature of this system is overlapping accountability. The DFA operates under dual reporting lines: it is financed by the Aimag Governor's Office but is guided operationally by MOFALI. At the soum level, the Division of Agriculture must navigate competing demands from MOFALI, the DFA, and the Soum Governor's Office. At the same time, international development agencies establish additional partnerships independently of MOFALI's oversight.

RDC serves as the national coordinating body for EAS. Public extension has an institutional history dating back to the establishment of the National Agricultural Extension Centre in 1996 (Government of Mongolia, 1996).

Formed in 2020 through the merger of the former National Agricultural Extension Centre and the Research, Production and Business Enterprise for Light Industry, RDC employs 36 staff but has only a four-person team implementing all activities related to the crop-sector EAS. RDC addresses this constraint by integrating most activities into platforms with multiplier capacity—such as development projects, farmer associations, and the private sector—and by outsourcing tasks to professional organisations and experts.

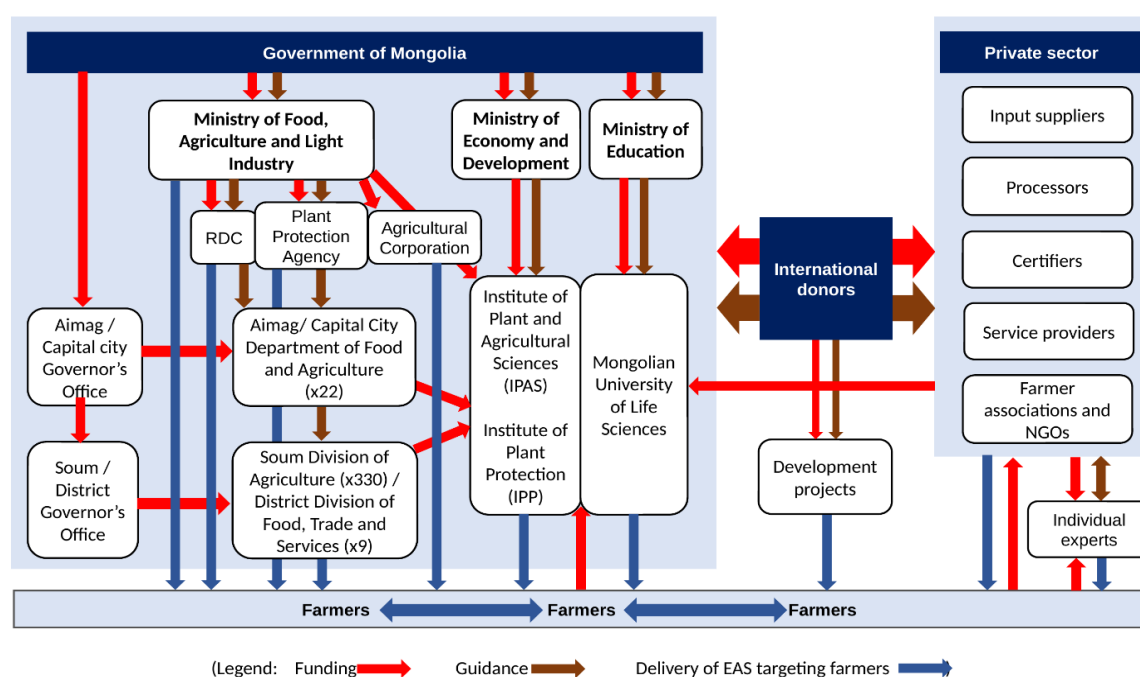


Fig. 1. Institutional arrangements and financing schemes for EAS in the crop sector of Mongolia

Source: Authors' elaboration based on documentary analysis and key informant consultations, 2024

3.1.2 Research Institutions as Cross-cutting Service Providers

IPAS, IPP, and MULS occupy a distinctive position. These institutions are commissioned by government agencies, engaged by development projects, contracted by private-sector actors, and called upon by farmer associations for specialised expertise. They function as cross-cutting service providers across all funding channels. Notably, varieties developed by IPAS are grown on 30% of cereal fields, 70% of potato fields, 60% of vegetable fields, and 70% of fruit plantations nationwide. In 2025, IPAS and IPP were transferred from MULS to the Ministry of Economy and Development, further complicating the already tenuous relationship between research and extension.

3.1.3 Farmer Associations and Private Sector

The growth of farmer associations since the mid-2010s has added an important dimension. The Mongolian National Crop Farmers' Association (MNCFA) operates through 34 regional branches and has pioneered on-farm trials with smart farming technologies. The Green Way Association of Vegetable Growers (GWAVG), established in late 2024, explicitly considers EAS provision as its main activity, reaching nearly all vegetable growers through a Facebook group of 125,000 members. The Mongolian Farmers' Association for Rural Development (MFARD) operates three Horticulture Extension Centres established under the SDC-funded MonVegi project.

Private-sector actors—including fertiliser manufacturers such as Bio Undarga LLC, machinery dealers such as Ensada Tractron LLC, and input suppliers—provide commercially motivated advisory services. Agricultural machinery dealers, in particular, organise international tours, demonstrations, and workshops for farmers on precision farming technologies. Individual experts—researchers, university lecturers, and retired specialists—are routinely contracted across all subsectors.

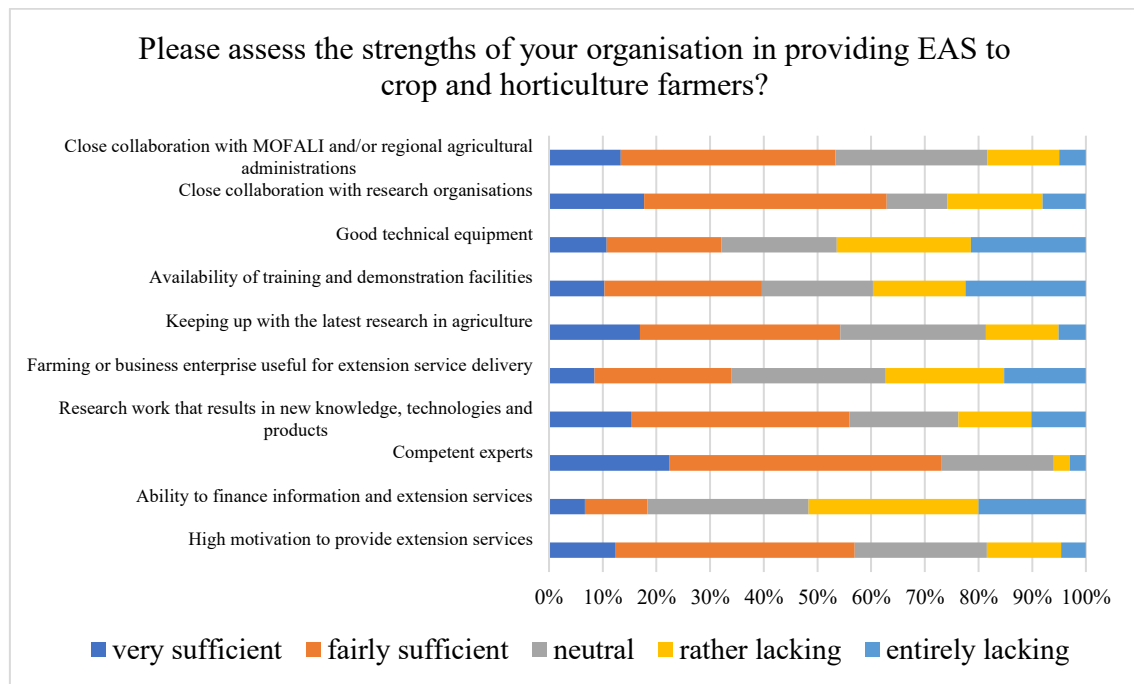


Fig. 2. Self-assessment of EAS providers: Strengths in providing EAS (n=68), providers' survey 2024

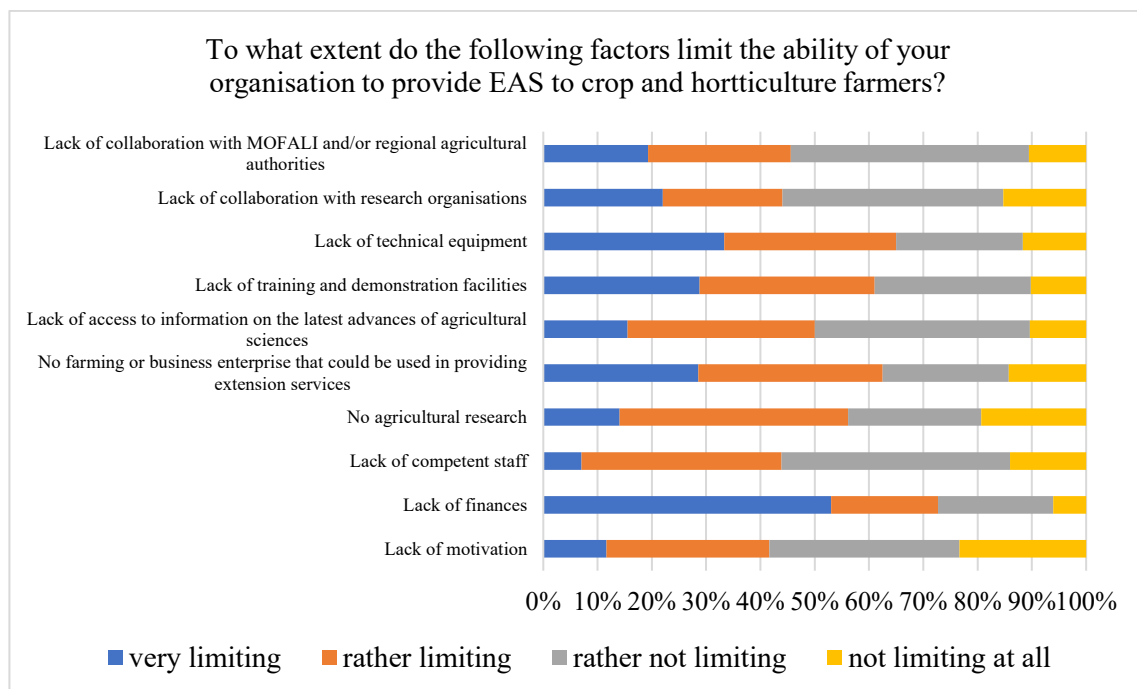


Fig. 3. Self-assessment of EAS providers: Limiting factors (n=66), providers' survey 2024.

3.1.4 Policy and Legal Framework

Mongolia lacks dedicated legislation governing EAS. Relevant provisions are scattered across the Law on Livestock Genetic Resources (2017), the Law on Seed and Variety of Cultivated Plants (2021), and the Law on Crop Farming (2016). A draft Law on Agriculture currently under development would provide the first explicit legal basis for EAS. The Atar-4 Campaign for Sustainable Crop Sector Development (2025–2028), adopted by

Government Resolution No. 47 (Government of Mongolia, 2025), includes specific EAS measures: training specialised advisors, establishing a digital advisory platform, and promoting smart farming technologies. However, its first-year evaluation reveals insufficient progress on these measures (RDC, 2025).

3.2 Findings of the Survey of Eas Providers

Of 67 respondents representing EAS provider organisations, 71% were employed at government organisations, MULS, or research institutes. Respondents were located across 18 of 21 aimags, with nearly half based in Ulaanbaatar. Horticulture producers emerged as the primary target group: 52% of responses identified growers of vegetables, fruits, and berries as the main recipients, followed by grain and oilseed growers and fodder crop growers. The reach of individual providers varied widely, from national-level actors reaching thousands of farmers annually to soum-level providers reaching up to 100 farmers annually.

Training events, field demonstrations, and information sessions for broader audiences were the most common types of EAS delivered (Table 3). Technical topics dominated: variety and seed selection, plant protection, fertilisation, and soil tillage. Investment planning, finance, and farm management were among the least common, a significant gap given the increasing importance of business dimensions of farming.

Table 3. Types of EAS provided by frequency, providers' survey 2024 (N=72)

Type of EAS	% of responses
Training events	78
Field days/demonstration events	61
Information events for broader audiences	57
Roundtable discussions, group meetings	56
Publications (print and online)	50
Consultations with individual farmers	44
Connecting farmers with experts/services	32
Consultations with farmer groups	31

Providers assessed themselves as generally capable, highlighting competent staff, close collaboration with research organisations, and high staff motivation as strengths. However, major weaknesses included a lack of financial resources, technical equipment, and training and demonstration facilities (Figs. 2 and 3). These material limitations, rather than lack of motivation or expertise, constitute the primary barriers to improved service delivery.

3.3 Findings of the Farmers' Survey

3.3.1 Farmer Profiles

Respondents represented diverse farm types: 39% crop farmers, 33% potato and vegetable growers, with the remainder growing fruits and berries, fodder crops, or operating integrated farms. In terms of legal form, 39% operated family farms, 50% were companies, and 11% were cooperatives. The dominant age group was 41–60 years. Twenty-seven per cent held postgraduate degrees, and nearly half had training in agronomy. About a quarter were “new farmers” with five years or less of experience.

3.3.2 Access to Professional Information and Training

Most respondents assessed the availability of professional information as only “fairly available,” indicating perceived gaps. The internet and social media emerged as the most common sources of professional information, followed by professional events such as regional meetings and conferences. Visits to research organisations and the use of professional publications were the least common sources. Only 14% received training more than once a year; 25% were trained once a year, and the remainder less frequently.

3.3.3 Access to Professional Advice and Support

The survey revealed a striking gap between demand and supply. More than half of the farmers surveyed receive professional advice only once a year or less frequently (Table 4), despite nine out of ten expressing a desire for more regular engagement.

Table 4. Frequency of farmers receiving professional advice and support (n=279).

Frequency of receiving professional advice	% of respondents
Every quarter or more often	21
Several times per year	21
Once a year	23
Less than once a year	35

Fellow farmers were identified as the most important source of professional advice, followed by farmer associations, IPAS, and DFAs. This reliance on peer networks, while providing valuable knowledge exchange, cannot substitute for systematic, research-based guidance. The prominence of farmer-to-farmer channels is consistent with international evidence that social learning among peers is a primary pathway of agricultural knowledge diffusion, but that its effectiveness depends on complementary support from formal advisory systems (BenYishay & Mobarak, 2019; Takahashi et al., 2020).

3.3.4 Assessment and Preferences

Farmers' assessment of the EAS system was sobering: 53% rated performance as rather or very poor and 23% considered it neither good nor poor, while only 19% assessed it positively (Fig. 4). The topics on which farmers most urgently seek advice largely align with those most commonly delivered—variety selection, fertilisation, plant protection, and soil tillage—yet farmers also expressed strong demand for advisory support in areas receiving less attention (Table 5).

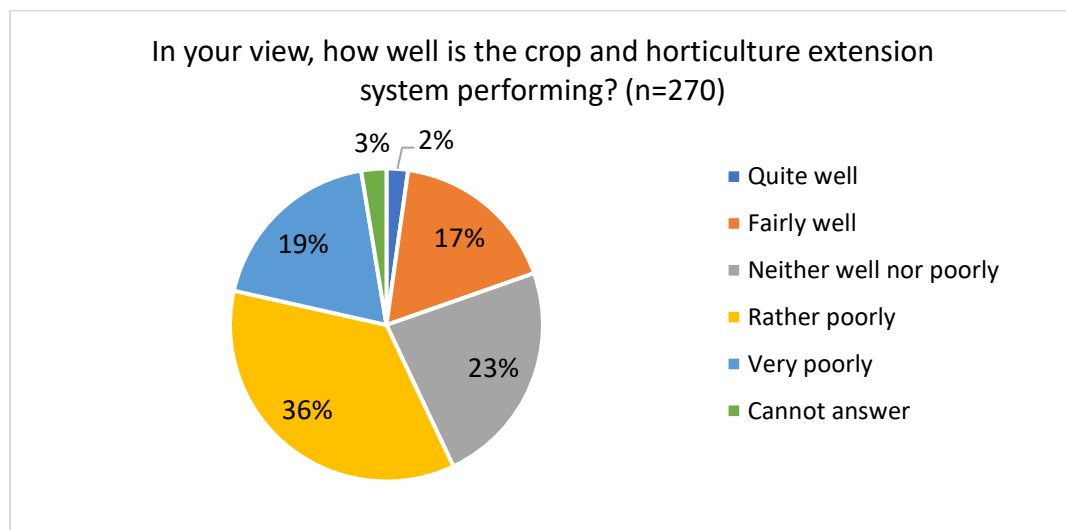


Fig. 4. Assessment of the performance of EAS in the crop sector (n=270), farmers' survey 2024

The mismatch in farm management (ranked 12th in supply but 7th in demand) is particularly notable, suggesting that EAS providers have been slower to develop capacity in business and market dimensions of farming. This pattern echoes international findings that extension content has been slow to move beyond production technology into farm management, marketing, and business skills, even as these have become decisive for farm viability (Davis et al., 2020; Norton & Alwang, 2020). Preferred delivery methods included exchange meetings, training events, field demonstrations, and group consultations. Farmers identified farmer associations, IPAS, DFAs, and MOFALI as the most suitable providers.

Table 5. Comparison of EAS topics: supply ranking vs farmer demand ranking

Topic	Ranking by EAS providers (# of responses)	Ranking by farmers (# of responses)
Variety and seed selection	1 (45)	1 (185)
Plant protection	2 (43)	3 (161)
Soil tillage	3 (41)	4 (130)
Fertilisation	4 (40)	2 (165)
Harvesting and storage	5 (35)	6 (80)
Irrigation	6 (30)	5 (91)
Crop rotation	7 (26)	8 (72)
Agrarian policies and legislation	8 (21)	13 (28)
Integrated crop and livestock farming	9 (19)	10 (48)
Machinery use and maintenance	10 (15)	9 (65)
Processing	10 (15)	11 (40)
Marketing	11 (14)	12 (37)
Farm management, including investment planning and accounting	12 (11)	7 (74)
No specific topic/ All topics	13 (10)	14 (25)

Note: Rankings derived from frequency of responses in provider and farmer surveys.

3.4 Implications for Strengthening Eas

Five interconnected challenges constrain the effectiveness of Mongolia's crop-sector EAS.

Insufficient human resource capacity: Chronic understaffing afflicts the public system, with many soum-level positions vacant and existing staff lacking systematic professional development.

Inadequate and unpredictable financing: Public budget allocations fall short, and heavy reliance on project-based funding creates cycles of activity and dormancy.

Weak coordination: Despite RDC's nominal role, it lacks the capacity and authority to orchestrate activities across the diverse provider landscape, resulting in fragmentation.

Limited research–extension integration: The 2025 transfer of research institutes to the Ministry of Economy and Development has further complicated an already tenuous relationship.

Gaps in coverage and content: Commercial farms are reached more effectively than smallholders, and service content remains oriented toward production techniques with insufficient attention to farm management, marketing, and emerging sustainability topics.

These challenges are consistent with international experience. Pluralism in advisory services widens the range of providers and funding sources, but it does not by itself produce coherent systems; without deliberate coordination mechanisms and adequately resourced lead agencies, pluralistic systems tend toward fragmentation and duplication (Birner et al., 2009; Davis et al., 2020). Chronic understaffing and unstable financing of public extension are likewise widely documented across developing and transition economies, and reviews caution that they undermine the sustained farmer–advisor relationships on which effective extension depends (Cook et al., 2021; Norton & Alwang, 2020). Evidence from other climate-stressed farming systems further shows that advisory services can significantly strengthen farmers' adaptive capacity, but only where services are accessible, context-specific, and delivered with sufficient frequency (Antwi-Agyei & Stringer, 2021)—conditions that the survey results indicate are not yet met in Mongolia.

Against these challenges stand genuine opportunities, and the policy commitment is strong. The Atar-4 campaign includes explicit EAS measures, and the draft Law on Agriculture would establish a clear legal foundation. Parliamentary Resolution No. 57 (State Great Khural, 2025) creates frameworks for green financing linked to climate-smart agriculture. Digital transformation offers particular promise: the crop production information system plant.mofa.gov.mn already serves 13,654 farmers and 2,389 entities, and social media has

become a primary information channel. International evidence suggests that digital tools can substantially reduce the cost of reaching dispersed farmers and improve the timeliness of advice, but that they complement rather than replace field-level advisory capacity and require deliberate attention to content quality, user capabilities, and institutional embedding (Fabregas et al., 2019; Klerkx et al., 2019; Steinke et al., 2021). Bilateral agreements on carbon markets with Singapore (October 2025) and Switzerland (November 2025) have opened pathways for farmers to participate in international carbon trading: these opportunities require substantial advisory support. Similarly, the continued global growth of organic agriculture points to certification and market opportunities for which Mongolian producers will require specialised advice (Willer et al., 2025). The growth of farmer associations provides effective channels for service delivery, and international projects, including the GCF-ADB Aimags and Soums Green Regional Development Investment Program and the JICA-funded MonSHEP project, offer opportunities to strengthen extension capacity.

3.5 Policy Recommendations

The findings translate into a set of policy recommendations that are grounded in the analysis above and address the five systemic challenges directly:

- (1) Institutionalise EAS in law and policy:** the draft Law on Agriculture should be adopted with explicit provisions on the mandate, financing, and coordination of EAS, giving the system a stable legal foundation for the first time.
- (2) Strengthen the coordinating body:** RDC should be equipped with the staffing, funding, and authority required to orchestrate the pluralistic provider landscape, and coordination mechanisms should be established at both national and aimag levels.
- (3) Rebuild human resource capacity:** vacant soum-level extension positions should be filled with qualified personnel supported by competitive salaries and appropriate working conditions, complemented by a system of continuous professional development for extension staff.
- (4) Secure stable and diversified financing:** core public budget allocations should be complemented by cost-sharing arrangements, service contracts, and better-aligned development-project funding to break the cycles of activity and dormancy created by project-based financing.
- (5) Reconnect research and extension:** formal cooperation agreements between MOFALI, RDC, and the research institutes now under the Ministry of Economy and Development should be established to keep research findings flowing into advisory content.
- (6) Broaden service content:** advisory capacity should be developed in farm management, marketing, climate adaptation, organic production, and carbon-market readiness, with providers adopting a proactive rather than reactive orientation toward emerging opportunities.
- (7) Expand digital advisory services:** the crop production information system and social-media reach should be built upon, while preserving and strengthening field-level advisory presence.
- (8) Leverage farmer associations:** MNCFA, GWAVG, MFARD, and regional associations should be engaged as delivery partners, extending their demonstrated capacity for on-farm trials and peer-based services into new advisory domains.

4. Conclusions

The study found that Mongolia's crop-sector extension and advisory services have developed into a pluralistic system involving public institutions, research organisations, farmer associations, private enterprises, individual experts, and development partners. This diversity provides a useful foundation for service delivery, but weak coordination prevents the system from operating coherently. The Research and Development Centre has a formal coordinating role, but limited staffing, funding, and authority restrict its ability to guide the wider provider network.

Survey findings indicate a clear gap between farmer demand and service availability. More than half of surveyed farmers received professional advice only once a year or less, and most wanted more regular engagement. Farmers relied heavily on other farmers, the internet, and social media, but these channels cannot fully replace systematic, research-based advisory support. Providers were generally motivated and technically capable, but their work was constrained by inadequate financing, limited equipment, and insufficient training and demonstration facilities.

The study concludes that Mongolia should strengthen extension coordination, fill vacant public extension positions, invest in provider training, improve research–extension linkages, and expand digital advisory platforms. Farmer associations can also play a larger role in delivering practical and demand-driven services, especially in farm management, climate adaptation, organic farming, and carbon-market readiness.

5. Limitations

This study has several limitations. The farmer survey was based on voluntary participation through digital questionnaires and therefore was not a probability sample of all crop and horticulture farmers in Mongolia. Farmers with better internet access or stronger links to extension staff may have been more likely to respond. Some survey questions were answered by fewer respondents than the total sample, which may affect interpretation of selected results. The provider survey also relied on self-assessment, which may reflect institutional perceptions rather than independently measured performance. Both surveys relied on self-reported perceptions, which may be subject to recall and social-desirability bias, and the findings could not be triangulated against administrative performance records, which are not systematically maintained for EAS in Mongolia. The study combined documentary research, consultations, and surveys, but did not include direct observation of advisory activities or independent evaluation of service quality. Some policy and institutional data were drawn from unpublished sources, which are available upon request. Future studies should use longitudinal designs, regionally stratified samples, service-use records, and qualitative interviews to examine how advisory services affect farm decisions, productivity, and resilience.

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Declaration of AI Use

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Competing Interests

Authors have declared that they have no known competing financial interests OR non-financial interests OR personal relationships that could have appeared to influence the work reported in this paper.

References

- Antwi-Agyei, P., & Stringer, L. C. (2021). Improving the effectiveness of agricultural extension services in supporting farmers to adapt to climate change: Insights from northeastern Ghana. *Climate Risk Management*, 32, 100304. <https://doi.org/10.1016/j.crm.2021.100304>

- Asian Development Bank [ADB]. (2020). Vegetable production and value chains in Mongolia. Manila: Asian Development Bank. <https://www.adb.org/sites/default/files/publication/624311/vegetable-production-value-chains-mongolia.pdf>
- Baast, E. (2019). Baseline study for the German-Mongolian cooperation project Sustainable Agriculture, Phase 3 (unpublished). Ulaanbaatar. Available from the author upon request.
- BenYishay, A., & Mobarak, A. M. (2019). Social learning and incentives for experimentation and communication. *The Review of Economic Studies*, 86(3), 976–1009. <https://doi.org/10.1093/restud/rdy039>
- Birner, R., Davis, K., Pender, J., Nkonya, E., Anandajayasekeram, P., Ekboir, J., Mbabu, A., Spielman, D. J., Horna, D., Benin, S., & Cohen, M. (2009). From best practice to best fit: A framework for designing and analyzing agricultural advisory services worldwide. *The Journal of Agricultural Education and Extension*, 15(4), 341–355. <https://doi.org/10.1080/13892240903309595>
- Chuluunbaatar, D., Annor-Frempong, C., & Gombodorj, G. (2017). Mongolia – A review of the agricultural research and extension system. Rome: FAO.
- Cook, B. R., Satizábal, P., & Curnow, J. (2021). Humanising agricultural extension: A review. *World Development*, 140, 105337. <https://doi.org/10.1016/j.worlddev.2020.105337>
- Customs General Administration of Mongolia [CGA]. (2025). Customs statistics. <https://gaali.mn/statistic>
- Davis, K., Babu, S. C., & Ragasa, C. (2020). Agricultural extension: Global status and performance in selected countries. Washington, DC: International Food Policy Research Institute. <https://doi.org/10.2499/9780896293755>.
- Fabregas, R., Kremer, M., & Schilbach, F. (2019). Realizing the potential of digital development: The case of agricultural advice. *Science*, 366(6471), eaay3038. <https://doi.org/10.1126/science.aay3038>
- Government of Mongolia. (1996). Resolution No. 286 on the establishment of the National Agricultural Extension Centre.
- Government of Mongolia. (2025). Resolution No. 47 on implementation of the Atar-4 campaign for sustainable crop sector development. <https://legalinfo.mn/mn/detail?lawId=17355924197531>.
- Klerkx, L., Jakku, E., & Labarthe, P. (2019). A review of social science on digital agriculture, smart farming and agriculture 4.0: New contributions and a future research agenda. *NJAS – Wageningen Journal of Life Sciences*, 90–91, 100315. <https://doi.org/10.1016/j.njas.2019.100315>
- Lee, C., Kim, H., & Choo, Y. (2020). Review for status and challenges of Mongolia's agricultural sector in terms of research and extension system. *Journal of the Korean Society of International Agriculture*, 32(4), 445–454. <https://doi.org/10.12719/KSIA.2020.32.4.445>
- Ministry of Environment and Tourism [MET]. (2024). Mongolia Fourth National Communication to the UNFCCC. Ulaanbaatar: Ministry of Environment and Tourism. <https://unfccc.int/documents/638318>
- National Statistics Office of Mongolia [NSO]. (2022). Results of the Agricultural Census 2022. Ulaanbaatar: National Statistics Office of Mongolia. Available at <https://www.1212.mn>
- National Statistics Office of Mongolia [NSO]. (2025a). Mongolian Statistical Information Service. <https://www.1212.mn>
- National Statistics Office of Mongolia [NSO]. (2025b). Agriculture sector 2024. Ulaanbaatar: National Statistics Office of Mongolia. Available at <https://www.1212.mn>
- Norton, G. W., & Alwang, J. (2020). Changes in agricultural extension and implications for farmer adoption of new practices. *Applied Economic Perspectives and Policy*, 42(1), 8–20. <https://doi.org/10.1002/aep.13008>
- Research and Development Centre for Food, Agriculture and Light Industry [RDC]. (2025). Atar-4 campaign: Report on implementation progress, results, and impact assessment (unpublished). Available from the authors upon request.
- State Great Khural (Parliament of Mongolia). (2025). Resolution No. 57 on measures to establish a green financing system and improve the legal environment. <https://legalinfo.mn/mn/detail?lawId=17432181751262>.
- Steinke, J., van Etten, J., Müller, A., Ortiz-Crespo, B., van de Gevel, J., Silvestri, S., & Priebe, J. (2021). Tapping the full potential of the digital revolution for agricultural extension: An emerging innovation agenda. *International Journal of Agricultural Sustainability*, 19(5–6), 549–565. <https://doi.org/10.1080/14735903.2020.1738754>
- Takahashi, K., Muraoka, R., & Otsuka, K. (2020). Technology adoption, impact, and extension in developing countries' agriculture: A review of the recent literature. *Agricultural Economics*, 51(1), 31–45. <https://doi.org/10.1111/agec.12539>

Willer, H., Trávníček, J., & Schlatter, B. (Eds.). (2025). The world of organic agriculture: Statistics and emerging trends 2025. Frick and Bonn: Research Institute of Organic Agriculture (FiBL) and IFOAM – Organics International. <https://www.organic-world.net/yearbook/yearbook-2025.html>

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