

THE PHARMA INNOVATION

Review paper: Extension approaches in agriculture and their role in farmer development

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Agricultural extension plays a crucial role in transferring scientific knowledge to farmers, enabling innovation, and improving livelihoods. Over time, various extension approaches have evolved — from top-down technology transfer models to participatory, farmer-led, and ICT-based systems. This review paper examines key agricultural extension approaches, their characteristics, strengths, and limitations. It also highlights how modern extension systems integrate participatory learning, digital tools, and public-private partnerships to make extension more inclusive and effective. The paper concludes with recommendations for strengthening extension services for sustainable agricultural development.

Keyword: From top-down technology, transfer models to participatory, farmer-led, and ICT

Introduction

Agricultural extension is the process of sharing information, knowledge, and technologies among researchers, extension agents, and farmers to improve productivity and sustainability. It acts as a bridge between agricultural research and farm practices, ensuring that innovations reach farmers effectively.

Over time, the philosophy and practice of agricultural extension have evolved. Early systems focused on technology transfer, while modern approaches emphasize participation, empowerment, and knowledge exchange.

Understanding these approaches is essential for designing effective extension programs that meet

farmers' diverse needs in a rapidly changing agricultural landscape.

Objectives of Agricultural Extension Approaches

1. To disseminate improved agricultural technologies.
2. To enhance farmers' skills, knowledge, and decision-making.
3. To promote sustainable and climate-resilient practices.
4. To strengthen linkages between research institutions, markets, and farmers.
5. To empower farmers through participatory learning and social inclusion.

Evolution of Agricultural Extension Approaches

Period	Approach	Key Features
1950s-1970s	Technology Transfer / Training & Visit (T&V)	Top-down model; focus on delivering scientific innovations.
1980s-1990s	Farming Systems Approach	Recognized diversity of farming systems; promoted adaptive research.
1990s-2000s	Participatory and Farmer Field School (FFS)	Farmers became active participants in problem-solving and learning.
2000s-Present	ICT-based & Demand-driven Extension	Focus on information communication technologies (ICTs), private sector, and farmer-led innovation.

Major Extension Approaches

Training and Visit (T&V) System

- Developed by the World Bank in the 1970s.
- Extension agents regularly visited farmers, provided training, and delivered new technologies.
- **Strength:** Structured and systematic.
- **Limitation:** Top-down; ignored local knowledge and farmer participation.

Farming Systems Research and Extension (FSRE)

- Emphasizes understanding farmers' socio-economic conditions before introducing technologies.
- **Focus:** On-farm trials, adaptive research, and inter-disciplinary collaboration.
- **Strength:** Location-specific recommendations.
- **Limitation:** Time-consuming and resource-intensive.

Participatory Rural Appraisal (PRA)

- Encourages farmers to identify, analyze, and prioritize their problems.
- **Strength:** Builds ownership and empowerment.
- **Limitation:** Effectiveness depends on facilitators' skills and local participation.

Farmer Field Schools (FFS)

- Originated in Southeast Asia (FAO initiative).
- Farmers learn by doing — conducting experiments and observing results.
- **Strength:** Experiential learning, farmer empowerment.
- **Limitation:** High cost per participant, difficult to scale up.

Group and Cooperative Approaches

- Farmers organized into groups, cooperatives, or Self-Help Groups (SHGs) for learning, input purchase, and marketing.
- **Example:** Women Self-Help Groups under the National Rural Livelihoods Mission (NRLM).
- **Strength:** Builds social capital and collective bargaining power.

ICT-Based Extension

- Use of mobile phones, radio, internet, and digital platforms for information dissemination.
- **Examples:** Kisan Call Centers, mKisan SMS Portal, Digital Green, e-NAM.
- **Strength:** Cost-effective, real-time, wide reach.
- **Limitation:** Digital divide and lack of digital literacy in rural areas.

Public-Private Partnership (PPP) Approach

- Collaboration between government, NGOs, and agribusiness companies for technology delivery.
- **Examples:** e-Choupal (ITC), Tata Kisan Sansar.
- **Strength:** Efficient and market-oriented.
- **Limitation:** May prioritize commercial interests over smallholder needs.

Farmer-Led Extension

- Farmers act as trainers and knowledge disseminators.
- **Example:** Lead Farmer Model and Community Resource Persons (CRPs).
- **Strength:** Peer learning, trust, and local adaptation.

- **Limitation:** Requires strong capacity building and coordination.

Comparative Analysis of Extension Approaches

Approach	Participation Level	Cost	Scalability	Suitability
Training & Visit	Low	High	Moderate	Uniform technology dissemination
Farmer Field School	High	High	Low	Integrated pest & crop management
ICT-Based	Moderate	Low	High	Remote and dispersed farmers
PPP Approach	Moderate	Moderate	High	Commercial crop value chains
Farmer-Led	High	Moderate	High	Community empowerment

Challenges in Agricultural Extension Approaches

1. **Fragmented Services:** Multiple agencies with limited coordination.
2. **Inadequate Human Resources:** Shortage of skilled extension personnel.
3. **Funding Constraints:** Limited budgets for field-level programs.
4. **Technological Gaps:** Poor access to ICT tools and digital infrastructure.
5. **Gender Inequality:** Women farmers often excluded from extension programs.
6. **Weak Feedback Systems:** Limited farmer feedback for research improvement.

Emerging Trends and Future Directions

1. **Digital Extension:** Integration of AI, drones, and mobile apps for personalized advisory services.
2. **Pluralistic Extension Systems:** Collaboration among public, private, and community-based actors.
3. **Gender-Sensitive Approaches:** Targeted programs for women and youth.
4. **Climate-Smart Extension:** Promoting resilience to climate change.
5. **Data-Driven Decision Making:** Using big data and GIS for precision advisories.
6. **Outcome-Based Monitoring:** Measuring impact rather than activity.

Conclusion

Extension approaches in agriculture have shifted from technology-centered to farmer-centered paradigms. Modern extension must combine participatory learning, digital communication, and multi-stakeholder collaboration to meet the

evolving needs of farmers. A strong, inclusive, and adaptive extension system is fundamental for achieving food security, rural prosperity, and sustainable agricultural transformation.

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