

Extension Reforms under the National Mission on Agricultural Extension & Technology (NMAET)

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The National Mission on Agricultural Extension & Technology (NMAET) was initiated to re-organize and empower India's agricultural extension system to become farmer-driven, technology-enabled, and demand-driven. Consisting of four sub-missions Agricultural Extension (SMAE), Seed and Planting Material (SMSP), Agricultural Mechanization (SMAM), and Plant Protection & Quarantine (SMPPQ) the mission encourages participatory planning, ICT integration, public-private partnerships, and gender mainstreaming. Achievements are operationalizing ATMA in every district, increasing ICT penetration, improving technology adoption, and strengthening women farmers. Regardless of capacity, resource, and coordination challenges, NMAET offers a strong foundation for sustainable, inclusive, and climate-resilient agricultural development in India.

Introduction

Agricultural extension services in India have hitherto focused on technology transfer from research institutions to farmers. Increasing climatic change, market forces, constraint of resources, and diversified farming systems have necessitated reforms in the extension systems. The National Mission on Agricultural Extension & Technology (NMAET), initiated during the 12th Five-Year Plan (2012–17) by the Ministry of Agriculture & Farmers Welfare, Government of India, was formulated to restructure, build, and modernize extension systems with farmer-first approaches.

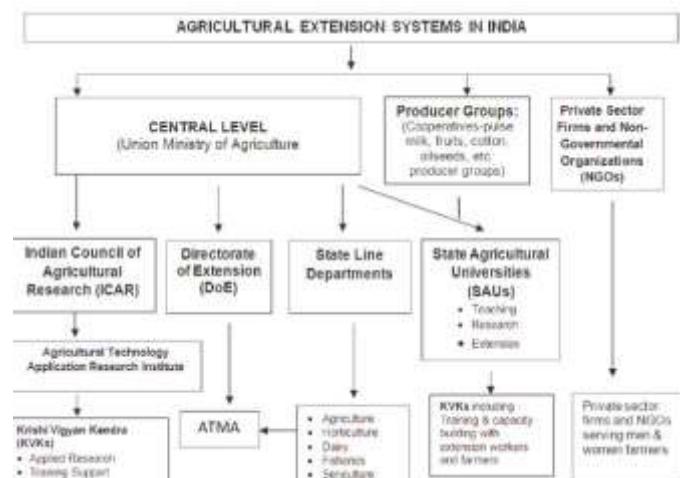
Key Objective:

To transform agricultural extension into farmer-led, responsible, and demand-based extension to assure integrated agricultural development.

3. Overview of NMAET

The National Mission on Agricultural Extension & Technology (NMAET) was initiated by the Government of India in the context of the 12th Five-

Year Plan with the overarching goal to restructure and enhance the system of agricultural extension so that it becomes more farmer-oriented, demand-led, and technology-driven. The mission emphasizes agricultural development as a whole by bringing together extension, seed production, mechanization, and plant protection.



Source: <https://www.researchgate.net>

It has four key Sub-Missions, each dealing with a particular area of agricultural development:



1. Sub-Mission on Agricultural Extension (SMAE)

– Deals with restructuring and reinforcing agricultural extension services under the ATMA (Agricultural Technology Management Agency) model. It involves farmer-to-farmer learning, participatory planning, and ICT-based knowledge sharing for enhancing outreach and adoption of new-age agriculture.

2. Seed and Planting Material Sub-Mission (SMSP)

– Endeavors to provide farmers with quality seeds and planting materials in a timely manner at competitive prices. It facilitates seed replacement, variety diversification, and quality certification for improving productivity.

3. Sub-Mission on Agricultural Mechanization (SMAM)

– Promotes the use of farm machinery and equipment to alleviate labour drudgery, enhance efficiency, and cope with labour shortages, particularly for marginal and small farmers, by way of subsidies and custom hiring centres.

4. Sub-Mission on Plant Protection and Plant Quarantine (SMPPQ)

activities. Mahila Kisan Sashakti karan is accorded special importance with an emphasis on women's participation and leadership in farm activities.

3.4 Use of ICT and Media

ICT tools are used extensively to reach the farmers rapidly and at low cost. The mKisan Portal, SMS advisory services, and mobile apps provide real-time agriculture advisories. Community radio stations, Doordarshan Krishi broadcasts, and video-based learning techniques support conventional extension. Digital dashboards facilitate transparent monitoring and evaluation of extension performance.

4. Reform Strategies

NMAET extension reforms are rooted in a structure of seven strategic pillars aimed at extending agricultural extension to be more participatory, inclusive, and responsive to new issues. These strategies are designed to ensure extension services are demand-driven, technology-enabled, and socially equitable.

1. Farmer-Driven Extension

The central idea is to put farmers in the focal point of the extension process. This entails their active involvement in planning, implementation, and appraisal of extension programs. Feedback from farmers is systematically used to refine interventions so that services suit their actual needs.

2. Decentralization

Decision authority is given to states, districts, and blocks for locally appropriate solutions. Decentralization improves flexibility, stimulates grassroots innovation, and minimizes reliance on top-down instructions.

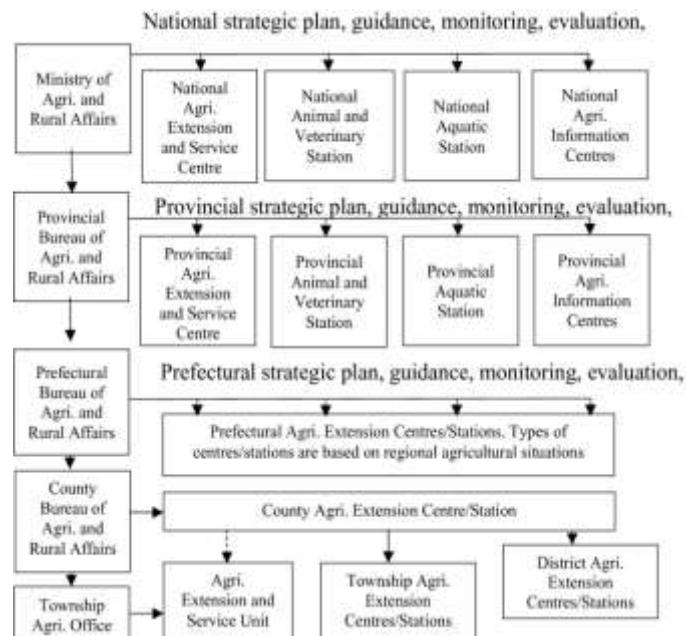
3. Convergence

Extension services are brought under convergence across agriculture, horticulture, animal husbandry, fisheries, and allied industries. Convergence

optimizes resources, prevents duplication, and offers farmers complete support packages.

4. Public–Private Partnership (PPP)

The reforms encourage interface with agri-business companies, NGOs, cooperatives, and input traders. PPPs expand outreach, promote technology transfer, and establish market linkages, especially for marginal and small farmers.



Source: <https://link.springer.com>

5. ICT Integration

Mobile phones, web-enabled applications, and digital platforms are utilized for providing real-time weather forecasts, pest forecasts, and market prices. ICT tools, like the mKisan Portal, enhance efficiency and coverage.

6. Gender Mainstreaming

Minimum 30% women farmer participation is guaranteed in all extension work. Special training and empowerment programs, e.g., Mahila Kisan, deal with gender-based issues in agriculture.

7. Monitoring & Evaluation

Management Information Systems (MIS), social audits, and independent evaluations are utilized to

monitor progress, measure impact, and ensure transparency. Ongoing monitoring provides opportunities for making corrections in program implementation in a timely manner.

5. Achievements of Extension Reforms under NMAET

The extension reforms initiated under the National Mission on Agricultural Extension & Technology (NMAET) have delivered significant progress in strengthening the agricultural knowledge system, improving technology adoption, and enhancing farmer participation. These achievements can be categorized as follows:

5.1 Institutional Outcomes

- The ATMA model has been made operational in all districts of the country, ensuring decentralized and participatory extension planning.
- There has been a significant increase in the participation of Farmer Interest Groups (FIGs) and Farmer Producer Organizations (FPOs), augmenting collective action and negotiating capacity.
- Improved linkages among research institutes, extension agencies, and farmers have increased relevance and uptake of technologies.

5.2 Technological Adoption

- Farmers have increasingly adopted improved seeds, high-tech farm machinery, and Integrated Pest Management (IPM) techniques, resulting in increased productivity and sustainability.
- Mechanization levels are now higher even for marginal and small farmers, aided by facilities such as custom hiring centres and subsidies on farm implements.

5.3 ICT Penetration

- The mKisan Portal has provided millions of SMS advisories on weather forecasts, pest warnings, and crop management advice in local languages.
- Mobile applications like Kisan Suvidha, Pusa Krishi, and weather alert services have increased the availability of real-time agricultural information to farmers.

5.4 Women Empowerment

- Women farmers have also been supported through specialized training modules and livelihood-enhancing activities in kitchen gardening, mushroom production, and value addition.
- Increased involvement of SHGs in extension planning and implementation has empowered rural women socially and economically.

6. Challenges in Implementation

Though the extension reforms under NMAET have contributed greatly to the consolidation of agricultural extension in India, some challenges persist in their achievement of full potential. They are both structural and operational, necessitating continued efforts to resolve them.

1. Capacity Gaps

One significant limitation is the lack of trained human resources with technical skills in ICT-enabled extension techniques. Most field-level extension personnel do not have sophisticated technical expertise in the use of digital tools, data analysis, and new modes of communication, restricting the outreach and potency of advice services.

2. Resource Constraints

Despite the importance of agricultural extension, funding allocations are often insufficient for large-scale farmer coverage. This leads to limitations in



conducting extensive training programs, exposure visits, and demonstrations, especially in remote areas.

3. Technological Gaps

Disparities in internet and mobile connectivity in the rural and tribal areas hinder the transmission of real-time advisories and access to online portals such as the mKisan Portal. Moreover, digital disparities among literate, device-accessible farmers and those with poor literacy or device access impact even benefits.

4. Coordination Issues

Strong inter-sectoral and inter-departmental convergence is necessary for effective extension. Coordination among agriculture, horticulture, animal husbandry, and allied departments is weak in some states and leads to duplication of effort or gaps in service delivery.

5. Limitations of Monitoring

Accurate and timely monitoring is essential for adaptive management. However, inconsistencies in data collection, reporting formats, and MIS utilization reduce the effectiveness of monitoring and evaluation systems. In some cases, feedback from farmers is not systematically integrated into program improvements.

7. Way Forward

To further enhance the effect of extension reforms under NMAET and mitigate current challenges, a futuristic strategy should marry technology, inclusivity, and local solutions. The following priority areas can inform future directions:

1. Strengthen Digital Extension

By leveraging artificial intelligence (AI) and big data analytics, advisory services can be transformed. AI-enabled platforms can provide customized crop advice, weather-based advisories, and real-time mapping of soil and crop health. Applications of

drones, satellite imaging, and IoT sensors can allow for accurate monitoring and timely interventions.

2. Bring in Climate-Smart Agriculture

Climate variability is a serious threat to agriculture systems. Extension services need to encourage in an energetic manner climate-resilient agriculture practices such as drought-tolerant crops, water-saving irrigation techniques, crop diversification, and integrated farming systems. Farmers will adapt and adjust to, as well as reduce, the effects of climate change through this integration.

3. Improve PPP Models

Public-Private Partnerships (PPPs) are able to increase outreach and introduce innovation into extension services. Agri-tech startups, agro-industries, and NGOs can be partnered with to enhance market linkages, deliver high-quality inputs, and promote value chain development.

4. Youth Engagement

Rural youth participation is essential to the sustainability of agricultural extension. Development of Agri-entrepreneurs and Extension Volunteers as local resource persons, filling the gap between farmers and technology providers, must be the focus of programs. This also serves to plug the gap in extension services' manpower shortages.

5. Localized Content Development

Advisory content must be tailored according to local agro-climatic conditions and presented in regional languages and dialects for easier comprehension and adoption. Access with audio-visual media, interactive voice response systems, and social media avenues can be further facilitated.

8. Conclusion

The NMAET Extension Reforms have reoriented agricultural extension in India from the top-down, supply-led model to a participatory, demand-driven, and ICT-based system. Though scaling and



sustaining reform challenges persist, the mission has established a strong platform for farmer empowerment, enhanced productivity, and inclusive agricultural growth. The way ahead calls for marrying new emerging technologies with localised knowledge to make agricultural extension adaptive, resilient, and farmer-driven.

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