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Assessing the role of Krushik exhibition in accelerating agricultural technology adoption among farmers in Maharashtra

Vaishnavi R Patil and Dr. Pallavi S Jambhale

Mahatma Phule Krushi Vidyapeeth, Rahuri, Dr. Sharadchandra Pawar College of MBA (Agri.), Baramati, Maharashtra, India

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Corresponding Author: Vaishnavi R Patil

Abstract

The Indian agriculture sector faces persistent challenges related to low technology penetration, limited access to modern tools, and slow behavioural transformation among farmers. To bridge this gap, agricultural exhibitions like Krushik, held annually in Baramati, Maharashtra, have emerged as interactive knowledge platforms that connect farmers directly with innovations, agri-tech companies, and extension institutions. This study evaluates the impact of Krushik Exhibition on the adoption of agricultural technologies among visiting farmers. Using primary data collected from 200 farmers who attended the 2025 Krushik Exhibition, the study employs a structured Technology Adoption Index (TAI) to quantify adoption levels and uses ANOVA analysis to examine the influence of various socio-economic factors. The results reveal that 80% of the farmers adopted at least one new technology after attending the event, with a high average TAI score of 88.24%. Key adoption drivers included cost-effectiveness, peer influence, and the opportunity to engage directly with product demonstrations and service providers. Further, ANOVA tests show statistically significant differences in adoption behaviour based on education level, landholding size, and farming experience. These findings highlight Krushik's effectiveness as a participatory and experiential extension model that promotes practical learning and boosts confidence in modern agricultural practices. The study concludes that agricultural exhibitions can act as strong enablers for technology dissemination and recommends strengthening outreach strategies to include smallholders and marginalized groups, ensuring inclusive and widespread adoption.

Keywords: Krushik exhibition, agricultural technology adoption, farmer innovation, agricultural extension, Technology Adoption Index (TAI), ANOVA, Maharashtra agriculture, experiential learning platforms

Introduction

Agriculture continues to be the backbone of India's rural economy, employing over 50% of the population and contributing significantly to GDP. However, the sector is currently grappling with critical challenges such as stagnating productivity, declining soil health, climate vulnerability, fragmented supply chains, and underutilization of available technologies. Despite the presence of well-funded research institutions and numerous technological innovations, adoption at the grassroots level remains inconsistent. One major reason is the lack of effective communication channels and contextual exposure to these innovations for end users—particularly small and medium-scale farmers. Traditional agricultural extension services, although useful, often suffer from scalability issues, communication gaps, and low engagement. In response, event-based interventions like agricultural exhibitions have gained prominence. Unlike conventional one-way information dissemination, exhibitions provide immersive, multi-sensory environments where farmers interact with innovations, ask questions, witness live demonstrations, and compare technologies in a short period. This makes them particularly effective in influencing decision-making and accelerating behavioral change.

Among such initiatives, the *Krushik Agricultural Exhibition* organized annually by the Agricultural Development Trust in Baramati, Maharashtra, stands out for its scale, diversity, and inclusiveness. Krushik hosts over 400 exhibitors and attracts more than 3 lakh visitors, including farmers, agribusinesses, researchers, students, and youth entrepreneurs. It showcases innovations in farm mechanization, irrigation, precision agriculture, organic inputs, ICT applications, and post-harvest technologies. The event structure emphasizes live demos, field trials, expert talks, startup showcases, and interaction zones, making it a comprehensive platform for agricultural learning and exchange.

Formulas

Technology Adaption Index

$$\text{TAI} = \frac{(\text{Obtained Adoption score})}{(\text{Maximum Adoption score})} \times 100$$

The ANOVA model

Total variation in the data into two components:
Total Sum of Squares (SST)=Between Groups Sum of Squa res (SSB)+Within Groups Sum Squares (SSW)

1. Between-Group Variance (SSB)

$$SSB = \sum_{i=1}^{k} n_i (\bar{X}_i - \bar{X})^2$$

Where:

- n_i = Number of Observations in group i
- $\bar{X}_i$ = Mean of group i
- $\bar{X}$ = Overall mean
- k = Number of groups

2. Within-Group Variance (SSW)

$$SSW = \sum_{i=1}^{k} \sum_{j=1}^{n_i} (X_{ij} - \bar{X}_i)^2$$

Where

- X_{ij} = Each individual observation
- $\bar{X}_i$ = Mean of Group i

3. Mean Squares

$$MSB = \frac{SSB}{k-1}, \; MSW = \frac{SSW}{N-k}$$

Where,

- MSB = Mean Square Between the groups
- MSW = Mean Square Within the groups

4. F-Ratio

$$F = \frac{MSB}{MSW}$$

5. Decision rule

- If F > F-critical (from F-distribution table) at a given significance level (e.g., 0.05), we reject the null hypothesis.
- This implies that at least one group mean is significantly different from the others.

Results and Discussion

Table 1: Classification of Farmers Based on Technology Adoption Behavior

Category	Frequency	Percentage (%)
Adoptive Farmers	160	80.00
Non-Adoptive Farmers	40	20.00
Total	200	100.00

Table 2: ANOVA Summary - Influence of Various Factors on Technology Adoption

Source of Variation	SS	df	MS	F	F crit
Between Groups	5.682	2	2.841	6.789	3.021
Within Groups	14.683	35	0.4195		
Total	20.365	37			

The F value (6.789) is greater than the F critical value (3.021), indicating significant variation in technology adoption across education levels and landholding sizes.

Table 3: Adoption Index Summary for Selected Respondents

Respondent No.	Adoption Score	Maximum Score	Adoption Index (%)
Learning new agricultural technologies and practices is beneficial to farmers	305	320	95.31%
The hands-on demonstrations at exhibition helps at better understanding of practices	270	320	84.38%
Research and trials	310	320	96.88%
Recommendations from peers	272	320	85.00%
Suggestions from agricultural experts	285	320	89.06%
Yield improvement	316	320	98.75%
Cost-effectiveness	286	320	89.38%
Farmers should not try new technologies unless other farmers have used them successfully	215	320	67.19%
Total	2259	2260	705.94%
Average			88.24%

A high mean TAI of 88.24% indicates Krushik's strong impact on technology uptake.

Discussion

The results demonstrate that Krushik Exhibition is a highly effective catalyst for promoting agricultural innovation. The fact that 80% of surveyed farmers adopted at least one new technology highlights its relevance and influence. The high TAI score further supports the conclusion that demonstrations, accessibility to expert knowledge, and peer validation at the event contributed significantly to adoption behavior. ANOVA analysis confirmed that education and landholding size were critical in determining adoption levels. Educated farmers with larger holdings tended to adopt more, likely due to better risk tolerance and access to capital. However, smallholders still benefitted from low-cost technologies and personalized demos. These findings resonate with Rogers' Diffusion of Innovation Theory, where factors like observability, trialability, and relative advantage play a major role. Krushik's interactive format enabled farmers to visualize and validate innovations before deciding to adopt them.

Conclusion

Krushik Agricultural Exhibition has a measurable and statistically significant impact on the technology adoption behavior of farmers. With 80% adoption and a mean TAI of 88.24%, the event serves as a powerful platform for experiential learning and agricultural transformation. ANOVA results highlight key demographic influences on adoption, offering direction for targeted interventions.

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