

IMPACT OF DIGITAL MARKETING AND E-COMMERCE ADOPTION ON FARMERS' ACCEPTABILITY OF DIGITAL PURCHASE: A QUANTITATIVE STUDY OF THE INDIAN FERTILIZER MARKET

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Abstract: *The Indian fertilizer industry is witnessing a gradual but significant shift in farmers' purchase behaviour due to increasing digital penetration and evolving commerce channels. Historically, fertilizers have been sold through distributor-led models, but the growth of digital platforms and e-commerce promises enhanced reach and efficiency. Despite this potential, empirical research on farmers' acceptability of digital purchase for fertilizer products in the Indian context remains limited. This study aims to quantitatively examine how digital marketing intensity, e-commerce adoption, and digital engagement influence farmers' acceptance of online fertilizer purchases. The research adopts a positivist research design and proposes to collect structured survey data from a representative sample of farmers, particularly those engaged in procurement of fertilizers and agri-inputs across different states in India. The key variables include digital awareness, perceived ease of purchase, trust in digital platforms, perceived utility, and purchase intention. The dependent variable is farmers' acceptability of digital purchase behaviour. Statistical techniques such as exploratory factor analysis, multiple regression, and Structural Equation Modeling (SEM) will be used to test the hypothesized relationships. The proposed model will help quantify the impact of digital marketing and e-commerce features on farmers' willingness to adopt digital buying channels for fertilizers. The findings are expected to generate statistically validated insights into digital adoption patterns among farmers, contributing to academic literature on digital acceptance in agri-inputs and providing practical direction for fertilizer companies seeking to enhance digital sales.*

Index Terms — *Digital Marketing, E-Commerce Adoption, Farmers' Purchase Behaviour, Fertilizer Industry, India.*

I. INTRODUCTION

The Indian fertilizer market is valued at over USD 45 billion and is projected to grow steadily due to rising food demand and agricultural intensification. Despite increasing smartphone penetration, fertilizer purchases remain largely offline. Digital platforms offer an opportunity to transform farmer engagement and purchase behaviour.

The fertilizer sector in India is a critical component of the agricultural value chain, supporting crop nutrition and agricultural productivity. As of 2025, the Indian fertilizer market was valued at around INR 1,021 billion, driven by rising food demand, supportive government policies, and advances in agricultural practices. Projections indicate continued steady growth in the industry over the next decade.

Despite this size and importance, fertilizer distribution has largely remained dealer and field sales centric, with limited direct digital interaction between farmers and manufacturers. Government initiatives such as the Digital Agriculture Mission and soil health card programs are paving the way for digital integration in agricultural practices, including nutrient management and input procurement.

In parallel, the digital ecosystem in Indian agriculture is evolving. Earlier research shows that internet and mobile-based agriculture extension services significantly influence knowledge adoption among farmers, with technology familiarity and perceived economic benefit serving as predictors of adoption behaviour. Moreover, academic studies demonstrate that e-commerce has been steadily progressing as a channel among farming communities, driven by increasing availability of digital devices and connectivity.

However, despite these macro-trends, quantitative evidence on farmers' acceptability of digital fertilizer purchases — particularly purchase intent and behavioural adoption — is limited. Most current knowledge focuses either on digital advisory tools or on broader agri-digital adoption patterns, but not on direct purchase behaviour relating to digital channels and e-commerce platforms.

This research therefore seeks to fill this empirical gap by quantifying the influence of digital marketing and e-commerce adoption on farmers' acceptability of digital purchase for fertilizer products, thereby providing evidence on whether farmers are willing and ready to buy fertilizers online.

II. LITERATURE REVIEW

Prior research highlights that digital technologies such as mobile apps, e-commerce, and digital marketing can enhance agricultural market access, strengthen supply chain linkages, and empower farmers with product information and price transparency. For example, multiple agri-tech platforms have demonstrated increased adoption of digital tools for agronomic advice and crop marketing across regions, indicating that digital platforms can influence farmers' choices.

Studies on e-commerce adoption in agriculture show that farmers who use digital platforms experience benefits such as broader market reach, reduced reliance on intermediaries, and time savings. Research from Trichy District, India, indicates that e-commerce practices have steadily increased among farmers, suggesting an openness toward digital purchase mechanisms.

Academic work on digital marketing in agriculture also suggests that digital exposure, social media usage, and online interaction can improve farmers' engagement with market information, potentially influencing their buying decisions. In addition, studies in broader agricultural marketing contexts show that digital platforms can shift consumer behaviour by lowering transaction costs and improving access to product information, which may translate into higher online purchase intention.

Yet, most existing literature focuses on technology usage and digital advisory adoption, rather than direct online purchasing behaviour for agri-inputs like fertilizers. This research extends the literature by quantitatively examining how digital marketing and e-commerce adoption affect farmers' digital purchase behaviour.

III. RESEARCH METHODOLOGY

3.1 Research Design

The study adopts a positivist, quantitative research design. A structured survey instrument will be developed to capture farmers' perceptions and digital purchase intentions across key variables: digital awareness, perceived ease of purchase, trust in digital platforms, perceived utility, and purchase intention. The dependent variable is farmers' acceptability of digital purchase behaviour.

3.2 Population and Sample

The target population comprises farmers actively engaged in the procurement of fertilizers and agri-inputs across different states in India. A representative sample will be drawn using stratified random sampling, ensuring geographic and crop-type diversity across major agricultural states. The sample size will be determined based on standard statistical power analysis for Structural Equation Modeling.

3.3 Data Collection

Primary data will be collected through structured questionnaires administered to farmers. The questionnaire will be pre-tested for reliability and validity. Likert-scale items (1–5) will be used to measure all constructs. Data collection will be conducted in regional languages to ensure comprehension among rural respondents.

3.4 Variables of the Study

Independent Variables: Digital Marketing Intensity, E-Commerce Adoption, Digital Awareness, Perceived Ease of Purchase, Trust in Digital Platforms, and Perceived Utility.

Dependent Variable: Farmers' Acceptability of Digital Purchase Behaviour (measured through Purchase Intention and Adoption Readiness).

3.5 Statistical Techniques

The following statistical techniques will be employed:

(i) Exploratory Factor Analysis (EFA): To identify underlying factor structures among the survey items and confirm construct validity.

(ii) Multiple Regression Analysis: To examine the individual and combined influence of digital marketing and e-commerce adoption variables on farmers' purchase behaviour.

(iii) Structural Equation Modeling (SEM): To test the hypothesized structural relationships among latent constructs and validate the proposed conceptual model of digital purchase acceptability.

IV. PROPOSED CONCEPTUAL FRAMEWORK

The proposed model posits that Digital Marketing Intensity and E-Commerce Adoption are primary antecedents that influence farmers' digital awareness and perceived utility of online channels. These perceptions, moderated by trust and perceived ease of use, determine farmers' acceptability of digital purchase behaviour for fertilizer products. The framework integrates elements of the Technology Acceptance Model (TAM) and diffusion of innovation theory to contextualise digital adoption in the agri-input sector.

Key hypothesized relationships include:

H1: Digital Marketing Intensity positively influences farmers' digital awareness.

H2: E-Commerce Adoption positively influences farmers' perceived utility of digital purchase.

H3: Perceived ease of purchase positively influences purchase intention.

H4: Trust in digital platforms positively moderates the relationship between perceived utility and purchase intention.

H5: Purchase intention significantly predicts farmers' acceptability of digital purchase behaviour.

V. CONCLUSION

The study is expected to provide empirical evidence on farmers' digital purchase acceptability, helping fertilizer companies design data-driven digital marketing and e-commerce strategies. By leveraging structured survey data and advanced statistical techniques, the research will generate empirical evidence on how digital marketing and e-commerce adoption influence fertilizer buying behaviour among farmers.

The findings are expected to offer measurable insights for fertilizer manufacturers, agritech platforms, and policy practitioners on which digital channels and engagement strategies are most effective in driving online purchase adoption. The results will also help refine digital marketing investments, optimize e-commerce platform features, and shape farmer education strategies to improve digital acceptance.

Furthermore, the study will contribute to academic literature by bridging the gap in understanding digital purchase behaviour in agri-input markets, providing a validated model that can be tested across emerging markets. Policymakers may also find the results useful in designing targeted interventions to improve digital literacy and adoption in rural India.

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