Farmer Perspectives on Digital Agriculture M-Apps: An Empirical View

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[Abstract] Digital adoption is being propelled in rural India at a very fast pace and has made many changes in Indian agroecosystems. Mobile applications' contributions to millions of rural farmers with access to information, such as weather forecasting, the use of appropriate technology for seeding and cultivation, the application of manure and pesticides, crop harvesting, the depiction or forecasting of market demands, financial assistance, and other services, can be a major boost for agriculture and rural development. Mobile phones can make distribution more cost-effective and strengthen ties between institutions, farmers, and customers for each farm's supply and demand. This paper delves into insights about mobile app user familiarity and reality in this context. This study outlines a survey of 250 farmer respondents, and it tested the variables of demographics and awareness, knowledge, and motivation levels of app-user utility with inferential statistics. The test results show that farmers are not significantly familiar with mobile app usage, owing to low knowledge, low motivation, and lack of awareness. Hence, these study findings encourage M-app developers to promote the knowledge of agriculture mobile apps with a strategic integration of push and pull to induce value addition to the needy population.

[Keywords] digital adoption, mobile -apps, value addition, knowledge, motivation

Introduction

India leads in the mobile feature market with 765 million mobile phone users, 320 million of whom live in rural areas. The Digital India initiative, which was launched in 2015, intends to increase digital literacy and develop digital infrastructure in rural regions in order to empower them. Digital agriculture is defined as the use of information and communication technology (ICT) to support the transmission of localized information and services with the goal of making farming more socially, economically, and environmentally sustainable; it also contributes to the delivery of nutritious and affordable food to everyone. Considering that agriculture is one of the most important sources of income for 58 percent of rural families, the role of Digital Agriculture within Digital India must be examined.

Mobile communications technology has quickly become the most common way of transmitting voice, data, and services. In general, mobile applications (m-apps) impel Indian farmers to unfold the agricultural and rural development (m-ARD apps) hold significant potential for advancing development. The rise of mobile apps supports farmers on government schemes and agriculture-related information, such as weather forecasting, the use of appropriate technology for seeding and cultivation, the application of manure and pesticides, crop harvesting, the depiction or forecasting of market demands, and financial assistance.

The digital transformation has made many changes in Indian agro ecosystems. In India, there are dozen m-apps serving farmers with broad applications. The market reach of these apps is good in terms of the brand; the reality is that farmers familiarity with and use of the apps is a challenging research question

in a post-pandemic situation. On this contextual ground, this study has drawn the following objectives.

Study objectives

1. To know the farmer's awareness and knowledge of the agriculture m-apps.
2. To understand the farmer motivation for m-app usage.
3. To explore the current trends of m-apps rural agriculture transformation in post-pandemic.

Literature review

Farmer Behavioral Perspectives

Farmers' actions depend on how they relate to the environment. Perhaps the most profound theory of behavior learning and development is social cognitive theory (Bandura, 1970). Providing organized reinforcement schedules to facilitate habitualization of behavior was the most common method of behavior modification and learning (Skinner). Field theory, developed by social psychologist Kurt Lewin, asserts that behavior cannot be explained purely by intrapersonal motivational variables. Rather, it must be viewed as a result of the whole of a person's circumstances.

The agriculturist behavior on m-apps is supported by persuasion theory. Behavioral change follows attitude change, according to the idea, and attitude change can be influenced by absorption and comprehension of persuasive information. This is determined by three main factors: the credibility of the source (apps), the persuasiveness of the message, and the responsiveness of the audience (Farmers).

Consumers used information cues to evaluate products (Olson & Jacoby, 1972). According to Alba and Hutchinson (1987), consumer knowledge is viewed as a multi-dimensional construct with different sorts of product-related experiences leading to distinct degrees of knowledge. Based on the situation and task, the knowledge influences product assessments and choosing behavior. Knowledge is in the form of brands, product attributes, usage contexts and general product class; choice rules are likely to be found in the m-app, which is in consumer's memory (Marks & Olson, 1981).

The likelihood is that farmers recognize the existence and availability of a company's product or service. According to Aaker (1991) brand awareness can be referred to as the degree of consumers' familiarity with a brand. According to Keller (2003), brand awareness is built and increased as a result of repeated vulnerability, which finally leads to the consumer's experience with the brand. Hearing, seeing, or thinking about a certain brand might help it stick in a consumer's memory. The constituents of motivation, according to Rabby (2001), are found in everyone and the internalized urge toward the dominating concept of the moment.

M-Apps Initiatives

M-apps are applications that are designed to take advantage of mobile technologies but can also be developed for other platforms. In India number of agriculture M-apps, Kisan Suvidha, IFFCO Kisan Agriculture Farmer Krishi Mariposa Krishi(ICAR), AgriApp, Kheti-Badi, Whatsapp (agricultural communities), Krishi Gyan, Crop Insurance, and Agri Market, are available in a text and visuals**,** helpline numbers refocused on agriculture advisories, government agriculture policies and schemes, new varieties of crops information, organic farming, weather, soil, market prices, online markets, knowledge on fertilizers, insecticides, seeds, machinery, and crop insurance.

On-line applications smartcrop, mandi trades, and kisaan market allow farmers to collect market information to sell their produce, and customers can compare and purchase produce. Regional apps like kisan suvidha, ePanta, rythuseva, m-sedyam, crop schemes, polampilusthondi, farm-o-pedia, agrismart, and krishisuchak focus on user base and deliver information about a certain region. These are all mobile apps that aid in the reduction of transportation, corruption, and transactional waste in agriculture, as well as provide a platform for farmers to share resources.

Model Framework
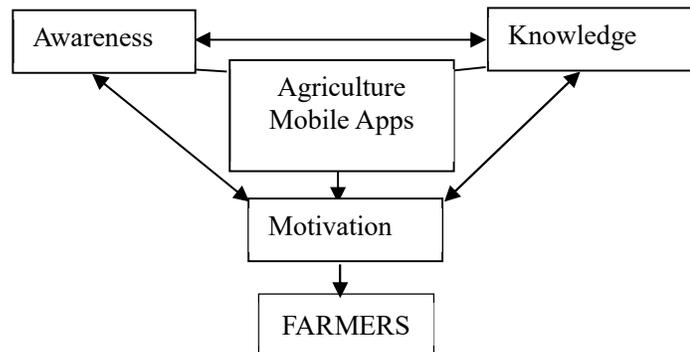
Present Study View A-K-M

This study model depicts on consumer awareness and knowledge of M-apps and recognition familiarity and application. Farmer motivation is a willing and a driving force to use the agriculture M-apps. Based on the framework, the following hypotheses are drawn for empirical testing.

Hypothesis
H1: Awareness of M-apps motivate the farmers to recognize the apps regularly.
H2: Knowledge on m-apps motivate the farmers to use the app regularly.
H3: Awareness and Knowledge of M-Apps have a significant positive relationship on motivation
of farmers to use the app regularly.

Methodology
This study focuses on the variables of awareness, knowledge and farmer motivation to use the M-apps. The objective is to determine the relationship between the awareness, knowledge (IV) with the motivation (DV). It specifies the appropriate action farmers are supposed to take on M-apps The empirical on evidence has collected through a structured questionnaire administered to 250 respondent farmers (convenience sampling) of North Andhra region. The questionnaire comprises 24 items using a five-point Likert Scale, where the responses denoted as 1 strongly disagree and 5 as strongly agree the reliability statistics of Cronbach Alpha were calculated to be .71 ($0.7 \leq \alpha < 0.8$), implying that the items have a reasonable level of internal consistency.

Results
The following Table 1 demographics provide an overview and summary of key analytical points of the survey. In the demographic distribution of the respondents, the highest was male (67.2%), aged 41 to 55years (32.8%), school education (35.2%), small-scale farming (61.6%), with household earnings of 1 to 2.4 lc (31.2%) are the farmers observed in the field data of (n)250 respondents.

Table 1
Demographics

Demographic	Categories	Percent (%) Sample(n=250)
Gender	Male	67.2
	Female	32.8
Age	16-25	16.4
	26-40	26.4
	41-55	32.8
	≥56	24.4
Education	Post-Graduation	6.4
	Graduation	32.8
	School	35.2
	No Education	25.6
Occupation Farming	Small Scale (1-5Acre)	61.6
	Medium (5-10Acre)	23.2
	Large (>10 Acre)	15.2
Household Income	1-2.4Lakhs	31.2
	2.4-3 Lakhs	24.8
	3-4 Lakhs	21.6
	4-5 Lakhs	12.8
	>5Lakhs above	9.6

The Variables' Relationship

The mean scores and standard deviations of the variables in the study are shown in the Table 2. It can be observed that the consumer level of awareness (3.24) and the knowledge (3.04) is a higher score on the mean, which indicates farmers possess an interest in agricultural m-apps, then motivation. The next phase in the research is to figure out how awareness, knowledge, and motivation are related.

Table 2
Standard Deviations of the Variables

N=250	Mean	Std.deviation
Awareness	3.24	1.39
Knowledge	3.04	1.45
Motivation	2.56	1.38

Table 3
Correlation Analysis

	Awareness	Knowledge	Motivation
Awareness	1.00	000(.413)	.957(-.003)
Knowledge	000(.413)	1.00	.690(-.025)
Motivation	957(-.003)	.690(-.025)	1.00

**Pearson Correlation is significant at the level of 0.01 (2-tailed, N=250).

The correlation study reveals a strong link between M-apps awareness and farmer motivation (r= 0.80, p= 0.000). However, there was no discernible link between knowledge and motivation. This shows the importance of awareness in effective farmer motivation. Awareness is a practical conscience that leads to action-oriented actions. Furthermore, no substantial link between knowledge and awareness has been discovered. This implies that awareness has nothing to do with knowledge. A person may have extensive knowledge of a subject yet lack the moral foresight to respond appropriately to the challenges. On the other hand, a person who lacks knowledge may have the inherent motivation to adhere to the M-apps and react accordingly to unknowingly perform the activity.

Multiple Regression Analysis

Multiple regression analysis was used to acquire a deeper understanding of the relationships between the independent (awareness and knowledge) and dependent variables (motivation) in order to expose any linkages between the two sets of variables. There are numerous substantial linear connections between the three constructs, as seen in the correlation tables. The link between a single dependent variable (motivation) and a number of independent variables was investigated using multiple regression analysis (predictors). To build the regression equation or model to describe its relative contribution to one dependent variable, a group of independent variables is weighted. The dimensions of awareness and knowledge were used as independent variables in the model, while motivation was used as the dependent variable. Table 4 summarizes the findings.

Table 4
Regression Analysis Results

Variables	Coefficient	t-Value	p-Value
Motivation	.00	10.57	.000
Knowledge	.009	.122	.903
Awareness	-.029	-.414	.680

R Square = 0.27, Adjusted R square = -.007, F–change = .087, *Significant F Change .917 at 1%, Durbin Watson 1.089.

Table 4 explained 47.7% of variance of motivation (DV), (F change = .087, p <.05). The result specifies that there are two dimensions, namely, Awareness (β= -029, p< .01) and Knowledge (β= .009, p< .01), which are Awareness is not in positive association with the motivation. As a result, these three dimensions are seen to be crucial and directly responsible for the presence and retention of farmer likeliness on M-apps. Furthermore, the findings show that Awareness and Knowledge are the key variables that explain the variation in motivation on M-apps. Thus, Hypotheses H1 (Awareness) and Knowledge (H2) were partially confirmed; Motivation is not well associated with the farmer. However, the test result concludes that Knowledge and awareness drives the farmer to use M-apps. But Awareness on M-apps is a source of the gap to create benefit to the end-user.

Discussion

The analysis indicates that a huge gap is present between farmer awareness, knowledge levels, and motivation on M-apps. Awareness and recognition are a first step referring to the Knowledge (Aaker, 1991). Although the correlation is established between the awareness, knowledge, and motivational ground level, the results suggest that m-apps information has a key role in improving farmers' awareness. In a comparison, consumer knowledge was found to be significant in a test; it differs with respondents' education. Even though farmers school education (35.2%) has shown a relatively higher mean of knowledge than lower educated or no education (25.2%) group, the awareness level is not triggered to recognize M-apps.

The situation is likely, as those with a higher education level are more likely to be exposed to various agricultural M-app facts and figures. Contrary to belief, simply knowing or having knowledge of

something does not imply positive action in the use of M-apps. In a regional study, Kisan Suvidha, ePanta, Rythu Seva identified good and moderate usage of apps in farming, except the schemes and benefits to reach the needy. Hence the results marked the need of M-apps value features and brand image is an essential, driven strategy to reach the farmer.

Recommendations

In light of these findings, empirical research may wish to recommend

1. Educating farmers on app usage is a social responsibility. Innovations and information developing M-Apps in local language is essential.
2. As a midstream program strategy, including offering incentives to farmers, and connecting M-apps to bank accounts and third-party payment apps is essential.
3. Provide app information of point of sales material, local store displays, and support local and national advertising of M-app usage and value-driven digital benefits.
4. Explore the possibility of partnering with government electric billing agencies, agri-product retailers, and/or other organizations to develop demonstrations of M-ap digital applications for use in.

Conclusion

The end of the study is concluded with creating awareness on agriculture M-apps is a valuable quest for the agriculture strategy. Although farmers are having low Knowledge on m-apps their awareness levels are not fully supported to motivate the farmer to use in M-apps and awareness is a prior concern for exhibiting certain behaviors, and unawareness leads to ignorant and reduction of individual capacity in protecting and upholding the agriculture in digital times. Hence, M-app Value-me's socially responsible approach is inevitable for the app developers to create more awareness of M-apps for better and risk-free prospective agriculture.

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