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Intention to Adoptict in Farming: An Empirical Analysis using Technology Acceptance Model

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Abstract
In the present study we analyze the farmers' perception towards adoption of technology such as ICT for better productivity in farming. The considered constructs are adopted from Technology adoption model (TAM). A total sample of 800 farmers from the Guntur district are collected through simple random technique and out of which survey respondents irregular responses are eliminated finally 756 samples are determined for statistical analysis. Chi-square test was performed to determine the association between perceptions and model constructs. Results are reported and discussions are made as per the results and in correlation between results and previous literature and finally, suggestions and future indication for extension of the study are proposed.

Keywords: *Technology, Farming, Ease of Use, Usefulness, Intention.*

1. INTRODUCTION:

From the last five decades, the state's agricultural objective policies and methods used to achieve these objectives have transformed from time to time, depending on internal and external factors. Sector-level agricultural policy can be further subdivided on the supply side and the demand side (Mahadevan, 2003). The first includes areas related to agrarian reform and land use, development and diffusion of new technologies, public investment in irrigation and rural infrastructure, and support for agricultural prices (Mahadevan, 2003; Mukherjee and Kuroda, 1997, Singh, 2010). Demand-side policies, for their part, include government interventions in agricultural markets and the operation of public distribution systems. These policies also have macroeconomic effects in terms of impact on public budgets (Ruttan, 2002). Policies at the macro level include policies to strengthen linkages in agriculture and non-agricultural activities, as well as industrial policies that affect the supply of raw materials for agriculture and the supply of agricultural equipment(Manideep, 2019c, 2019b, 2019a).

OBJECTIVES OF THE STUDY:

- To review the literature with regard to technology adoption feasibility in farming which in turn leads to productivity.
- To empirically analyze the perceptions of farmers towards technology (ICT) adoption for enhancement in productivity

2. LITERATURE REVIEW:

Indian farmers face natural problems such as drought, floods, deforestation and natural disasters due to large geographical disparities as well as infrastructure problems. Farmers' bargaining power is not strong because they pay high-priced inputs and cannot sell their products on the market at high prices, resulting in a

general loss of their net income. (Jain, 2017). At the time of technological development and innovation, information and communication technologies have the power to change the state of agriculture in India (Sivakoti Reddy, 2016). The rural population relies to a large extent on agriculture because of the lack of alternative employment opportunities, which makes the current study of strategic importance (Jain, 2017). Based on TAM, the researcher developed and tested FTAM in China's development after incorporating certain concepts, such as social influence, innovation, job relevance, personal effectiveness and relative advantage. As an independent variable. All FTAM constructs have sufficient theoretical support. The results of the study showed that some TAM constructs have a direct and indirect effect on the adoption and intention of computer scientists to develop and use them (Jain, 2017, Reddy, 2005, Thi, Chi and Yamada 2002).

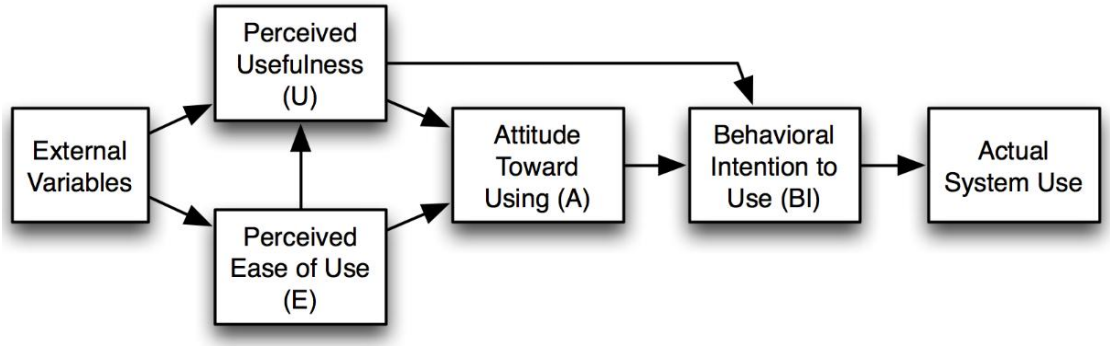

Figure 1: Actual TAM Model
Source: Davis, Bagozzi & Warshaw 1989

The information-based agricultural agriculture system (precision farming) is designed to maximize agricultural production and is often described as the next major development in agriculture. The combination of global positioning system (GPS) and mobile mapping should provide farmers with the information they need to implement precision farming based on decisions (Mittal and Tripathi, 2009). In the Indian context, the use of mobile phones as a means of providing information on agriculture will depend on the extent to which the mobile network has been able to link farmers to market information in a timely manner. and precise (Jain, 2017, Mittal and Tripathi, 2009, Mukherjee and Kuroda, 2003, Shahabinejad and Akbari, 2010, Thi et al., 2002).

The impact on productivity can be measured directly in terms of higher yield for farmers, with a decreasing effect on crop patterns and potential yield of planted crops. Information on price factors: input and output prices, and non-price factors, such as information on input availability, seed quality, modern techniques, etc., will play the main role to improve agricultural productivity.

RESEARCH QUESTIONS:

1. Does Perceived Usefulness of Technology (ICT) intense its adoption for farming?
2. Does Related Advantage of Technology (ICT) intense its adoption for farming?
3. Does Perceived Ease of use of Technology (ICT) intenseits adoption for farming?

HYPOTHESIS FORMULATION:

H1: Perceived Usefulness of Technology (ICT) positive significantly influences its adoption for farming.

H2: Related Advantage of Technology (ICT) positive significantly influence its adoption for farming.

H3: Perceived Ease of use of Technology (ICT) positive significantly influence its adoption for farming.

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3. METHODOLOGY:

To test the hypothesis the demographic characteristics such as gender, age, marital status, qualification monthly income and experience in farming are cross tabulated towards hypothesized statements and its association was tested using chi-Square test. A total sample of 800 farmers from the Guntur district are collected through simple random technique and out of which survey respondents irregular responses are eliminated finally 756 samples are determined for statistical analysis.

PROPOSED MODEL:

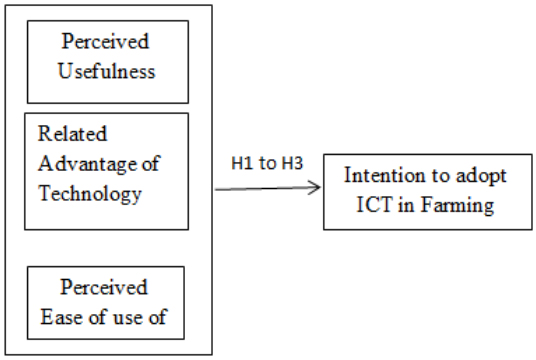

Figure 2: Proposed Model

DEMOGRAPHICS OF THE RESPONDENTS:

About 70.1 percent of the 756 total respondents are male were as the rest are female. Coming to the age factor of the total respondents about 36.8 percent were in the age of 25-35 years and majorly about 40.7 percent are in between 35-45 years. Were, coming to marital status about 92.6 percent of the respondents are married and rest are single. With respect to educational qualifications of the farmers about 33.3 percent are graduates and the rest about 61.3 percent are qualified in secondary education. When coming to earning capacity of the farmers about 45.8 percent incomes are in between Rs. 20,000 – 30,000 and about 45.8 percent have 2-5 years farm experience in the seasonal and tropical times.

INFERENTIAL ANALYSIS

The method adopted for data collection is a non-probabilistic sampling method- snowball sampling such that, referrals from farmers as a chain process responses are collected and about 150 responses are collected in that after eliminating the inappropriate and semi-filled responses are removed in the final process of data analysis and only a few about 4 responses cases are replaced with mean values and that task is achieved by SPSS.

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.613
Bartlett's Test of Sphericity	Approx. Chi-Square	226.611
	Df	37
	Sig.	.0001

Table 1: Sample Adequacy

A principle components factor analysis was performed to determine the factors from the adopted questionnaire. Before to that, KMO and Bartlett's test was performed to determine the sample adequacy and it is found that by test it is 0.613 which is sufficient enough for performing factor analysis. This is represented in the table 1. The items of the model are measured on a seven point likert scale were, mean and standard deviation of the model constructs are represented in the table 2, that the mean of trustworthiness is 3.542, the mean of adoption intention is 3.942, the mean of perceived advantage is 4.892 and the mean of perceived ease of use is 5.449.

The constructs and the items are drawn from the literature, but the validity and to examine the variance explained by these constructs to the proposed model a dimension reduction technique is used in the present study(Manideep, 2019c, 2019a; Manideep & Yedukondalu, 2019). All the items and its responses are loaded in SPSS and Exploratory factor analysis is performed and it is found that four constructs evolved and the variance explained by these constructs is about

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71.369 percent. As per the literature, a model explaining 60 percent of variance is considered valid and .the factors are decided based on the eigenvalue, if the eigenvalue is >1 it is considered as a factor. The SPSS out below table 3 displays the result along with Rotation Sums of Squared Loadings.

The rotation technique in this model is varimax rotation, which is an non-orthogonal method that, from table 5, it can be determined that out of 15 items about 6 items are removed due to cross loadings and item loadings under that factor is less that 0.6 and this is dome as per the literature.

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.231	24.787	24.787	2.231	24.787	24.787	1.987	22.076	22.077
2	1.764	19.600	44.387	1.764	19.600	44.387	1.543	17.148	39.223
3	1.399	15.546	59.933	1.399	15.546	59.933	1.505	16.722	55.947
4	1.029	11.435	71.368	1.029	11.435	71.368	1.388	15.422	71.369
5	.638	7.094	78.462						
6	.628	6.975	85.437						
7	.496	5.516	90.954						
8	.451	5.009	95.963						

Table 2: Factor Loadings and Explained Variances

It can be observed from table 2, that all the items are >0.6(Correlated with that factor) and 3 items are under Perceived usefulness, and 2 items are under Perceived advantage, Perceived ease of use and at last 2 items under adoption intention construct. The factor analysis does not define any causal relation between the factors but the validity of convergent and divergent validity is evaluated by this.

Study Construct	Perceived usefulness	Adoption Intention	Perceived advantage	Perceived ease of use	Reability	Mean	Std. Deviation	N
Perceived usefullness	1	.19*	.00	-.00	0.680	3.542	1.4608	139
Adoption Intention	.19*	1	.13	.25**	0.660	3.942	2.3344	139
Perceived advantage	.00	.13	1	.06	0.740	4.892	1.1496	139
Perceived ease of use	-.00	.25**	.06	1	0.540	5.449	2.1402	139

Table 3: Correlation and reliability Test

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

A serial multiple regression method is used to observe the impact of the independent variables Perceived usefulness, Perceived advantage and Perceived ease of use on adoption intention from table 4 it can be determined that Perceived ease of use is positively and significantly effects (β =0.251, P<0.05) the farmersadoption intention, Perceived usefulness significantly effects(β =0.195, P<0.05) the farmersadoption intention and Perceived advantage positively not significantly effects(β =0.117, P>0.05) the farmersadoption intention.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.726E-16	.081		.000	1.000
	Perceived usefulness	.195	.081	.195	2.410	.01730
	Perceived advantage	.117	.081	.117	1.440	.1520
	Perceived ease of use	.251	.081	.251	3.090	.0020

Table 4: Decomposed Standardized Coefficients of the model

4. RESULTS AND DISCUSSION:

From the model: message attributes along with educational qualification of the respondents have predicted a 14 percent of proportional variation (coefficient of determinant R^2 is 0.14). It is observed that the proportion of variation has increased by 3 percent (R^2 = 0.11, change in R^2=0.03) about 3 percent of the variance is explained by qualification of respondents and it is a key element in forming adoption intention. Hence, it is proved that both the hypothesis, H1 and H3 are positive significantly associated with adoption intention means, both can contribute to formation of adoption intention and H2, the Perceived advantage was not significant that means farmers do not consider this as a considerable factor in adoption decision. The control variable qualification of respondents also a major decision contributing factor.

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
Study Constructs	.345[a]	.119	.099	.9494805
Study Constructs with Educational Qualification	.379[b]	.144	.118	.9396878

Table 5: Model Determination

a. Predictors: (Constant), Perceived advantage, Message Credibility, Perceived usefulness. b. Predictors: (Constant), Perceived advantage, Message Credibility, Perceived usefulness, Educational Qualification
c. Dependent Variable: Adoption Intention

IMPLICATIONS AND FURTHER RESEARCH:

States of India where agriculture is the main occupation of the state's inhabitants. The respondents who completed the questionnaire were contacted personally, but the circumstances under which the test was conducted were not checked. Therefore, it is not known whether the conditions were still optimal for such a test, such as time, sincerity, distractions, and no source of bias, and the test ended in one session without interruption. Sometimes the researcher had to leave the questionnaire to the respondents for later interpretation(Jain, 2017). It could have been better for respondents to complete the questionnaire under the best test conditions and under the best possible control. The current study took into account a limited number of demographic indicators, while in the future other variables such as household composition, ethnicity, social class, etc. It can be taken into account for a similar study(ALI, 2005; Amin & Li, 2016; Barker, Dawe, & Inocencio, 2003; Jain, 2017; Jin et al., 2019; Mahadevan, 2003; Mittal & Tripathi, 2009; Mukherjee & Kuroda, 2003; Reddy, 2005; Shahabinejad & Akbari, 2010; Singh, 2010; Stiroh, 2019).

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