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## Constraints faced by respondents in adoption and acculturation of digital technologies

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#### Abstract

The present study was conducted in Karnal, Rohtak and Jhajjar districts of Haryana state covering 360 respondents. Results showed majority of the respondents (88.61%) had lack of skill regarding digital technologies with Rank I followed by cost of technology is high (82.22%) with Rank II and lack of funds and resources (76.94%) with Rank III. Except the caste variable, all other independent variables *viz.*, age, education, occupation, annual income, family type and farm size were found to be significant and positive correlated with constraints. The dependent variables including constraints had significant and positive relationship with z value at 5 per cent level of significance which showed that it is between -1.96 to +1.96, therefore, the data falls between the acceptance region, that's why null hypothesis is accepted.

**Keywords:** Constraints, digital technologies, significant, positive relationship

#### 1. Introduction

Technology has repeatedly propelled Indian agriculture forward by overcoming productivity stagnation, strengthening market ties, and improving farm management. As a result, careful management of all inputs is required for the long-term viability of such a complex system. Farmers are looking for new ways to increase production efficiency today due to rising agricultural costs and commodity prices. The time has come to combine information technology and agricultural science for improved economic and environmental crop production (Rogers, 1995) [3]. Adoption and acculturation of digital technologies for sustainable farming systems, on the other hand, is a difficult and dynamic issue for farmers, extension services, agri-business, and policymakers. Farmers have always been interested in new technology. Until recently, farmers' technology choices were mostly based on the need to boost production, efficiency, and sustainability (Schwab, 2016) [4].

Agriculture will need to be viewed as a business entity that is always innovating and catering to changing market demand in order to have a successful future growth strategy. The deployment of new technologies can account for a large portion of agricultural growth. Despite the fact that agricultural technologies are rapidly evolving in India and that a variety of business models are driving the eco - system, there is a need to design a path to successful commercialization of agricultural commodities and to scale it up by utilising the appropriate incentives and policy support (Kite-Powell, 2016) [1]. Therefore, keeping all these factors in mind, the present study was carried out to identify the constraints faced by the respondents in adoption and acculturation of digital technologies.

#### 2. Methodology

The proposed study was conducted in three districts i.e., Karnal from Zone I, Rohtak from Zone II and Jhajjar from Zone III based on the agro-ecology region and cropping pattern of Haryana state. To meet out the sample size, a total of three districts from each zone were selected randomly. Two blocks from Karnal district i.e., Asandh and Nilokheri were selected; Sampla and Kallanaur, two blocks were selected from Rohtak district and Bahadurgarh and Beri two blocks were selected from Jhajjar district. Thus, a total of six blocks from the three districts were included under the present study. Three villages i.e., Assandh, Balla and Chochran from Asandh block and Ajanthalli, Bir Naraina and Shamgarh from Nilokheri block were selected. From Sampla block, three villages i.e., Nayabans, Samchana and Gijhi and Patwapur, Madhodhi Ranghdhyan and Ballamb from Kallanaur block were selected. From Bahadurgarh block, Loharheri, Dahkora and Rohad and Gorchi, Barhana and Gangtan dighal from Beri block were selected.

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Thus, a total of 18 villages were selected randomly to draw the representative sample. Twenty farmers including both males and females, who were actively involved in agriculture and educated up to at least middle class were selected by multi-stage random sampling method. Therefore, the sample constituted for the proposed study was 360 farmers as the respondents to collect the information for the purposively study. A well-structured interview schedule was used as a tool for data collection including all the variables of the study. Data were collected personally by the researcher. Statistical tools applied for data analysis such as frequency, percentages, weighted mean score, mean score, Co-efficient of correlation (r) and Z test.

### 3. Results and Discussion

The results of the study has been incorporated below:

#### 3.1. Perceived constraints in Adoption and Acculturation of digital technologies by the respondents

Distribution of respondents regarding perceived constraints in adoption and acculturation of digital technologies has been incorporated in the Table presented below:

#### 3.2 Perceived constraints in Adoption and Acculturation of digital technologies by the respondents

Table 1 regarding perceived constraints in adoption and acculturation of digital technologies by the respondents clearly depicted that among all the factors affecting the adoption and acculturation were related to different ranks given below. It was found that majority of the respondents (88.61%) had lack of skill regarding digital technologies with Rank I followed by noise of machines (82.22%) with Rank II, cost of technology is high (76.94%) with Rank III, poor change proneness (76.39%) with Rank IV, lack of feedback to the administration (76.11%) with Rank V, small land holdings and poor response to farmers need (75.28%) with Rank VI each respectively, inability to access credit facility and low risk proneness (74.44%) with Rank VII each respectively, lack of access to women farmers (74.17%) with Rank VIII, cutting of trees for the machines to enter the field (73.06%) with Rank IX, technology is inappropriate for the farm (71.67%) with Rank X, do not understand the value of technology (70.56%) with Rank XI, not enough time to spend on technology (69.72%) with Rank XII, loss of

competitiveness (69.44%) with Rank XIII, lack of enough funds and resources (69.17%) with Rank XIV, less linkages (68.61%) with Rank XV, fear of failure (75.28%) with Rank XVI, lack of weather friendliness (67.22%) with Rank XVII, lack of awareness (66.39%) with Rank XVIII, lack of training (66.11%) with Rank XIX, lack of motivation (65.83%) with Rank XX, non-durability of electronic devices (65.28%) with Rank XXI, high cost of operation and maintenance (61.94%) with Rank XXII, lack of subsidy to farmers on digital technologies (61.11%) with Rank XXIII, poor power supply (60.56%) with Rank XXIV, lack of company support when machinery stops working (60.00%) with Rank XXV and lack of technological infrastructure (56.11%) with Rank XXVI.

Therefore, it can be concluded that majority of the respondents (88.61%) had lack of skill regarding digital technologies with Rank I followed by cost of technology is high (82.22%) with Rank II and lack of funds and resources (76.94%) with Rank III. The findings were consistent with those of Muzari *et al.* (2013)<sup>[2]</sup>. In terms of economic factors, the government may have to prioritise its policy to create easy loan facilities for the farming community to access the loan. Further, small micro banking institution and more SHGs may be created to support farmers with loan facilitates. This will further enable the farmers to meet the investment cost and afford the high cost digital technologies. Moreover, it will increase the payment capacity of farmers to access digital farm advisory services from paid version of digital farm advisory. Though these economic factors were ranked low by the responses of farmers, there is a need for increasing the awareness of farmers on the available credit facilitating schemes. The Department of Agriculture may provide adequate funding support and resources and organise capacity building programme on good agricultural practices to minimise the cost of operation and maintenance. Also, the ensured power supply would enable farmers to adapt to digital technologies for farming. There is a need for extension functionaries to ensure increased soil fertility, remedy measures for disease outbreak at a timely manner and assure water for irrigation. Also, there is a need for adequate manpower at grassroots level to respond to farmers' queries and questions in districts Karnal, Rohtak and Jhajjar districts effectively. Moreover, the institutional support needs to be enhanced for enabling farmers to adoption and acculturation of digital technologies.

**Table 1:** Perceived constraints in Adoption and Acculturation of digital technologies by the respondents

Sr. No.	Statements	Karnal	Rohtak	Jhajjar	Total	Rank
1	Lack of skill	103 (85.83)	107 (89.17)	109 (90.83)	319 (88.61)	I
2	Noise of machines	99 (82.50)	98 (81.67)	99 (82.50)	296 (82.22)	II
3	Cost of technology is high	88 (73.33)	91 (75.83)	98 (81.67)	277 (76.94)	III
4	Poor change proneness	92 (76.67)	91 (75.83)	92 (76.67)	275 (76.39)	IV
5	Lack of feedback to the administration	87 (72.50)	92 (76.67)	95 (79.17)	274 (76.11)	V
6	Small land holdings	97 (80.83)	91 (75.83)	83 (69.17)	271 (75.28)	VI
7	Poor response to farmers need	91 (75.83)	89 (74.17)	91 (75.83)	271 (75.28)	VI
8	Inability to access credit facility	92 (76.67)	89 (74.17)	87 (72.5)	268 (74.44)	VII
9	Low risk proneness	86 (71.67)	88 (73.33)	94 (78.33)	268 (74.44)	VII
10	Lack of access to women farmers	92 (76.67)	90 (75.00)	85 (70.83)	267 (74.17)	VIII
11	Cutting of trees for the machines to enter the field	91 (75.83)	90 (75.00)	82 (68.33)	263 (73.06)	IX
12	Technology is inappropriate for the farm	89 (74.17)	85 (70.83)	84 (70.00)	258 (71.67)	X
13	Do not understand the value of technology	85 (70.83)	86 (71.67)	83 (69.17)	254 (70.56)	XI
14	Not enough time to spend on technology	80 (66.67)	84 (70.00)	87 (72.50)	251 (69.72)	XII
15	Loss of competitiveness	87 (72.50)	82 (68.33)	81 (67.50)	250 (69.44)	XIII
16	Lack of enough funds and resources	77 (64.17)	84 (70.00)	88 (73.33)	249 (69.17)	XIV
17	Less linkages	77 (64.17)	82 (68.33)	88 (73.33)	247 (68.61)	XV
18	Fear of failure	82 (68.33)	81 (67.50)	81 (67.50)	244 (67.78)	XVI

19	Lack of weather friendliness	73 (60.83)	81 (67.50)	88 (73.33)	242 (67.22)	XVII
20	Lack of awareness	75 (62.5)	79 (65.83)	85 (70.83)	239 (66.39)	XVIII
21	Lack of training	79 (65.83)	79 (65.83)	80 (66.67)	238 (66.11)	XIX
22	Lack of motivation	74 (61.67)	80 (66.67)	83 (69.17)	237 (65.83)	XX
23	Non-durability of electronic devices	77 (64.17)	79 (65.83)	79 (65.83)	235 (65.28)	XXI
24	High cost of operation and maintenance	73 (60.83)	75 (62.50)	75 (62.50)	223 (61.94)	XXII
25	Lack of subsidy to farmers on digital technologies	67 (55.83)	72 (60.00)	81 (67.50)	220 (61.11)	XXIII
26	Poor power supply	65 (54.17)	73 (60.83)	80 (66.67)	218 (60.56)	XXIV
27	Lack of company support when machinery stops working	68 (56.67)	70 (58.33)	78 (65.0)	216 (60.00)	XXV
28	Lack of technological infrastructure	62 (51.67)	67 (55.83)	73 (60.83)	202 (56.11)	XXVI

\*Figures in parantheses indicate percentage

### 3.3 Relationship of independent variables with constraints about digital technologies

The data in Table 2 regarding relationship of independent variables with constraints revealed that there except the caste variable, all other independent variables were found to be significant and positive correlated with constraints. This might be because as the age of the respondents increased, with the enriched experience they might learn how to run the digital technologies. Education also played a major role in the constraints as the respondents if well-educated; they would face less constraints because of more awareness and knowledge. Occupation as already discussed, the small and marginal farmers were carrying out service and other business with the farming activities, therefore, they might have knowledge about the implementation of technologies, so they will face less constraints. Annual income also affected the constraint variable as if a farmer is wealthy, he might consult the experts, and he might be educated that he would face lesser problem in usage of digital technologies. Family type has affected constraints as if size of a family is large, there is a scope of more consultation with the family members and constraints could be reduced. Farm size had nothing to do with constraints, as if farm size is more, there is nothing like that the constraints will increase or decrease to the farmers. Therefore, the null hypothesis (Ho) was rejected in relationship between independent variable *viz.*, age, education, occupation, annual income, family type, farm size with the constraints faced in adoption and acculturation of digital technologies.

**Table 2:** Relationship of independent variables with constraints about digital technologies

Variables	Constraints
Age	0.53*
Caste	0.03
Education	0.63*
Occupation	0.42*
Annual income	0.37*
Family Type	0.57*
Farm Size	0.62*

\*Significant at 5% level of significance

### 3.4 Z test analysis on constraints about digital technologies in Karnal, Rohtak and Jhajjar districts

Z test analysis on constraints about digital technologies in Karnal, Rohtak and Jhajjar districts is presented in Table 3. It was found that constraints had significant and positive relationship with z value at 5 per cent level of significance which showed that it is between -1.96 to +1.96, therefore, the data falls between the acceptance region, that's why null hypothesis is accepted.

**Table 3:** Z test analysis on constraints about digital technologies in Karnal, Rohtak and Jhajjar districts

Variables	Mean	SD	Z Value
Constraints (Karnal district)	0.69	0.17	0.16*
Constraints (Rohtak district)	0.71	0.17	0.10*
Constraints (Jhajjar district)	0.72	0.17	0.26*

\*Significant at 5% level of significance

## 4. Conclusion

The findings of the study showed that majority of the respondents (88.61%) had lack of skill regarding digital technologies with Rank I followed by cost of technology is high (82.22%) with Rank II and lack of funds and resources (76.94%) with Rank III. Except the caste variable, all other independent variables *viz.*, age, education, occupation, annual income, family type and farm size were found to be significant and positive correlated with constraints. The dependent variables including constraints had significant and positive relationship with z value at 5 per cent level of significance which showed that it is between -1.96 to +1.96, therefore, the data falls between the acceptance region, that's why null hypothesis is accepted.

### 4.1 Declaration of Competing Interest

Authors declare that there are no conflicts of interests.

### 5. Acknowledgements

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