Agri Growers Multi-Source Usage Behavior : An Examination of Internet and Physical Sources

Mehak Kapoor* and Harpreet Singh**

* Punjabi University, Patiala

** Punjabi University, Patiala

Abstract

Businesses are fast adopting various sources/channels due to the benefits of leveraging multiple sources at the same time, as a result of the advent of breakthrough internet technologies and competitive pressure. Similarly, farmers do not rely on a single source for information about their agricultural activity, but rather on a variety of sources. However, the sources are still underutilized, which could be due to a variety of factors. As a result, the primary goal of the study was to discover the factors that influence farmers' attitudes toward two types of information sources : the Internet and physical sources. The TRA (Theory of Reasoned Action) model was used as a foundation and additional source characteristics-related aspects that have the greatest impact on farmers' attitudes toward a source were identified from previous literature. The study identified factors from two main models related to source selection i.e.; the cost-benefit model and the Least effort model. A survey was conducted among a total sample of 600 farmers of Punjab using a structured self-administered questionnaire and utilized a multistage stratified proportionate sampling technique, as well as numerous data analysis techniques such as descriptive statistics such as percentages frequencies and multiple regression analysis. According to the findings, the following factors have a substantial influence on search attitudes regarding internet sources : Fundamental TAM (Technology Acceptance Model) variables such as perceived usefulness followed by perceived ease of use, facilitating conditions, information quality and previous experience. The factors which were found to be significant and positively related to search attitude towards physical information sources were Information Quality followed by Previous Experience with the source while communication difficulty and search effort had no significant influence. The outcomes of this study give a solid empirical foundation for all information providers, both public and private, to create a modified information distribution system

that takes into consideration the factors that influence farmers' opinions toward both types of sources.

Key Words

Internet Sources, Physical Information Sources, ICT Sources, Non-ICT Sources, Multi-Channel Usage, Technology Acceptance Model, Information Searching Behavior, Farmer's Information Seeking.

INTRODUCTION

With the introduction of breakthrough internet technologies and competitive pressure, businesses are rapidly adopting many sources/channels due to the benefits of utilizing several sources at the same time. Businesses use a variety of sources rather than focusing on a single source because a single source does not fully meet their needs. Even with the development of internet technologies, people continue to choose conventional methods of performing their work due to the ease of doing activities through those methods. To create systems that work in harmony with humans, information system designers must first understand their information behavior. Employees' effective information-seeking behavior, for example, has been found to affect their job performance, ability to cope with uncertainty in tasks, knowledge acquisition and the maintenance of comfortable social relationships with colleagues in modern organizations (Morrison, 2002; Vakkari, 2003). Those that seek information not only learn from others to address their current difficulties, but they are also able to adapt the obtained knowledge and even produce new knowledge. However, most of the studies (Hardy, 1982; O'Reilly, 1982; Chakrabarti, Feineman, and Fuentevilla, 1983; Swanson, 1987; Choo, 1994; Vancouver & Morrison, 1995; Fidel and Green, 2004 and Yitzhaki & Hammershlag, 2004) have used a cost-benefit framework and have focused on the effect of source quality and accessibility on seekers' choices. The previous literature contains two models for selecting information sources. The first, the Cost/Benefit model, argues that information searchers choose information channels based on the projected advantages and costs of accessing that information source. Many supporters of this paradigm believe that the projected advantages are the most essential criterion for the information seeker. The second model, the Least-Effort model, asserts that information seekers choose information channels based on minimizing the effort or expense of acquiring information, even if this means sacrificing the quality of the information to be received. In some previous research, the term channel was used to refer to the source of information (Byström and Järvelin; Gerstberger & Allen, 1968; Hardy, 1982; Swanson, 1987). As a result, these two

elements, Perceived Cost and Perceived Benefits, were discovered to be deciding factors in the selection of all kinds of information sources. Other authors have investigated the impact of channel characteristics on channel choice and have added perceived cost and perceived advantages as channel characteristics. Previous research has looked into the effects of channel traits on consumers' channel choices; it is widely accepted that consumers' perceptions of channel traits and reactions to these traits are fundamental in channel utility and their channel choices (Verhoef *et al.* 2007; Macik *et al.* 2012). Several core channel features have been highlighted in the literature, including easiness of use, usefulness, price, experience, service, contact speed, convenience, Media richness elements and risk (Gupta *et al.* 2004; Verhoef *et al.* 2007; Pieterson, Teerling, & Ebbers, 2008). As a result, many scholars have stated that understanding how users' perceptions of channel characteristics (attributes) influence their channel choice in a multi-channel environment is critical for practitioners and academics (Gupta *et al.* 2004; Pookulangara *et al.* 2011; Yu *et al.* 2011; Maity and Dass 2014). Information is essential for every type of organization to flourish in this competitive environment and correct information sources must be leveraged to deliver the necessary information. Farming is also another type of business that requires knowledge to operate efficiently and sustainably. Farmers, like other people, rely on a variety of sources for knowledge, but their use of these sources is not optimal. So, to increase its utilization, variables influencing its selection must be identified. The purpose of this study is to determine the impact of various source characteristics on the attitude toward that source and the scope is confined to the internet and physical information sources to make the study simple and precise.

THEORETICAL BACKGROUND AND RESEARCH MODEL

Fishbein and Ajzen's (1975) theory of reasoned action (TRA) is a well-established theory that is commonly used to evaluate and explain human behaviors in various disciplines, including marketing, consumer behavior and information systems. According to the TRA, attitude is a significant predictor of behavior. One's beliefs in the behavior determine one's attitude. Beliefs are defined as a person's subjective view that executing a specific behavior will result in specific outcomes. TRA can be used to examine how customer attitudes regarding a specific behavior influence how they behave. Based on the TRA, Srisuwan and Barnes (2008) and Verhoef *et al.* (2007), we argue that consumer-perceived source characteristics may affect consumer source attitudes but the

effects may be different across sources. Consumers choose specific sources for search depending on their perceptions of how well the source would satisfy their search needs (Hardy 1982; Noble *et al.* 2005). Human choices can be explained using the cost-benefit paradigm. Its logic is similar to that of the push-pull effect (Lee 1966). Push-pull effects allow for the examination of customer behavior. Push effects are bad conditions that force people to leave their current circumstances. Pull effects are the favorable aspects of a location that entice people to visit it. According to this concept, excessive expenses of using a source may drive consumers to an alternative. The pull of benefits, on the other hand, may draw the consumer to a specific source.

Based on the literature (Hardy 1982; Jepsen 2007; Kollmann *et al.* 2012; Moon 2004; Noble *et al.* 2005; Park and Kim 2003; Reardon and McCorkle 2002; Verhoef *et al.* 2007), this study identifies six main consumer-perceived source characteristics such as Perceived ease of use, Perceived usefulness, Previous experience, Information quality, Search effort, Facilitating conditions and Communication difficulty in case of Internet source and Information quality,

Table 1

Source Characteristics and Respective Types with Sources

| Type	Source Characteristics	Source
Perceived Search Benefit (Internet and Physical)	Information Quality	Hardy (1982); Jepsen (2007); To *et al.* (2007); Verhoef *et al.* (2007) and Nelson *et al.* (2005)
Perceived Search Benefit (Internet)	Facilitating Conditions	Venkatesh *et al.*, 2003
Perceived Search Benefit (Internet)	Perceived Ease of Use	Davis (1989); Bigné *et al.*, (2008)
Perceived Search Benefit (Internet)	Perceived Usefulness	Davis (1989); Bigné *et al.*, (2008)
Perceived Search Benefit (Internet and Physical)	Previous Experience	Xie & Joo (2009); Frambach, Roest & Krishnan (2007).
Perceived Search Cost (Internet and Physical)	Search Effort / Physical Proximity	Hardy (1982); Baker *et al.* (2002); Kang, Herr, & Page (2003); Ratchford *et al.* (2003); Jepsen (2007) and Verhoef *et al.* (2007).
Perceived Search Cost (Internet and Physical)	Communication Difficulty	Xu, Tan & Yang (2006); Agarwal, Xu & Poo (2011).

Source : Author's Compilation

physical proximity (search effort), previous experience and communication difficulty in case of physical information sources Perceived ease of use, Perceived Usefulness, Previous experience, Information quality and Facilitating conditions were part of perceived benefits and Search ben, as well as communication difficulty, were part of Perceived Cost.

Table 1 shows the source characteristics and respective types. Figure 1 shows the research framework. Source attitude refers to users' positive or negative feelings towards a source (Fishbein and Ajzen 1977). Since source attitude is an important predictor of source choice, it serves as the dependent variable. Thus, the study has proposed the various hypothesis based on the previous literature available :

H1 : Perceived information quality from a given source has a positive effect on farmers' attitudes toward searching on that source.

  H1a : Perceived information quality from internet sources has a positive effect on farmers' attitudes toward searching on that source.

  H1b : Perceived information quality from a physical source has a positive effect on farmers' attitudes towards searching on that source.

H2 : Perceived search effort from a given source has a negative influence on farmers' attitudes toward search on that source.

  H2a : Perceived search effort from internet sources has a negative influence on farmers' attitudes toward searching on that source.

  H2b : Perceived search effort from physical sources has a negative influence on farmers' attitudes toward search on that source.

H3 : Perceived communication difficulty from a given source has a negative influence on farmers' attitudes toward searching on that source.

  H3a : Perceived communication difficulty from internet sources has a negative influence on farmers' attitudes towards searching on that source.

  H3b : Perceived communication difficulty from a physical source has a negative influence on farmers' attitudes toward searching on that source.

H4   :   Facilitating conditions has a positive effect on farmers' attitudes towards searching on internet sources.

H5   :   Perceived ease of use has a positive effect on farmers' attitudes towards searching on internet sources.

H6   :   Perceived usefulness has a positive effect on farmers' attitudes towards searching on internet sources.

H7   :   Previous experience from a given source has a positive effect on farmers' attitudes toward searching on that source.

        H7a   :   Previous experience with internet sources has a positive effect on farmers' attitudes toward searching on that source.

        H7b   :   Previous experience from a physical source has a positive effect on farmers' attitudes toward searching on that source.

H8   :   Search attitude towards internet sources has a negative influence on farmers' attitude toward physical sources

Figure 1 : Research Framework
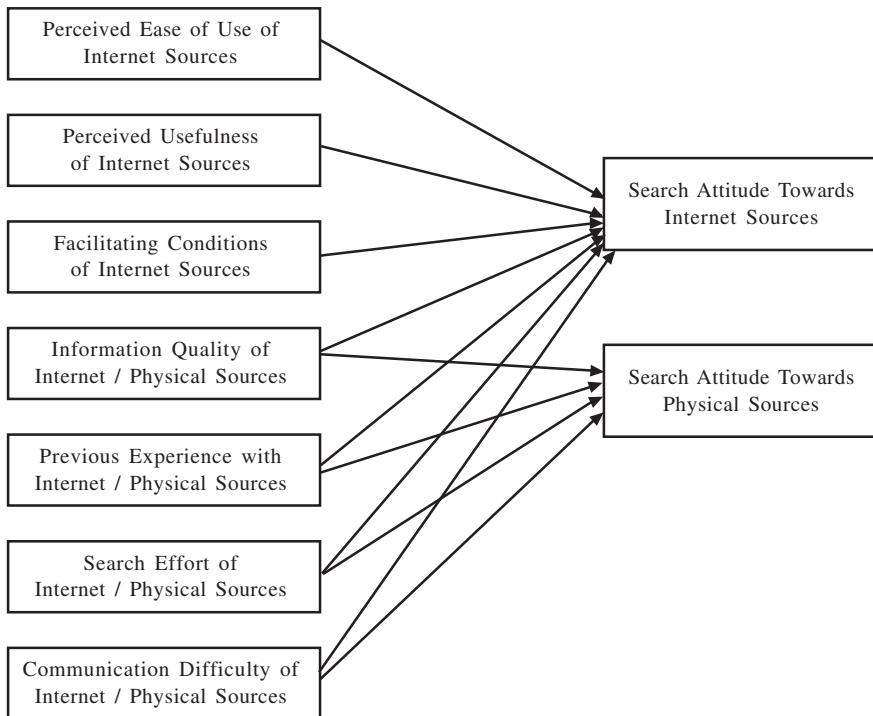
METHODOLOGY

Study Area

The Punjab state of India was chosen as the study area. Punjab is comprised of three regions i.e., Majha, Malwa and Doaba. Poadh is one of Punjab's important regions, yet it is incorporated into Malwa and does not have its status. So, farmers from each region have been included in the study to have more accurate results and more generalization.

Sampling Design

In this study, multistage sampling was used. Punjab was chosen from among numerous states in India because, despite being second in wheat production among all other states in India. Farmers are still not obtaining a fair price for their produce and dealing with a slew of issues, particularly small farmers who believe they are constantly disregarded and unable to obtain the most basic requirement of farming, namely information related to agriculture activities. Following the selection of the Punjab state, all of the regions of Punjab were chosen. Following that, the Godden. B. (2004) formula for estimating sample size was applied to the total farmers of each region, which was calculated to be 600 in each case. Further stratified proportionate sampling was used to pick the sample to be included in the study from each estimated sample size for each region and for that one specific fraction or percentage is applied on subgroups, i.e., $1/3^{rd}$ /200 from each region. Finally, 600 farmers were chosen for the field survey using judgmental sampling.

 Sample size in case of Infinite Population (For population more than 50000) Godden. B. (2004) :

$$SS = Z^2 \times (P) \times (1-P)/C^2$$

Z = Z value (1.96 for 95% confidence level)

P = Percentage of population picking a choice expressed as decimal

C = Confidence interval expressed as decimal

(0.4 = + / –4 percentage points…)

SS = $(1.96)^2 \times 0.5 \times 0.5) / (0.04)^2 = 3.8416 \times 0.25 / 0.0016 = 600$

(For each region)

Data Collection

As a data collection method, a field survey was performed. The study collected quantitative data using a structured questionnaire that included standardized questions about the characteristics of both sources, namely the internet and physical sources, as well as farmers' attitudes toward both sources.

To acquire a thorough understanding, the questionnaire also included several closed-ended questions about the farmers' socio-economic characteristics, such as age, farming experience, education and income from farming. The measure items were generated based on past literature in the channel management domains listed in Table 1 and they were changed and adjusted to fit the context of this study. This study used the methods proposed by Hair *et al.* (2003) to establish the face validity of the instrument. A few agricultural specialists, including Punjab Agriculture University professors, Krishi Vigyan Kendra employees and a few progressive farmers, assessed the original items for completeness, phrasing, clarity, structure and appropriateness. Based on their comments, small wording changes were made to a few items, as well as minor changes to the order and arrangement of the items in the survey instrument. All question items were responded to on a seven-point Likert scale, with 1 being strongly disagreed and 7 strongly agree. After data collection, this study will continue to investigate construct validity (factor structure, convergent validity and discriminant validity) (Hair *et al.* 2003). This study collected 610 responses from 650 questionnaires distributed. In addition, the study excludes 10 responses since the respondents did not complete the questionnaire completely. Finally, 600 legitimate responses were analyzed.

Data Analysis

This study employed quantitative data analysis techniques. Descriptive statistics such as percentages and frequencies were used to define the respondent's socioeconomic characteristics. The current study employs multiple regression analysis to investigate the impact of the identified independent variables on the dependent variable, i.e., search attitude. The data were analyzed with SPSS version 25.

RESULTS AND DISCUSSION

Table 2 shows the demographics of the sample. The majority of respondents are between the ages of 31 and 40, with the next group being between the ages of 21 and 30. 79.4% had received some form of formal schooling. Farmers' ability to use ICTs and recognize their usefulness in farming activities would be enhanced through education. Education has been noted as a crucial component in the adoption and absorption of technology by Adesina and Baidu-Forson (1995). The findings also suggest that a very small percentage of farmers earn a good living, with the majority earning between Rs.50001 and Rs.100,000, accounting for 41.7% of all respondents which is very less for

Table 2

Respondents' Percentage Distribution Based on Socio-economic Characteristics (n = 600)

Characteristics		Percentage (%)
Age (in Years)	Less than 21 years	2.7
	From 21 to 30 years	21.3
	From 31 to 40 years	32.2
	From 41 to 50 years	17.5
	From 51 to 60 years	20.0
	More than 60 years	6.3
Educational Qualification	No. Formal Education	20.7
	Primary Education	24.7
	Secondary Education	27.7
	Graduate	19.5
	Postgraduate	7.5
Income from Farming (in Rupees/ per annum)	50000 or less than 50000	13.8
	50001-100000	41.7
	100001-150000	11.2
	150001-200000	12.7
	200001-250000	14.5
	More than 250000	6.2
Farming Experience (in Years)	10 or less than 10	45.7
	11-20	36.3
	21-30	13.8
	31-40	4.2

Source : SPSS Output, 2023

maintaining the living standard. As a result, numerous activities must be implemented to boost farmer income levels to maintain agricultural sustainability. Furthermore, the findings revealed that the majority of farmers had 10 or fewer years of experience, followed by 11-20, 21-30 and so on. More experienced farmers apply their previous farming experiences in their farming activities, while farmers who are new to farming require more information and understanding of the many information sources accessible to them.

Table 3

Utilization of Internet and Physical Information Sources:

Sources	Mean	S.D.
Internet Sources :		
Internet on Computer / Laptops :-		
(i) Agriculture Websites	1.86	.642
(ii) Social Media Applications	2.02	.740
Internet on Mobile Phones :-		
(i) Agriculture Applications	2.80	1.673
(ii) Social Media Applications	3.34	1.821
(iii) Agriculture Websites	1.83	1.091
Physical Information Sources :		
KVKs / Research Stations	2.65	1.661
Input Dealers / Shops / Private Companies	4.61	1.643
Other Farmers	4.63	1.552
State Agricultural Universities	2.60	1.637
State Department of Agriculture	2.60	1.695

Source : SPSS Output, 2023

According to the findings of Table 3, farmers used more physical information sources such as other farmers and input dealers and fewer internet sources. In terms of internet sources, they were mostly using social networking apps on mobile phones, followed by agricultural apps, with relatively little use of other internet sources such as the internet on desktops. However, the findings suggested that farmers did not rely on a single source for information, but rather used many sources because no single source could give the information that they need.

Reliability and Validity of the Measures

Exploratory factor analysis was performed using a Varimax rotation to validate the various dimensions underlying the data set. It was applied separately to the items of internet sources and items of physical sources. Factor loadings of 0.5 or greater were used as the cutoff value for all items and factor extraction was based on Eigen values greater than one, as proposed by Teo (2001) and Hair *et al.* (2006). The Kaiser-Meyer-Olkin (KMO) value for items related to internet sources was found to be 0.921 and for physical sources was .863 which is greater than the 0.5 limit set by Field (2013). This study's Bartlett's test results were significant, with a chi-square of 13361.84 (p-value < 0.01) for internet sources and a chi-square of 7882.60 (p-value < .01) for physical sources. In the

case of internet sources, eight factors explained 71.90% of the variance whereas for physical sources five factors were identified which explained about 73.5 the % of the variance. There is a good and consistent factor structure as all items appropriately load on their anticipated constructs. The internal consistency reliability coefficients for all the constructs are well above the recommended level of 0.7.

Table 4
Results of Reliability and Factor Analysis

Constructs	Scale Items	Factor Loadings	Cronbach Alpha	Eigen Values	Percentage of Variance
Internet Sources					
Previous Experience	PEX1	.808	.915	10.326	10.913
	PEX2	.839			
	PEX3	.823			
	PEX4	.767			
	PEX5	.861			
Perceived Usefulness	PU1	.683	.892	3.941	10.382
	PU2	.802			
	PU3	.759			
	PU4	.818			
	PU5	.821			
Information Quality	IQ1	.845	.900	3.169	10.303
	IQ2	.811			
	IQ3	.853			
	IQ4	.855			
	IQ5	.828			
Facilitating Conditions	FC1	.711	.879	2.304	9.473
	FC2	.696			
	FC3	.752			
	FC4	.727			
	FC5	.764			
Search Effort	SE1	.770	.855	1.949	8.907
	SE2	.792			
	SE3	.819			
	SE4	.778			
	SE5	.819			

Continued

Continued Table 4

Ease of Use	EOU1	.784	.883	1.718	8.151
	EOU2	.689			
	EOU3	.776			
	EOU4	.811			
Search Attitude	ATT1	.692	.882	1.311	7.281
	ATT2	.685			
	ATT3	.747			
	ATT4	.753			
Communication Difficulty	CD1	.845	.841	1.168	6.498
	CD2	.827			
	CD3	.876			
Physical Sources					
Information Quality	IQ1PS	.845	.915	5.395	17.140
	IQ2PS	.841			
	IQ3PS	.863			
	IQ4PS	.838			
	IQ5PS	.881			
Previous Experience	PEX1PS	.853	.915	3.705	17.130
	PEX2PS	.871			
	PEX3PS	.854			
	PEX4PS	.809			
	PSPEX5PS	.888			
Search Effort	SE1PS	.797	.874	2.753	15.248
	SE2PS	.814			
	SE3PS	.801			
	SE4PS	.799			
	SE5PS	.839			
Search Attitude	ATT1PS	.818	.875	2.313	13.353
	ATT2PS	.836			
	ATT3PS	.832			
	ATT4PS	.831			
Communication Difficulty	CD1PS	.888	.855	2.004	10.629
	CD2PS	.874			
	CD3PS	.879			

Source : SPSS Output, 2023

Tables 5 and 6 present the correlation matrix. The correlation coefficients between the independent variables were examined to diagnose if multicollinearity was an issue in this study. Since the highest correlation is .584 for internet sources and .147 for physical sources and this is below the threshold value of .9, we conclude that multicollinearity is not a major issue in this study (Hair *et al.* 2006).

Table 5
Correlation Matrix between items of Internet Sources

	EOU	PU	SE	CD	PEX	IQ	FC	ATT
EOU	1							
PU	.504**	1						
SE	-.089*	-.097*	1					
CD	-.188**	-.144**	-.031	1				
PEX	.426**	.373**	-.073	-.210**	1			
IQ	.079	.171**	.013	-.139**	-.055	1		
FC	.584**	.495**	-.067	-.267**	.478**	.146**	1	
ATT	.555**	.560**	-.083*	-.308**	.426**	.296**	.579**	1

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

Table 6
Correlations Matrix between Items of Physical Information Sources

	ATT	SEPS	CDPS	PEXPS	IQPS	ATTPS
ATT	1					
SEPS	.147**	1				
CDPS	.003	-.048	1			
PEXPS	-.426**	-.225**	.003	1		
IQPS	.008	-.045	.000	.106**	1	
ATTPS	-.210**	-.129**	-.003	.261**	.339**	1

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

In case of internet sources, Ease of Use (r = .555, p < .01), Perceived Usefulness (r = .560, p < .01), Information Quality (r = .296, p < .01), Previous Experience (r = .426, p < .01) and Facilitating Conditions (r = .579, p < .01) were

all found to be significantly and positively correlated to farmers' search attitude towards internet sources. Whereas search effort (r = -.083, p < .05) and communication difficulty (r = -.308, p < .01) were also found to be significantly correlated with search attitude but on a negative basis. Whereas in the case of physical information sources, all factors were found to be significant at p < .01 except communication difficulty. Previous Experience (r = .261, p < .01) and Information Quality (r = .339, p < .01) were found to be significantly and positively correlated to farmers' search attitude towards physical sources and Search attitude towards internet sources (r = -.210, p < .01) and Search effort (r = -.129, p < .01) were found to be significantly and negatively correlated to farmers' search attitude towards physical sources whereas communication difficulty was found to not correlate with search attitude towards physical sources.

MULTIPLE REGRESSION ANALYSIS

Multiple regression analysis is used to investigate the association between a single dependent variable and numerous independent variables (Hair *et al.*, 2006). The multiple regression analysis is used to test the hypotheses produced to analyze farmers' attitudes on searching for information on the internet and physical sources. The Table shows the findings of the analysis. Variance inflation factor (VIF) and Tolerance were calculated to test for multicollinearity among the independent variables. The results revealed that the VIF values of all predictor variables were less than 10 and the tolerance indication was greater than 0.1. As a result, these findings imply that there is no multicollinearity among the predictor variables.

The findings of the multiple regression analysis for physical sources suggest that the F-statistics (F = 27.080) were significant at p < 0.01. As a result, the model is fit. This leads to the conclusion that there is a considerable association between adoption variables and attitudes toward physical information sources. The R^2, or coefficient of determination, was 18.6%. In other words, it may be deduced that the discovered adoption variables account for 18.6 percent of farmers' attitudes toward using physical sources to look for agricultural information.

The findings of the multiple regression analysis for internet sources suggest that the F-statistics (F = 95.233) were significant at p < 0.01. As a result, the model is fit. This leads to the conclusion that there is a considerable association between adoption variables and attitudes toward internet sources. The R^2, or coefficient of determination, was 53%. In other words, it may be

deduced that the discovered adoption variables account for 53 percent of farmers' attitudes toward using Internet sources to look for agricultural information.

Table 7

Multiple Regression Analysis of Internet Sources

Predictor Variable	Standardized Beta	T-value	Sig	Tolerance	VIF
EOU	.213	5.768	.000	.581	1.722
PU	.250	7.181	.000	.658	1.519
SE	-.023	-.792	.429	.984	1.016
CD	-.123	-4.139	.000	.903	1.108
PEX	.127	3.757	.000	.699	1.431
IQ	.196	6.698	.000	.924	1.082
FC	.207	5.398	.000	.540	1.851

Note : Overall Model F = 95.233; p < .01; R^2 = .530; Adjusted R^2 = .524

Table 8

Multiple Regression Analysis of Physical Sources

Predictor Variable	Standardized Beta	T-value	Sig	Tolerance	VIF
ATT	-.138	-3.349	.001	.813	1.231
SEPS	-.060	-1.572	.117	.943	1.060
CDPS	-.006	-.165	.869	.998	1.002
PEXPS	.155	3.696	.000	.781	1.281
IQPS	.321	8.594	.000	.985	1.016

Note : Overall Model F = 27.080; p < .01; R^2 = .186; Adjusted R^2 = .179

Multiple regression analysis was used to test hypotheses and it was discovered that in the case of internet sources various perceived benefits of the source such as perceived usefulness, ease of use, information quality, facilitating conditions and previous experience with the source have a significant and positive relationship (p < 0.01) with farmers' search attitude toward internet sources, whereas perceived cost related to source such as communication difficulty is found to be significant but negatively associated whereas search effort had no significant effect. So, this leads to the acceptance of various

hypotheses i.e., H1a, H3a, H4, H5, H6 and H7a.In the case of physical information sources, Previous experience with the source and information quality has a significant and positive relationship (p < 0.01) with farmers' search attitude toward physical information sources, whereas search attitude towards internet sources has a significant and negative relationship with farmers search attitude towards physical information sources (p < .01). Two factors such as Search effort and Communication difficulty were found to have no significant effect. So, this leads to the acceptance of various hypotheses i.e., that H1b, H7b and H8.

Comparing the empirical results between the two information sources shows that Information quality had a larger effect on Search Attitude for Physical sources (β = .321) than for internet sources (β = .196). However, the effect of previous experience on search attitude was also slightly larger for physical sources (β = .155) than for internet sources (β =.127). It is also concluded through the results that information quality is the strongest determinant of search attitude towards physical sources followed by previous experience whereas, in the case of internet sources, major TAM determinants such as Perceived usefulness followed by Perceived Ease of Use were found to be the strongest determinants of search attitude towards internet sources.

DISCUSSION

The study found the characteristics that influence farmers' search attitudes toward the internet and physical information sources. The mean results of internet and physical source use reveal that physical source utilization is more than internet source utilization, yet utilization is still insufficient. So, utilization of both sources of information must be increased by removing the barriers that prevent farmers from using these sources and factors that influence farmers' attitudes toward these sources must be identified and their relationship with attitude should be examined further. The study revealed many source-related features, such as perceived benefits and perceived costs of the sources, which influence their attitude toward using these sources. The cost-benefit model and the least-effort model were used and identified in the study. Perceived benefits of the source were further identified as Information quality, perceived ease of use, perceived usefulness, facilitating conditions and previous experience with the source and perceived cost were identified as search effort, which refers to the amount of effort and time spent searching for information through the source and communication difficulty, which refers to the difficulty that users face when communicating with information suppliers through the source. These benefits and costs were further classified based on the type of source. The study used

the major core variables from TAM, namely perceived usefulness and perceived ease of use, which influence attitudes toward technology adoption. The outcomes of this study also concluded that the two primary variables that influence farmers' search attitudes regarding using internet sources for searching information are perceived usefulness and perceived ease of use. The results were consistent with the findings of Pouratashi and Rezvanfar, 2010; Farahat, 2012; Salimi, Pourdarbani and Nouri, 2020; Suresh *et al.*, 2022). Other factors which were found to be significant and positive were Perceived ease of use (Davis, 1989; Zhang, Zhu and Liu, 2012; Verma and Sinha, 2016; Suresh *et al.*, 2022), Facilitating Conditions (Oh and Yoon, 2014; Tenzin and Dorji, 2016; Sa'ari *et al.*, 2017; Morosan and Verkijika, 2018; AlHadid *et al.*, 2022), Information Quality (Chen & Wells, 1999; Chen and Janda *et al.*, 2002; Wang *et al.*, 2016; Kante, Oboko & Chepken, 2018), Previous Experience Naik *et al.*, 2020 and Birke, Lemma, & Knierim, 2010). In terms of perceived cost, search effort was found to be insignificant because internet sources allow users to find information quickly and easily (Gupta *et al.*, 2004; Lee and Kim 2008; Park and Kim 2003; Sen *et al.*, 2006; Wang *et al.*, 2016). Communication problem, on the other hand, was found to have a significant but unfavorable association with search attitude toward internet sources. The results agree with those of Xu, Tan and Yang (2006) and Agarwal, Xu and Poo (2011). When a user is unable to understand what the information provider wishes to communicate via that source, the user refrains from acquiring information from that source. In the case of physical information sources, information quality was discovered to be the most significant factor that positively impacts search attitudes toward physical information sources and the findings were consistent with those of (Chen and Wells, 1999; Wang *et al.*, 2016; and Janda *et al.*, 2002; Zimmer, Henry and Butler, 2007). Previous experience was the next most important factor. According to the findings, prior experience had a strong favorable influence on attitudes toward using physical information sources. The results agree with those of Frambach, Roes and Krishnan (2007). Search effort and communication difficulty had an insignificant effect on farmers' attitudes toward physical information sources.

According to the findings, several common factors influence farmers' attitudes toward using the internet as well as physical information sources to receive information about their agricultural activities. Farmers, on the other hand, continue to prefer physical information sources over internet sources, but their impression of both is not much positive. As a result, information providers must take these findings into account and plan their strategies accordingly, as well as raise awareness of the benefits of both sources and engage in practices that will

increase utilization of both sources among farmers, particularly internet sources, because it is necessary to move farmers towards technology to help them in gaining maximum benefits from the utilization of technology to survive in this competitive environment.

MANAGERIAL IMPLICATIONS OF THE STUDY

This study looked into the factors that influence farmers' search attitudes toward the internet and physical information sources. These models will assist information providers, both public and private, in developing a modified information distribution system that takes into account the factors that influence farmers' attitudes toward both categories of sources. According to the findings, perceived usefulness and perceived ease of use were the most important factors in the case of internet sources, indicating that farmers' positive attitudes toward internet sources will emerge when they find them beneficial and easy to use. As a result, it is suggested that information producers and strategists concentrate on providing valuable content and applications for mobile devices. The government should also ensure that each hamlet's current technological infrastructure supports the use of technology. This includes having access to external resources like fast mobile internet and power network capacity, as well as having the ability to acquire the necessary technical skills and knowledge to implement technology through effective training. By providing training and conducting campaigns, information providers should also promote various usage, technical skills and benefits of using internet sources among rural farmers, because to achieve future growth and sustainability in agriculture, rural and small farmers must be equipped with proper internet utilization. Furthermore, strategists should consider the quality of information distributed via the internet and physical sources, which includes timely information available and accurate, reliable and up-to-date information in the language preferred by farmers, to entice more farmers to use the internet and physical information sources. The information providers must also consider the costs of using information sources, which include both time and effort, as well as the difficulty encountered in acquiring information because any difficulty encountered in acquiring information from a source lead to increased use of time and effort. So, farmers face communication difficulties when obtaining information from internet sources because they find it difficult to converse and explain their queries to information suppliers via internet sources, which they do not face when obtaining information from physical sources and this must be overcome by information

suppliers to increase the adoption of internet sources. The findings of this study provide a solid empirical foundation for all information suppliers and strategists wanting to fully leverage the power of the internet and physical sources in providing farmers with need-based information.

LIMITATION AND FUTURE STUDIES

There are a few limitations of this study. Firstly, India is a geographically dispersed country with farmers residing in various states. So, the sample size taken for this study is not that significant as the study has considered only Punjab State. Therefore, more farmers can be considered from other states also for generalizing results for the entire country. Further, a comparative study could also be conducted based on different states to get well acquainted with the type of information needed by the farmers of different states as well as the sources and factors impacting their selection. And lastly, this study identified only a few factors that affect attitudes towards usage of the internet, as well as physical sources but other factors, can also impact attitudes towards both sources. So, there is the scope of considering other source characteristics like perceived enjoyment, ability to handle multiple information cues simultaneously, rapid feedback, personalization ability to provide information in different languages, etc., as well as individual related factors such as personal innovativeness, social influence, socio-demographics (age, gender, education, income, experience, land size, crop type) trust, etc., to study their impact on information source selection in the future research model. Because the study is limited to only the internet and physical information sources, future studies could include other sources as well to gain a thorough understanding of each information source available to farmers to improve information accrual by farmers based on their needs and through the mechanism most preferred by them.

References

Adesina, A. A.; and Baidu-Forson, J. (1995), Farmers' Perceptions and Adoption of New Agricultural Technology : Evidence from Analysis in Burkina Faso and Guinea, West Africa, *Agricultural Economics*, 13(1), 1-9.

AlHadid, I.; Abu-Taieh, E.; Alkhawaldeh, R. S.; Khwaldeh, S.; Masa'deh, R. E.; Kaabneh, K.; and Alrowwad, A. A. (2022), Predictors for E-Government Adoption of SANAD App Services Integrating UTAUT, TPB, TAM, Trust and Perceived Risk, *International Journal of Environmental Research and Public Health*, 19(14), 8281.

Agarwal, N. K.; Xu, Y.; and Poo, D. C. (2011), A Context Based Investigation into Source Use by Information Seekers, *Journal of the American Society for Information Science and Technology*, 62(6), 1087-1104.

Baker, J.; Parasuraman, A.; Grewal, D.; and Voss, G. B. (2002), The Influence of Multiple Store Environment Cues on Perceived Merchandise Value and Patronage Intentions, *Journal of Marketing*, 66(2), 120-141.

Bigne Alcaniz, E.; Ruiz Mafe, C.; Aldas Manzano, J.; and Sanz Blas, S. (2008), Influence of Online Shopping Information Dependency and Innovativeness on Internet Shopping Adoption, *Online Information Review,* 32(5), 648-667.

Birke, F. M.; Lemma, M.; and Knierim, A. (2019), Perceptions Towards Information Communication Technologies and Their Use in Agricultural Extension : A Case Study from South Wollo, Ethiopia, *The Journal of Agricultural Education and Extension*, 25(1), 47-62.

Byström, K.; and Järvelin, K. (1995), Task Complexity Affects Information Seeking and Use, *Information Processing and Management,* 31(2), 191-213.

Chakrabarti, A. K.; Feineman, S.; and Fuentevilla, W. (1983), Characteristics of Sources, Channels and Contents for Scientific and Technical Information Systems in Industrial R and D, *IEEE Transactions on Engineering Management*, (2), 83-88.

Chen, Q.; and Wells, W. D. (1999), Attitude Toward the Site, *J Advert Res,* 39(5), 27–37.

Choo, C. W. (1994), Perception and Use of Information Sources by Chief Executives in Environmental Scanning, *Library & Information Science Research*, 16(1), 23-40.

Davis, F. D. (1989), Perceived Usefulness, Perceived Ease of Use and User Acceptance of Information Technology, *MIS Quarterly*, 319-340.

Farahat, T. (2012), Applying the Technology Acceptance Model to Online Learning in Egyptian Universities, *Procedia-Social and Behavioral Sciences*, 64, 95-104.

Field, A. (2013), Discovering Statistics using IBM SPSS Statistics, Sage Publication.

Fidel, R.; and Green, M. (2004), The Many Faces of Accessibility : Engineers' Perception of Information Sources, *Information Processing and Management*, 40(3), 563-581.

Fishbein, M.; and Ajzen, I. (1977), Belief, Attitude, Intention and Behavior : An Introduction to Theory and Research.

Frambach, R. T.; Roest, H. C.; and Krishnan, T. V. (2007), The Impact of Consumer Internet Experience on Channel Preference and Usage Intentions Across The Different Stages of the Buying Process, *Journal of Interactive Marketing*, 21(2), 26-41.

Gerstberger, P. G.; and Allen, T. J. (1968), Criteria Used by Research and Development Engineers in the Selection of an Information Source, *Journal of Applied Psychology*, 52(4), 272.

Gupta, A.; Su, B. C.; and Walter, Z. (2004), Risk Profile and Consumer Shopping Behavior in Electronic and Traditional Channels, *Decision Support Systems*, 38(3), 347-367.

Hair, J. F.; Babin, B.; Money, A. H.; and Samouel, P. (2003), Essentials of Business Research Methods, Wiley, New Jersey

Hardy, A. P. (1982), The Selection of Channels When Seeking Information : Cost / Benefit Vs. Least Effort, *Information Processing & Management*, 18(6), 289-293.

Janda, S.; Trocchia, P. J., Gwinner, K. P. (2002), Consumer Perceptions of Internet Retail Service Quality, *Int. J. Serv. Ind. Manag.*, 13(5).

Jepsen, A. L. (2007), Factors Affecting Consumer Use of the Internet for Information Search, *Journal of Interactive Marketing*, 21(3), 21-34.

Kante, M.; Oboko, R.; and Chepken, C. (2019), An ICT Model for Increased Adoption of Farm Input Information in Developing Countries : A Case in Sikasso, Mali, *Information Processing in Agriculture*, 6(1), 26-46.

Kollmann, T.; Kuckertz, A.; Kayser I (2012) Cannibalization or Synergy? Consumers' Channel Selection Sn Online–Offline Multichannel Systems, *J. Retail Consumer Serv.,* 19(2), 186–194. doi:10.1016/j. jretconser.2011.11.008

Lee, E. S. (1966), A Theory of Demography, *Demography*, 3, 6-7.

Lee, H. H.; and Kim, J. (2008), The Effects of Shopping Orientations on Consumers' Satisfaction with Product Search and Purchases in a Multi-Channel Environment, *J. Fashion Mark Manag.,* 12(2), 193–216. doi:10.1108/ 13612020810874881.

Macik, R.; Mazurek, G.; and Dorota, M. Ä. (2012), Channel Characteristics' Influence on Physical vs. Virtual Channel Choice for Information Search and Purchase — The Case of Polish Young Consumers, *International Journal of Cyber Society and Education,* 5(1), 35-54.

Maity, M.; and Dass, M. (2014), Consumer Decision-Making Across Modern and Traditional Channels : E-commerce, M-commerce and In-store, *Decision Support Systems*, 61, 34-46.

Moon, B. J. (2004), Consumer Adoption of the Internet as an Information Search and Product Purchase Channel : Some Research Hypotheses, *International Journal of Internet Marketing and Advertising*, 1(1), 104-118.

Morrison, E. W. (2002), Information Seeking within Organizations, *Human Communication Research*, 28(2), 229-242.

Naik, B. J.; Rao, B. M.; Rambabu, P.; and Rekha, M. S. (2020), Attitude of Farmers towards Information and Communication Technology (ICT) Tools, *Current Journal of Applied Science and Technology*, 39(43), 72-81.

Noble, S. M.; Griffith, D. A.; Weinberger, M. G. (2005), Consumer Derived Utilitarian Value and Channel Utilization in a Multi-channel Retail Context, *J Bus Res,* 58(12), 1463–1651.

Oh, J. C.; and Yoon, S. J. (2014), Predicting the Use of Online Information Services Based on a Modified UTAUT Model, *Behaviour & Information Technology*, 33(7), 716-729.

O'Reilly III, C. A. (1982), Variations in Decision Makers' Use of Information Sources : The Impact of Quality and Accessibility of Information, *Academy of Management Journal*, 25(4), 756-771.

Park, C. H.; and Kim, Y. G. (2003), Identifying Key Factors Affecting Consumer Purchase Behavior in An Online Shopping Context, *International Journal of Retail & Distribution Management*.

Pieterson, W.; Teerling, M.; and Ebbers, W. (2008), Channel Perceptions and Usage : Beyond Media Richness Factors, In *Electronic Government : 7th International Conference, EGOV 2008, Turin, Italy, August 31-September 5, 2008. Proceedings 7* (pp. 219-230), Springer Berlin Heidelberg.

Pookulangara, S.; Hawley, J.; and Xiao, G. (2011), Explaining Mul-Channel Consumer's Channel-Migra on Inten on Using Theory of Reasoned ac on.

Pouratashi, M.; and Rezvanfar, A. (2010), Analysis of Factors Influencing Application of ICT by Agricultural Graduate Students, *Journal of the American Society for Information Science and Technology*, 61(1), 81-87.

Reardon, J.; and McCorkle, D. E. (2002), A Consumer Model for Channel Switching Behavior, *International Journal of Retail & Distribution Management*, 30(4), 179-185.

Salimi, M.; Pourdarbani, R.; and Nouri, B. A. (2020), Factors Affecting the Adoption of Agricultural Automation using Davis's Acceptance Model (Case Study : Ardabil), *Acta Technologica Agriculturae*, 23(1), 30-39.

Sa'ari, J. R.; Jabar, J.; Tahir, M. N. H.; and Mahpoth, M. H. (2017), Farmer's Acceptance towards Sustainable Farming Technology, *International Journal of Advanced and Applied Sciences*, 4(12), 220-225.

Sen, R.; King, R. C.; and Shaw, M. J. (2006), Buyers' Choice of Online Search Strategy and Its Managerial Implications, *J Manag Inf Syst,* 23(1), 211–238. doi : 10.2753/MIS0742-1222230107.

Srisuwan, P.; and Barnes, S. J. (2007), Predicting Determinants of Online Channel Use in a Multi-Channel Environment : The Case of Outline Magazine.

Swanson, E. B. (1987), Information Channel Disposition and Use, *Decision Sciences*, 18(1), 131-145.

Teo, T. S. (2001), Demographic and Motivation Variables Associated with Internet Usage Activities, *Internet Research,* 11(2), 125-137.

To, P. L.; Liao, C.; and Lin, T. H. (2007), Shopping Motivations on Internet : A Study Based on Utilitarian and Hedonic Value, *Technovation*, 27(12), 774-787

Venkatesh, V.; Morris, M. G.; Davis, G. B.; and Davis, F. D. (2003), User Acceptance of Information Technology : Toward a Unified View, *MIS Quarterly,* 425-478.

Verhoef, P. C.; Neslin, S. A.; and Vroomen, B. (2007), Multichannel Customer Management : Understanding the Research-Shopper Phenomenon, *International Journal of Research in Marketing*, 24(2), 129-148.

Vakkari, P. (2003), Task-Based Information Search. In B. Cronin (Ed.), *Annual Review of Information Science and Technology* (Vol. 37, pp. 413–464), Medford, NJ : Information Today.

Vancouver, J. B.; and Morrison, E. W. (1995), Feedback Inquiry : The Effect of Source Attributes and Individual Differences, *Organizational Behavior and Human Decision Processes*, 62(3), 276-285.

Verma, P.; and Sinha, N. (2016), Technology Acceptance Model Revisited for Mobile Based Agricultural Extension Services in India. *Management Research & Practice*, 8(4).

Wang, Y. M.; Lin, H. H.; Tai, W. C.; and Fan, Y. L. (2016), Understanding Multi-Channel Research Shoppers : An Analysis of Internet and Physical Channels, *Information Systems and e-Business Management*, 14, 389-413.

Xie, I.; and Joo, S. (2009), Selection of Information Sources : Accessibility of and Familiarity with Sources and Types of Tasks, *Proceedings of the American Society for Information Science and Technology*, 46(1), 1-18.

Xu, Y.; Tan, B. C.; and Yang, L. (2006), Who Will You Ask? An Empirical Study of Interpersonal Task Information Seeking, *Journal of the American Society for Information Science and Technology*, 57(12), 1666-1677.

Yitzhaki, M.; and Hammershlag, G. (2004), Accessibility and Use of Information Sources Among Computer Scientists and Software Engineers in Israel : Academy Versus Industry, *Journal of the American Society for Information Science and Technology*, 55(9), 832-842.

Yu, U. J.; Niehm, L. S.; and Russell, D. W. (2011), Exploring Perceived Channel Price, Quality and Value as Antecedents of Channel Choice and Usage in Multichannel Shopping, *Journal of Marketing Channels*, 18(2), 79-102.

Zhang, L.; Zhu, J.; and Liu, Q. (2012), A Meta-Analysis of Mobile Commerce Adoption and the Moderating Effect of Culture, *Computers in Human Behavior*, 28(5), 1902-1911.

Zimmer, J. C.; Henry, R. M.; and Butler, B. S. (2007), Determinants of the Use of Relational and Non-relational Information Sources, *Journal of Management Information Systems*, 24(3), 297-331.