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E-MAUSAM KRISHI SEWA: TRANSFORMING AGRICULTURAL INFORMATION THROUGH SMS WEATHER SERVICES FOR FARMERS: A PERCEPTION STUDY AMONG FARMERS OF HARYANA

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ABSTRACT

This research study focuses on agriculture information dissemination among farmers through e-Mausum Krishi Sewa. The main objective of the study are: Evaluate the level of awareness among farmers in Haryana about E-Mausam Krishi Seva, To know the current adoption rates of E-Mausam Krishi Seva among farmers in Haryana and Explore how the SMS weather services contribute to enhancing agricultural practices. The study found a significant relationship between message adoption and agricultural experience among farmers. Mobile phone was found to be the best medium for disseminating agricultural information, with the majority of farmers aged 30 or more being active and productive. Most farmers found the information useful and relevant, and were satisfied with mobile SMS services. The study suggests that agricultural experience correlates with the perceived usefulness of information, and that more research or interventions may be needed to address message readability issues for different levels of agricultural expertise. The findings could help design communication tactics and agricultural services that cater to individual needs and preferences.

KEYWORDS: Agricultural Information, E-Mausum Krishi Sewa, Information Transformation, Perception, SMS.

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I. INTRODUCTION

E-Mausam Krishi Sewa, an innovative effort, has helped to alter the way that how agricultural information is distributed to farmers in Haryana. This study investigates the influence of SMS weather services given by E-Mausam Krishi Sewa on farmer perception in the region. The programme seeks to provide farmers with timely and accurate weather forecasts provided straight to their cell phones, allowing them to make more informed decisions regarding their agricultural methods. This project will perform a perception study among farmers to better understand how E-Mausam Krishi Sewa has changed their agricultural practices, productivity, and general well-being. The research investigates the usefulness of SMS weather services in meeting the unique demands of Haryana's agricultural community, giving light on the issues that farmers confront and how this technology has helped to mitigate those challenges. Finally, the findings of this study aim to give useful insights into the success and possible areas for development for E-Mausam Krishi Sewa, therefore contributing to ongoing efforts to improve agricultural practices and livelihoods in Haryana. In the era of climate change, with fast rising weather and climatic unpredictability, preserving small farmers' incomes and maintaining their ability to adapt and build resilience to the escalating consequences of climate change is critical.

We investigated the effect of knowledge services, such as the India Meteorological Department's agrometeorological advising services, on agricultural yields for main crops in arid agroclimatic zones of India (Nannewar, R. G., Kanitkar, T., & Srikanth, R.,2023). Climate change provides a significant challenge to global agriculture, affecting both crop productivity and overall food security. The Earth's changing climate causes fluctuations in temperature, precipitation patterns, and the frequency of extreme weather events, all of which have serious implications for agricultural systems. Rising temperatures can interrupt conventional growing seasons, impacting the best circumstances for certain crops. Changes in precipitation patterns may cause droughts or floods, jeopardising agricultural output. Furthermore, the increased frequency of extreme weather events like hurricanes and heatwaves can destroy crops and agricultural infrastructure.

Climate change exacerbates pre-existing issues such as water shortages and soil degradation, aggravating the agriculture sector's problems. E-Mausam Krishi Seva, a combined effort between the Government of Haryana and the prestigious Haryana Agricultural University (HAU), is a trailblazing project in altering agricultural practices in the region. This joint company uses technology to supply farmers with critical weather information via SMS services. Recognising the importance of timely and accurate weather predictions for agricultural planning,

the Haryana government has formed a partnership with HAU to harness its agricultural research and extension experience. HAU is crucial in creating and sharing relevant agricultural information, ensuring that the E-Mausam Krishi Seva meets the unique demands of Haryana's farming community. This partnership demonstrates a proactive strategy to increasing farmers' resilience in the face of climate unpredictability. So, this research study focused on the utilisation of the services among the farmers of Haryana.

II. REVIEW OF LITERATURE

There is a demand for weather and climate information that is easy to find, comprehend, and suited to the needs of consumers. Weather and climate information distribution should play an important role in policy debates at all levels in order to improve climate risk management. Investors and governments might potentially boost their income streams by developing and diversifying technologies for delivering impact-based projections tailored to critical areas of the economy. Future research is needed to assess the generation of the impact-based prediction, its performance, uncertainties, and how it translates into farmer decisions (Agyekum, T. P., Antwi-Agyei, P., &Dougill, A. J., 2022). According to the study "The future of serving agriculture with weather/climate information and forecasting: some indications and observations" the precision agricultural methods, as well as the enforcement of new regulatory requirements to protect food safety and environmental quality, will rely heavily on increased use of weather/climate information and predictions.

Though new technologies will improve forecasting and improved climate services will become available, a number of critical issues remain unknown and must be addressed by a coordinated effort within the agricultural weather and climate community, beginning with a renewed effort to educate agricultural clients about the potential new services that the discipline has to offer weather forecasting and climate change. According to the study "Weather and Climate Forecasts for Agriculture" despite rigorous agronomic preparation on a micro scale to fit local environment, crops endure a variety of weather fluctuations from year to year. Weather anomalies have limited impact. Deviations from typical weather occur more frequently in practically every year, place, and season. Crop season delays can be caused by rainfall in semi-arid tropics, temperature fluctuations in the tropics, temperate zones, and subtropics, or end-of-season showers in irrigated crops. The other major factor is departures from normal patterns in the temporal progression of distinct weather factors (Doblas-Reyes. et.all, 2003). The referenced research

highlighted mobile phones' revolutionary influence on agricultural practices and decision-making processes. According to Bayes et al. (1999), Goodman (2005), Kwaku & Kweku (2006), and Donner (2006), mobile phones have considerably improved farmer decision-making by increasing social cohesion and improving relationships within agricultural and business groups. Murthy's (2009) research highlighted the significance of mobile phones in providing new market techniques for farmers, lowering reliance on traditional broadcast media, and promoting speedy communication and rational decision-making via SMS. May and Hearn (2005) emphasised SMS's success in transmitting critical agricultural information such as weather updates, pricing, and pesticides, establishing mobile phones as an important medium for information distribution among farmers.

Ravinder and Vister (2010) emphasised the dependability and accessibility of mobile apps for farmers, taking advantage of the rising cost of ICT infrastructure. Ganesan, Umadikar, and Prashant's (2015) study demonstrated the usefulness of mobile voice messaging in disseminating agricultural technology information to farmers, with high satisfaction ratings ascribed to audio quality and content. Surabhi and Gaurav (2009) emphasised a variety of information sources for farmers, but progressive farmers, input dealers, and the media are the most important. Finally, Mittal and Tripathi (2008) demonstrated the impact of mobile phones in linking farmers to market information, resulting in greater sales productivity.These studies support the favorable influence of mobile technology on agricultural information distribution and decision-making processes.

III. OBJECTIVES OF THE STUDY

A. Evaluate the level of awareness among farmers in Haryana about E-Mausam Krishi Seva
B. To know the current adoption rates of E-Mausam Krishi Seva among farmers in Haryana.
C. Explore how the SMS weather services contribute to enhancing agricultural practices.

IV. RESEARCH METHODOLOGY

This research study surveyed 152 farmers of Haryana. The primary data for the study was collected from the farmers through interview by face to face using well-defined questionnaire. The primary data has the responses about the independent variable farming experience in year and dependent variables like adoption of service, satisfaction level of farmers about the service, information sources of farmer, etc. The secondary data of the study were collected from the journals, research paper and web site of e-Krishi Mausum Sewa site and secondary data were also collected from the

messages which disseminated by the e- Krishi Mausum Sewa running by Choudhary Charan Singh Haryana Agriculture University, Hisar (CCSHAU) for analysing the information pattern which follow by the disseminators. Data collection tools and techniques used in this research study are the tabulation of the data, simple descriptive analysis (frequencies and percentages) and for the inferential statistical Chi-Square is used to find the association between the variables. The SPSS IBM20 (Statistical Package for Social Sciences) was used to examine and analyse the data.

V. DATA ANALYSIS AND INTERPRETATION

The table 1 illustrated the data of cross tabulation of the variables farmer experiences and information sources used by them to know about the e-Mausum Krishi Sewa.

Table 1 : Cross Tabulation of Categorical Variables

Farming experience in Years*Information Sources						
		Farming experience in Years				Total
		5-10	11-20	21-30	30 Above	
Information Sources about the Services	Television	28	76	16	12	132
		18.42	50.00	10.53	7.89	86.84
	Radio	12	16	8	4	40
		7.89	10.53	5.26	2.63	26.32
	News Papers and Magazines	8	48	8	4	68
		5.26	31.58	5.26	2.63	44.74
	Voice message	16	32	4	0	52
		10.53	21.05	2.63	0.00	34.21
	SMS	32	88	20	12	152
		21.05	57.89	13.16	7.89	100.00
	KSK	20	48	8	4	80
		13.16	31.58	5.26	2.63	52.63
	Kisan Mela	16	68	20	8	112
		10.53	44.74	13.16	5.26	73.68
	Supply Venders	16	40	4	0	60
		10.53	26.32	2.63	0.00	39.47

	Friends and Family	24	64	8	8	104
		15.79	42.11	5.26	5.26	68.42
	Agriculture Officers	28	16	12	0	56
		18.42	10.53	7.89	0.00	36.84
	Internet	24	12	4	0	40
		15.79	7.89	2.63	0.00	26.32
	Own Experiences	28	80	16	8	132
		18.42	52.63	10.53	5.26	86.84
Total		**32**	**88**	**20**	**12**	**152**
Percentage		**21.05**	**57.89**	**13.16**	**7.89**	**100.00**
Percentages and totals are based on respondents.						
a. Dichotomy group tabulated at value 1. = 'Yes'						

Source: Compiled by Author

The table indicates the farmer distribution depending on years of agricultural experience and information sources used to receive services information. The figures in the table represent the number of respondents who fit into particular categories. Additionally, the percentages are derived using the total number of respondents for each information source. Television as an information source used by the farmers found as majority of respondents 132 use television as an information source to know about the information related to the service. Most of them have 11 to 20 years of farming experience. Radio has 40 replies, with a clear preference for those with 5-10 and 11-20 years of experience. Newspapers and magazines received 68 responses, with a sizable proportion having 11-20 years of agricultural experience. Voice Message has 52 replies, with the majority having 5-10 years and 11-20 years of experience.

SMS is the most common information source, with 152 replies. This is prevalent across all experience groups, especially 11-20 years of experience. KSK (Kishan Sewa Kendra) 80 responses representing various experience groups. Kisan Mela 112 replies, the majority with 11-20 years of experience. Further, Supply Vendors has 60 replies, mostly with 5-10 and 11-20 years of experience. Friends and Family have 104 responders, spread across several experience categories. Agriculture Officers have 56 replies, with a sizable proportion in the 5-10 and 11-20 years of experience categories. Internet has 40 responders, with the bulk falling into the 5-10- and 11-20-years' experience categories. Own Experiences have 132 responses, evenly dispersed throughout the various experience categories.

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The table 2 shows a cross tabulation of the particular variables about farming depending on several years agricultural experience. The data in the table represent the number of respondents who fit into particular categories. The chi-square test was used to evaluate the relationship between message different variables and agricultural experience. The Adoption of Message has three level of measurement these were Adopted, Not yet, but intend to and don't intend to. Adopted the message was adopted by 120 responders. Not yet, but intend to has 16 responders these respondents have not yet embraced the message, but have stated their desire to do so. Don't intend to be chosen by 16 respondents, those one do not intend to implement the message.

Table 2: Cross Tabulation of Categorical Variables

Farming experience Cross tabulation									
Particulars		**Farming experience in Years**				**Total**	**X2 Value**	**df**	**Asymp. Sig. (2-sided)**
		5-10	**11-20**	**21-30**	**30 Above**				
Adoption of the message	Adopted	28	64	16	12	120	12.845	6	.046
		18.42	42.11	10.53	7.89	78.95			
	Not yet but intend to	0	12	4	0	16			
		0.00	7.89	2.63	0.00	10.53			
	Don't Intend to	4	12	0	0	16			
		2.63	7.89	0.00	0.00	10.53			
Usefulness of the information	Yes to all message	8	28	12	8	56	23.672	9	.005
		5.26	18.42	7.89	5.26	36.84			
	Yes most of the message	20	40	4	4	68			
		13.16	26.32	2.63	2.63	44.74			
	Yes about half of the message	0	12	4	0	16			
		0.00	7.89	2.63	0.00	10.53			
	Yes few of the message	4	8	0	0	12			
		2.63	5.26	0.00	0.00	7.89			
Trustworthiness	Yes	28	68	20	12	128	9.446	3	.024

Farming experience Cross tabulation									
of the Service		18.42	44.74	13.16	7.89	84.21			
	No	4	20	0	0	24			
		2.63	13.16	0.00	0.00	15.79			
Language Satisfaction	Very Satisfied	16	52	8	8	84	3.396	3	.335
		10.53	34.21	5.26	5.26	55.26			
	Satisfied	16	36	12	4	68			
		10.53	23.68	7.89	2.63	44.74			
	Not Satisfied	0	0	0	0	0			
		0.00	0.00	0.00	0.00	0.00			
Content Satisfaction	Very Satisfied	24	56	12	12	104	17.602	6	.007
		15.79	36.84	7.89	7.89	68.42			
	Satisfied	8	28	4	0	40			
		5.26	18.42	2.63	0.00	26.32			
	Not Satisfied	0	4	4	0	8			
		0.00	2.63	2.63	0.00	5.26			
Know about e-Krishi Sewa portal	Yes	12	32	4	4	52	2.134	3	.545
		7.89	21.05	2.63	2.63	34.21			
	No	20	56	16	8	100			
		13.16	36.84	10.53	5.26	65.79			
Right time message receiving	Yes	28	80	16	12	136	3.643	3	.303
		18.42	52.63	10.53	7.89	89.47			
	No	4	8	4	0	16			
		2.63	5.26	2.63	0.00	10.53			
Message Readability	Yes every	32	80	16	12	140	7.975	3	.047
		21.05	52.63	10.53	7.89	92.11			
	Yes but some time not	0	8	4	0	12			
		0.00	5.26	2.63	0.00	7.89			
Total		**32**	**88**	**20**	**12**	**152**			
Percentage		**21.05**	**57.89**	**13.16**	**7.89**	**100.00**			

Source: Compiled by Author

The table also depicts the distribution of adoption categories across various agricultural expertise levels. In these 28 responders with 5-10 years of agricultural experience have absorbed the message, 64 with 11-20 years of experience have adopted it, 16 with 21-30 years of experience and 12 were found with more than 30 years of experience out of total 120 respondents those who chosen the adoption of message. The chi-square test is used to examine whether there is a significant relationship between message adoption and agricultural experience. The p-value (Asymp. Sig.) is below the standard significance limit of 0.05 ($p < 0.05$), suggesting a statistically significant connection. In practice, this implies that there is evidence that the message's acceptance is connected with varying levels of agricultural expertise.

Respondents with 11-20 years of agricultural experience are more likely to find the material beneficial, particularly "Yes most of the message," than other types of farming experience. Respondents with varying degrees of agricultural expertise had significantly diverse perceptions of the information's value. The chi-square test determines the independence of two categorical variables, which are “Usefulness of the information” and “Farming experience in years”. The low p-value (0.005) indicates a strong relationship between the perceived usefulness of the material and the respondents' agricultural experience. The chi-square score (23.672) reflects the strength of this link.

Trustworthiness of the service, the chart compares the trustworthiness of the service (Yes or No) across various levels of agricultural experience (5-10 years, 11-20 years, 21-30 years, and 30 years or more). The "Yes" option has various numbers for each level of agricultural experience 28 for 5-10 years, 68 for 11-20 years, 20 for 21-30 years, and 12 for 30 years or more. The total count for "Yes" is 128. In the "No" category, there are counts for each range of agricultural experience 4 for 5-10 years, 20 for 11-20 years, for a total of 24 out of grand total of 152. The chi-square test determines whether there is a significant relationship between service reliability and agricultural experience. The p-value of 0.024 falls below the standard significance level of 0.05. In practice, this shows that there is a strong correlation between farmers' faith in the service and their years of expertise. There are 16 respondents with 5-10 years of agricultural experience who are "satisfied" with the language of SMS services. There are 36 responders with experience of 11 to 20 years who are satisfied. There are 12 responses between experience of 21 and 30 years and four people above the age of 30 responded.

The total number of "satisfied" responders is 68. Not satisfied, there are no respondents in any agricultural experience category who are "Not Satisfied" with the languages of SMS, resulting in

a total count of zero. The chi-square test determines whether there is a significant relationship between language satisfaction and farming experience. With a p-value of 0.335 (higher than the standard significance criterion of 0.05), there is insufficient evidence to significant relationship between the variables. This shows that there is no substantial relationship between language satisfaction and farming experience. For those who are familiar with the e-Krishi Sewa site (Yes): 12 respondents have five to ten years of farming experience, 32 responders have 11 to 20 years of farming experience, four responders have 21 to 30 years of farming experience and four responders have 30 years or more of farming experience said yes in their response about the question. The total number of responders who know about the portal is 52.

For those who are unaware of the e-Krishi Sewa site (No): 20 responders have five to ten years of agricultural experience, 56 responders have 11 to 20 years of farming experience, 16 responders have 21 to 30 years of farming experience and eight responders have 30 years or more of farming experience said no in their responses. There are 100 responders who do not know about the portal.

The p-value is 0.545, which above the usually accepted significance level of 0.05. There is no significant difference was found between the variables. For the question ‘Receiving message timely’ respondents those replied "Yes," there are 28 with 5-10 years of agricultural experience, 80 with 11-20 years, 16 with 21-30 years, and 12 with 30 years or more. The overall count is 136. The respondents those replied "No," 8 with 11-20 years of agricultural experience, 4 with 21-30 years, and 0 with 30 years or more. The overall count is 16. The chi-square value of 3.643 indicates a modest relationship between agricultural experience and perceptions of receiving signals at the appropriate time. The p-value of 0.303 exceeds the standard significance level of 0.05. This means that the observed correlation might be attributable to random chance, and there is insufficient evidence of significant association.

The message readability replies have two option “Yes, every message” and “Yes, but sometime not”, “Yes, every message readability is consistently high”, “Yes, but sometimes not”. Refers to the message readability is generally excellent but not always. Yes, everyone was found with 32 respondents with 5–10 years of agricultural experience, 80 respondents with 11 to 20 years of agricultural experience, 16 people with 21 to 30 years of agricultural experience and 12 persons having 30 years or more of farming expertise. The total for "Yes every" is 140. Yes, but sometimes not found with 8 respondents with 11 to 20 years of agricultural experience. Four respondents with 21 to 30 years of farming experience, the total count for "Yes but sometimes not" is twelve. The

chi-square test reveals a substantial relationship between agricultural experience and message readability perceptions. The p-value of 0.047 is smaller than the standard significance level of 0.05, indicating that there is sufficient evidence to reject the null hypothesis. This means that there is a statistically significant association between reported message readability ("Yes every" vs. "Yes, but sometimes not") and respondents' agricultural experience.

VI. CONCLUSION

The research study concludes with the help of result of the research, the chi-square test findings indicate a statistically significant relationship between message adoption and agricultural experience. Additional study or follow-up investigations may be required to better understand the nature of this connection and the factors impacting message uptake among farmers of varying levels of expertise. In conclusion, the table gives insights into the link between the acceptance of a message and farmers' experiences, suggesting a statistically significant association based on the chi-square test. It is found that mobile phone is a best medium to disseminate the agricultural information among farmers. It is found that the age group 30 year or more agriculture experience in majority to receive the messages this age group is active productive age. It is found that majority of the farmers adopted the information received through mobile SMS services.

Almost all the farmers said that most of the messages are useful for them and they said messages are relevant for them. The satisfaction of the farmers in term of all three categories (Language and Content) majority was very satisfied with mobile SMS services. Majority of the farmers accepted that disseminated information were useful and trustworthy, the results indicate that there is a significant association between agricultural experience and perceived usefulness of information. This data might be useful in designing communication tactics and agricultural services to fit the individual requirements and preferences of farmers with varying degrees of expertise. Farmers' years of experience appear to correlate with their faith in the service. The lower p-value suggests that the association is statistically significant.

Additional analysis or post-hoc testing may be required to investigate particular patterns or variations between degrees of agricultural expertise. The statistics do not give sufficient evidence to suggest that knowledge of the e-Krishi Sewa portal is proportional to years of agricultural expertise. It is possible that farmers' views of getting message at the appropriate time are rather consistent across different degrees of farming expertise. The finding suggested, it can be concluded that people with varying degrees of agricultural experience rate message readability differently. More research or focused interventions may be required to address possible issues in

message readability for certain individuals within the agricultural community, such as those who occasionally find the messages less readable despite overall good impressions.

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