Attitude of farmers towards Artificial Intelligence in Agriculture

Abstract

Digital technology innovations, particularly in artificial intelligence (AI), have the potential to significantly benefit agriculture. Agriculture is increasingly being held accountable for ensuring food security and safety while also taking into account environmental concerns. AI in the agricultural sector has the potential to feed a continuously growing global population while also contributing to achieving the UN's Sustainable Development Goals (SDGs).This was the right time to analyse and explore the artificial intelligence in agriculture. The present study was conducted in Dindigul district of Tamil Nadu.The findings indicated that farmers had moderately favourable level of attitude towards AI in agriculture.Farmers had positive attitude towards AI in agriculture because AI-enabled systems make weather predictions, monitor agricultural sustainability, and assess farms for the presence of diseases or pests and undernourished plants using data like temperature, precipitation, wind speed, and sun radiation in conjunction with photographs taken by satellites and drones.

Key Words : Artificial Intelligence, Agriculture, Farmers

Introduction

Given an increasing world population and rising food demand, it is critical to use efficient farming methods to increase production on limited land. AI is becoming increasingly prevalent in agriculture, and AI-powered devices are improving the current farming system. Agriculture is dependent on a variety of factors, including soil nutrient content, moisture, crop rotation, rainfall, temperature, and so on. Artificial intelligence-based products can use these variables to track crop productivity. Industries are turning to Artificial Intelligence technologies to improve a variety of agriculture-related tasks during every step of the food supply chain.AI-powered agricultural applications and solutions have been developed to help farmer’s practice precise and regulated farming by providing accurate advice on managing water, rotation of crops, promptly harvesting, kind of crop, ideal planting, infestations, and nutrition management.

Systems powered by AI use data such as temperature, precipitation, wind speed, and solar radiation, as well as pictures taken by orbiting satellites and drones, to forecast weather,

observe the sustainability of agriculture, and evaluate farms for the presence of infectious diseases or pests and malnourished plants.

Farmers without connectivity can benefit from AI immediately with equipment as simple as an SMS-enabled phone and the Sowing App. Farmers with Wi-Fi access can use AI apps to receive a constantly AI-tailored plan for their farms in the meantime. With the help of IoT and AI-driven technologies, farmers can meet rising food demand while increasing output and revenue in a responsible manner that does not deplete valuable natural resources. Climate variables include temperature, precipitation, wind, and solar radiation. The research presented here aims to achieve the following objectives based on its historical context. The study attempts to examine farmers' attitudes regarding artificial intelligence in the agricultural sector.

Methodology

The present study was conducted in Dindiguldistrict of Tamil Nadu. An ex-post facto research design was used in the present investigation. Three blocks were selected for the study. Each block forty respondents were selected. Thus a complete of 120 farmers were sampled for the study byproportionate random sampling method.Data was collected through a well-structured interview schedule which wasdeveloped keeping in view of the objective of the study.

For this objective, schedule consists of 10 statements. Out of 10 statements, 5 were positive and 5 were negative statements andrated on a five point continuum ‘Strongly Agree’,‘Agree’, ‘Undecided’, ‘Disagree’, and ‘StronglyDisagree’ with scores of 5, 4, 3, 2 and 1respectively for positive statements. For negativestatements the score of 1, 2, 3, 4 and 5 wereassigned for ‘Strongly Agree’, ‘Agree’,‘Undecided’, ‘Disagree’, and ‘Strongly Disagree’,respectively. On the groundwork of attitudescores obtained, farmers were categorized intothree categories as less favourable, moderately favourable and highly favourable. The collecteddata were coded, classified and tabulated. Thestatistical tools like Frequency, Percentage,Mean and Standard Deviation were used.Coefficient of correlation was carried out to findout nature of relationship between profilecharacteristics and attitude of farmers.

Results and Discussions

Distribution of respondents according to their attitude towards AI in Agriculture

Table 1 Distribution of respondents according to their attitude towards AI in Agriculture

S.No	Category	Frequency	Percentage
1	Less Favourable	17	14.17
2	Moderately Favourable	80	66.67
3	Highly Favourable	23	19.16
	Total	**100**	**120**

At a look from Table 1 inferred that majority(66.67 %) of the farmers had moderately favourableattitude towards AI in Agriculture followed by high(19.16 %) and rest (14.17 %) of the farmers hadless favourable attitude towards AI in Agriculture.

Content analysis of attitude statements regarding AI in Agriculture

Table 2 Content analysis of attitude statements regarding AI in agriculture

An appraisal of the content analysis of 10 statement as shown in the table indicated

S.No	Statements	SA	A	UD	DA	SDA

that all the respondents had moderately favourable attitude,

		F	%	F	%	F	%	F	%	F	%
1	AI systems can enhance farmers in terms of their social and economic wellbeing	30	25.00	40	30.33	25	20.84	15	12.50	10	08.33
2	AI systems can enhance farmers in terms of their social and economic wellbeing	25	20.84	49	40.83	21	17.50	15	12.50	10	08.33
3	AI can be used to create intelligent systems which are embedded in machines that can work with higher accuracy	34	28.33	40	33.33	20	16.67	14	11.67	12	10.00
4	AI provide new opportunities for business and entrepreneurs to deliver innovative solutions as service at affordable prices to the farmers	35	29.17	41	34.17	26	21.66	11	09.17	7	5.83
5	AI techniques can also be the enabler of the paradigm shift of location based advisory services to farmers	28	23.33	35	29.16	25	20.83	22	18.34	10	08.34
6	AI seems to be High initial investment	20	16.67	15	12.50	37	30.83	30	25.00	18	15.00
7	Automation through AI could lead to job losses in agricultural labour	22	18.33	13	10.83	38	31.67	31	25.83	16	13.33
8	Farmers with limited access to technology and digital literacy skills risk being left behind in the AI revolution	25	20.83	38	31.67	27	22.50	20	16.67	10	08.33
9	AI could lead to the erosion of traditional farming knowledge and practices accumulated over generation	15	12.50	17	14.16	29	24.17	38	31.67	21	17.50
10	AI-driven intensification of agriculture could have negative environmental consequences	14	11.67	16	13.33	30	25.00	37	30.83	23	19.17

An appraisal of the content analysis of 10 statements as shown within the table 2 that just above all the respondents had medium favourable attitude towards Artificial Intelligence in Agriculture. About 40 per cent (40.83 %) of the respondents agreed followed by strongly agreed (20.84 %), undecided (17.50 %), Disagree (12.50 %) and strongly disagree (08.33 %)with the statement of AI systems can enhance farmers in terms of their social and economic wellbeing. Followed by nearly 35 percent of the respondents (34.17 %) followed by strongly agreed (29.17 %), under decision (21.66 %), disagree (09.17 %) and strongly disagree (05.83%) with the statement of AI provide new opportunities for business and entrepreneurs to deliver innovative solutions as service at affordable prices to the farmers.Nearly 34 percent of the respondents (33.33 %) agreed followed by strongly agreed

(28.33 %), under decision (16.67 %), disagree (11.67%) and strongly disagree (10.00) with the statement ofAI can be used to create intelligent systems which are embedded in machines that can work with higher accuracy. Nearly 32 percent of the respondents (31.67 %) agreed followed by strongly agreed (20.83 %), under decision (22.50 %), disagree (16.67%) and strongly disagree (08.33) with the statement ofFarmers with limited access to technology and digital literacy skills risk being left behind in the AI revolution. Nearly 31 percent of the respondents (30.33 %) agreed followed by under decision (20.84 %), strongly agreed (25.00%), disagree (12.50 %) and strongly disagree (08.33) with the statement of AI systems can enhance farmers in terms of their social and economic wellbeing. About (29.16 %) of the respondents agreed followed by strongly agreed (23.33%), under decision (20.83 %), disagree (18.34 %) and strongly disagree (08.34) with the statement of AI techniques can also be the enabler of the paradigm shift of location based advisory services to farmers. About (14.16 %) of the respondents agreed followed by strongly agreed (12.50%), under decision (24.17 %), disagree (31.67%) and strongly disagree (17.50) with the statement of AI could lead to the erosion of traditional farming knowledge and practices accumulated over generation. About (13.33%) of the respondents agreed followed by strongly agreed (11.67 %), under decision (25.00 %), disagree (30.83 %) and strongly disagree (19.17 %) with the statement of AI-driven intensification of agriculture could have negative environmental consequences. About (12.50%) of the respondents agreed followed by strongly agreed (16.67 %), under decision (30.83 %), disagree (25.00 %) and strongly disagree (15.00 %) with the statement of AI seems to be High initial investment. About (10.83%) of the respondents agreed followed by strongly agreed (18.33%), under decision (31.67%), disagree (25.83 %) and strongly disagree (13.33 %) with the statement of Automation through AI could lead to job losses in agricultural labour.

Coefficient of Correlation between Profile of Farmers and Attitude towards AI in agriculture

To study the nature of relationship between theprofile characteristics of farmers and attitude offarmers towards AI in agriculture, coefficient ofcorrelation were computed and the values arepresented in Table 3. From Table 3 it is evidentthat amongst independent variables of farmers,ten variables viz., education, land holding,experience in farming, annualincome, training undergone, social participation,extension contact, innovativeness, economic orientation and scientific orientation had positive and significantrelationship with attitude.

Whereas, profilecharacteristics such as risk orientation had anegative and significant relationship with attitudeof farmers and age had a negative and nonsignificantrelationship with the attitude offarmers.

Table 3 Coefficient of Correlation between Profile of Farmers and Attitude towards AI in agriculture

S.No	Independent Values	r Value
1	Age	-0.132 NS
2	Education	0.189*
3	Land Holding	0.244*
4	Experience in farming	0.235*
5	Annual income	0.213*
6	Training Undergone	0.278*
7	Social participation	0.224*
8	Extension contact	0.251*
9	Innovativeness	0.274*
10	Economic orientation	0.262*
11	Risk orientation	-0.145 NS
12	Scientific orientation	0.291*

0.05% level of Significant. NS-Non Significant

Conclusion

The findings indicated that farmers had moderately favourable level of attitude towards AI in agriculture due Artificial intelligence (AI) makes it possible for machines to learn from experience, adjust to new inputs and perform human-like tasks. Using these technologies, computers can be trained to accomplish specific tasks by processing large amounts of data and recognising patterns in the data. In the future, AI will help farmers evolve into agricultural technologists, using data to optimize yields down to individual rows of plants. Hence, that they had beenshowing positive attitude towards AI in agriculture because AI-enabled systems make weather predictions, monitor agricultural sustainability, and assess farms for the presence of diseases or pests and undernourished plants using data like temperature, precipitation, wind speed, and sun radiation in conjunction with photographs taken by satellites and drones.

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