Utilitarian Usage of Social Media for Information Diffusion About Smart Agricultural System

Berkmans J[1][a], A. Peter[2][b] and S. Latha[2][c]
[1]Commerce, St. Joseph's College, Tiruchirapalli, India
[2]Alagappa Government Arts College, Karaikudi, India

Keywords: Smart Agricultural System, Information Diffusion, Utilitarian Consumption, Social Media.

Abstract: In this information era people who residing metro politician city required lot of interest to know the benefits of smart agricultural system adopting in their home. This will influence the farmers in the future. Therefore, it will impact the whole universe to reduce carbon level, as the consequence of this the temperature would be in control in the planet. The aim of this research is to know how the social media is being used for information diffusion about Smart Agricultural System (SAS). This research has adopted a descriptive in nature and convenient sampling techniques. 219 samples have been employed from the household in cities and metro politician city. The ANOVA test result's exposed that the residence of cities and metro city have very good awareness in adopting SAS but they have ineffective usage of greenhouse related products and further failed to understand the usefulness of smart agricultural system.

1 INTRODUCTION

Sadhguru (2022) shared in a video conversation that we receive same level of rain today as we received before 200 years. But the change is that we have huge showering within short period which cause catastrophe on lives, infrastructure, and agriculture sector. This amount rain is supposed to shower the whole year with a span of distance. According to him the reason for the change is due to the increment of earth temperature year by year. The agricultural sector is being affected very severely relatively other sectors. Smart Agriculture involves using technologies like Internet of Things (IoT), sensors, location systems, robots, and machine learning on farms. The primary objective of SAS is to enhance the overall quality and quantity of crops while optimising human labour efficiency. In general, Indian farmers are facing problems with adoption of education, innovation and technology. This significantly impact with their productivity and turned into least attractive business. Social media is the platform where individuals engage in creating, sharing, and exchanging ideas and knowledge within online communities and connections. The research evaluated the use of Facebook, Twitter, Instagram, LinkedIn, YouTube, and Orkut for utilitarian purposes. Indian consumers used internet and social media frequently for hedonic consumption whereas this research explore that how effectively the social media is being used for utilitarian purpose. This kind of consumerism is characterized by a focus on the practical qualities of products and services and an effort to satisfy one's material rather than subjective wants. Increasing user performance or productivity is one example of an instrumental benefit that utilitarian systems aim to give. In this connection, the researcher has proposed that social media has to be used for information diffusion in implementing SAS.

2 RESEARCH PROBLEMS

From 1750 to 2023 an average earth temperature has been increased 0.9degree. Due to this we face recently unpredicted climate changes in Tamil Nadu

[a] https://orcid.org/0009-0004-0730-109X
[b] https://orcid.org/0009-0004-0730-109X
[c] https://orcid.org/0009-0004-0730-109X

J, B., Peter, A. and Latha, S.
Utilitarian Usage of Social Media for Information Diffusion About Smart Agricultural System.
DOI: 10.5220/0012881300004519

In *Proceedings of the 1st International Conference on Emerging Innovations for Sustainable Agriculture (ICEISA 2024)*, pages 58-63
ISBN: 978-989-758-714-6

coastal area such as Chennai and Thoothukudi region as rain showered up to 92cm without predicting it. ISRO scientist Venkateshwaran explains that if the level of carbon is increased in the space, due to that the level of temperature also will be increased constantly. Further he added that from 1750 our space carbon level was only 280ppm (Parts per million), in 1999 it was 367ppm, and 2017 it was 421ppm. The temperature has been increased 1.5times since 1750 on average of less than 200 years. Therefore, there is a change in the universal cycle which results in increment in the temperature has the level of carbon elevated. As social animal human being produces carbon dioxide whereas the eco-system produces oxygen. Because of this inefficient cyclical process, the heat level is increased up to one degree. If the heat level is increased, the water evaporation also pointedly increased in the sea. Because of this we have frequent severe cyclonic storms created at the sea level. For the last 150 years the rain level has been increased in Karnataka region whereas Srinagar region witnessed decreased snowfall related rainfall. The rain level has been increased Goa and Gujarat regions but in Kerala region the rain level has been decreased. Human being failed to understand this and they wanted to produce more carbon related products such as auto mobile, industrial products which have short life in order to generate more profit without concern of environmental changes. Due to the above-mentioned causes, there is huge impact in agricultural sector comparatively other sector products. Therefore, this research tries to find out the implementation of Smart Agriculture System and utilitarian usage of social media in creating sustainable society (Theekkathirnews, 2023).

3 REVIEW OF LITERATURE

3.1 Awareness

Engaging in social media has a beneficial and notable impact on the degree to which farmers adopt Low-carbon Agricultural Practices (LAPs). Engaging in social media can greatly boost the earnings of farmers with a lower income bracket. Qi Yang and Wang (2021) found that social media has a significant influence in the spread of LAPs among farmers, which in turn increases economic development in emerging nations. When farmers share invaluable information via online communities, the costs of reducing emissions decrease. Policy benefits for agricultural adaptation to climate change can be enhanced by promoting sharing of knowledge and fostering social development within farming communities (CordeliaKreft& David Schäfer, 2023). A greenhouse equipped with a smart gauge yields superior energy conservation and decreased emissions outcomes. Leveraging multi-parameter tracking is advantageous for efficient greenhouse management, with wireless connectivity increasingly supplanting traditional connections for data transfer both within and outside the greenhouse. Technological advances such as neural learning and big data are beneficial in greenhouse monitoring, enhancing autonomous greenhouse management and optimising energy utilisation in greenhouse building (Haixia Li & Zhao, 2021). The correlation between social media reporting and farmers' attitudes on crop choice, land management, and water storage was favorable and statistically significant. Social media reports have a strong influence on farmers' decisions regarding adopting sophisticated techniques for crop selection, pest control, land management, and water storage (Javed, 2023). Federico Platania & Arreola (2022) propose that social media engagement, especially by the Federal Emergency Management Agency (FEMA), can lead to market-related and societal apprehensions regarding potential shortages and economic difficulties, thereby causing an increase in agricultural commodity prices. Increased public worry about climate change and uncertainties in economic decisions heighten market response, enhancing social media influence (Federico Platania & Arreola, 2022).

3.2 Greenhouse Environment

The Internet of Things (IoT) technologies, including smart sensors, devices, network structures, big data analytics, and intelligent decision-making, are seen as a potential answer to greenhouse farming obstacles like climate control, crop monitoring, and harvesting (RakibaRayhana & Zheng Liu, 2020). Using IoT technologies in smart greenhouses requires balancing the costs of agricultural output with environmental protection, ecological degradation, and sustainability. Implementing IoT infrastructure requires a significant amount of cash and typically results in increased energy consumption, which raises the potential for climate change (Maraveas & Arvanitis, 2022). The GMaaS programme offers forecasts using computational models created for indoor climate, agricultural production, and irrigation operations. Typically, these models are programmed directly into applications or integrated into software tools for usage as Decision Support Systems (DSSs). The Web application utilises the Representational State

Transfer (RESTful) services of the platform to enable users to easily interact with the system (Muñoz & Sánchez-Molina, 2022).

3.3 Usefulness

Farmers incur significant financial losses due to inaccurate weather forecasts and improper watering techniques for their crops. Advancements in wireless sensor technologies and miniaturised sensor devices allow for its utilisation in automatic environment monitoring and managing greenhouse parameters for Precision Agriculture (PA) applications (Chaudhary & Waghmare, 2011). German farmers are cognizant of climatic shifts and have a collective dedication to decreasing greenhouse gas emissions, although they lack adequate knowledge. Without regulation of agricultural greenhouse gases through taxes or subsidies, personal motivation remains the most powerful driver for voluntary emission reduction (Kerstin Jantke, 2020). Implementing different technologies to meet these goals was limited by the absence of a single solution that could immediately enable agricultural producers to achieve zero energy use, zero emissions, and optimal resource utilisation. The agricultural system integrates intelligent frequency conversion irrigation and automatic control in greenhouses using sensor nodes, wireless transmission network, sensor setup, and data collection system. The technique designed for practical implementation in greenhouses has shown positive results. The farmer achieved significant economic and ecological benefits by automatically acquiring real-time data on greenhouse environment parameters and biological information. This has great importance for the advancement of contemporary agricultural information-based and intelligent systems (Guo & Zhong, 2015). Enhanced crop management and increased crop yields through the utilisation of our intelligent agriculture technology. The cost-effectiveness of the system is determined by the original cost, running costs, and the reliability of wireless sensor network (WSN) data. Therefore, it might be utilised for precise crop production planning and decision-making about cultivation activities (Denis Pastory Rubanga& Shimada, 2019).

4 METHODOLOGY

This research is conducted to find out that how Smart Agricultural System is used to impact the carbon level. It is descriptive research in nature and selecting greenhouse owners residing in Madurai, Trichy and Chennai. 219 data were collected through filed visit and video conferencing method. The convenient sampling technique was adopted. The secondary data were collected from different journals, magazines, you tube channels, reports from state and central government websites meant for agricultural related information.

5 DATA ANALYSIS AND INTERPRETATION

Table 1: Social Media usage and Information Diffusion About Smart Agricultural System (SAS).

Social Media Usage	Category	No. of Respondents	Percent
Social media frequently used for SAS	Whatsapp	63	29
	Instagram	48	22
	Facebook	85	38
	Linkedin	08	4
	Orkuit	05	2
	Twitter	10	5
	Total	219	100

(Source: Primary Data)

The above table 1 enlightens that the utilitarian usage of social media for efficient information diffusion and implementation of smart agricultural system. 38 percent of the householders are using Facebook for updating greenhouse product related information, 29 percent of the greenhouse owners are using Whatsapp as their communication channel to understand and update online agricultural market related activities, 22 percent of the householder used Instagram, 5 per cent of the respondents are using Twitter, 4 percent of them are using Linkedin and 2 per cent of them are using Orkuit as the channel for communication and receive information related to smart agricultural system. Therefore, it is obvious that 38 percent of them have used Facebook as their channel for information diffusion about smart agricultural system.

6 FACTOR ANALYSIS FOR IDENTIFYING THE SMART AGRICULTURAL SYSTEM

Factor analysis has been conducted with 24 items that stimulate the greenhouse owners to implement smart agricultural system and their purposive use of social media for information diffusion. The principal component analysis is performed in order to discover the different factors.

KMO measure of sampling adequacy and Bartlett's test of Sphericity values are found out through performing factor analysis. The result of KMO measure of sampling adequacy (0.901) exposes that there is a satisfactory sample size for conducting factor analysis. It confirms that variables are correlated and suitable for performing factor analysis.

Principal Component Analysis has been performed for extracting factors with Eigen value greater than one. Three latent variables have been extracted from twenty four observed variables using the factor analysis and these three factors which were extracted together accounted for 68.17% of the variance. The results have been attained through rotated varimax and these variables with loading greater than 0.50 were reserved for further analysis. Three items with loadings below 0.50 were not considered for further analysis. The percentages of variance explained by three factors are 17.83%,38.87%and 11.47% respectively. These three factors are termed as "Awareness", "Greenhouse Environment" and "Usefulness".

6.1 Awareness

Factor one named as "awareness" and accounted 18% of the total variance such as 'awareness about IoT usage', 'availability of IT infra', 'awareness about e-banking' and e-commerce, Expenses ability for digital marketing, Ready to learn new avenues and Interested for online marketing related awareness variables were tested.

6.2 Greenhouse Environment

Greenhouse environment has emerged as an important factor for smart agricultural system and it accounted for 39% of the total variance. Nine variables are loaded in the second factor which are 'zig bee wireless sensor network technology' (0.727), 'radio frequency identification' (0.697), 'wireless sensor network' (0.694), 'sensors and global positioning system' (0.687), 'intelliSense internet of things' (0.686), 'computer environment control system' (0.686), 'light detection and ranging' (0.671), 'long wave infrared' (0.652) and 'internet +' (0.645) products used for agricultural environment at their home residing in metro cities.

6.3 Usefulness

Factor three titled on "Usefulness" and accounted for 11% of the total variances. Six statements are loaded in the third factor which are 'affordability for customers and farmers too', 'availability of buyers', 'quick response of buyers', 'quick order processing and execution', 'less stress of logistics and warehousing' and 'ready to pay premium charges' for implementation of smart agricultural system in household.

Table 2: Cronbach's Alpha Values for Adoption of Smart Agricultural System (SAS)

SAS	No. of. Items	Alpha
Awareness	6	0.888
Greenhouse Environment	9	0.954
Usefulness	6	0.832

(Source: Primary Data)

The reliability table 2reveals the alpha value of each latent variable with number of observed variables. The first latent variable termed as "awareness" comprises six variables with the alpha value of 0.888.The second factor called as "greenhouse environment" comprises nine items with the alpha value of 0.954 and the last factor is termed as "usefulness" which contains six variables with the alpha value of 0.832. The above test conformed that there is an excellent reliability as concerns to this construct.

H_1: utilitarian usage of social media has a significant difference with information diffusion about smart agricultural system.

Table 3: Mean Comparisons of Usage of Social Media and Smart Agricultural System

Adoption of Smart Agricultural System						
Social Media Usage	Awareness		Greenhouse Environment		Usefulness	
	Mean	SD	Mean	SD	Mean	SD
Whatsapp	2.01	0.467	2.02	0.646	1.86	0.558
Instagram	2.06	0.535	2.14	0.540	1.61	0.636
Facebook	1.93	0.462	1.87	0.574	1.94	0.429
Linkedin	1.97	0.552	1.97	0.516	1.78	0.514
Orkuit	1.82	0.554	2.10	0.561	1.90	0.588
Twitter	2.36	0.660	2.02	0.607	1.90	0.636

(Source: Primary Data)

Table3 illustrates that mean comparisons of usage of social media information diffusion and implementation of smart agricultural model. Twitter *(M=2.36)* has utilized frequent channel for promoting awareness whereas Orkuit *(M=1.82)*channel has used least awareness about the smart agricultural system. Majority of the householder have used Istagram *(M=2.14)*as mostly used channel for spreading and receiving information and Facebook *(M=1.87)*has been used least channel for creating and adopting greenhouse environment. Facebook *(M=1.94)* has significantly spread useful information about greenhouse product whereas Instagram*(M=1.61)* has used for least information about of greenhouse products. Therefore it is concluded that the channel Twitter *(M=2.36)* has been frequently used for information diffusion about smart agricultural system.

Table 4: One Way Analysis of Variance Summary Table Comparing Social Media Usage for Information Diffusion about Smart Agricultural System

SAS		Sumof Squares	*df*	Mean Square	F	Sig.
Greenhouse Environment	BetweenGroups	2.742	4	0.686	2.058	0.084
	WithinGroups	137.219	464	0.333		
	Total	139.962	468			
Awareness	BetweenGroups	11.402	4	2.851	9.218	0.000
	WithinGroups	127.404	464	0.309		
	Total	138.806	468			
Usefulness	BetweenGroups	2.359	4	0.590	2.083	0.081
	WithinGroups	116.624	464	0.283		
	Total	118.983	468			

(Source: Primary Data)

One-way ANOVA table 4 states the comparison between purposive usage of social media for information diffusion about smart agricultural system. The alternative hypothesis is accepted for "Awareness" variable whereas effective use of "Greenhouse Environment" related product and usefulness variables have been rejected by the alternative hypothesis. Therefore it is conceded that greenhouse owners have highly awareness about greenhouse agricultural systems whereas they don't have effective implementation of greenhouse products and its usefulness to the nature.

7 DISCUSSION

38 percent of the household used Facebook as their social media platform to promote and shares information related to smart agricultural system. Tiwtter is the highly influenced social media in information diffusion about smart agricultural system. These households have good awareness of the information diffusion about the smart agricultural system whereas they have very least interest or indifference with effective usage of greenhouse related products. They have less concern about usefulness of greenhouse product which has the effect of climate changes as the consequence they faced sever cyclone in the past. Hereafter greenhouse owners should be very cautious to use least cost or affordable cost greenhouse products at their home for effective management of soil, climate, and temperature assessment for cultivation of agricultural products. Therefore we can avoid facing much losses in connection with sever cyclone in the metro cities. Majority of them have education and have financial stability to take care of our cities for better life. Therefore we can create sustainable society to donate to the forthcoming generations.

8 CONCLUSION AND FUTURE RESEARCH

The technology that was used for SAS would be environmental friendly. It is, fundamentally a support and management tool in agricultural sector. Environmental predictive system is used to predict the weather condition in advance and the farmers proactively take certain decision to get better yield and increasing their productivity. In the recent years, this predictive system has also been very challenging for agriculture sector, public infrastructure and business. This system sometime is used for adequate management of the agro- ecological parameter of temperature, relative humidity and luminosity, which directly benefit to the growth of the crops. The proposed system (SAS) will create green environment in the city and minimize the carbon level around their residential place. It will allow the householders to take needed preventive and correct action by providing a technological platform based on free software and least cost hardware as well as the data mining techniques.In future, complete success of this model also will influence the farmers in the near future. The future direction is howcan be greenhouse products effectively used by contract farming.

REFERENCES

Chaudhary, .., & Waghmare. (2011). Application of Wireless Sensor Networks for Greenhouse Parameter Control in Precision Agriculture. International Journal of Wireless & Mobile Networks , 140-149.

Chrysanthos Maraveas, C.-S. K. (2023). Agricultural Greenhouses: Resource Management Technologies and Perspectives for Zero Greenhouse Gas Emissions. Resources Development and Agricultural Engineering, https://doi.org/10.3390/agriculture13071464.

Cordelia Kreft, R. H., & David Schäfer, R. F. (2023). Quantifying the impact of farmers' social networks on the effectiveness of climate change mitigation policies in agriculture. American Journal of Agricultural Economics, https://doi.org/10.1111/1477-9552.12557.

Denis Pastory Rubanga, K. H., & Shimada, S. (2019). Development of a Simplified Smart Agriculture System for Small-scale Greenhouse Farming. Sensors and Materials, 831-843.

Federico Platania, T. H., & Arreola, F. (2022). Social Media Communication During Natural Disasters and the Impact on the Agricultural Market. Technological Forecasting and Social Change, https://doi.org/10.1016/j.techfore.2022.121594.

Guo, T., & Zhong, W. (2015). Design and Implementation of the Span Greenhouse Agriculture Internet of Things System. 2015 International Conference on Fluid Power and Mechatronics (FPM) (p. 10.1109/FPM.2015.7337148). China: IEEE.

Haixia Li, Y. G., & Zhao, H. (2021). Towards Automated Greenhouse: A State of the Art Review on Greenhouse Monitoring Methods and Technologies Based on Internet of Things. Computers and Electronics in Agriculture, https://doi.org/10.1016/j.compag.2021.106558.

Javed, M. N. (2023). Social Media Reporting on Agricultural Adaptation to Climate Change in Pakistan: Measures and Implications for Sustainability . Heliyon , https://doi.org/10.1016/j.heliyon.2023.e21579.

Kerstin Jantke, M. J. (2020). Agricultural Greenhouse Gas Emissions: Knowledge and Positions of German Farmers. Center for Earth System Research and Sustainability, https://doi.org/10.3390/land9050130.

Maraveas, P., & Arvanitis, B. L. (2022). Applications of IoT for Optimized Greenhouse Environment and Resources Management. Computers and Electronics in Agriculture, https://doi.org/10.1016/j.compag.2022.106993.

Muñoz, G., & Sánchez-Molina. (2022). A New IoT-Based Platform for Greenhouse Crop Production. IEEE Internet of Things Journal, 10.1109/JIOT.2020.2996081.

Qi Yang, Y. Z., & Wang, F. (2021). Social Media Participation, Low-Carbon Agricultural Practices, and Economic Performance of Banana Farmers in Southern China. Frontiers in Psychology, https://doi.org/10.3389/fpsyg.2021.790808.

Rakiba Rayhana, G. X., & Zheng Liu. (2020). Internet of Things Empowered Smart Greenhouse Farming. IEEE Journal of Radio Frequency Identification, 195 - 211

Sadhguru. (2022). The Mystical Secret of Water (Recorded by Isha foundation), Coimbatore, Tamil Nadu,India)

Venkateshwaran (2023). Earth is Affected with Fever, What is the Medicine [Recorded by Theekkathir]. Darmapoori, Tamil Nadu, India.