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Digital Marketing for Global Agricultural Produce: Success in the Digital Era

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ABSTRACT

Background: There is a great need for creative solutions, especially those that reduce poverty and help many people. Since the advent of the internet in everyone's daily lives, marketing has grown more adaptable in this digital age. This research paper aims to determine how farmers and consumers react to the global digital transformation of agriculture and to research consumers' behaviour in using digital platforms for purchasing products.

Methods: Secondary data used in this study was collected from statistical handbooks and 110 farmers were surveyed *via* a simple random sampling technique to collect primary data through questionnaires. Random questionnaire survey was carried out in the southern region of Tamil Nadu to analyse consumer perceptions of digital transformation.

Result: The survey showed that middle-class farmers abandoned farming in favour of other ventures; as a result, they used considerably fewer mobile apps than farm labourers did. In terms of employment, livelihoods and environmental impact, agri-food systems are the largest economic sector in the world. The results of the study showed that willingness to adopt digital marketing was influenced positively by gender, income, education and occupation.

Key words: Adoption, Binary logistics, Consumer perception, Digital platforms, Mobile phones.

INTRODUCTION

The emergence of new technology has changed the world by connecting everyone with the help of mobile networks, broadband internet, cloud platforms, the Iot, AI and open data. Recent technological advancements in agriculture have created new chances for people to become self-sufficient in food FIG 1the world economy. The agro-industry offers prospects beyond farming and pursuing a number of agro-based company concepts might be very profitable. Smith (2011) defines digital marketing as the practice of promoting goods and services online or through a variety of digital distribution channels presenting digital values and experiences through digital technologies, digital marketing encompasses the activities of establishing and maintaining relationships with consumers and partners who are digitally focused" (Rakić, B., and Rakić, M. 2018). According to Sudhakar Reddy (2021), farmers gain from digital marketing platforms since they increase the selling price and reduce the marketing costs of their agricultural products, such as cotton lint, maize grains, paddy, vegetables, *etc*. Ashish Kumar *et al* (2023) pointed that ICT tools help farmers and improve their ability to make data-driven decisions. Nowadays, information and communication technology is present in every home, empowering farmers to fully utilise their resources.

There is a great need for creative solutions, especially those that reduce poverty and help many people. Since the advent of the internet in everyone's daily lives, marketing has grown more adaptable in this digital age.

According to Zwass *et al*. (2017), the idea of e-commerce had emerged 70 years ago as a channel for the exchange of business documents, such as orders or invoices, between suppliers and their commercial clients, with a system of primarily using telex to place orders. Later, in the 1970s and 1980s, e-commerce developed into simple electronic transactions and teleshopping, primarily using computer-to-computer electronic data communication. Balmiki Pradhan (2021) noted that it was not until the 1990s that online shopping became practical. In 1992, an online bookstore called Book Stacks Unlimited was launched. It transitioned to the Internet in 1994 and began functioning from the books.com domain.

After being established in 1995 as an online book retailer, Amazon went on to become one of the first websites to sell products other than books (History, 2021). In the same year, eBay, a website for online auctions, was established (eBay, 2020). The present growth of e-marketing was significantly influenced by the COVID-19 pandemic (UNCTAD, 2021). Additionally, COVID-19 provided evidence that e-marketing could be transformative one day. According to Kong (2019), rural e-commerce consists

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mostly of the use of the Internet to promote goods and services for people residing in rural areas as well as to purchase goods and services from rural areas. Agri-food systems are functioning in the midst of instability and vulnerability, according to Gulsia (2024).

As of 2024, 5.17 billion people in general, or 63.82% of the global population, is active on social media. Now a days Facebook continues to be the most popular social media network, with more than 3.05 billion users (Rohit Shewale, 2024).

The data in the graph (Fig 1) indicates that the number of social media users worldwide has increased over time and will continue to rise at the same rate. Digital market analysis (2023) predicted that the size of the global digital marketing market is expected to increase from USD 366.1 billion in 2023 to approximately USD 1,310.3 billion by 2033, with a compound annual growth rate (CAGR) of 13.6% from 2024 to 2033.It was also reported by *Simon Kemp (2024)* the number of Internet users increased 15.5 per cent during the outbreak. In contrast, internet users aged between 16 to 64 spend an average of 8 hours 52 minutes per day on various media, which is 8 hours greater than traditional media usage. These results demonstrate that consumers are now spending more time online. Oseremen Ebhote (2020) drawn the conclusion that successful transformation and digital marketing are highly recommended for agricultural development. Considering the global shift towards digitalization, it is essential to examine how individuals are adapting to this change. According to Shubhangi Salokhe (2024), in his report from pointed out that the government must to help farmers sell their produce directly by offering user-friendly applications for digitally marketing and obtaining market data. Kumar Vijay (2020), Digital marketing's primary goal is to leverage technology on the internet to draw in customers with different brands.

This research paper aims to determine how farmers and consumers react to the global digital transformation of agriculture considering the objectives of the study as follows: (1) To examine the dynamics and developments in digital marketing for global agriculture, (2) To study the consumers' opinions regarding digital platforms for buying agricultural products and (3) To analyse farmers' perspectives regarding the use of mobile applications in Indian agriculture.

MATERIALS AND METHODS

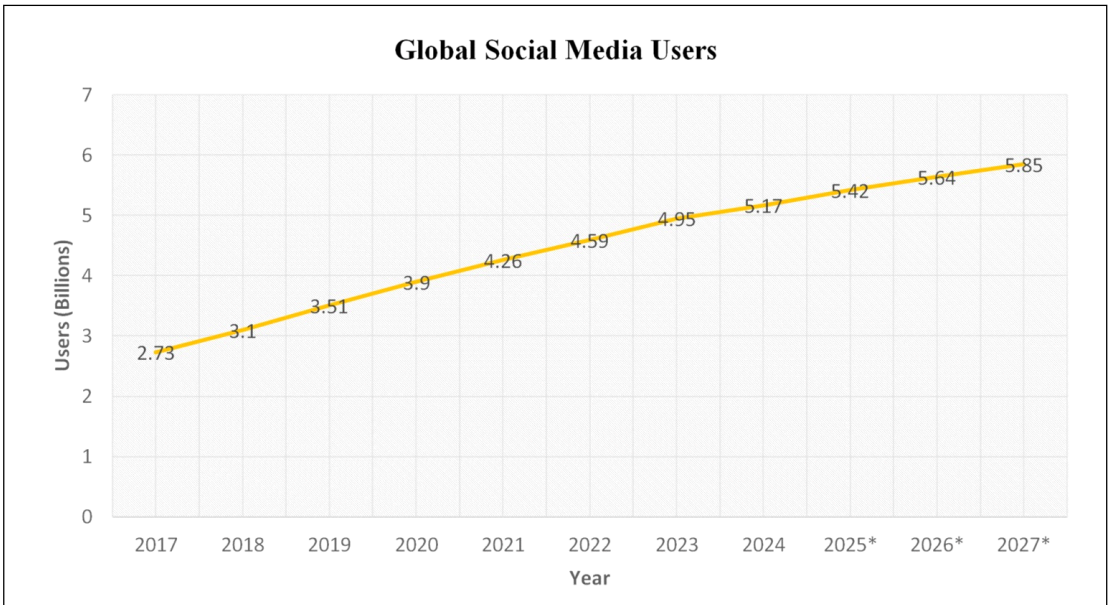
All the primary and secondary data used in this study were collected from statistical handbooks and 110 farmers were surveyed via a simple random sampling technique to collect primary data through questionnaires. Random questionnaire survey was carried out in the southern region of Tamil Nadu to analyse consumer perceptions of digital transformation.

Tools for analysis

Simple percentage analysis

Binary logistic regression

Logit regression was used to explain the relationship between one dependent binary variable and one or more independent variables, to analyse the factors that influence the adoption of digital marketing.



(Reference: Authors Analysis, *-Future forecast)

Fig 1: Statistics on social media users globally.

Empirical model

Ln [p/(1-p)] = a + b1X1 + b2X2 + b3X3 + b4X4 + b5X5

Where,

p= Willingness to adopt digital marketing.

1-p= Non-willingness.

X1- Age of the person.

X2- Gender of the person (1- Male, 0- Female), which is the categorical variable.

X3- Educational level of the person (1= Schooling, 2= Under-graduate, 3 = post-graduate, 4 = Doctorate, 5=post-doctorate).

X4- Occupation of the person (1= farming, 2 = self-employment, 3= private job, 4= government job).

X5- Income of the person (1= less than Rs 10,000, 2 = Rs 10,000 to 20,000, 3= Rs 20,000 to 40,000, 4= more than Rs. 40,000).

Variable X1 is the scale variable.

Variables X2 and X4 are the nominal variables.

Variables X3 and X5 are ordinal variables.

RESULTS AND DISCUSSION

Progress in global digital marketing

The percentage share of digital marketing advertisements (49.89%) that generate the most profit among all other categories is shown in Table 1. Gaming (32.54 %) is the next most popular hobby; with all children these days being addicted to video games.

Fig 2, shows that global spending on digital advertising increased from 329.02 billion USD in 2019 to 576.17 billion USD in 2024. This illustrates the rapid growth in the field of digital advertising.

Global agricultural digital marketing

The agriculture and food sector is facing numerous issues. With the global population anticipated to increase from 7.6 billion in 2018 (UN DESA, 2019) to more than 9.6 billion in 2050, there will be a large increase in food consumption (UN DESA, 2017) and resources needed to meet these needs are extremely limited.

In the current digital era, the management of all activities through digitization will revolutionize every component of the agri-food chain to satisfy peak demand. According to market estimates for the next decade, the latest move that could assist in ensuring that agriculture meets the needs of the global population is a “digital agricultural revolution”.

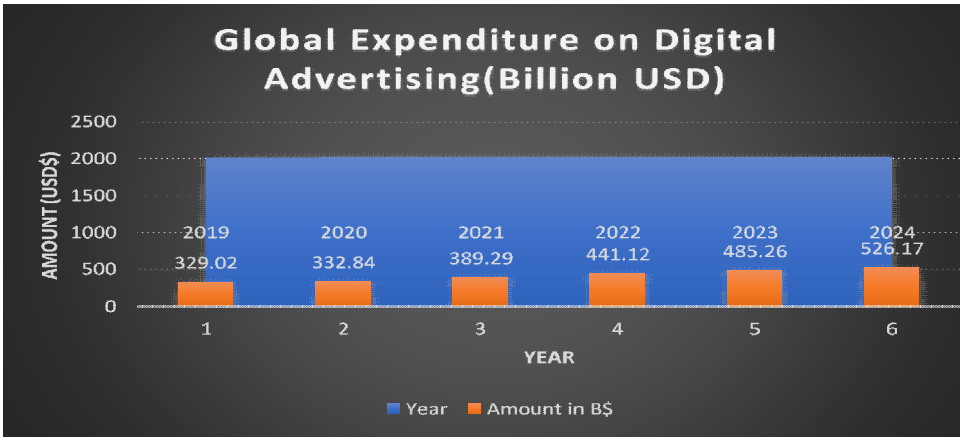
Mobile phones and the internet have had an enormous impact on almost every area of the economy, including agriculture. Recently, digital technologies have had a significant impact on agricultural and food production worldwide. Many E-strategy guides have also been developed to aid poor countries with digital agriculture in trading agricultural commodities and purchasing inputs. According to a report by Market and Market analysis, in 2023, the global income from the digital agricultural industry is expected to reach 18 billion USD in 2027, with an annual growth rate of 10.5 per cent to 29.8 billion USD in 2027. In the agricultural industry, a digital platform assists farmers in obtaining resources such as machinery, finance, marketing and sales. If digital technology is integrated into the agricultural industry, countries all over the world will be better able to meet the world’s rising food demand.

Hao *et al*. (2021) claim that since the Internet continues to grow quickly, an increasing number of people are

Table 1: Profit Share of Digital Marketing 2023.

Area of representation	Profit (billion)	Percentage
Website design	11	1.19
Information technology	5	0.54
Gaming	300	32.54
Digital marketing advertisement	460	49.89
Cyber security	146	15.84
Total	922	100

(Reference: Authors Analysis).



(Reference: Authors Analysis)

Fig 2: Global Expenditure on Digital Advertisement.

choosing to shop online and this number has increased significantly over the past ten years.

Advantages of digital marketing for agricultural commodities

According to Lashgarara *et al*. (2024), farmers must have access to accurate and up-to-date information in order to improve the quantity and quality of agricultural products they market. ICT plays a crucial role in the marketing of agricultural products by speeding up the distribution of information. Digitalizing agriculture can be understood as a trading strategy that involves purchasing and selling agricultural products online. This kind of electronic trading could lower transaction costs, broaden market access and increase product information. In general, e-trading is simple to use and economical for businesses and customers.

In favour of the Consumer

1. Selling directly to customers to save time.
2. A comprehensive understanding of how prices are set for certain products is needed to make it easier to choose a product.
3. Information about the products is easily accessible from the customers' location.
4. The client can acquire fresh products according to their requirements.
5. Customers can make purchases at any time based on their needs.

In favour of the Producer

1. A producer has the option of selling goods anywhere in the nation or even outside the nation.
2. The availability of online marketing will be constant and time-free.
3. There will not be any product haggling.
4. A lack of intermediaries will result in lower product costs.

Key stakeholders in the global agricultural digital ecosystem

Eden Farm, Waycool Foods and Products Pvt Ltd., Agrofy Kaset Thai Hitech Co.Ltd., Agri Marketplace, COFCO International, Cranswick PLC, Crofarm Agriproduct Pvt Ltd., Tanihub, Deere and Company, AGCO Corporation, Raven Industries, AgJunction, Trimble, Twinga Foods Limited, Syngenta.

Although the concept of digital marketing penetrates all corporate sectors, the agricultural industry has lower involvement due to the following factors: (1) Lack of knowledge and security issues, (2) Start-up expenses, (3) A dearth of digital tools, (4) Infrastructure Shortcomings, (5) Not ready to adopt new techniques and (7) Fear of using.

Market participants in the global online food grocery market

Amazon (US), Walmart (US), Alibaba Group (China), JD. Com (China), Ocado (UK), Instacart (US), Tesco (UK), Carrefour (France), Kroger (US), Mercadona (Spain), AholdDelhaize (Netherlands), Peapod (US), Coop (Switzerland), Rewe (France), Sainsbury's (UK), Target (US), Supermarket Grocery Supplies Pvt. Ltd. (BigBasket)

The global online food market

Products available on the digital market includes: (1) Fresh Produce, (2) Breakfast and Dairy, (3) Snacks and Beverages, (4) Meat and Seafood, (5) Staples and cooking essentials and (6) Others

Digital agriculture platforms in developing nations such as India

Currently, everything is digitalized and digital platforms enable effective production and marketing.

India is a country that values agriculture, with more than 70 per cent of the population depending on agriculture for employment opportunities. In fact, India is the world's top producer of pulses, paddy, wheat and wheat-related goods. In addition to other crops, 40 per cent of the world's rice exports are made from India to other nations and Indian farmers are changing to the current state as the world moves toward digitalization. The use of mobile devices and the internet has had a substantial impact on almost every economic sector, including agriculture. Smallholder farmers benefit greatly from the digital transformation of agriculture, which has improved market transparency, increased farm productivity and improved logistics. In particular, during the public health crisis caused by the COVID-19 pandemic, digital agriculture has assisted developing nations in fending off the pandemic's negative effects on food production and supply chains.

The Agricultural Produce Market Committee (APMC) mandis is connected through the pan-Indian electronic trading portal known as the National Agriculture Market (e-NAM) to form a unified national market for agricultural commodities, which was launched by the Prime Minister Narendra Modi on April 14, 2016. The e-NAM platform encourages greater marketing options for farmers to sell their produce through an online system for competitive and transparent price discovery as well as an online payment capability.

As of March 31, 2023, more than 1.75 crore farmers and 2.43 lakh traders had enrolled on the e-NAM platform. There are now 2,575 FPOs registered on the e-NAM platform. The e-NAM platform has recorded trades worth $2.50 lakh crore.

It was discovered during primary data collection in the southern areas of India that farmers were increasingly using their mobile phones as a digital platform to expand their agricultural activities.

Table 2: Use of mobile phones as digital platforms by agricultural workers.

Farmers of South India	
Owners of Farm (%)	Agricultural Daily Laborers (%)
30	70
80:20	30:70
(Smartphones: Keypad)	(Smartphones: Keypad)

(Reference: Authors Analysis).

Previously, mobile phones were only used for communication and only in the past five years has there been a boom in their use. Only in the last five years have mobile phone usage rates exploded and mobile phones have previously been used only for communication.

Landlords make up approximately 30 per cent of the population, while agricultural labourers make up approximately 70 per cent (Table 2). Only 20 per cent of landlords use keypad phones for various reasons, whereas 80 per cent of them use Android smartphones with touch screens. While 50 per cent of agricultural labourers use keypad phones, only 30 per cent use Android phones.

According to related research (Table 3), 37 per cent of people use smartphone apps to acquire weather updates. This was due to the high susceptibility of many agroclimatic zones to natural disasters, including floods, cyclones and droughts. Therefore, to conduct their farming operations, farmers are interested in receiving regular weather updates.

Table 4 shows that 80% percent of respondents stated mobile apps were technologically helpful and 55% percent of farmers believed recent upgrades were highly appropriate for digital platforms.

Supply chain management in connection with e-trading in fresh products

Modern information and communication technology (ICT) and artificial intelligence (AI) systems plays significant role in supporting online sales and purchases. They also collaborate with financial vendors to enable online payments and with storage facilities to maintain the

Table 3: Farmers' opinions on the use of mobile applications for farm management.

Particulars	Number of Farmers	Per cent
Knowing the cost of the inputs and outputs	15	14
Understanding crop management techniques	4	4
Obtaining information on weather-related information	41	37
Information on input prices	9	8
Information on fertilizer application	4	4
Information on the marketing of harvested produce	18	16
Crop pest management	6	5
Total	110	100

(Reference: Authors Analysis).

Table 4: Perceptions of farmers towards digital platforms for agriculture.

Indicator	Perceptions (%)		
	Bad	Average	Good
Reliability	42	35	23
Recent updates	10	35	55
Technologically applicable	0	20	80
Good visibility of the content	31	20	49
Price of the App is cost - effective	30	39	31
Need-based Information	39	44	17

(Reference: Authors Analysis).

Table 5: Customer's preferences for purchasing fresh agricultural and allied sector products online.

Items preferred	Number of respondents	Per cent
Fruits and vegetables	15	14
Beverages	8	7
Meat and meat products	14	13
Sea foods	13	12
Fresh flowers and dried flowers	2	2
Cooked food Items from zomato/swiggy	22	20
Textiles	25	23
Ornamental nursery plants/seedlings	11	10
Total	110	100

(Reference: Authors Analysis).

Table 6: Preferred means of payment by consumers for buying fresh agricultural products through the Internet.

Preferred method of payment	Number of Respondents	Percentage
Cash on delivery	15	14
G-Pay/Paytm and other mode of online transaction	57	52
Paying with debit cards	12	11
Paying with credit cards	18	16
NEFT/RTGS payment mode	8	7

(Reference: Authors Analysis).

Table 7: Omnibus Tests of Model Coefficients.

		Chi-square	df	Sig.
Step 1	Step	98.953	7	.000
	Block	98.953	7	.000
	Model	98.953	7	.000
Step 2[a]	Step	-.080	1	.778
	Block	98.873	6	.000
	Model	98.873	6	.000

A. A negative Chi-squares value indicates that the Chi-squares value has decreased from the previous step.

Table 8: R2 values.

Step	-2 Log likelihood	Cox and Snell R Square	Nagelkerke R Square
1	38.655[a]	.593	.831
2	38.735[a]	.593	.831

Table 9: Variables in the Equation.

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	age	.060	.214	.079	1	.778	1.062
	gender (1)	2.491	.972	6.561	1	.010	12.070
	education	20.652	4.242E3	.000	1	.996	9.315E8
	occupation			4.973	3	.174	
	occupation (1)	1.623	7.524E3	.000	1	1.000	5.066
	occupation (2)	4.329	7.524E3	.000	1	1.000	75.903
	occupation (3)	3.013	7.524E3	.000	1	1.000	20.355
	income	.611	.419	2.125	1	.145	1.842
	Constant	-48.563	1.415E4	.000	1	.997	.000
Step 2[a]	gender (1)	2.504	.972	6.629	1	.010	12.227
	education	20.938	4.259E3	.000	1	.996	1.239E9
	occupation			6.183	3	.103	
	occupation (1)	.903	7.565E3	.000	1	1.000	2.467
	occupation (2)	3.415	7.565E3	.000	1	1.000	30.425
	occupation (3)	2.502	7.565E3	.000	1	1.000	12.212
	income	.666	.373	3.181	1	.074	1.946
	Constant	-46.962	1.422E4	.000	1	.997	.000

a. Variable(s) entered on step 1: age, gender, education, occupation, income.

freshness of delivered goods. If you want to ensure that customers accept and are happy with purchasing fresh products online, additional care is needed. It is vital to manage the supply chain and customers' perceptions of the online shopping experience.

Table 5 reveals that 20% of consumers prefer to purchase cooked food items from Zomato or Swiggy and 25% of people choose to purchase textiles through online marketing, which is the greatest percentage.

Table 6 shows that G-Pay, PayTM and other online payment methods are the most popular among

consumers. These days, it's much simpler to purchase goods online without having to brave the crowds and cashless transactions are also quite simple.

Factors that influence consumers' adoption of digital marketing for the purpose of purchasing agricultural marketing.

The omnibus tests of model coefficients (Table 7) indicate that in step 2, the significance of the chi-square value is less than 0.05, which reflects the model accuracy. The Cox and Snell R square values and Nagelkerke R square value (Table 8) indicate that 59 to 83 per cent of the variation in the dependent variable is explained by the independent variable.

Table 9 indicates that the odds ratios of all the variables were positive. Gender, education, occupation and income are positively related to the dependent variable. The variables for gender (male) and monthly income were found to be significant at the 10 per cent level. This indicated that men are more interested in digital marketing. A one-rupee increase in income increased willingness toward digital marketing by 66.6 per cent.

CONCLUSION

According to eMarketer, the product category for which online growth was most rapid is food, with 18 per cent growth predicted for the U.S. alone last year. Rural e-commerce has already started to address many of the problems that carop up when agricultural products are commercialized and including the rural population in both production and consumption opens a wide range of development opportunities. The survey also showed that middle-class farmers abandoned farming in favour of other ventures; as a result, they used considerably fewer mobile apps than farm laborers did. In terms of employment, livelihoods and environmental impact, agri-food systems are the largest economic sector in the world. The results of the study showed that willingness to adopt digital marketing was influenced positively by gender, income, education and occupation. Agriculture is losing popularity among young people worldwide. However, to address the problems of nutrition and food security, considerable reforms are urgently needed.

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Consent

There is no involvement of Animals/Humans for research.

Author contribution

Each author has contributed to the data collection, selection of tools, analysis of data and interpretation of results.

Conflict of Interest

There is no conflict of interest among all authors.

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