Impact of Education and Traditional Psychology of Farmers to Upgrade Farm Entrepreneurship: An Assessment of Requirement of Training of Technology into the Farm Community

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Abstract

This study attempts to analyse the contribution of m-commerce component and its usage to upgrade the farm entrepreneurship. Furthermore, this also investigate how the educational and age (affected by the traditional psychology) factors affect to adopt the mobile technology for daily routine of farm business. The provision of information through mobile phone-enabled agricultural information services (m-Agri services) has the potential to revolutionise agriculture and significantly improve the livelihoods of smallholder farmers in rural India as m-Agri services can be accessed through mobile phones.

In this paper, primary data is collected by distributing questionnaire which is drafted based on exited literatures. Multistage random samplings are used to collect the data. After applying Structure equation Modelling between the variables, study revealed that farmers who are having education above 10th class are using M-commerce and getting higher profit. And 41% farmer demanded special training for Mobile and information technology to get higher return on their capital in farm business.

Keywords— Agri-Business, Agricultural entrepreneurship, and m-commerce mobile revolution

I. INTRODUCTION

In the previous six months, 79 % of smartphone users completed an online purchase using their mobile devices. As per the data set mentioned (Smith, 2022) mobile devices got estimation account for 56% of online transactions in 2021. Furthermore, worldwide e-Commerce web traffic on mobile is 2.47 times that on desktop. The number of smartphone users is expected to reach 6.6 billion by 2022, up 4.9 percent from the previous year. By 2023, 85 percent of the world's population will be smartphone owners (WARD,2022).

Nothing left behind in economy without the usage of mobile phones and smart apps. Even the most tradition sector agriculture is not untouched by the application of internet and mobile usage. With the worldwide smart farming industry expected to increase at a compound annual growth rate of 13.27 percent to $12 billion by 2021, India is on the verge of breaking through since it is home to one-fifth of the world's smallholder farmers Dutta (2018). Meanwhile, Internet use in rural India is

increasing. India has 120 million farmers, 30 million of whom use cell-phones and have a rudimentary comprehension of digital markets. Around 315 million Indians living in rural regions is connected in 2020. Increased Internet availability in rural areas is the tipping point for India's ag-tech business. Ag-tech is building new paths for Indian agriculture, particularly as climate change threatens farmers (Jaiswal et.al., 2021).

To dig deeper, many researches are being conducted and revealed that agriculture sector was the only sector reporting the positive growth while covid. Agriculture contributes 3,616,523 cr. rupees (20.19 % share) in GVA (MOSPI, 2021). Hence with the integration of mobile technology and internet things agriculture sector can ensure the optimum profit range and economic performance.

Table 1: Telephone statistics with relation to agriculture productivity

S. No.	Indicators		2014	2015	2016	2017	2018	2019	2020
1	Mobile subscription (in million)		904.52	969.54	1034.11	1170.59	1188.99	1161.71	1157.67
2	Telephone Subscription (%)	Rural	40.49	41.77	42.27	41.99	43.40	43.46	44.29
		Urban	59.51	58.23	57.73	58.01	56.60	56.54	55.71
3	Internet Subscriber (per 100 inhabitant)		20.29	24.09	26.98	32.86	38.02	48.48	55.12
	Rural		-	49.07	58.28	70.83	84.74	97.94	99.12
	Urban		-	12.89	12.80	15.49	16.41	25.36	32.24
6	Agriculture GVA/hect (current price)		1362.10	1494.05	1596.68	1806.59	2033.20	911.63	929.83

Source: Telecom Statistical Bulletin: 2020 & agriculture statistics.

In table-1, mobile and internet application is given in both category rural and urban areas. If we look into the pattern. Mobile and internet expansion happened in urban areas more than rural areas. However, this usage is having similar trend like agriculture productivity. So we can not be very sure but can have the foundation for this empirical study that mobile and internet application have positive impact on Agri business and entrepreneurship. However, this is matter of concern whether this integration has some scope in agriculture sector or not as it is rooted in the very traditional methodologies and belief.

The traditional value chains in agriculture include a number of different middlemen between the producers and the end customers. In most cases, farmers sell their products to intermediaries at the entrances of their farms. After there, the product makes its way via a chain of different middlemen on its way to the final consumer (Bowonder,2003). As a consequence of this, farmers only get a tiny percentage of the price paid by the final customer, which is due to the fact that each middleman in the value chain gets a profit. The advent of agri- entrepreneurship has opened the door to the possibility of optimizing the agricultural value chain and cutting down on inefficiencies in the distribution of farm products. This paves the door for farmers to sell their goods to a wider variety of customers, such as agribusinesses, shops, restaurants, and individual consumers (Oguoma et. al , 2010). The use of agri-e-commerce also makes it easier for farmers to enter new markets and boosts the value chain's level of transparency. In developing areas, agri-entrepreneurship represents a newly emerging potential. However, there is a significant gap between nations that are still developing with relation to their level of preparedness for agribusiness (Thornton, 2010).

Our Market Attractiveness Index, which assesses nations according to a variety of Agri-entrepreneurship enablers, takes these disparities into consideration when compiling its rankings. In order to make the most of the increasing potential, agri-entrepreneurship requires business models that are both scalable and sustainable (Chand, 2019). The operational duties that the agri-entrepreneurship performs within the context of their local market should guide the selection of the appropriate business model. It also is contingent on other elements, such as the type of product being sold and the strategic goals of the company (Rankin et.al. , 2016). Since mobile operators are increasingly participating in both the agriculture and e-commerce markets – by launching their own products and working in partnerships – the emerging opportunity in agri- entrepreneurship is a key strategic consideration. This is because mobile operators are increasingly participating in both markets. As a result of addressing the need for digital payments, the incorporation of operator-led mobile money services into agri-entrepreneurship platforms have the potential to expand mobile money acceptance and use (Donovan, 2012). A platform that would allow agricultural e-commerce companies to more rapidly grow their service offerings might be provided by mobile carriers because of the scope of their operations and the existing ties they have with their consumers. In addition, rural operators' core services may profit from m-commerce and mobile usage opportunities presented by the agricultural sector (Balasubramanian et.al., 2018).

While observing the importance of the m-commerce and mobile usage in upgrading the agi-entreprenuership, this study is segmented into five sections. In first section many literatures are explored to understand the drivers having the relationship with m-commerce, and agri-entrepreneurship. In section-2, sampling methods and research methodology are elaborated along with the mathematical model applied to establish the relationship between the variables.in section-3; data is analysed with the help of statistical tools

and mathematical model defined in section-2. In section-4 discussion and findings are presented and compared with the existing literature. At the last fifth section is dealing with concluding remark of the study.

II. OBJECTIVE OF THE STUDY
❖ To analyse the impact of Mobile and M-commerce on Agri-entrepreneurship and understand the future scope of m-commerce among the farm – entrepreneur.

III. REVIEW OF LITERATURE
Mobile phone is not less than any revolution in developing countries to uplift all sectors. Many researches are being conducted to understand the importance and efficiency of the Mobile usage and M-commerce. In this context, Singh (2016) asserted that mobile phones are one of the finest ICT tools, and everyone in society benefits from them. In underdeveloped nations, mobile phones have played a vital role in terms of economic development and have greatly narrowed the gap between communities. Mobile phone calls are not more costly, and people, particularly impoverished farmers, use them often in distant locations of developing nations. Further, its impact on agriculture sectors have given a different direction to the many third world countries. In Indian economy, Tripathi (2009) has conducted survey and reaved the effect of mobile phones on farmers. He demonstrates the critical role of mobile that mobile phones in cutting transaction costs and increasing farmer income levels by efficiently addressing their urgent agricultural-information needs.

In many policies and technological advancement, mostly small holding farmers left behind Kokate & singh (2013) discussed the accessibility to technology knowledge as one of the most critical facilitators for smallholders to increase production continuously. Pilot research on the use of mobile technology to provide agricultural information and advice to small-holder farmers throughout the nation revealed a flow of a range of messages that reduced the cost and availability of information at the correct moment. A platform comprising

technology, subject matter, and ground-level institutions has been developed, along with an architecture for content production and delivery based on location-specific needs. However, for obtaining the positive benefit of mobile technology, particular skill sets are required. Lack of these skill sets can present a reverse impact. Khan et. al (2019) elaborated the possible effect of lacking these skills sets and asserted that farmers' limited ability to utilise mobile phones and lack of understanding of information sources are important obstacles in farm-related mobile phone use. Based on the results, the present research offered suggestions and policy implications for realising the full potential of these ICT-enabled agricultural solutions.

Panda and Das (2019) compared mobile to other ICT tools, and presented a fact that 70% of farmers use mobile for production purposes, while the majority of farmers use mobile for communication with others and general information. As a result, the role of mobile in the growth of the agricultural industry is critical for supplying farmers with accurate and timely information. Further, Landmann et.al. (2020) supported the claim of positive impacts on the desire to use a smartphone for agricultural reasons may be confirmed by subjective norms, attitude, self-control, and positive and negative predicted emotions. There is no indication that negative expected failure emotions outweighed other variables.

In terms of other supportive factors, Rajkhowa and Qaim (2022) found that mobile phone ownership is connected with a higher chance of engaging in off-farm work, including casual wage labour, paid employment, and non-agricultural self-employment. This relationship is stronger in female-headed families than in male-headed households. The estimates also reveal that mobile phone ownership is positively related to household income, which is partially mediated by the off-farm employment mechanism. Moreover, khan et.al (2022), stated because of its critical influence on the financial system and social life, mobile internet technology (MIT) is regarded as a major innovation in information and communication technology (ICT). Furthermore, it is a necessary tool for closing the digital gap between urban and rural communities.

According to the findings of Ramli (2019), treated farmers are more inclined to use mobile phone technology. The most expensive monthly membership costs over RM 350, while the average expenditure ranges between RM 31 and RM 60. The majority of respondents believe it is an acceptable fee for the useful information they get. The demographic factors are tested by Krell et.al. (2021) and revealed that age and income are not strongly connected to m-service usage, and we examine this finding in terms of smartphone ownership, gender, and education intersections. Consistent with previous qualitative study, our quantitative findings indicate the necessity for m-services providers to design for basic or feature phone users in order to increase agro-meteorological information transmission.

Apart from social and demographical factors, pandemic like COVID situation also change the picture of m-commerce. Lyangar et.al. (2020) asserted that smartphone technology on its own and as extension of telemedicine has significant applications in the current COVID-19 pandemic. As the smartphone technology further evolves with fifth generation cellular network expansion, it is going to play a key role in future of health medicine, patient referral, consultation, ergonomics and many other extended applications of health care. Moreover, E-commerce integration with m-commerce also boost the mobile usage in farm business. Negrao (2018) proved this Both individually and internationally, there is a concurrent link between e-commerce adoption and performance of m-commerce in farm businesses . This research adds to the body of knowledge on e-commerce adoption, the effect of e-commerce on performance, and other factors that influence the success of agricultural businesses.

IV. RESEARCH METHODOLOGY

This research article is focusing on adoption of m-commerce and agri-entrepreneurship strategy adoption and growth pattern. Study is

quantitative and analytical. Variables are scaled up on nominal and ordinal scaling. Figure-1 represents the conceptual framework for the study representing interrelation between the variables.
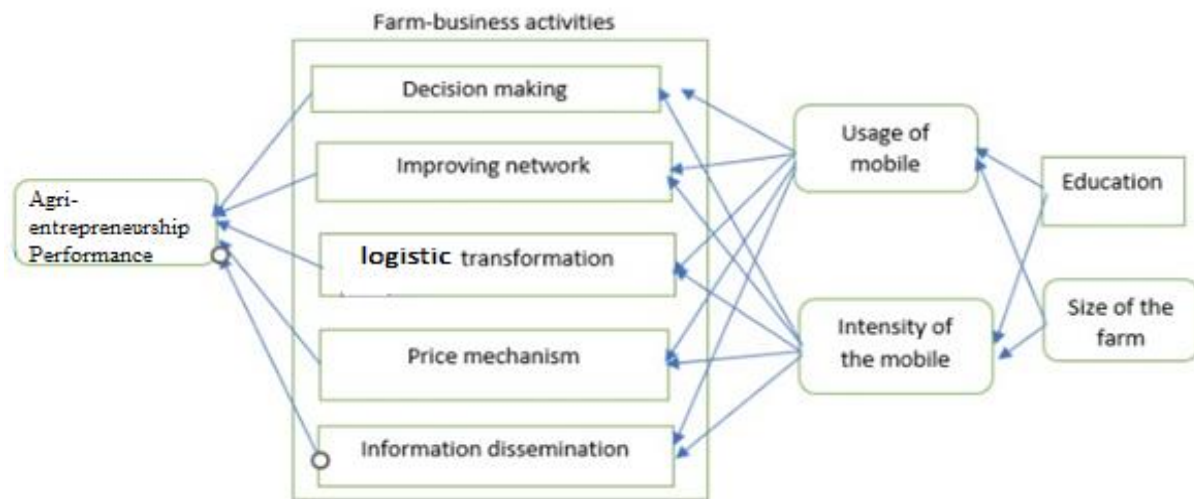

Figure 1: Conceptual framework of the study

4.1-Sampling Frame:

Farmers of Uttarakhand was chosen randomly for being interviewed to understand their farm-enterprises and m-commerce contribution in strategy making. Data is collected during September 2020 to December 2021.

4.2-Sample size and areas:

Sampling area is two districts of Uttarakhand one is Dehradun and other is Udham singh Nagar. Both are plane areas of Uttarakhand but belongs to different Mandal. Dehradun is from Garhwal Mandal whereas Udham Singh Nagar is from Kuman Mandal. Total 110 farmers were selected. 55 from each district. These are selected because both are well developed and having similar infrastructure.

4.3-Hypothesis of the study:

Ha1: There is association between age and Possible Usage of Mobile apps and M-commerce.

Ha2: There is association between education and Possible Usage of Mobile apps and M-commerce.

Ha3: M-commerce and Mobile Usage do have impact on Agri-entrepreneurship performance and activities.

4.5-Mathematical Modelling:

Structure equation modelling is applied to solve the simultaneous equation representing the causes and effect relationship between the variables.

The following is the STATA code to run the structure equation set for this present study:

Model-1:

gsem (Strategy -> O_DM,) (Strategy -> O_Collab,) (Strategy -> O_logist,) (Strategy -> O_PM,) (Strategy -> O_ID,) (O_DM -> PAG,) (O_Collab -> PAG,) (O_logist -> PAG,) (O_PM -> PAG,) (O_ID -> PAG,) (education -> MAU_Int,) (education -> Fre_Usage,) (FS -> MAU_Int,) (FS -> Fre_Usage,) (MAU_Int -> Strategy,) (Fre_Usage -> Strategy,), latent(Strategy) nocapslatent

V. DATA ANALYSIS AND EXPLANATION

Table-2 is expressing the percentage analysis and explanation of the variables included in Model-1. As per the table, most of the farmers (78%) are between the age of 20-30 and have education between 12th grade to the graduation. In sample of 110, no farmer was having any technical education. Among These farmers 39% farmers were experiencing increment in their farm entrepreneurship performance whereas

similar proportion (38%) was experiencing contraction in their performance whereas 23% were stated no changes in their farm enterprises. Most of the farmers do hold medium size of the plant and land. Among these farmers, 61.3% were using Smart phone mobile with agriculture software. And in these 61.3% farmers only 22% were regularly using these apps. Most of them rarely usage these apps for their farm business. But they all responded with the training and awareness program they (66% to 69%) would like to incorporate this operation like internet and m-commerce daily farm business activities. Moreover, $0% of them suggested to use these facilities for upgrading their business in seasonal crop as they are major source of income rather than cash crops. Prices and operations for cash crops are constant over the year like in sugarcane, Jute, cotton etc.

Table 2: Descriptive statistics of the variables

S. No.	Variable Name (1)	Description of the variables (2)	Scale Assessment in percentage (3)		
1	Age	Age of the respondent farmers	(20-30) =78.4	(30-40) =16.2	(40-50) = 5.4
2	Education	Education of the respondent farmers	Below 10th = 5.4	12- graduate = 51.4	Post graduate= 43.2
3	PAG	Agri-entrepreneurship status	Decreasing=37.8	Constant=23.4	Increasing= 38.7
4	FS	Farm size	small (1.00-4.00 hectare) = 37.8	Medium 4.00-10.00 hectare = 48.6	Large 10.00 hectare and above= 13.5
5	MAU_Int	Mobile app usage or internet		Yes= 61.3	No=38.7
6	Fre_Usage	Intensity of using mobile app and internet	Rarely= 53	Sometimes= 26.5	Mostly= 21.5
7	PUS	Possible usage of Agricultural app and software in future	No= 2.7	May be = 31.5	Yes = 65.8
8	PSM	Possible usage of m-commerce in future	No = 2.7	May be = 27.9	Yes = 69.4
9	PUCrop	usage mobile app/internet for agri-entrepreneurship (crop category)	Food Crop= 30	Seasonal Crop= 40	Cash Crop = 30
10	PIU	Possibilities of area where farmers want to use M-commerce	Enhancing knowledge production and operation area = 49	Marketing information and networking=40	Accessing financial assistance= 11
11	O_DM	M-commerce contributes in decision making	No= 4.5	May be= 28.8	Yes= 66.7
12	O_Collab	M-commerce contributes in networking and collaboration	No= 2.7	May be= 21.6	Yes= 75.7
13	O_logistic	M-commerce contributes in logistic facilities	No = 3.6	May be = 27.0	Yes = 69.4
14	O_PM	M-commerce contributes in price mechanism	No= 7.2	May be= 28.8	Yes= 64

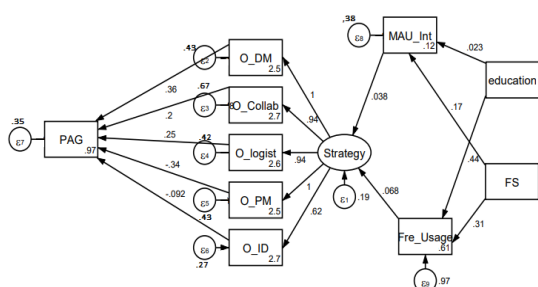| 15 | O_ID | M-commerce contributes in information dissemination | No= 0.9 | May be= 18 | Yes= 81.1 |
| 16 | Training required | Would you required special training to adopt upgraded m-commerce features for your farm business | No= 16.2 | May be= 42.3 | Yes= 41.4 |

Any enterprises can't move ahead without purpose, 49% farmers inclined towards purpose to enhance knowledge production and operation area whereas 40% showed interest in marketing purpose.

From 11 to 15 serial number listed variables reflected the opinion of the farmers about the entrepreneurial strategies. 67% of the farmers stated that M-commerce is very useful to make decision about their business and sale. 75.7 % of the farmers agreed that M-commerce contributes in developing network and collaborating with other business model. 69% of the farmers stated that m-commerce app help to supervise and operate the logistic function of the business. 64% of them said it helps then in deciding prices and market value of their product. 81% farmers reported that m-commerce app is good to send and receive important farming information.

Many farmers who were not using internet/M-commerce or who were using but can not access the optimum facilities among them 41.4% demanded for special training to upgrade their enterprises by using those apps.

Model-Chi square p value = 0.0469

Figure 2: SEM OUTPUT from STATA

Figure-2 represents the structure equation model reflecting the impact of education and farm size on usage of the m-commerce and Apps. At first place, Model significance is important. Hence the P value of models' chi-square test is less than -.5 which reflects goodness of fit of the model with the variables. Further the arrows of the respective variables are representing the relationship. Like Education does have the positive impact with 0.023 marginal rate and M-commerce usage intensity is getting affected by .44. in the same way farm size also affect the Mobile app m-commerce usage and intensity of m-commerce usage. If farm size is getting large then farmers have chance to use m-commerce with the rate of 0.17. and intensity will increase with the rate of 0.31. Similarly, we can suggest that these two variables M-commerce usage and Intensity of M-commerce influence the entrepreneurial strategies with .04 and .07 marginal rate respectively.

Strategy variable in Figure-2 Represent the entrepreneurial strategies adopted by farmers in decision- making, Networking, Logistics, Price mechanism, and Information dissemination. All do have higher values on arrows (more than 0.5). which refers that these factors define the entrepreneurial strategies. These strategies finally affect the agri-business or farm entrepreneurial performance. As per the regression weightage decision making strategy affect the growth pattern of the enterprises with the 0.36 rate whereas Price mechanism strategies and information dissemination strategies does have negative impact (but these two relationships are not significant as p > .05 from table-3). Moreover, Logistic and market networking and collaboration do have positive impact on agri- entrepreneurial performance.

SEM regression Tables:

Table 3: SEM regression coefficients parameters

S. No	Variables	Coef.	Std. Err.	z	P>|z|
	M-commerce contribution in Decision Making <-				
1	Strategy	1(constrained)			
2	_cons	2.537697	.0707712	35.86	0.000
	M-commerce contribution in Networking and Collaboration <-				
3	Strategy	.9408569	.1136858	8.28	0.000
4	_cons	2.650769	.064036	41.39	0.000
	M-commerce contribution in Logistic operation <-				
5	Strategy	.9444089	.123738	7.63	0.000
6	_cons	2.578399	.0672035	38.37	0.000
	M-commerce contribution in Price mechanism <-				
7	Strategy	1.01741	.1299456	7.83	0.000
8	_cons	2.482182	.0750202	33.09	0.000
	M-commerce contribution in Information Dissemination <-				
9	Strategy	.6224314	.0938582	6.63	0.000
10	cons	2.749565	.0490177	56.09	0.000
	Agriculture entrepreneurial performance <-				
11	O_DM	.3618077	.1081673	4.74	0.048
12	O_Collab	.202021	.0444583	0.83	0.009
13	O_logist	.2540076	.0094985	4.21	0.005
14	O_PM	-.3432764	.1605231	-1.90	0.051
15	O_ID	-.0924993	.2383707	-0.39	0.698
16	_cons	.9745081	.4616375	3.74	0.043
	Mobile App and M-commerce usage <-				
17	Education	.0226469	.0091712	4.25	0.008
18	Farm Size	.170913	.0661214	3.58	0.010
19	_cons	.116419	.2670352	0.44	0.663
	Intensity of M-commerce Usage <-				
20	Education	.4352442	.1889374	3.30	0.021
21	FS	.3142251	.1400993	4.24	0.025
22	_cons	.6072187	.5657989	1.07	0.283
	Entrepreneurial Strategy <-				
23	MAU_Int	.0381295	.0118501	4.34	0.033
24	Fre_Usage	.0683369	.052734	1.30	0.195

Source: Author's calculation[1]

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[1] To see the variable name in table-3 refer table-2 column-2

In table-3, The significance of the relationship (Coefficients) can be explained by two parameters i.e. Standard Error and p values. Table-3 is the tabulated structure of the SEM model represented in figure-2 along with additive information of significance of the relationship. If the coefficient measurement is more than double of standard error that means coefficients are significant otherwise the relationship is not significant. In table-3, All variable do have significant impact on their respective dependent variable except O_PM, and O_ID listed at 14 and 15 serial number as p value is .051 and 0.698 (more than 0.05). Hence this negative impact is not acceptable as deniable. In one way this is indeterministic relationship. The rest of all causes and effect relationship does have significant impact on their respective dependent variable mentioned in figure-2 explanation.

Dependency between Demographic variable to the potential usage of m-com and mobile for Agri-entrepreneurship

Table 4: Chi-square table to represent the association between the variables.

S.No.	Associated variables	Chi- Square test (P value)	Remark
1	Age and potential usage of agriculture app	0.000* (@5% significance level)	There is association between Age and potential usage of agriculture app
2	Education and potential usage of agriculture app	0.033* (@5% significance level)	There is association between Education and potential usage of agriculture app
3	Age and potential usage of M-commerce for agriculture operation	0.092* (@10% significance level)	There is association between Age and potential usage of M-commerce for agriculture operation
4	Education and potential usage of M-commerce for agriculture operation	0.028* (@5% significance level)	There is association between Education and potential usage of M-commerce for agriculture operation

Source: Author's calculation

In the study, variables are measured at nominal scale, hence instead of co-relation chi square test will be applied to examine the association between the variables. At the very first place, p-value of the chi-square measure between Age and potential Usage of mobile apps refers to reject null hypothesis and accept the alternative hypothesis, which means Age does have significance association with the mobile app usage.

Moreover, Other assessment from 2 to 4 list in table-4 also contain less p value (less than 0.05) which indicates rejection of the null hypothesis against alternative hypothesis reflecting an association between the variables.

Consequently, Age and education significantly associated with the potential usage of m-commerce and mobile app.

VI. FINDINGS AND DISCUSSION:

1- Educated farmers are more inclined to the mobile app usage and they also confirm the frequent usage of the app and m-commerce.

2- Aged farmers more than 20-30 bracket are using App and m-commerce more frequently and more tend to use app for their farm business.

3- Land holding also decide the mobile usage, farmers having large farm size have tendency to use mobile more frequently than the small holding farmers.

4- Mobile usage and intensity to use M-commerce significantly affect the entrepreneurial strategies like decision making, networking & collaborating, Logistic operations, price mechanism, and information dissemination.

5- However, Price mechanism and Information dissemination do not have significant impact on Agri-entrepreneurial performance as these evidences are not adequate.

6- Other strategies like Decision making influenced by M-commerce, Collaboration & networking and Logistic operation does have significant positive impact on Agri-entrepreneurial performance.

7- Demographic features like age and education may have positive association with potential exploration of m-commerce.

8- 41% of the farmers demanded the good quality training for efficient usage of Agriculture app and M-commerce for their Entrepreneurial growth.

VII.   CONCLUSION   AND RECOMMENDATION

In this study, demographic factors of the farmers affect the agricultural app and m-commerce usage which further revealed a positive impact on the entrepreneurial strategy to improve the farm-business performances. In that Decision making regarding the production function and logistic operation listed among the significant strategies whereas price mechanism and Information dissemination do have reverse impact but not significant. As 41% of the farmers of this empirical study demanded for special training for using the agricultural apps and m-commerce functions.

Hence by utilizing the findings of this study, Farmers should focus on the price mechanism and accurate information to improve their performance. And the concern authority should arrange some quality training program to maximize the benefits of the m-commerce app and functionalities. As per the descriptive analysis, many farmers are willing to adopt this digital technology and very much willing to expand their farm-business specially the young farmers aged between 20-30. Hence, the concern parties should focus on this target farmers to give new dimensions of agriculture sector.

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