Indian Journal of Extension Education
Vol. 55, No. 1, 2019 (115-118)

Assessment of Level of Digitization of Farmers and Extent of Digital Divide in Farm Information Delivery

Laxmipriya Upadhyaya[1], R. Roy Burman[2], V. Sangeetha[3], V. Lenin[4], J. P. Sharma[5] and Sukanta Dash[6]

ABSTRACT

India is the world's largest sourcing destination for the information technology (IT) industry, accounting for approximately 67 Per cent of the US$124– 130 billion markets (IBEF, 2017) but, the expected outcome from such a positive growth is dismal. Again, the benefit of accessing and using digital media for economic gain is very unevenly distributed which can be termed as "digital divide". So, the present study was conducted aiming at delineating the extent of digital divide between farmers of digitally well performing state and digitally weaker state in the context of farm information delivery. For doing so, state of Maharashtra and Uttar Pradesh were selected purposively with due literature exploration. The districts with basic digital infrastructure were selected for study so that infrastructure will not remain as the only factor behind digital deprivation. Three villages from each district were selected randomly with a sample size of twenty from each village making sixty farmers per district and one hundred twenty farmers as total sample size. The interview schedule was developed for the study. Personal and focus group discussion methods were used as tools for data collection. To measure the digital divide an index of digitization was developed using standard methodologies. Upon analysis, it was found that there was a significant difference in the mean ownership of ICTs access to ICT tools and services digital literacy (14.6**) frequency of use and quality of use of ICT tool and technologies between farmers of Nashik and Varanasi. The digitization index for farmers of Nashik (Mean=0.61) were significantly higher than farmers of Varanasi (Mean=0.33) and there exists a significant difference in level of digitization and thus, digital divide. The Gini's coefficient of digital inequality suggested that in Nashik, the farmers were more unequal in terms of ownership (0.21) and frequency of use (0.30) but for Varanasi, it was found that there present a higher inequality in all components *i.e.* ownership (0.28), access to ICT tools and services (0.26), digital literacy (0.33), frequency of ICT use (0.44) and quality of ICT use (0.38). This study can be useful for researchers and policy makers delineating the factors behind digital divide and thus can help to choose best fit strategy for the region.

Keywords: Digitization, digital literacy, digital divide, gini's coefficient.

INTRODUCTION

The focus of Indian agriculture is moving forward from production to profit orientation with the globalization paving the way to several international markets for Indian farmers leading to constant demand of information related to market price, weather, good agricultural practices for quality output, policies, and recent technologies related to value addition *etc.*, to match the changing direction of Indian and global agricultural trend. The delivery for right information at right time plays a very crucial role in realizing the fruit of hard toil. In this context, the use of Information Communication Technologies (ICTs) for agricultural communication can meet up the purpose of providing timely, accurate and relevant information with low cost and high speed. The opportunities like growing internet penetration in urban as well as rural areas, smarter apps through smart phone, cheaper mobile telephony *etc.* are noteworthy. In the context of agriculture, the potential of ICT can be assessed broadly under two heads: (a) as a tool for direct contribution to agricultural productivity *e.g.,* remote sensing, precision farming *etc.,* (b) as an indirect tool for empowering farmers to take informed and quality decisions which will have positive impact on the way agriculture and allied activities are conducted, *e.g.,* providing timely and reliable information on crop, weather, market *etc*., to make farmers more competitive and resilient (Nyirenda-Jere, 2010). Again, as per the data of Telecommunication Regulatory Authority of India (TRAI), the number of total telephone subscribers in India increased from 28.53 million in March 2000 to 1188.55

[1.] Division of Agricultural Extension, ICAR-Indian Agricultural Research Institute, New Delhi-110012, [2.] Division of Agricultural Statistics, ICAR-Indian Agricultural Statistics Research Institute, New Delhi-110012

million and wireless subscriptions increased from 1.88 million in March 2000 to 1164.26 million till February 2017. This overwhelming growth in Indian telecom sector has also attracted policy makers in the past to think of harnessing ICT tools and technologies in agriculture to reap the benefits of painstaking agricultural researches by taking research output directly to land as fast as possible with greatest accuracy. This resulted in emergence of many ICT driven information delivery mechanisms like e-choupal, AGMARKNET, AGRISNET, Tarahat project, e-sagu, Akashganga, mKisan portal, Digital Green and so on. But, due to differential access and usage of ICT tools and technology across different age, income, gender, geographical area *etc.,* the complete potential of these technologies are yet to be unleashed and full benefit is yet to be harnessed. The benefits of interactive innovations cannot be harnessed until & unless most of its stakeholders are not adopting it. This is true in case of Information and Communication Technological innovations as well, which has made the task of information dissemination easier, but simultaneously has created wide gap between adopters and non-adopters. The information and knowledge gap created owing to differential access, ability to use and actual usage of ICT tools and technologies can be designated as "Digital Divide". According to Organization of Economic Cooperation and Development (OECD), the term digital divide refers to the gap between individuals, households, businesses and geographic areas at different socio-economic levels with regard to their opportunities to access information and communication technologies (ICTs) and to use of the internet for a wide variety of activities. Digital divide is a multifaceted phenomenon including several dimensions. The earlier studies exclusively emphasized the differential access to ICTs as the main component of digital divide while, with progress in research the skill to operate ICTs and sustained usage of these technologies over time were given due importance.

The access dimension mostly point towards the easier reach to tangible infrastructure as well as exposure to digital services, where as skill was the ability to operate hardware (medium related skills), ability to judge upon the right software or right channel (software related skills) and draw the appropriate information out of it (content related skills) *etc.,* (Van Dijk, 2003). The real time usage of ICT tools and technologies were very important as it was seen that the most frequent criticism that farmers in India had regarding information provided through mobile phone services was that the information was generic and was considered old and routine (Mittal *et al.,* 2010). Actual use of the technology should also be monitored, as a supplied technology does not necessarily imply that it is being used for economic means (World Bank, 2011).Thus, getting the desired benefits and the sustained usage refers to the availability of right information at right time with a palatable content so that user can maximize the benefit out of it and adhere to the use of ICTs over long run. Though, the knowledge of the digital divide is prerequisite to design a successful ICT programme, a very little study can be cited on the topic. So an attempt has been made to know the extent of digital divide in terms of access, skill to use and usage of ICTs with respect to agricultural information delivery which may help researchers, intellectuals, policy makers to modify and design ICT led information delivery programmes with a better precision.

METHODOLOGY

The study was conducted in purposively selected states of Maharashtra and Uttar Pradesh. Maharashtra is having faster growth rate in agriculture as well as access to different ICT tools (computer with internet 36.94 % teledensity 98.98% according to report of Telecom Regulatory Authority of India, August, 2016) whereas U.P. has a sluggish growth rate in both agriculture and ICT usage (computer connected to internet-17 % and tele-density 68%). From the available literature, the three digitally best performing districts were identified in both the states and one of them selected for the study district. Nashik district was selected for study area form Maharashtra as it was leading both agriculturally and digitally, similarly, Varanasi was taken as study area from Uttar Pradesh for an even comparison. Three villages in each of the districts were selected randomly. A sample size of 20 farmers were selected by simple random sampling method from each selected village thus making 60 per district and 120 total farmers. The interview schedule was designed with due procedure and data collected through personal interview, questionnaire and focus group discussion. The digital divide was conceptualized as the difference between the level of digitization between the farmers of Nashik and Varanasi. The index of digitization was constructed to measure the level of digitization. Table 1 showed the components of digitization index and their relative weights. The descriptive statistics like mean, range and standard deviation, inferential statistics like t test and Gini's coefficient of inequality were used for analysis and interpretation of data.

Table 1: Weightage given to components of digitization index

COMPONENTS	WEIGHTAGE
Ownership	1.56
Accessibility	2.43
Digital Literacy	1.79
Frequency of use	2.02
Quality of use	2.2

Research Hypothesis

H_0: There is no difference in level of digitization between farmer groups of Nashik and Varanasi

H_1: There is significant difference in level of digitization between the farmer groups of Nashik and Varanasi

RESULTS AND DISCUSSION

In present study, the digital divide has been operationalized as the difference in digitization level among the stakeholders. To calculate digitization level, the digitization index has been constructed by combining five sub-components. The components of digitization index were ownership of ICT tool, accessibility to ICT tools and services, digital literacy, frequency of use and quality of use. The components of digitization were measured separately and tested for significance. Table 2 showed that in Nashik, the mean ownership score of farmers of Nashik was found to be 30.5 whereas the same for farmers of Varanasi was 23.8. Therefore, the farmers of Nashik and Varanasi were significantly different (t=4.3) at 5 per cent level of significance in terms of ownership of ICT tools.

Table 2: Significance Test of Digitization components between Farmers of Nashik and Varanasi

Differential Levels of	Nashik (n=60)		Varanasi (n=60)		"t" value
	Mean	S.D.	Mean	S.D.	
Ownership	30.5	8.7	23.8	8.1	4.3*
Accessibility	40.2	6.8	29.5	5.5	9.3**
Digital Literacy	98.5	19.0	55.2	12.8	14.6**
Frequency of use	39.8	12.2	28.9	7.1	6.00**
Quality of use	38.1	5.9	28.9	7.1	7.6**

(*significant at 5% level of significance, **significant at 1% level of significance)

The access dimension of digitization can be viewed from dual perspectives, one is, to own the ICT tools at individual or household level and the other is to access the ICT services at group or community level. But the possession of ICT tools enhances the probability of access of information through ICT tools. The prior studies were also established that the most obvious factor characterizing the digital divide was the extent of physical access to ICTs and the internet, leading to greater digital benefits (Vandijk, 2006). The findings in Table 2 revealed that the mean accessibility score of Nashik and Varanasi farmers were 40.2 and 29.5, respectively and difference in mean accessibility between the two districts were statistically significant (t=9.3). The digital literacy was the sum total of all necessary skills one could possess to operate ICT tools for information access, storage and retrieval as and when needed Table 2 depicted that the farmers of Nashik and Varanasi were mostly different in their digital literacy. The difference in mean digital literacy of farmers of Nashik (Mean=98.5) and Varanasi (Mean=55.2) were found to be highly significant (t=14.6) at 1 per cent level of significance indicating that only infrastructure would not do the job, capacity building also must be done to attain a higher level of digitization.

The digital divide goes far beyond mere access to computers and focuses on who is taking advantage of the digital opportunity and who cannot (ECLAC, 2003). Even if tele-density as well as penetration of mobile phones has increased but the study on usage of mobile phones for accessing agricultural information under the IFFCO-Airtel Kisan Card initiative, found that proactive usage of the service by the farmers was very low (Kishore, 2013). So real time frequency of use and quality of use of ICT tools and services should also be taken care of. The farmers of Nashik and Varanasi were also highly different in terms of the frequency of use of ICT tools and services for agricultural information purposes with the mean being 39.8 and 28.9 and t value 6.0 (Table 2). The mean quality of use score was found to be 38.1 for Nashik and 28.9 (Table 2) for Varanasi which was significantly different (t=7.6) at five per cent level of significance. The sub-indices were formed by assigning corresponding weight to the components and then averaged to get the digitization index for individual farmer of Nashik and Varanasi. The mean digitization index for Nashik was calculated to be 0.64 and for Varanasi it was 0.33. From the Table 3, it can be comprehended that the mean digitization level of farmers of Nashik and Varanasi was significantly different (t=9.6) at one per cent level of significance.

Table 3: Comparative Digitization level of farmers of Nashik and Varanasi

Districts	n	Mean	Std. Deviation	t value
Nashik	60	0.641	0.189	9.6**
Varanasi	60	0.334	0.163	

(**significant at 1% level of significance)

Thus, the alternative hypothesis was accepted suggesting that there was a significant gap in digitization and hence the farmers of Nashik and Varanasi were found to be digitally divided.

Further, to find the extent of digital divide, amount of inequality was measured using Gini Coefficient. The inequality was measured in terms of ownership, access, digital literacy, frequency and quality of use of ICT tool. The Gini coefficient was calculated among the farmers of Nashik and Varanasi district, separately.

Table 4: Gini's coefficient of inequality

Types of inequalities	Nashik	Varanasi
Ownership	0.21	0.28
Accessibility	0.17	0.26
Digital Literacy	0.16	0.33
Frequency of use	0.30	0.44
Quality of use	0.17	0.38

The data presented in Table 4 showed that within the farmers of Varanasi, there existed a higher inequality as compared to Nashik, in all the components studied. In Nashik, the digital inequality for accessibility, digital literacy and quality of use were very minimal, Gini Coefficient falling below 0.2, whereas for ownership, inequality was a bit higher. The maximum inequality in Nashik was found for frequency of use of ICT tool (0.30) suggesting that to achieve digital uniformity in Nashik, the care must be taken to enhance the frequency of use of ICT tools for agricultural information purposes. In Varanasi, the inequality in digital literacy, frequency and quality of use was found to be above 0.3 which decoded that to achieve a higher equality among stakeholders of Varanasi; focus should be given more on these components.

CONCLUSION

The digital infrastructure is the much essential facility to attain digital equality but not sufficient, due attention should be given to enhance digital literacy, sustained use over time with substantial benefit. This can be achieved through providing access to services at community level where individual access is costly and difficult, capacity building of farmers and stakeholders, economically benefitting up-to-date content with user customization and so on.

Paper received on : October 26, 2018
Accepted on : November 01, 2018

REFERENCES

Economic Commission for Latin America and the Caribbean [ECLAC], Paths towards Information Society in Latin America and the Caribbean. Santiago, Chile:

IBEF (India Brand Equity Foundation). IT &ITes Industry in India. Available at http://www.ibef.org /industry/information-technology-india. aspx, accessed 8 February 2017. New Delhi: India Brand Equity Foundation, 2017.

Kishore. D, Gupta. V., 2014. ICTs for agricultural extension: a study in the Indian Himalayan region, *The Electronic Journal of Information System* in Developing Countries (EJISDC), 48. 3, 1-12,.

Mittal, S., Gandhi, S. and Tripathi. G., 2010. Socio-economic Impact of Mobile Phones on Indian Agriculture. *Working Paper* 246, New Delhi: *Indian Council for Research on International Economic Relations,* pp.1-53,

Nyirenda-Jere, T., 2010. Unlocking the promise of ICTs for Transforming Agriculture in Africa, Retrieved from *CTA publications,* pp. 7-31,.

OECD (Organization for Economic Cooperation and Development), (2011) "The E-government Imperative: Main Findings." OECD Policy Brief, OECD/60/ 60/2502539,.

TRAI. 2016. Report on Telecom Sector in India; a decadal profile. *Telecom Regulatory Authority of India,.*

Van Dijk, J. and Hacker, K., 2003. The Digital Divide as a Complex and Dynamic Phenomenon, *Information Society,* 19, 315-327,.

World Bank 2011. Report on ICT in Agriculture Connecting Smallholders Knowledge, Networksand Institutions,.