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The Impact of ICT on Rural Livelihood of Farmers in West Bengal, India

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Abstract

Agriculture is a major contributor to West Bengal's economy, as the state's manufacturing sector is constrained by topographical constraints. As a result of the foregoing background, this study aims to investigate the effect of ICT on farmers' livelihoods in West Bengal.Primary data collection is done from the rural farmers in West Bengal, based on a pre-defined questionnaire.Data analysis is done via Cronbach's Alpha, factor analysis linear regression. Taking into consideration of 95% confidence level and 5% confidence interval, total sample size of 381 have been determined. All the five dimensions of livelihood -Financial Capital (FC), Human Capital (HC), Physical Capital (PC), Social Capital (SC) and Natural Capital (NC), have been considered in the present study.Based on the analysis it is found that ICT has a positive impact on all the five tenets of livelihood in the district of PurbaMedinipur, West Bengal.

Keywords

Farmer, livelihood, ICTs, factor analysis and impact.

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Introduction

In the context of any developing country, the constant focus has been to figure out the net end result based on the usage of the ICT usage by its various population segments. Out of the various segment special focus has been on the rural population to understand the impact. Out of the various impacts studied in different spheres, special focus has been on the economic impact and the subsequent upliftment of rural livelihood. The study on this economic impact and upliftment of rural livelihood gets a special attention as this in turn has the potential to influence the economy of the country.

Over a considerable time-scale, it has been noticed that there is a relationship between ICT, social capital and quality of life in developing countries. ICT as a tool can have a high success rate in affecting the social capital among communities in a positive manner and thus for improving the quality of life for the inhabitants. Another observation made is that ICT has the ability to reduce the costs associated with ambiguous information and hence intensify social relationships. In rural segment the gradual percolation of ICT needs constant attention. Post the regime of mobile telephony being ushered in rural areas of India, as an effect, quite a few positive changes have been noted in the rural livelihood segment. This is not only limited to social capital but in other aspects as well.Over the period of time there has been a general observation in regards to the point that mobile phones acts as a medium to reduce the cost of accessing information.

ICTs can be a powerful medium in removing the information barriers that often prevent the poor in remote areas from accessing markets, in turn leading to lower incomes. In the agriculture sector, ICT adoption can facilitate advancements by making available timely information about prices and quality needs, extension and latest technological inputs, and weather and water resources (Braun, 2010).

In rural America, telecommunication technologies could benefit various aspects of rural business by helping in faster communication with suppliers, customers and new market information (Korsching and Bultena, 1998). In the same study it was also highlighted thatICT can enable urban workers (in the information sector) to live in rural areas

and telecommute to their jobs. The location of businesses in rural areas can also be facilitated with rapid and accurate distant transmission of data and information. ICT could maintain the viability of rural institutions such as schools, libraries, and hospitals by providing local access to distant, specialized information and other required assistance. Heeks, 1999 is of the opinion that the economically weaker section of the society is lacking information in relation to their local context and there is a definite need here. The gap can be fulfilled from interaction between communities and members rather than from an ICT-based data transfer. The new information can be best shared to the poor by the organic information systems that arise from their community only. In case of access issues and the aforesaid is a challenge, then same can be delivered by conventional telecommunication methods like telephones rather than new ICT tools. A study on the impact of mobile phones on the urban poor in India Sarin and Jain (2009) showcases the point that many believe that the mobile phone has indeed led to improvement in their economic level. In addition to the economic factor there has been a positive impact on the social front also.

In the rural China, the growth was happening at a steady rate. Internet spread was also in the rise in addition to mobile phones and the telecom service providers were also making profit (Harwit, 2004). In a study based out of Madhya Pradesh, Maharashtra and Andhra Pradesh, it was observed that the primary intention of spreading ICT was to create awareness among young and middle-aged farmers on the availability of ICT services. It was also highlighted that emphasis should be given in providing information related to farming as small and marginal farmers were using the ICT services (Meera et al., 2004). Due to gradual and well-regulated expansion of telecom services in the country, people in rural areas are having access to mobile services. This has been boosted by the prepaid (or "pay-as-you-go") services. The farmers are also reportedly using the mobile phones for a variety of purposes. But it is yet to be established the extent to which the farmers would be willing to use and pay for getting the information regarding agriculture through mobile (Ansari and Pandey, 2013).

In a study Zaremohzzabieh et al., (2014) have mentioned that in the recent past, the role of ICTs in promoting socio-economic development and sustainable livelihoods has become the subject of heated discussions. The available evidence suggests that ICTs have some constructive influences on sustainable livelihoods which include human, social, financial, physical and natural assets.

Zainudeen et al. 2006 looks at a different aspect, where the users at the Bottom of Pyramid (BOP), in the developing countries (specifically South Asian Region) face challenge in mobile use. The calls made are very few and many of which are not in relation to any decision making. As a result, in this category it is difficult to apply any specific strategy. As an example, the users at BOP do not seem to see how quick access to important information might be helpful in taking right decisions to enhance earning capacity or reduce transaction costs (De Silva and Zainudeen, 2007). A later study however provides a contrasting view. It shows that mobile phones now are increasingly affordable at BOP level in the same region and hence the penetration has increased. As a result, there is an increased potential to extend the overall social benefits to rural regions. This is turn will drive growth (De Silva et al., 2011).

Ginige and Richards (2012) highlights a study done on the farmers residing in rural areas in Sri Lanka. The research revealed that the farmers don't have proper access to information as the mobiles they are using are not connected to the Internet and there were no other ways or means of communication. The farmers, as a result, are not able to make any informed decisions about their livelihoods and as fallout; they are facing hardships in their day-to-day lives.

Most of the agricultural institutes and organizations have their own telephone based advisory services for farmers which provide telephone based Agri advisory services through a dedicated telephone number to provide on demand information and advisory. The on-line phone based expert advice service, Kisan Call Centres (KCC), launched by the Ministry of Agriculture, Government of India is available for all within the country since January 2004. The mobile based Agri Advisory services offers text, voice and video content based Agri information services through mobile phones. ITC's Agri Business Division launched "e-Choupal" in June 2000. As a part of it, village internet kiosks managed by the farmers (called "sanchalaks") themselves. 'e-Choupal' services now, reach out to over 4 million farmers (appx) growing a range of crops like soybean, coffee, wheat, rice, pulses, and shrimps.

Okyere and Mekonnen, 2012 highlights that the development of ICTs has facilitated the dissemination of knowledge and information and it has brought in a major change in the use of technology in agricultural production

and provision of market information to maximize the returns from agricultural sector. The study highlights evidence that rural incomes have been increasing with the use of ICT tools. In spite of that there are challenges on the ground level in making ICT platforms available to a large number of the rural population who are engaged in agriculture. Access to the tools can expand further if the costs of the devices and connectivity go down.

Agriculture plays a vital role in Indian economy and also globally. According to the India Census (2011), 54.6 % of the total workforce is engaged in agriculture and allied sectors. According to the Agricultural Annual Report 2018-2019, the sector accounts for 17.7% of the country's Gross Value Added (GVA) for the year 2017-18 (at current prices). As per the Land Use Statistics 2014-15, the total geographical area of the country is 328.7 million hectares, of which 140.1 million hectares is the reported net sown area and 198.4 million hectares is the gross cropped area with a cropping intensity of 142%. The net area cultivated works out to be 43% of the total geographical area(India. Department of Agriculture, Cooperation and Farmers Welfare, 2015). But in spite of the fact that agriculture employs a huge number of people, agriculture as a field, it is a grossly an unorganised sector in India. ICT can play a definitive role in the agricultural in India.

The current research is limited to see the impact of ICT on the livelihood of the farmers in West Bengal. Agriculture is a prime contributor to the economy of West Bengal where expansion of industrial sector is limited due to its topographical constraints. In the various literature referred till now, there is no concrete work happening on the impact of ICT on rural livelihood in West Bengal.

Materials and methods

As per the Agricultural Census of 2011, the following are the classifications of farmers as per their land holdings. For the study two classes of farmers have been considered. They are the small farmers and the semi-medium farmers. For simplicity's sake, they have been classified as small and big farmers. Smalls Farmer (Small Farmer as per Agricultural Census 2011) means a farmer cultivating (as owner or tenant or share cropper) agricultural land of more than 1 hectare and up to 2 hectares (5 acres). Big Farmer (Semi-Medium as per Agricultural Census 2011) means a farmer cultivating (as owner or tenant or share cropper) agricultural land of more than 2 hectares (more than 5 acres) up to 4 hectares (9.88 acres).

According to the agricultural census 2011,classification of farmer as marginal is less than 1hectare, small farmer is 1-2 hectares, semi medium farmer is 2–4 hectare, medium farmer is 4-10 hectare and large farmer more than 10 hectares.

The population of the study consists of all small farmers and big farmers in PurbaMedinipur, West Bengal. The selection of the farmer segments is based on the fact that the small and big farmers have the necessary ability to adapt to technical changes in the district. The other block of farmers in the district are the marginal farmers, whose land holdings are less than 1hectares in most cases and the usage of ICT is sparse.

Total number of small and big farmers as on 12th March 2018 is 48435 as per Comprehensive District Agricultural Plan (C-DAP) for Purba Medinipur, West Bengal. This report is prepared by the Deputy Director of Agriculture (Administration), Purba Medinipur. No of big farmers is 9429 and no. of small farmers is 39006 (West Bengal. Department of Agriculture (Administration), Purba Medinipur, 2018). Total sample is 381 (95% confidence level and 5% confidence interval) Proportionate sample size of big farmer is 307 and a small farmer is 74. The study is mainly based on primary data. The tool of 'questionnaire' is used to collect the relevant information. However secondary data has also been collected for providing necessary background information of the study area.The questionnaire has been developed after considering the literature review, expert opinion, own observation and pilot study. To assess the reliability of the questionnaire, the computation of the coefficient of alpha is done. This coefficient measures the internal consistency of the items. Alpha was developed by Lee Cronbach in 1951 to provide a measure of the internal consistency of a test or scale. Internal consistency describes the extent to which all the items in a test measure the same concept or construct and hence it is connected to the inter-relatedness of the items within the test (Tavakol and Dennick, 2011). Data has been analysed using statistical software SPSS17. In examining relative impact of ICT on livelihood, livelihood status has been considered as a dependent variable and uses of ICT is treated as independent variables. In order to avoid multi co linearity effect among the independent variables factor analysis has been used (Deb and Singh, 2018). Factor scores have been treated as independent

variables. In order to find the significant impact of ICTs on livelihood in PurbaMedinipur multiple linear regression line has been applied. Descriptive statistics mean, Standard deviation are used in the study in order to assess item statistics. Livelihood of farmers in five dimensions has been measured by interval scale. Each dimension consists of many statements. Likert scale of five levels has been used against each statement. A single interval scale has been developed by using weighted average method.

Results and discussion

Analysis and findings of the empirical examination of the study are discussed below.

Table 1 revailes how the extent to which ICT has affected farmer benefits. Producers are influenced by ICT in a variety of financial ways, ranging from 3.1832 to 3.7853. The greatest impact was shown in the financial side, with sales increasing (3.7853), followed by a better market price (3.6937), and lower expenses owing to simple access to information (3.4791).

Particulars	Mean	Std. deviation
Easy access to new clients	3.2565	.90907
Better market prices	3.6937	.76875
Reduced costs due to easy information availability	3.4791	.72331
Increased sales	3.7853	.89090
Reduced cost of travel	3.2513	.83222
Ability to check on availability of products before travel	3.2199	.87173
Less time needed to make business arrangements, e.g., delivery of produce	3.1832	.85906

Source: Author's compilation from the questionnaire

Table 1: Item Statistics (Influence of ICT on different financial aspect).

Measuring impact of ICT on Financial Capital

The items statistics for Financial Capital in relation to the various items are observed from the primary data (Table 2). The reliability of the scale is performed and coefficient of Cronbach's Alpha is found to be 0.739 for 7 items (or statements) considered for the study. A very high value of Cronbach's Alpha (0.739) is indicative of very high degree of reliability of scale and it also shows that the items are highly correlated. Scale Statistics is observed that mean score is 23.8691 which falls under high impact. Thus, it can be concluded that farmers are found to have high impact of ICT on Financial Capital. The respondents had been asked to rate the statements related to livelihood on a five-point Likert Scale. A score of 1, 2, 3, 4 and 5 was given to each statement for the responses strongly disagree, disagree, neither agree nor disagree, agree and strongly agree, respectively. Then a total score for livelihood impact has been found by adding the scores of all the statements related to all the dimensions of livelihood. There were 7 items considered to measure impact of ICTs on Financial Capital (livelihood) of farmers in East Midnapur of West Bengal. Maximum score for a respondent is 35 [7X5] and minimum score possible is 7 [7X1]. The difference between the maximum possible score and minimum possible score was 28. In order to make five-point scales to measure the impact of ICT on livelihoods of individual farmer, this range was divided by 5 and it is found to be 5.6. Adding 5.6 with 7 (minimum possible score), the score interval for very low impact is obtained which comes out to be 7-12.6. Similarly adding 5.6 with subsequent values, next higher range was obtained. In the following table attitude score is interpreted. Overall impact of all the respondents was calculated by adding their score in the Likert scale. Based on the percentage as shown in Table 3 (below), the impact of ICT on Financial Capital is quite high. The high impact percentage for the farmers with an effect in financial capital is 45.3%

Interpretation of scale value	Scale value				
	Financial Capital	Human Capital	Physical Capital	Social Capital	Natural Capital
Very low impact	7-12.6	4-7.2	5-9	8-14.4	8-14.4
Low impact	12.6-18.2	7.2-10.4	9-13	14.4-20.8	14.4-20.8
Moderate Impact	18.2-23.8	10.4-13.6	13-17	20.8-27.2	20.8-27.2
High impact	23.8-29.4	13.6-16.8	17-21	27.2-33.6	27.2-33.6
Very high impact	29.5-35	16.8-20	21-25	33.6-40	33.6-40

Source: Author's compilation from the questionnaire

Table 2: Interpretation of scale value

and farmers falling under the category of moderate impact is incidentally also 45.3%. Hence the data clearly shows that ICT have very significant impact on Financial Capital. Additionally, the combination of high and moderate impact has a total percentile score of "90.6%".

Impact of ICT on FC	Frequency	Percent
Very low impact	0	0
Low impact	17	4.5
Moderate impact	173	45.3
High impact	173	45.3
Very high impact	19	5.0
Total	382	100.0

Source: Author's compilation from the questionnaire

Table 3: Financial Capital.

Measuring impact of ICT on Human Capital

The items statistics for Human Capital in relation to the various items considered are presented in Table 4. The reliability of the scale is performed and coefficient of Cronbach's Alpha is found to be 0.651 for 4 items (or statements) considered for the study. Scale Statistics is observed that mean score is 14.8796 which falls under high impact. The overall level of impact of ICT on Human Capital is presented in the Table 5 (5.55%) of the farmers are having high impact on the human capital dimension of livelihood. Additionally, 24.6% of the farmers fall under the bracket of moderateimpact and 18.8% of the farmers are under very high impact as showcased. The combination of all the above percentages is 98.4%. Thus, it can be concluded that farmers are found to have high impact of ICT on Human Capital.

Particulars	Mean	Std. Deviation
Increase in jobs in farming due to increase in business.	4.0550	.78343
Increase in productivity due to easy information on weather and better agricultural practices.	4.2827	.66298
Alternative livelihood generation other than farming for family members.	3.4791	.88637
Enhancements in life skills due to knowledge via ICT.	3.0628	.83633

Source: Author's compilation from the questionnaire

Table 4: Item Statistics

Impact of ICT on HC	Frequency	Percent
Very low impact	0	0
Low impact	6	1.6
Moderate impact	94	24.6
High impact	210	55.0
Very high impact	72	18.8
Total	382	100.0

Source: Author's compilation from the questionnaire

Table 5: Human Capital

Measuring impact of ICT on Physical Capital

The items statistics for Physical Capital in relation to the various items considered are presented in Table 6. The reliability of the scale is performed and coefficient of Cronbach's Alpha is found to be 0.711 for 4 items (or statements) considered for the study. Scale Statistics is observed that mean score is 16.4541which falls under high impact. Thus, it can be concluded that farmers are found to have high impact of ICT on Physical Capital. The overall level of impact of ICT on Physical Capital is presented in the Table 7.

50 % of the farmers fall under the category of moderate impact, while 39% of the farmers are under the high impact bracket. Additionally, around 8.1% of the farmers are very highly impacted by ICT on the physical capital aspect. Hence, around 97.1% of the farmers are impacted by ICT in this particular scenario and it can be concluded that there is a significant impact of ICT on the Physical Capital.

Particulars	Mean	Std. Deviation
Increased information on access to road and transport.	3.8268	.75493
Getting required information on housing and safe buildings.	3.0236	1.01409
Desired information on access to water source/irrigation.	4.1549	.76754
Input received on clean and affordable energy.	2.8084	.78976
Access to desired information and communication.	2.6404	.83309

Source: Author's compilation from the questionnaire

Table 6: Item Statistics.

Impact of ICT on PC	Frequency	Percent
Very low impact	0	0
Low impact	11	2.9
Moderate impact	191	50.0
High impact	149	39.0
Very high impact	31	8.1
Total	382	100.0

Source: Author's compilation from the questionnaire

Table 7: Physical Capital

Measuring impact of ICT on Social Capital

The items statistics for Social Capital in relation to the various items considered are presented in Table 8. The reliability of the scale is performed and coefficient of Cronbach's Alpha is found to be 0.725 for 8 items (or statements) considered for the study. Scale Statisticsis observed that mean score is 31.3298 which falls under high impact. Thus, it can be concluded that farmers are found to have high impact of ICT on Social Capital. The overall level of impact of ICT on Social Capital is presented in the Table 9. In the case of Social Capital, 70.9% of the farmers fall under the category of high impact. This is quite significant and it can safely be concluded that ICT has brought in a sea change in this aspect of livelihood in the current study area.

Particulars	Mean	Std. Deviation
Increased speed of communication – get immediate answer compared to letters or even landline.	3.6806	.66213
Communication with Government dept.'s.	3.7670	.71037
More frequent contact with friends and relatives.	3.9503	.60195
Help quickly in cases of emergencies.	4.3770	.75940
Availability of professional staff – vets, para-vets, doctor, nurse etc.	4.4346	.70963
Better coordination with other group members.	3.0576	.93732
Better access to family health information.	3.7932	.66139
Improved information regarding deaths, marriages, births and future events.	4.2696	.78575

Source: Author's compilation from the questionnaire

Table 8: Item Statistics.

Impact of ICT on SC	Frequency	Percent
Very low impact	0	0
Low impact	1	.3
Moderate impact	28	7.3
High impact	271	70.9
Very high impact	82	21.5
Total	382	100.0

Source: Author's compilation from the questionnaire

Table 9: Social Capital.

Measuring impact of ICT on Natural Capital

The items statistics for Natural Capital in relation to the various items considered are presented in Table 10.The reliability of the scale is performed and coefficient of Cronbach's Alpha is found to be 0.705 for 8 items (or statements) considered for the study. Scale Statistics is observed that mean score is 31.3298, which falls under high impact. The analysed data in the table11 demonstrates that there is significant impact of ICT on Natural Capital of Livelihood. Highly impacted farmershave a percentage of 44.5%. Farmerswithmoderate impact on natural capital follows suit at a percentile of 44.5 %. In a mixed bag of moderate and high impact the total percentile stands at 89.8%. Thus, it can be concluded that farmers are found to have high impact of ICT on Natural Capital.

Particulars	Mean	Std. Deviation
Provide information on land usage in farming.	3.6466	.71227
Provide information on proper water usage in farming.	3.6492	.75119
Information on weather in general and storm protection.	3.9895	.79361
Increase skills and knowledge in farming with available information.	3.0340	.99942
Availability of knowledge for equipment/tools usage.	2.9319	.98043
Helped in better communication overall.	3.3874	.81756
Information on available sources of funds, loans etc.	4.0890	.83709
Provide right information on savings.	3.6702	.71070

Source: Author's compilation from the questionnaire

Table 10: Item Statistics

Impact of ICT on NC	Frequency	Percent
Very low impact	0	0
Low impact	5	1.3
Moderate impact	170	44.5
High impact	173	45.3
Very high impact	34	8.9
Total	382	100.0

Source: Author's compilation from the questionnaire

Table 11: Natural Capital.

Significant Impact of ICT on livelihood of farmers

To ascertain the impact of ICTs on livelihood, multiple linear regression line is used. Impact levels of livelihood for farmers, after using ICT tools, is considered as dependent variable and frequency of ICT usage is the predictor variable. It is coded in the SPSS as Y=1 (very Low impact), Y=2 (Low impact), Y=3 (moderate impact), Y=4 (high impact). Y=5 (Very high impact). Equal interval

of impact level of five dimensions livelihood has been developed. As dependent variables are interval scale, five separate multiple linear regressions lines for five dimensions of livelihood have been used. ICTs considered in the study are Radio, TV, Mobile Phones, SMS, Smart Mobile App, Call centre/ IVR and website. Frequency uses of the ICTs are considered as independent variables. There is a high chance to have multicollinearity effect among the independent variables. In order to avoid multicollinearity effect, factor analysis for all the independent variables has been applied.Factor's score has been treated as independent variable. Factor analysis has been carried out for extracting the factor. In order to extract the factors and also to avoid the cross loading among the factors of the variables Eigen value criteria (greater than one) and Varimax rotation criteria have been used respectively. Sample adequacy has been checked using KMO and Bartlett's test which is satisfactory as the sample adequacy is 0.578. This shows that number of samples collected is adequate for the study.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.578
Bartlett's Test of Sphericity	Approx. Chi -Square	422.523
	Df	21
	Sig.	.000

Source: Author's compilation from the questionnaire

Table 12: Result of KMO and Bartlett's Test.

The Table 12 shows the summary results of the sample adequacy.In the second step, summary of the extracted factors and the total variance explained by total number of extracted factors have been presented. It should be noticed that these extracted factors are obtained after avoiding the cross loadings. It is found that three factors are loaded and with the help of those three factors which explains 64.317variance. Details description about the variables loaded in different factors are presented in Table 13.

In the Table 14, the results of rotated component matrix are shown. In this case, the variables are loaded under three factors and on the basis of the arrangement. From the Table 15 (below),

Component	Initial Eigen values			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
Radio	2.065	29.503	29.503	2.065	29.503	29.503	1.903	27.191	27.191
TV	1.352	19.316	48.819	1.352	19.316	48.819	1.364	19.484	46.676
Mobile phone	1.085	15.499	64.317	1.085	15.499	64.317	1.235	17.642	64.317
SMS	.774	11.050	75.368						
SmartmobileApp	.741	10.583	85.950						
IVR	.723	10.330	96.280						
Website	.260	3.720	100.000						

Source: Author's compilation from the questionnaire

Table 13: Total variance explained.

Factors and Variables	**Factor 1**	**Factor 2**	**Factor 3**
ICT Core Tools (Factor 1)			
SMS	.590		
Smart mobile app	.877		
Website	.789		
ICT Devices (Factor 2)			
Radio		.628	
Mobile phone		.700	
ICT Peripheral Devices (Factor 3)			
TV			.551
IVR			.576

Source: Author's compilation from the questionnaire

Table 14: Varimax Rotated Loading.

it is found that Factor 1 and Factor 2 have significant impact on Financial Capital at 5 % level of significant as p value is less than .05. Factor 3 is found to be insignificant as p value is higher than .05. So, from the study it is seen that five ICTs variables like SMS, Smart mobile App, website, Radio and mobile phone are having significant impact on livelihood level for Financial Capital. From beta value in the table, it can be concluded that Factor 1 has higher impact than Factor 2 for higher beta value. Factor 1 (SMS, Smart mobile app and Website), Factor 2 (Radio and Mobile phone) and Factor 3 (TV and IVR).

Table 16, highlights that Factor 1 and Factor 2 have significant impact on Human Capital at 5 % level of significant as p value is less than .05. Factor 3 is found to be insignificant as p value is higher than .05. So, from the study it is seen that the five ICTs variables SMS, Smart mobile App, website, Radio and mobile phone are having significant impact on livelihood level for Human Capital. From beta value in the table, it can be concluded that Factor 1 and Factor 2 same impact with similar beta value. Factor 1 (SMS, Smart mobile app and Website), Factor 2 (Radio and Mobile phone) and Factor 3 (TV and IVR). Table 17, shows cases that Factor 1 and Factor 2 have significant impact on Physical Capital at 5 % level of significant as p value is less than .05. Factor 3 is found to be insignificant as p value is higher than .05. So, from the study it is seen that the five ICTs variables SMS, Smart mobile App, website, Radio and mobile phone are having significant impact on livelihood level for Physical Capital. From beta value in the table, it can be concluded that factor 2 has higher impact than Factor 1 for higher beta value. Factor 1 (SMS, Smart mobile app and Website), Factor 2 (Radio and Mobile phone) and Factor 3 (TV and IVR).

From the Table 18, it is found that Factor 1 and Factor 2 have significant impact on Social Capital at 5 % level of significant as p value is less than .05. Factor 3 is found to be insignificant as p value is higher than .05. So, from the study it is seen that the five ICTs variables SMS, Smart mobile App, website, Radio and mobile phone are having significant impact on livelihood level

	Un-standardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	3.508	.033		106.732	.000
ICT Core Tools (Factor 1)	.131	.033	.197	3.973	.000
ICT Devices (Factor 2)	.109	.033	.165	3.316	.001
ICT Peripheral Devices (Factor 3)	.034	.033	.052	1.046	.296

Source: Author's compilation from the questionnaire

Table 15: Impact of ICT on Financial Capital.

	Un-standardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	3.911	.034		116.550	.000
ICT Core Tools (Factor 1)	.176	.034	.251	5.243	.000
ICT Devices (Factor 2)	.179	.034	.256	5.330	.000
ICT Peripheral Devices (Factor 3)	.030	.034	.042	.886	.376

Source: Author's compilation from the questionnaire

Table 16: Impact of ICT on Human Capital.

	Un-standardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	3.524	.034		102.794	.000
ICT Core Tools (Factor 1)	.079	.034	.115	2.301	.022
ICT Devices (Factor 2)	.130	.034	.190	3.791	.000
ICT Peripheral Devices (Factor 3)	.046	.034	.067	1.336	.182

Source: Author's compilation from the questionnaire

Table 17: Impact of ICT on Physical Capital.

	Un-standardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	4.136	.026		158.351	.000
ICT Core Tools (Factor 1)	.084	.026	.159	3.225	.001
ICT Devices (Factor 2)	.120	.026	.227	4.594	.000
ICT Peripheral Devices (Factor 3)	.023	.026	.043	.867	.386

Source: Author's compilation from the questionnaire

Table 18: Impact of ICT on Social Capital.

	Un-standardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	3.618	.032		111.399	.000
ICT Core Tools (Factor 1)	.127	.033	.190	3.892	.000
ICT Devices (Factor 2)	.136	.033	.204	4.169	.000
ICT Peripheral Devices (Factor 3)	.086	.033	.129	2.635	.009

Source: Author's compilation from the questionnaire

Table19: Impact of ICT on Natural Capital.

for Social Capital. From beta value in the table, it can be concluded that the Factor 2 has higher impact than the Factor 1 for higher beta value. Factor 1 (SMS, Smart mobile app and Website), Factor 2 (Radio and Mobile phone) and Factor 3 (TV and IVR).

Table 19 (above), highlights that Factor 1, Factor 2 and Factor 3 have significant impact on Natural Capital at 5 % level of significant as p value is less than .05. So, from the study it is seen that the all the seven ICTs variables SMS, Smart mobile App, website, Radio, mobile phone, TV and IVR are having significant impact on livelihood level for Natural Capital. From beta value in the table, it can be concluded that factor 2 has higher impact than Factor 1 and Factor 3 for higher beta value. Factor 1 (SMS, Smart mobile app and Website), Factor 2 (Radio and Mobile phone) and Factor 3 (TV and IVR).

Conclusion

To ascertain the impact of ICT on rural livelihood, all the five tenets of livelihood have been assessed as a part of this study.The ICT toolsin focus for the assessment were Smart Mobile App, Website, SMS, Radio, TV, IVR and Mobile phones.

Natural Capital is seen to be significantly impacted by SMS, Smart Mobile App, Website, Radio, Mobile phones, TV and IVR. Radio and Mobile Phone has a higher impact than the rest here.It implies that the farmers in the study area havea better understanding of the natural resources at their disposal and have learnt to do an optimum management of the same.

For Physical Capital, the ICT usage among the farmers has led to some definite enhancements. With knowledge being available on equipment and transport infrastructure, there is betterment in this segment. It has also greatly influenced the access to desired communication. The usage has increased the knowledge of house/safe buildings and access to water for irrigation.

The main factor to highlight is the strong positive impact on the Financial Capital. The tools Smart Mobile App, Website, SMS, Radio and Mobile phones have contributed to this. ICT usage has led to a significant growth on the financial aspect in the study area. So, there is ample evidence that rural incomes have been increasing with the use of ICTs to access knowledge and information. Similar observations were seen in the different studies like, Chong et al., (2009) mentions increase of household income as a result of ICT usage. For the economic empowerment of the poor population in the rural areas, the mobile phones can be a very useful tool. Okyere and Mekonnen (2012) highlight that with the advent of the mobile services and increased usage in the rural segment; the farmers could use the price information from various places and sell their produce at an optimum price.

Social Capital is impacted by SMS, Smart Mobile App, Website, Radio and Mobile phones. But out of these, Radio and Mobile Phone have a higher

impact than the rest. Hence mobile phone conservations and the radio broadcasts are playing a strong positive role. The research has also unearthed that for this tenet, 70.9% of the farmers are significantly impacted. It shows that ICT has brought in a sea change in this aspect of livelihood and there is a better connectivity/relationship in the area. It also indicates that greater household income (as a result of the positive impact seen in the financial capital), has led to a greater participation in external activities.

Moving ahead, the analysed data also indicates that ICT usage by the farmers has heavily impacted the Human Capital.Hence it can be clearly stated that ICT has led to skill development, nutrition and health.

Based on the positive impact seen on all the five segments/tenets of the livelihood, the collective statement at this juncture is that, ICT is truly impacting rural livelihood for big and small farmers of Purba Medinipur area of West Bengal. This in turn has the capacity to drive growth. Similar observations were seen in the different studies like De Silva et al. (2011) similarly highlights that ICT has increased potential to extend the overall benefits to the rural segment. Okyere and Mekonnen (2012) highlights that the development of ICTs has facilitated the dissemination of knowledge and information and it is revolutionizing agricultural production and provision of market information to maximize the returns to agriculture. ICT as a development tool is creating awareness among farmers and rural artisans for their betterment; geographical information system (GIS) is opening new approaches to regional planning and to management of natural resources.

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