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An Impact of Information and Communication Technology on Rural Economy: With Special Reference to Bijnor District

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Abstract
The process of generating information is based on the development of an abettor and sophisticated system, i.e. Information and Communication Technology (ICT). These systems can increase productivity of the process and it also provides a facility to access the information with clarity, timely and effectiveness. There are several influencers of ICT on the different spheres of life, they maybe social, cultural, economic and political areas. Farmers are also using closed-circuit television camera systems, global positioning systems, computer-controlled devices, smart phones, mobile apps, etc. in agriculture and other allied activities.
The exploratory research has been undertaken to find out the impact of ICT on rural economy (agriculture and employment) of the Bijnor district. The study was conducted in 11 blocks of Bijnor district. The primary data was collected through questionnaire-cum-interview schedules from 360 respondents belonging to the rural areas of the Bijnor district. The hypothesis formulated based on the objective which stated that does there any relationship exists between the information and communication technology, and factors influencing the rural economy. The primary data were used for the testing of hypothesis. For this purpose, the null hypothesis was generated to seek relationship between ICT and rural economy. Hypotheses were tested through statistical tools such as, descriptive statistics, model summary, ANOVA and coefficients. The findings of the study stated that the factors of rural economy such as agriculture activities and employment do have a relationship with the information and communication technology and its usage. Thus, it can be said that ICT does play a significant role in the development of rural economic province (agriculture activities and employment generation).
Key Words: *Information and Communication Technology, Rural Economy, Agriculture, Employment.*

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1. INTRODUCTION

Technology always had been an element of surprise from its very first beginning levels. The collective efforts generated by the scientists and entrepreneurs made it a set of comprehensive material that is used for guiding the innovative path to humans. Man's ingenuity has no levels of discoveries. Moreover, from the beginning of mankind, human beings were so experimental among all the species that they had experienced and did huge endeavors. This greed for technology brings societies more closely than ever before. Therefore, the communication around the globe has witnessed a drastic change in the recent past. This development in return has brings more and more potential of information delivery and data base managements. Thus, the role of ICT showed its importance in order to help the economies for growth and development. There are several evidences that showed the ICT as the driver for the economic growth (Galloway, Laura and Mochrie, Robbie, 2005).

There is great optimism over the potential of ICT and its allied peripherals for the purpose of promoting economic development of different countries. It has been observed that in the recent era, the ICT industry has transformed the global economy and connected people, societies, economies and markets in a remarkable way. As the ICT industry gaining the center stage at world forum and memorandum of understanding among several nations across the globe, experimentations with the technologies and its usage in different spheres of lives for economic development and inclusive growth prospective have increased and get its importance around the world. It has also created new vulnerabilities and opportunities for disruption.

According to World Bank details published in 2018-19, approximately 46.15% of the world population came from rural areas and population of rural people from developing countries, such as India, China, Bangladesh, South Africa and Indonesia were 67%, 44%, 66%, 35% and 46% respectively. Digitalization is predictable to thoroughly alter each day life and this success story has been of much-hyped around the world. And rural development is an ongoing process by socio-economic well-being of rural areas (Yoo, 2010). ICT is now a global trait encompasses the following key elements:

- Breakdown of Technology
- Linking information and network connectivity economic externalities
- Impact of ICT on nation's domestic politics and global relations
- Transformation in the socio-economic and cultural relations

The innovations in ICT help in designing innovative processes and business models as well as new technologies and products which helps the countries in achieving inclusive growth. The innovations in technology may either market driven or technology driven along with the transportations, operations, medical and health care sector and other related fields to the innovations in business models of different organisations like DTS-I technology in automotive sector or market driven innovations like low cost Tata ACE commercial vehicles in the transportation sector or operations driven innovations like low cost heart and eye surgeries in the health care sector (Singh & Singh, 2014). Similarly, the global geography of digital agriculture development is prominent in the south of the globe (Trendov et al., 2019; Barreto, 2018; Lele, 2017). Hence, it can be said that there is crucial requirement of inclusion of allied activities of ICT.

1.1 ICT and its Role in Rural Economy

ICTs play an important role in agricultural value chains having different influence on market competitiveness using rapid development technology. Farmers also use closed-circuit television camera systems, global positioning systems, and smart phones applications, Radio Frequency devices, such as RFID along with other equipment connected with the technology of ICT. Many studies showed that the impacts of ICT on socio-economic provision of rural areas are prominent. It also had shown the radical expansion in usage of mobile, computer and internet among rural people (Rahaman et al., 2017). The use of ICT and its allied technologies are diminishing the gap between urban and rural area; Rao, (2014) projected a framework for execute ICT for agriculture development in India. Hence, the role of ICT in making decision regarding farming activities help to cope up with the supply chain model and therefore giving support in the nation development level (Narcyz Roztocki et al., 2019).

1.2 Rural Employment

Information and communication technology can be a course of affective measure for employment the rural people. It is the necessity of the time that the ICT does the help to the rural people for awareness of their rights and empower them for the better life. The empowerment of the rural people can be done with the help of ICT through an accurate and timely availability of information with appropriate cost and effective accuracy. The world gets connected with the help of ICT; hence to search a job from the native place has become easier and more convenient. The limitations of the location have shattered and several other e-platforms have provided various measures to earn online without leaving the local place. One of the examples is E-commerce that has provided a major means for the information technology to obtain business objectives. The E - platform provided new markets and new business opportunities for the producers' and sellers.

ICT provides a fundamental structure towards the growth journey of the country areas through providing opportunities for the rural area. The telecom industry also facilitates for the electronic fund transfer and easy online payments from any part of the world. This encourages the rural people to get the best price for their product, as they can easily access the available price and market for their produces that they have manufactured.ICT can be levied in such structure that provides a measure for several types of economic achievements. Therefore, it is clear that ICT is a game changer for the economic development of the country. ICTs measures can be used as a method for awareness creation elements and providing feedback generated at rural people's end for employment. It helps in the GDP and also provides the latest information to the people, even those who are living in remote areas. The future of the economy, especially rural economy is highly associated with innovation in the field of factors that are influencing the rural livelihood. The production, operation, marketing, distribution, all such activities provide new market latent approaches in regard to the ICTs sustainable development role.

2. REVIEW OF LITERATURE

Aruleba, Kahinde & Jere, Nobert (2022) did a systematic study on the ICT related technologies during the time of COVID-19. The study was based on 233 articles to find the challenges and difficulties encountered in rural areas of South Africa. The findings of the study highlighted the key struggles and challenges along with the commendation to augment the ICT embracement.

Mathur, H. (2021) studies and comprehended in detail regarding the new age agriculture innovative techniques those were often regarded as 'agritech'. There were fifteen variables in the study and these variables defined the role of agritech in the field of agriculture and farming activities. It was presented in a model that has potential in catalyzing several unexplored model related to rural entrepreneurship. He further provided that these 15 models can be used as power boost-ups for growing agritechs.
Kamra, A. (2021) provided the notes on the e-commerce levels that played a momentous factor in the field of e-commerce businesses and allied investments. The study showed different categories of ventures that can access to international market and in the field of process disperse that exports are only predestined for large business houses with colossal investment competence. This is due to e-commerce helps in transcending boundaries. Furthermore, the study stated that a larger scope to the customers was provided and sellers also get direct selling while the place and location do not matter in it. Thus, it provides a greater opportunity to sellers and customers.
Singh (2020) emphasized the role of ICT in enhancing the cooperation among developing countries particularly among South Asian Countries. The study suggested that a number of common problems of ICT sectors of South Asian Countries such as lack of ICT infrastructure, low level of ICT penetration, challenges of Business Process Outsourcing (BPO) companies, etc. can be solved through the corporation of countries.
Cerna & Buya (2015) assessed the role of cell phones in seeking information regarding activities such as, market for fish in Abobo and Itang region of Woreda. The study focused on the usage of mobile phones and data collected through simple random sampling and purposive sampling methods. The findings indicated that the use of cell phones enabled fishermen to gain their catches, improve and boosted their incomes, expanded their markets. The study also recommended that establishment of new strategies and policies to reduce the quantities of catch spoilage in the markets.
Syiem & Raj (2015) performed a model based study related to access and use of ICT in Meghalaya State of India. The study used a random sampling technique to select the farmers as respondents. The study revealed that social communication and contacting middle men for the promotion become easier than before.
Sujata P. Deshmukh & G. T. Thampi (2014) studied the makeover effect of e-commerce & m-commerce on nationwide productivity in India. The m-commerce and e-commerce transactions carried out using a mobile handheld device have become very common in rural regions. In the countries like India, fluent English speaking people are only 4%. Therefore, m-commerce used in local language, would not only ensure quick implementation by the customers, but also be an instantaneous success.
Chaudhary, TH (1995) concluded in his study that realizing the importance of rural telecommunication as a means of social and economic upliftment of the vast majority of people in the country. The opening of telephone exchange in country side would help the rural people. Between 1991 and 1995 alone, as many as 1.38 lacs villages were provided with telephone facility and as on 12thFeb., 1996 there were nearly 2,00,287 villages connected with telephone facility out of 2,43,555 gram panchayats in the country, as many as 1,55,410 have been provided with telephone facility. Furthermore, for the rural population of India, a rural telecommunication package was introduced to the tune of Rs. 200 crores which includes promotional rates for the

subscribers of telephone services. This included a reduction in tariff, a registration fee and telephone rental, subsidized installation charges, an increase in free calls for rural telephone and increase in commission to the franchises of STD/ISD/ PCO in rural areas.

3. NEED OF THE STUDY

The researcher found distinguish literature on the impact of ICT on Indian economy, but very few studies were found on the topic related to rural economic factors, such as agriculture & employment with the ICT. Due to the latest information and multiple objectives this study will provide unique findings. As per the available literature, ICT sector of India is playing the vital role of a catalyst in fostering the growth, generating opportunities, and connecting the people and their needs at some clicks. Malini, D. H. (2016) stated that ICT is transforming rural lives in the information era. In order to bring an eloquent insights around the contribution of ICT in the Indian economy, more specifically, to the rural economy of Bijnor district, an appropriate methodology along with research viewpoint, literature gap, development of research strategy, selection of appropriate data collection tool, and data analysis procedures and tools. Therefore, it is important to do a critical evaluation of this topic, i.e. 'Impact of Information and Communication Technology on Rural Economy: With Special Reference to Bijnor District of the collection of pertinent data and careful analysis in order to derive meaningful findings out of it.

4. RESEARCH METHODOLOGY

The exploratory research has been undertaken to find out the impact of ICT on rural economy (agriculture and employment) of Bijnor district. The study was conducted in 11 blocks of Bijnor district. The primary data was collected through questionnaire-cum-interview schedules from 360 respondents belonging to the rural areas of Bijnor district. The hypothesis formulated based on the objective which stated that does there any relationship exists between the information and communication technology, and factors influencing the rural economy. The primary data is collected through structured questionnaire-cum-interview method. The secondary data collected from several sources, such as research journals, magazines, newspaper articles, etc. which were considered the most authentic source of information related to the Indian economy. The above stated hypotheses are tested through descriptive and inferential tools. In the current study, the researcher had performed several statistical techniques for the purpose of studying objectives through statistical measures using statistical software such as SPSS.

Bijnor District is a district of Uttar Pradesh with its administrative headquarters located in the Bijnor city. According to the 2011 census, the district encompasses a geographical area of 4,561 sq. km. and had a population of 36, 82,713 (persons) including 19,21,215 (males) and 17,61,498 (females). LFP rate is 43.86% for the year 2017-2018. Most important reserve of income in this district is from the agricultural sector and per capita income is Rs. 65,451. The percentage of urban/ rural population was 25.13 (urban), 74.87 (rural). Forest cover (as per 2017) was around 8.81% of total geographical area. Sub-districts (05), Towns (26) and Villages (2,984) were in the district. The district is one of the agriculturally advanced districts in the western part of the state. The economy of the district is predominantly agricultural. The agricultural year is divided into three parts by the three harvests, which go by the usual names of Kharif, Rabi, and Zaid. The last is of very little importance. Among the various kharif crops in the district the most important is rice.

5. OBJECTIVES OF THE STUDY

a) To study the role of ICT in agriculture activities for the development of rural economy.
b) To study the role of ICT in employment for the development of rural economy.

6. HYPOTHESES OF THE STUDY

The hypothesis formulated based on the objective which stated that does there any relationship exists between the information and communication technology and factors influencing the rural economy. The primary data were used for the testing of hypothesis. It was based on the respondents residing in Bijnor district.

The main hypothesis and sub- hypotheses are shown below:

H01: there is no significant impact of ICT on the rural economy.
H01.1: there is no significant impact of ICT on the rural economy factor (agriculture).
H01.2: there is no significant impact of ICT on the rural economy factor (employment).

7. DATA ANALYSIS AND INTERPRETATION

In order to study the impact of the ICT on the rural economy of Bijnor, the hypothesis formulated based on the objective which stated that does there any relationship exists between the ICT and factors influencing the rural economy. For this purpose, the hypothesis were generated which showcased the relationship of ICT and rural economy.

Table 1: The Table Showed the Coding Value of ICT Variables

S. No.	Statements	Coding value
1.	How frequently do you use ICT devices?	ICT1
2.	How much time do you devote daily on the internet?	ICT2
3.	Do you visit social sites daily?	ICT3
4.	Do you use the Internet for information purpose?	ICT4
5.	Does ICT help in your work?	ICT5
6.	What is the regularity of searching information on the internet?	ICT6
7.	Do you participate in online groups or concerned activities?	ICT7
8.	Have you used your ICT mode to send or read emails?	ICT8
9.	How many times do you download/ upload/ browse required material from the internet?	ICT9
10.	Do you save your documents digitally?	ICT10

In the above table, the coding value of the statements of ICT is given. The values of coding are ICT1, ICT2, ICT3, ICT4, ICT5, ICT6, ICT7, ICT8, ICT9 and ICT10.

Table 2: Descriptive of ICT

	N	Minimum	Maximum	Mean	Std. Dev.
ICT1	360	1.00	5.00	3.8668	1.1478
ICT2	360	1.00	5.00	3.9322	1.1514

ICT3	360	1.00	5.00	4.0118	1.0875
ICT4	360	1.00	5.00	4.0769	.9956
ICT5	360	1.00	5.00	4.0119	1.1082
ICT6	360	1.00	6.00	3.8788	1.1025
ICT7	360	1.00	5.00	4.0372	1.1328
ICT8	360	1.00	5.00	3.5003	1.4682
ICT9	360	1.00	5.00	3.5351	1.4988
ICT10	360	1.00	5.00	3.9802	1.1076
Valid N (listwise)	360				

The above table expressed the mean values (between 3.5003 and 4.0769) of all items along with the standard deviation. Moreover, the table stated minimum and maximum value (between 1 and 5) of information and communication technology variables.

The section shows the coding value of the statements of rural economic variables. Further, mean values, standard deviation, minimum and maximum value of observed variables are stated. Descriptive statistics showed the number of items with no. of respondents for the given study.

Table 3: Coding Values of Rural Economy Variables

S. No.	Statements	Coding Value
1.	Can agriculture be related to the rural economy?	AF1
2.	Is agriculture, providing the strength of rural society?	AF2
3.	Do you have the assurance in agriculture, for better economy?	AF3
4.	What is your belief towards the expenditures in agriculture?	AF4
5.	Does agriculture deliver returns to those living in rural provinces?	AF5
6.	Sustainability can be reached with the assistance of agricultural undertakings?	AF6
7.	Employment is directly linked with rural development?	EMF1
8.	People are not having adequate chances for employment in rural regions?	EMF2
9.	There are imperfect sources of employment in rural areas?	EMF3
10.	Employed people do have more involvement in rural economy?	EMF4
11.	Technical learning can offer more employment to the people?	EMF5
12.	Government schemes of employment help in rural economy to elevate?	EMF6

The above table showed the variety of factors influencing rural economy, such as, AF1, AF2, AF3, AF4, AF5, AF6, EMF1, EMF2, EMF3, EMF4, EMF5 and EMF6 were associated with the agriculture and employment respectively.

Table 4: Descriptive Statistics of Rural Economy Variables

	N	Minimum	Maximum	Mean	Std. Deviation
AF1	360	1.00	5.00	3.4532	1.1865
AF2	360	1.00	5.00	3.6245	1.1875
AF3	360	1.00	5.00	3.5621	1.1789
AF4	360	1.00	5.00	3.5366	1.1972
AF5	360	1.00	5.00	3.6543	1.1379
AF6	360	1.00	5.00	3.5548	1.1582
IF1	360	1.00	5.00	3.5556	1.1278
IF2	360	1.00	5.00	3.6578	1.1837
IF3	360	1.00	5.00	3.5444	1.1575
IF4	360	1.00	5.00	3.5800	1.1124
IF5	360	1.00	5.00	3.6178	1.1402
IF6	360	1.00	5.00	3.5600	1.1138

The above table expressed the mean values (between 3.4532 and 3.6578) of all items along with the standard deviation. Moreover, the table stated minimum and maximum value (between 1 and 5) of rural economy variables.

H01.1: There is no significant impact of ICT on the rural economy factor (agriculture).

Table 5: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error
1	.247[a]	.061	.058	1.02927
a. Predictors: ICT				

Table 6: ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	24.624	1	24.624	23.243	.000[b]
	Residual	379.277	358	1.059		
	Total	403.901	359			
a. Dependent Variable: AF						
b. Predictors: ICT						

Table 7: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.881	.344		14.176	.000
	ICT	-.427	.089	-.247	-4.821	.000
a. Dependent Variable: AF						

The above tables showed the model summary, ANOVA and Coefficients of Beta (Unstandardized and standardized) along with the t-value, significance level and confidence interval level of Beta. ANOVA test that confirmed the overall regression model is a good fit for the data. The Beta value indicates the relationship of the agriculture factor with the independent factor; the positive beta value represents the positive relationship between the predictor and the outcome. The table showed that the *P*-value (0.000) for the *F* test statistic is less than 0.05, providing strong evidence against the null hypothesis. Therefore, there is a significant relationship between independent variable, i.e. ICT and dependent variable, i.e. agriculture factor.

H01.2: there is no significant impact of ICT on the rural economy factor (employment).

Table 8: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error
1	.260[a]	.068	.065	.97259
a. Predictors: (Constant), ICT				

Table 9: ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	24.626	1	24.626	26.032	.000[b]
	Residual	338.753	358	.946		
	Total	363.379	359			
a. Dependent Variable: EMF						
b. Predictors: (Constant), ICT						

Table 10: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.871	.325		14.971	.000
	ICT	-.427	.084	-.260	-5.102	.000
a. Dependent Variable: EMF						

The above tables showed the model summary, ANOVA and Coefficients of Beta (Unstandardized and standardized) along with the t-value, significance level and confidence interval level of Beta.

ANOVA test that confirmed the overall regression model is a good fit for the data. The Beta value indicates the relationship of the agriculture factor with the independent factor; the positive beta value represents the positive relationship between the predictor and the outcome. The table showed that the P-value (0.000) for the F test statistic is less than 0.05, providing strong evidence against the null hypothesis. Therefore, there is a significant relationship between independent variable, i.e. ICT and dependent variable, i.e. employment factor.

8. CONCLUSION

The role of ICT in the rural society has an in-depth impact that can be understood with the tactics of the people towards ICT and technology usage. The development of ICT has bought a development process for the socio-economic attributes that are further and large influencing the lives of the rural people. The socio-economic role of ICT in the rural development is unforeseen and has a huge impact on the economic structure of rural areas. Alongside, ICTs measures should be studied in detail in the development of the rural economy of the country. Therefore, it can be concluded that the factors of rural economy such as agriculture activities and infrastructure do have a relationship with the information and communication technology and its usage. Thus, it can be said that information and communication technology (ICT) does play a significant role in the development of rural economy.

The initiatives taken in the field of technology, especially ICT has given the ray of shine to the dream which is focused on sustainable development. ICT can directly or indirectly plays a role in the development of the rural region. This whole study had focused on the role of ICT and its role in the rural economy. The study prescribes that every entity of the society should undertake its responsibility in the sustainable development.

9. LIMITATIONS

- This study is based on the impact of ICT on the rural economy, focusing only employment and agriculture activities.
- The area selected is restricted to rural areas of Bijnor district of Uttar Pradesh.
- Total number of respondents on which the final analysis was carried after data refining was 360.
- The cost of carrying the research, restrictions of statistical tools and human errors was also among the limitations of the study.

10. FUTURE SCOPE OF THE RESEARCH

The study was primarily based on the objective to study the role of ICT in the employment and agriculture activities for the development of the rural economy of Bijnor district. However, there is a future scope of research that includes the following:

a) Study with variables of rural economy, such as infrastructure, medical, electricity supply, etc.
b) Level of responsiveness among general public regarding agricultural and non-agricultural activities.
c) Importance of ICT in schooling and occupation.
d) The role of ICT in confining immigration of the labour force either in metropolitan areas or in other states.
e) Comparison between traditional and modern methods towards ICT and similar technologies.

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