Research Article

An Economic analysis of Information Communication Technology and Agricultural growth in Hassan District

Dr. Girisha M.C.

[1]Associate Professor, Department of P.G. studies in Economics, Government First Grade College for women M. G. Road Hassan
Corresponding Author: Dr. Girisha M.C.

Abstract
Increasing production is a major challenge facing present agriculture. Smallholder farmers who dominate the landscape of developing world need to improve farming through acquiring adequate knowledge and information. Information and Communication Technology services provide critical access to the knowledge, information and technology that farmers require to improve the productivity and thus improve the quality of their lives and livelihoods. It is hence crucial to provide farmers with the knowledge and information in a quality and timely way. "Although some ground-level tools like the television, radio, mobile can serve as major promoters for information, knowledge and development opportunities, the access for farmers in remote villages is delimited due to the lack of infrastructure". Agriculture sector is considered to be the most predominant sector of Indian economy. "From last few decades' research, extension and farmers efforts have all contributed significantly to enhancing food production ". Meeting this demand necessitates a growth rate of nearly 2 percent per annum in food grain production and the agriculture sector has to grow at a minimum targeted four percent per annum. Approaching paper on the India's 12th five-year plan states that the "weakness in the economic performance thus far is that growth in the farm sector" and the average annual growth rates of GDP in agriculture and allied sectors during the eleventh plan period was 3.3 percent. So, there is a quick need of vibrant, innovative and dynamic approach to be adopted for agricultural development in order to serve farmers better and achieve target rate. Further, land and water resources are almost reaching their limits; hence, achieving food security heavily relies on "Knowledge Resource". Therefore, ICT Dissemination of adequate and accurate information is very essential to sustain Agriculture.
Keywords:

1. Introduction:

Facts conversion is an unlimited sign of the present advancement of ICT. ICT shows the main role in an informative organization that will prepare the learners the much-desired information, expertise they need in the present-day struggle. As technology combined with present learning pedagogies, this makes the learning process more interesting and enjoyable. As informative institutions are now created to combine the marketplace essentials in their progress prospectus this cover trend to the role of ICT as collective with other learning capitals. As global preparation everywhere these movements develop a great chance for the organization to prove that learning training shifts to the present way of education.

"Smooth equipment" is at ease with language that is commonly being used in every presence's life. Smartphone's, tablets, gadgets, smart televisions, etc., are the producers of smooth equipment that have complete human life smoother, relaxed, and manageable. Smart technology has not simply better the way of quick but also developed an included part of every person's life. The Information and Communication technology to be accurate has converted a pouring strength behindhand financial growth and a developing tool as thriving. ICT is a stretched term for Information technology which is a technical source to make figures available at the right time, right place in the right form to the right user. Former, one had to wait for the newspapers to get the info across the world. Now with the smoother equipment, information can be accessed from anywhere using smart phones and gadgets. All this is made thinkable with the help of Information and Communication Technology. Information technology has been inducing our survives in the current years in the areas of education, healthcare, and business. Going the extra mile, Information and communication technology in schools has had a major effect.

ICT is precise caring for all learners as it takes several encouraging impressions on their teaching. Primarily, learners will be inspiring to assent to learn and to join in education events. Also, with the effect of ICT, the class of work of learners can be successful and which then given them the self-confidence or self-reliance to perform higher learning tasks. With the application of ICT, learners are agreed on more flexible and more adapted learning which allowed more work to be finished. ICT qualify two-way learning with the little symptom of the isolated learner. ICT affects increasing learner motivation through hands-on-activity, visual demonstrations, and improved modes of performance. By using ICT, also has an oversee result to change the value of the learner's effort. For the student who has deprived writing and language abilities, ICT affects it to recover such as using word handling. Besides, the effect of ICT on students is to level single changes and has for the most part affected things for learners with special needs. As a learner can effort at the pace and strength suitable to their loads, ICT affects improving self-pacing with improved skills to deal with separate learning styles. The make use of ICT has as well agreed learners create high worth multimedia products.

Developing countries are always facing food shortages as the population growth rate is too high when compared to food production rates. Africa is an example of a region that has been facing a long-term food crisis due to the reasons above. Currently the annual African population growth rate stands at 3.1% which is higher than the current food growth rate. In the past decade, only a dozen countries have managed to achieve a food growth rate of 2.5%. Among some of the causes of food shortages are increasing food demands while the world is facing a decrease in natural resources. These include water shortages, declining soil fertility, effects of climate change and a rapid decrease of fertile agricultural lands due to urbanization.

ICT is used to accelerate the food growth rate by using technologies to perform tasks like predict weather conditions, learn about the latest methods to improve farming productivity and gauge the levels of supply/demand based on economic statistics. To maintain quality and supply, new approaches and technological innovations are required to cope with these challenges and to enhance the livelihoods of the rural population. Three important roles which ICT can play are in enhancing agricultural production, improving market access, and capacity building and empowerment.

The present study forms part of agricultural economics by emplacing on the primary sector growth and development. Services and facilities those are available for farmers to become efficient and smart to enhance their agriculture production particularly. Information and Communication Technology is of utmost importance which determines the effectiveness and utilization of services and facilities to improve both farmer and nation at macro and micro level. In particularly the agricultural production of the nations and farmers cultivation method

and knowledge depends on innovation technology as well as information technology. Thereby, Information and Communication Technology is very important variable in determining agricultural production and farmers' efficiency in farming activities. So present study focuses on how ICT is emphasized in agriculture sector and awareness and impact to the farmers.

2. Methodology of the study:

Present study is considered both primary and secondary data is collected through interviews and questionnaires from respondents.

2.1 Primary source: The present study is on the awareness and usage of ICT in agriculture in Hassan district of Karnataka state. The Study area Hassan district extends over an area of 6826.15 Sq. Kms, which is about eighth largest district in the state of Karnataka. It comprises 08 talks namely Alur, Arkalgud, Arasikere, Belur, Channarayapatna, Hassan, Holenarasipura, and Sakaleshpura. The study was conducted in 04 Talks among 08 talks in the district which are Hassan, Belur, Arkalgud and Holenarasipura. These talks are selected onthe basis of which talks are growing more agricultural commodities of Maize, Potato and Paddy in Hassan district. Study selected 04 villages in each talk and in each village 25 samples has been selected randomly to meet the objectives of the study.

2.2 Secondary source: The secondary data is collected from the government report, documents, research articles, journals, newspapers and internet. Appropriate statistical tools are used for the analysis and interpretation of data.

3. Objectives of the study:
1. To examine the role of ICT and decision-making process in agriculture.
2. To explore the gaps in the adoption of ICT by farming community.
3. To compare the agriculture returns of ICT users and non-ICT users.

4. Hypothesis of the study:
1. The dependence and adoption of ICT is related to socio economic factors.
2. There is significant difference in the agricultural returns of ICT users and non-ICT users.

5. Important Achievements of the e-Agriculture Community

Activities relating to the e-agriculture component of Action Line C7 are underpinned by the global e-Agriculture Community from 2016 to 2022 highlights steady and significant growth in both membership and international reach. Membership numbers nearly quadrupled over the period, rising from 3,640 in 2016 to 12,131 by 2022, reflecting a growing global interest and engagement in digital agriculture initiatives. The number of participating countries also expanded from 150 in 2016 to 190 by 2021, indicating enhanced international collaboration and recognition. Notably, there was a sharp rise in members between 2017 and 2020, suggesting increased adoption of digital platforms in agriculture during this time, possibly accelerated by global trends such as the digital transformation of agriculture and the COVID-19 pandemic. Overall, the e-Agriculture Community has shown remarkable growth in outreach and participation, positioning itself as a key platform for knowledge exchange and innovation in agricultural development.

Year	2016	2017	2018	2019	2020	2021	2022
Members	3640	4887	6033	7658	9483	11166	12131
countries	150	150	170	170	183	190	190

Source: Pocket Book of Agricultural Statistics 2022

6. Average Size of Operational Holdings in India

The Average Size of Operational Holdings in India from 2000-01 to 2010-11 reveals a consistent trend of fragmentation, especially at the aggregate level. The overall average holding size declined from 1.33 hectares in 2000-01 to 1.15 hectares in 2010-11, indicating increased land subdivision due to population pressure and inheritance practices. While marginal and small

holdings remained relatively stable, reflecting little change in their already small sizes, a slight increase in their size by 2010-11 suggests some consolidation efforts. Medium and large holdings experienced marginal fluctuations but retained their comparatively larger land sizes. This persistent decline in average landholding size, especially across all holdings, raises concerns about the economic viability of farms and highlights the need for policy support for land consolidation, cooperative farming, and improved productivity for smallholders.

SL NO	Category of Holdings	Average Size of Holdings		
		2000-01	2005-06	2010-11
1	Marginal	0.40	0.38	0.39
2	Small	1.42	1.38	1.42
3	Semi-Medium	2.72	2.68	2.71
4	Medium	5.81	5.74	5.76
5	Large	17.12	17.08	17.38
6	All Holding	1.33	1.23	1.15

Source: Pocket Book of Agricultural Statistics 2022

7. Agriculture Land use in India

Agricultural land use in India between 2012–2013 and 2020–2022 reveals notable shifts in land allocation patterns. The net area sown, a crucial indicator of agricultural activity, increased from 43% to 45%, suggesting a modest expansion of cultivated land, likely due to greater agricultural demand or improvements in irrigation and land development. Conversely, the area under forests declined from 21% to 18%, raising concerns about environmental sustainability and deforestation. The land not available for cultivation slightly decreased from 18% to 17%, possibly reflecting land being brought back into productive use. Fallow lands and other uncultivable lands both showed marginal increases (from 8% to 9% and 10% to 11%, respectively), which may indicate soil fatigue, water scarcity, or economic unviability leading to temporary or permanent abandonment of land. Overall, while there is a positive trend in expanding cultivated area, the reduction in forest cover and rise in fallow/unusable land call for balanced land use planning and sustainable agricultural practices.

Land Use Particulars 2012-2013	Percentage of Share	Land Use Particulars 2020-2022	Percentage of Share
Forest	21%	Forest	18%
Not Available for Cultivation	18%	Not Available for Cultivation	17%
Net Area Sown Area	43%	Net Area Sown Area	45%
Fallow Lands	8%	Fallow Lands	9%
Other uncultivable land fallow	10%	Other uncultivable land fallow	11%
Total	**100%**	**Total**	**100%**

Source: Pocket Book of Agricultural Statistics 2022

8. Distributions of Agricultural Households by Principal Source of Income

The distribution of agricultural households by principal source of income reveals that a substantial majority, 63.4%, primarily depend on cultivation for their livelihood, highlighting the continued importance of farming in rural India. The second most common source is wage or salaried employment, accounting for 22%, indicating that a significant portion of agricultural households also rely on non-farm jobs to supplement their income. Other sources such as non-

agricultural enterprises (4.7%), livestock (3.7%), and other agricultural activities (1.1%) play a relatively minor role, suggesting limited diversification in rural income streams. The 'others' category, comprising 5.1%, may include pensions, remittances, or miscellaneous sources. This data underlines the need to enhance income stability through diversified livelihood options and strengthen support systems for both farm and non-farm sectors in rural areas.

Source of Income	Share of Percentage
Livestock	3.7%
Other Agri Activity	1.1%
Non-Agricultural Enterprise	4.7%
Wage/Salaried Employment	22.0%
Others	5.1%
Cultivation	63.4%
Total	**100**

Source: Primary Data

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9. Agriculture Cultivators:

Taluks	Male	Female	Total	Area of principle crops (Hectare) /potato production in(MT)		
				Paddy	Maize	Potato
Alur	14746	9510	24256	5528	6687	585.00
Arkalgud	40828	18030	58858	14518	10080	20670.00
Arsikere	56337	26679	83016	70	11854	15820.00
Belur	29827	13648	43475	5010	10498	4704.00
C.R.Patna	53917	30090	84007	4474	6557	6339.65
Hassan	48239	27323	75562	2674	20671	90100.00
H.N Pura	35503	20118	55621	7071	3787	23360.00
Sakaleshpura	8224	4015	12239	9972	0	0.00
Total	**287621**	**149413**	**437034**	**49317**	**70134**	**161578.65**

Source: District at a Glance

10. Annual Income Level of the Respondents

In Rs	No. of Respondents	Percent (%)
<25000	44	11.0
25001-50000	150	37.5
50001-100000	136	34.0
100001-500000	70	17.5
Total	**400**	**100.0**

Source: Primary Data

Annual income levels of respondents shows that a significant portion of the population falls within the lower-income brackets. Out of 400 respondents, the largest group (37.5%) earns between ₹25,001 and ₹50,000 annually, followed closely by 34% earning between ₹50,001 and ₹1,00,000, indicating that over 71% of respondents have an annual income below ₹1 lakh. Only 11% earn less than ₹25,000, while 17.5% fall in the relatively higher income bracket of ₹1,00,001 to ₹5,00,000. This distribution reflects that the majority of respondents live with modest incomes, highlighting potential economic challenges and the need for targeted development interventions to enhance rural livelihoods and financial inclusion.

11. Major Crops Cultivated

Crops	No. of Respondents	Percent (%)
Paddy	52	13.0
Potato	8	2.0
Maize	6	1.5
Paddy, Potato, maize	334	83.5
Total	**400**	**100.0**

Source: Primary data

It is observed that 83.5 percent of the respondents disclosed that they grow paddy, potato and maize while 13 percent of the respondents stated that they grow only paddy. Respondents growing either potato or maize as a separate crop are very less.

12. Agro Allied Activities

Response	Poultry Farming	Dairy Farming	Fishery	Sheep Rearing	Sericulture	Piggery
Yes	5.8	32.2	3.5	9.5	17.0	1.2
No	94.2	67.8	96.5	90.5	83.0	98.8
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: Primary Data

Apart from main agricultural activities, it emerged that various activities such as poultry, dairy, fishery, sheep rearing, piggery and sericulture are being carried out by the respondents. Firstly, with respect to poultry farming, it is observed that only 5.8 percent of them are involved and remaining 94.2 percent not into this non agriculture activity. With regard to dairy farming, it is observed that nearly one third of the respondents (32.3 percent) are involved while 67.8 percent of them not do this activity. Likewise, with respect to fishery, only 3.5 percent of them are involved, 17 percent are doing sericulture and only 1.2 percent into piggery for additional source of income apart from agricultural source.

13. Usage of Radio and TV for Agricultural Information

Response	No. of Respondents	Percentage (%)
Yes	21	22.6
No	72	77.4
Total	**93**	**100.0**

Source: Primary Data

The usage of radio and TV for agricultural information indicates that these traditional media channels are underutilized among the surveyed group. Out of 93 respondents, only 21 individuals (22.6%) reported using radio or television to access agricultural information, while a significant 77.4% (72 respondents) do not rely on these sources. This suggests a limited role of broadcast media in disseminating agricultural knowledge, possibly due to lack of access, relevance, or preference for other information sources such as mobile phones, internet, or personal networks. The findings point to the need for strengthening and modernizing agricultural communication strategies to reach a broader audience more effectively.

14. Ever Consulted RSK (Raitha Samparka Kendra)

Response	No. of respondents	Percentage (%)
Yes	204	89.1
No	25	10.9
Total	**229**	**100**

Source: Primary Data

The data on consultations with Raitha Samparka Kendras (RSKs) reveals a high level of engagement among agricultural households. Out of 229 respondents, 204 (89.1%) reported

having consulted RSKs, while only 25 (10.9%) had not. This indicates that RSKs are widely recognized and utilized as reliable sources of agricultural information and support services. The strong usage suggests that these centers play a crucial role in disseminating knowledge, offering technical advice, and addressing farmers' concerns. It also reflects positively on the accessibility and relevance of RSKs in serving the needs of the farming community.

15. Awareness about Kissan Call Center/SMS Portal

Response	No. of Respondents	Percentage (%)
Yes	89	22.2
No	311	77.8
Total	**400**	**100.0**

Source: Primary Data

The response regarding the awareness on Kissan Call Center/SMS Portal, it is observed from table 6.25 that 22.2 percent of respondents are aware of this kind of Kissan Call Center/SMS Portal while a little more than three fourth (77.8 percent) of the respondents are not at all aware of Kissan Call Center/SMS Portal.

16. Hypotheses testing and analysis

The result of Chi-square test, it is observed that p-value is 0.000 (chi-square = 127.79) which is lesser than the significant alpha level of 0.01 (at 99 % confidence level). Hence, the null hypothesis is rejected and alternative hypothesis is accepted that there is an association between education and usage of ICT tools in agriculture. In essence, there is a statistical evidence to conclude that the higher qualified respondents are using ICT as compared to the lesser qualified respondents. As evident, there is a gradual increase in the percentage of ICT users from 21.6 % (studied up to primary education) to 74.1 % of those respondents completing their Pre University. Furthermore, it is observed that all graduate and post graduate respondents are using ICT for development of agriculture.

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17. Conclusion

Indian agriculture sector is the second largest agricultural producer in the world. ICT is very important for agriculture sector to compete in this competitive world and it helps to seek information on farm activities and to enhance the knowledge of farmers. ICT is of great significance both for the individual and economic development or agricultural development of a country. Nowadays information is one of the fundamental tools for agricultural growth and development because today agriculture is not only an occupation it has become a business. So ICT enhance the farmers' production efficiency and minimizes their risk and burden in farm activities. In this background, an impact study on awareness and utilization of ICT in agriculture in Hassan district was taken up. The study also provides brief agricultural profile of India and Karnataka. The study revealed the major ICT policies and programmes under public sector to

promote agriculture sector. Further, the study focused on the role of ICT in agriculture sector at global, national and state level. Appropriate statistical and econometric techniques like chi-square test, logistic regression and independent t-test s have been employed for analyzing the data.

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