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*Original Article*

# Impact of Information Technology on Farm Income of Hill Area of India

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**Abstract**

The study of information technology on farm income of hill area of India during year 2010-11 using simple random sampling technique revealed that mobile service is more common as compared to the other services and cost incurred on this service was one-fourth of the total cost(Rs370/-)of information technology incurred on average farms situation. On an average cost incurred on additional inputs with us the technology for information by the farmers was Rs 1802.50/ farm and added cost to the labor was Rs 895.30/ farm on overall farms situation. Whereas, technology saved time was 10.33 times with one unit used time through information technology. The substantial impact of information technology was noted in enhancing productivity/ production and employment generation. The total contribution of information technology on per farm income was estimated to be Rs 40037 on an average farms situation, which accounted for about 31 percent. The net additional returns over total cost of information technology and additional inputs were Rs 36935.87, accounted for about 28.53 percent of the total farm income. The output-input ratio analysis of the information technology indicated its superiority; it contributes 13 times more with one rupee investment on it.

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## Introduction

Today is the era of the Information technology. Information is critical to the social and economic activities that comprise the development process. Economic development has witnessed many revolutions in agriculture (i.e. green, white, yellow and blue revolutions), bio-technology and industries and also in information technology. Good communication and information system reinforce commitment to sustainable productivity in agriculture. It is accepted globally that increased information flow has a positive effect on the agricultural sector. However, collecting and dissemination information is often difficult and costly. Information technology (IT) offers the ability to increase the amount of information provided to all stake holders in the agricultural sector effectively and to decrease the cost of disseminating the information. Hence, it is a well known fact that access to information holds the key for successful development. Improved communication and information access is directly related to socio-economic development of any nation through improving decision-making in agriculture. Agriculture is one of the prospective areas in which information technology is effectively used for the social and economic development of the Indian agrarian community and hill area is no exception.

The economy of Himachal Pradesh, being a hill state, is predominately dependent upon agriculture and in the absence of strong industrial base; any fluctuation in the agriculture and its allied sectors causes serious implications for overall economic growth. Rapid growth of agriculture is essential not only for self reliance, but also for meeting the food

and nutritional security of the hill people thereby bringing about equitable distribution of income and wealth in rural areas to reduce poverty and also improve the quality of life. In agriculture, information technology considered as fifth factor of production along with land, labor, Capital and organization/ management. Information has, therefore, become an important and direct input in agriculture production of hill farmers where roads, transportation means and communication network systems are poor. However, till know no single study has been conducted anywhere to quantify the impact of information technology on agriculture. Whatever studies are conducted those are qualitative in nature. Moreover, the existing information system is beset, with number of problems particularly in hill and rural areas. Therefore, it needs to be investigated through a comprehensive study to assess the impact of information technology on production/income and possible measures for sustainable development of hill agriculture. Keeping this background in view, the present study has been undertaken to assess the impact of information technology on farm income of hill area of India with the following specific objectives

**Objective of the study**

- To examine sources of information technology used in farm production in the study area.
- To assess the impact of information technology on cost, time, employment, production and income of the farmers.
- To suggest suitable policy measures on information technology for agricultural development.

**Methodology**

The study was confined to Kangra district of Himachal Pradesh which has maximum number of land holdings (about 22 per cent) and cultivated area (about 21 per cent) of the State. Moreover, State Agricultural University is also situated in this district and lies in the proximity of agricultural advanced state of Punjab. Therefore, information technology could play a catalytic role in agricultural development in this district. Keeping in view, time and resource constraint of the scholar two blocks i.e. one most developed (Panchrukhi) and other most backward block (Nagrota Surian) were selected purposely on the basis of Composite Infrastructural Index (Kumar *et al*. 2007)). In first stage a list of villages falling in each block was prepared from the revenue records and two villages were selected from each block by simple random sampling method. At the second stage, complete lists of farmers were prepared from each selected village and 20 households were selected randomly from each village randomly. Thus, a total of 80 farm households were selected from these two blocks of the district. The study was based mainly on Primary data which were collected through survey method for the year 2010-11. In order to achieve the objectives of the present study, both tabular and mathematical techniques were employed for the analysis and interpretation of the data.

**Result and Discussion**

*Sources of information technology in agriculture*

Farming community is facing a multitude of problems to maximize crop productivity. In spite of successful research on new agricultural practices concerning crop cultivation, the majority of farmers are not getting upper bound yield due to several reasons. One of the reasons is that expert/scientific advice regarding crop cultivation is not reaching to farming community timely. It is true that Indian farmers possess a valuable agricultural knowledge and expertise. However, a wide information gap exists between the research level and practice. Farmers need timely expert advice to make them more productive and competitive especially in hill area like Himachal Pradesh where personal mobility is difficult. In order to achieve this objective to some extent, farmers are using different means of information technology. The main sources of information technology used in study area are given in Table 1. In study area mobiles, landlines' phone, television, radio, computer/ internet, e-mail, fax, newspapers and magazines were some sources used by the farmers. It can be seen from the table that in Panchrukhi block total cost involved in the use of information technology per household for agricultural related work was about Rs. 416 whereas in Nagrota Surian block it was Rs. 324 per household. On an overall situation, it was about Rs. 370 per household. It was found that the use of information technology services was higher in advanced area as compared to the backward area in the district. It is evident from the table that more than one-fourth cost was incurred in the mobile services in all the situations in the study area. It indicates that mobile service is more common as compared to the other sources. The rank-wise cost and effectiveness of the sources indicated that in

**Table 1:** Sources of Information technology on sample households (Annum/ household/)

| Particulars | Panchrukhi | | Nagrota Surian | | Overall | |
|---|---|---|---|---|---|---|
| | Cost (Rs) | Rank | Cost (Rs) | Rank | Cost (Rs) | Rank |
| Mobile | 122.9 | 1 | 88.3 | 1 | 105.6 | 1 |
| Landline | 72.3 | 2 | 44.2 | 4 | 58.3 | 3 |
| Television | 64.1 | 3 | 64.6 | 2 | 64.3 | 2 |
| Radio | 46.7 | 5 | 49.4 | 3 | 47.9 | 4 |
| Computer/ internet | 3.9 | 8 | - | - | 2.0 | 9 |
| E-mail | 8.0 | 7 | 5.0 | 8 | 6.5 | 8 |
| Fax | - | - | 35.0 | 5 | 17.5 | 7 |
| Newspaper | 37.6 | 6 | 25.0 | 6 | 31.3 | 6 |
| Magazines | 60.3 | 4 | 12.5 | 7 | 36.4 | 5 |
| Total | 415.7 | | 324.0 | | 369.9 | |

Panchrukhi area, mobile service was ranked at 1st position followed by landline, television, magazines, radio, newspaper, e-mail and computer/internet. No fax machine service was used by the farmers.

Whereas in Nagrota Surian, mobile services (1st rank) was followed by television, radio, landlines, fax, newspaper, magazines and e-mail. No computer/ internet services were recorded for agricultural information dissemination. In overall situation, mobile ranked at number one television, landlines, radio, magazines, newspapers, fax, e-mail and computer/ internet ranked 2nd, 3rd, 4th, 5th, 6th, 7th, 8th and 9th on the basis of cost per farm respectively in the study area. From the above discussion, it may be inferred that a majority of the respondents were getting agricultural related information through mobiles, television, landlines and radio. The study conducted by Muhammad and Muhammad (2006) in Pakistan on role of mass media in the dissemination of agriculture technologies among farmers reported television at 1st and 2nd position whereas no role of mobile and landline/telephones was noticed.

The farmers of the study area spent more than three-forth of the total expenditure on information technology services for these sources. Some of the farmers used newspapers and magazines for detail information regarding farming and accounted for about one-fifth of the total cost of the information technology services. It was observed during the survey that a vast majority of the respondents did not use internet, e-mail and fax services for getting farming related information and had spent very meager amount, constituted only about 6 per cent of the total cost on information technology services in farming.

*Cost of inputs added through information technology*

Information technology acts as a catalytic agent in the agricultural production. With the use of technology for information some suggestions and ideas come out to add additional inputs which persuade the farmers for adding additional inputs on their field. These additional inputs incurred some cost. These costs have been presented in Table.2.

**Table 2:** Cost of critical inputs added through information technology on sample farms (per household)

| Sr. No. | Particulars/Inputs | Panchrukhi | | Nagrota Surian | | Overall | |
|---|---|---|---|---|---|---|---|
| | | Qty | Cost (Rs) | Qty | Cost (Rs) | Qty | Cost (Rs) |
| 1. | Seed treatment (fungicide used) Bavistin,Mavistin (gms) | 9.70 | 3.30 | 6.50 | 2.20 | 8.10 | 2.75 |
| 2. | Chemical weeding (Weedicide used) Himagrilon (kg/lt) | 0.80 | 480.00 | 0.70 | 420.00 | 0.75 | 450.00 |
| 3. | Plant protection (Insecticides, pesticides and fungicides used) Endosulphan,Shri ram Buto 50,Superhit, Tilt, Malathion, Metamil, etc.(kg/lt/gm) | 2.02 | 445.50 | 0.84 | 160.00 | 1.43 | 302.75 |
| 4. | Purchase of FYM (quintal) | 23.50 | 940.00 | 20.10 | 804.00 | 21.80 | 872.00 |
| 5. | Purchase of fertilizers: Urea, IFFCO CAN(kg) | 20.00 | 200.00 | 15.00 | 150.00 | 17.50 | 175.00 |
| 6 | Total | | 2068.80 | | 1536.20 | | 1802.50 |

It can be seen from the table that additional inputs added in the existing farm situation by the farmers with the use of information technology were seed treatment (fungicide), chemical weeding (herbicide), plant-protection (insecticides), pesticides (fungicides), FYM and fertilizers. These additional inputs add additional cost on the sample farms with additional information along with facilities available through access of information technology. It was found that the total per farm expenditure on various additional farm inputs was more in Panchrukhi (Rs. 2,068.80 / farm) than that of Nagrota Surian (Rs. 1, 536.20 / farm). On overall farm situation, this cost was Rs. 1,802.50 per farm. FYM was found to be the most important input accounting for 48.38 per cent (Rs. 872 / farm) of the total expenditure incurred on additional inputs followed by weeding (24.96%), plant protection measures (16.79 %), fertilizers (9.70%) and fungicide for seed treatment. Similar trend has been observed in Panchrukhi and Nagrota Surian. Thereby, it revealed that the behavior and attitude of the backward and forward farmers in the study area were almost same toward the purchase of additional inputs with the access of information technology.

*Impact of information technology on employment*

Modern farming is influenced by information technology. It has been observed that technology eliminated many jobs into one and resulted into generation of new type of employment. The efficiency and performance of new jobs depend upon the skills and level required to perform jobs through information technology. It either increases or decreases the employment. In farming, it has been generally observed that information technology has saved the time to get information. After getting sufficient relevant information related to farming, it enforces the farmers to invest more on critical inputs which requires manpower resultantly it influence the employment pattern of the farming system.

The extent of these changes needs to be measured in a quantitative form. Keeping this background in view the employment pattern of the study area was examined and presented in the following sections.

*Impact of information technology on time saving and employment*.

Information technology helps in place utility of the inputs required by the farmers. Farming related information must be made available in time. For this purpose, a speedy transmission is necessary. Late dissemination of activity-wise information is of no use. Often, this information becomes stale, particularly when it is disseminated too late to be of any use. There were different sources of information technology in the study area which helped the farmers in timely dissemination of the information and saved time of farm labor. It can be seen from Table 3 that information technology saved the time to get information and message relating to farming operations and decisions. In Panchrukhi block total time taken by per farm through information technology related to seed treatment, method of sowing, fertilizer application, irrigation, chemical weeding, plant protection measures, purchase of FYM and fertilizer was 3.1 man hours which had saved 3.3 man days per farm. The time taken to operate all the farming operations in Nagrota Surian was 1.7 man hours per farm and saved time (2.9 man days).

On overall farm situations, per farm time used through information technology was 2.4 man hours and saved the time of 3.1 man days per farm. The operation-wise time used on seed treatment, method of sowing time, fertilizer application, irrigation, chemical weeding, plant protection, purchase of FYM and purchase of fertilizers was 0.4, 0.3, 0.2, 0.3, 0.3, 0.2, 0.2, 0.2 and 0.3 man hours respectively. The situation-wise analysis of the impact of information technology to save time on farm employment indicated that in Panchrukhi information technology saved time of nine hours with the use of one hour to get information through information technology. Whereas time saved 13.65 times in Nagrota Surian with one unit used through information technology. On an average farm situation, time saved was 10.33 times with one unit used time through information technology. The significantly higher time saved with the one unit through information technology has more utility in backward area as compared to the forward area of the district.

*Additional employment through information technology*

Human labor is a basic input used in production of all agricultural crops. With the support of information technology, the labor used for getting information pertaining to different farming operations had been reduced as on one side presented in Table 3. On the another side, information technology enforced the farmers to add additional inputs which need additional inputs along with human labor on their farm as presented in Table 4.

**Table 3:** Impact of Information technology on time saving and farm employment (Per household)

| Sr. No. | Particulars | Panchrukhi | | Nagrota Surian | | Overall | |
|---|---|---|---|---|---|---|---|
| | | Used time (Man hours) | Saved time (Man days) | Used time (Man hours) | Saved time (man days) | Used time (Man hours) | Saved time (man days) |
| 1. | Seed treatment | 0.4 | 0.6 | 0.4 | 0.8 | 0.4 | 0.7 |
| 2. | Method of sowing | 0.3 | 0.5 | 0.3 | 0.5 | 0.3 | 0.5 |
| 3. | Sowing time | 0.2 | 0.4 | 0.2 | 0.4 | 0.2 | 0.4 |
| 4. | Fertilizer application | 0.5 | 0.4 | 0.1 | 0.2 | 0.3 | 0.3 |
| 5. | Irrigation | 0.4 | 0.3 | 0.2 | 0.1 | 0.3 | 0.2 |
| 6. | Chemical weeding | 0.3 | 0.2 | 0.1 | 0.2 | 0.2 | 0.2 |
| 7. | Plant protection | 0.3 | 0.4 | 0.1 | 0.2 | 0.2 | 0.3 |
| 8. | Purchase of FYM | 0.3 | 0.2 | 0.1 | 0.2 | 0.2 | 0.2 |
| 9. | Purchase of fertilizers | 0.4 | 0.3 | 0.2 | 0.3 | 0.3 | 0.3 |
| 10. | Total | 3.1 | 3.3 | 1.7 | 2.9 | 2.4 | 3.1 |
| 11 | Saved time | 8.52 times | | 13.65 times | | 10.33 times | |

Note: One Manday= 8 hrs man labor

**Table 4:** Additional employment through information technology for applying additional inputs

(Per household)

| Sr. No. | Operations | Panchrukhi | | Nagrota Surian | | Overall | |
|---|---|---|---|---|---|---|---|
| | | Man days | Value (Rs) | Man days | Value (Rs) | Man days | Value (Rs) |
| 1. | Seed treatment | 0.13 | 15.60 | 0.10 | 10.00 | 0.12 | 12.80 |
| 2. | Method of sowing | 4.14 | 496.80 | 3.18 | 318 | 3.66 | 407.40 |
| 3. | Fertilizer application | 0.56 | 67.20 | 0.44 | 44.00 | 0.50 | 55.60 |
| 4. | Irrigation | 2.00 | 240.00 | 1.50 | 150.00 | 1.75 | 195.00 |
| 5. | Chemical weeding | 0.24 | 28.80 | 0.18 | 18.00 | 0.21 | 23.40 |
| 6. | Plant protection | 0.50 | 60.00 | 0.44 | 44.00 | 0.47 | 52.00 |
| 7. | Application of FYM | 1.00 | 120.00 | 0.92 | 92.00 | 0.96 | 106.00 |
| 8. | Purchase of fertilizers | 0.41 | 49.20 | 0.37 | 37.00 | 0.39 | 43.10 |
| 9. | Total | 8.98 | 1077.6 | 7.13 | 713.0 | 8.06 | 895.30 |

It can be seen from the table that the additional man days used for applying additional inputs through information technology on overall farm situation were 0.12, 3.66, 0.50, 1.75, 0.21, 0.47, 0.96 and 0.39 man days per farm on seed treatment, method of sowing, fertilizer application, irrigation, chemical weeding, plant protection measures, FYM carrying/ application and purchase/carrying of fertilizer.

Slightly higher additional labor was observed in all the farm operations in Panchrukhi as compared to Nagrota Surian but, trend was same in all the situations. The total addition labour used in Panchrukhi block was 8.98 man days per farm and the corresponding figure for Nagrota Surian was 7.13 mandays per farm. On an overall farms situation, per farm additional labor used with the support of information technology was 8.06 man days. A critical analysis of the table revealed that with the marginal saving of time (Table 3) through information technology generated additional employment in farming. The addition to cost of the added labor was noted to be Rs 1077.60, Rs 713 and Rs 895.30 per farm in Panchrukhi, Nagrota Surian and overall farms situation in the study area respectively.

*Contribution of information technology on farm production and productivity*

Information technology brings improvement in farm operations and planning which improves farm production and productivity. The foremost visible impact was increase in output per unit area. It was visualized from Table 5 that the production of major field crops showed increase, which was observed 41 per cent in paddy followed by wheat (35%) and maize (29%) in Panchrukhi (Forward area).

**Table 5:** Contribution of information technology on existing farm production (Per farm)

| Sr. No. | Crops | Panchrukhi | | Nagrota Surian | | Overall | |
|---|---|---|---|---|---|---|---|
| | | Existing produc Tion (q) | Contrib ution of IT (%) | Existing produ ction (q) | Contri bution of IT (%) | Existing produ Ction (q) | Contrib ution of IT (%) |
| 1 | Maize | 0.22 | 29.00 | 0.24 | 30.00 | 0.23 | 29.60 |
| 2 | Paddy | 24.50 | 41.00 | 4.06 | 27.50 | 14.28 | 34.30 |
| 3 | Wheat | 36.00 | 35.00 | 26.00 | 32.50 | 31.00 | 33.70 |
| 4 | Pulses/mash | - | - | 1.00 | 23.00 | 0.50 | 23.00 |
| 5 | Vegetables | 1.55 | 36.50 | 22.35 | 29.00 | 13.73 | 32.80 |
| 6 | Potato | 18.00 | 22.50 | - | - | - | 22.50 |
| 7 | Sugarcane | - | - | 3.90 | 17.50 | 1.95 | 17.50 |
| 8 | Berseem | 3.00 | 6.50 | 5.40 | 8.00 | 4.13 | 7.30 |
| 9 | Tea | 1.50 | 12.00 | - | - | 0.75 | 12.00 |

Where as in Nagrota Surian, maximum increase was observed in wheat (32.5 %) followed by maize (30 %) and paddy (27.5%). In pulses, significant contribution of information technology was noted in production/ productivity (23%) in Nagrota Surian. The results were inconclusive for Panchrukhi as these crops were missing on sample farms. In vegetables, Table 5 further displayed the impact of information technology on production/ productivity of commercial crops including vegetable, potato, sugarcane and tea. The impact of information was quite discernible on all the situations in vegetables. In Panchrukhi increase was significantly higher (36.5%) as against the Nagrota Surian (29%). However, low impact was visible in case of berseem. This may be due to less emphasis towards forage crops. The potato was the commercial crop of Panchrukhi block and contribution of IT in potato production was recorded 22.5 per cent. The sugarcane was climatically commercial crop of Nagrota Surian and tea was in Panchrukhi. The contribution of information technology was noted 17.5 and 12.0 per cent in the respective crop.

On overall farms situation, highest contribution of information technology in cereals production was noted in paddy (34.3%) followed by wheat (33.7%) and maize (29.6%).

In vegetables the contribution of information technology was 32.8 per cent followed by potato (22.5%), sugarcane (17.5%) and tea (12%). The lowest contribution was noted in production of berseem crop (7.3%). The perusal of this table clearly showed substantial impact of information technology in enhancing productivity and production of all crops in the districts.

*Contribution of information technology on farm income*

The overall impact of information technology on land productivity has been summarized through Table 6. As seen earlier, the information technology spread in all the situations in study area has resulted into increased yield of crops. As such, per farm production increased significantly across all the areas of the district. This increased production ultimately led to increased income per farm. Table 6 indicated that the crop-wise contribution of information technology on farm income ranged from 41 per cent in Paddy to 6.5 per cent in berseem in Panchrukhi. Whereas, in Nagrota Surian highest increase was noted in wheat crop (32 %) and lowest in berseem (8.0%).

On overall farm situation crop-wise contribution of information technology indicated that the highest contribution of information technology was noted in paddy (34.3%) followed by wheat (33.70 %), vegetables (32.8%), maize (29.5%), pulses/mash (23%), potato (22.5%), sugarcane (17.5%), tea (12.0%), and berseem (7.3%).

**Table 6:** Contribution of Information technology on farm income of sample households (Per farm)

| Sr. No | Crops | Panchrukhi | | | Nagrota Surian | | | Overall | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Total income (Rs) | Contribution of IT (Rs) | % contribution of IT on total income | Total income (Rs) | Contribution of IT(Rs) | % contribution of IT on total income | Total income (Rs) | Contribution of IT (Rs) | % contribution of IT on total income |
| 1. | Maize | 343 | 99.47 | 29.0 | 494 | 148.20 | 30.0 | 418.5 | 123.45 | 29.5 |
| 2. | Paddy | 47775 | 19587.75 | 41.0 | 5765 | 1585.38 | 27.5 | 26770.0 | 9182.11 | 34.3 |
| 3. | Wheat | 61200 | 21420.00 | 35.0 | 45760 | 14872.00 | 32.5 | 53480.0 | 18022.76 | 33.7 |
| 4. | Pulses/mash | - | - | - | 7500 | 1725.00 | 23.0 | 3750.0 | 862.50 | 23.0 |
| 5. | Vegetables | 2195 | 801.18 | 36.5 | 50800 | 14732.00 | 29.0 | 26497.5 | 8691.18 | 32.8 |
| 6. | Potato | 18000 | 4050.00 | 22.5 | - | | - | 9000.0 | 2025.00 | 22.5 |
| 7. | Sugarcane | - | - | - | 1560 | 273.00 | 17.5 | 780.0 | 136.50 | 17.5 |
| 8. | Berseem | 900 | 58.50 | 6.5 | 1674 | 87.86 | 8.0 | 1287.0 | 93.95 | 7.3 |
| 9. | Tea | 15000 | 1800.00 | 12.0 | - | - | - | 7500.0 | 900.00 | 12.0 |
| 10. | Total | 145413 | 47816.9 | 32.88 | 113553 | 33423.44 | 29.43 | 129483 | 40037.45 | 30.92 |

The total contribution of information technology on per farm income was estimated Rs. 47,817 in Panchrukhi, Rs 33,423 in Nagrota Surian and Rs. 40,037 on an overall farms situation, which accounted for about 33, 29 and 31 per cent respectively.

Thus, it can be concluded from the table that information technology is the most important input to increase the farm income in all type of farm situations. Similar results had been obtained by Rheingold (2005) in a study conducted in china about phones and market mobile technology in rural development. He indicated that farms could earn 60 per cent more on their crops if they had access to telephone to learn the true prices in nearby urban markets.

*Net income of information technology*

Net contribution of information technology indicates the output/return of the information technology on the farm economy. The computation of all costs involved through information technology access on the farm is necessary to determine the real profit of information technology. The cost incurred on different inputs and actual charges of the information technology in the study area has been computed and presented in Table 7. It is evident from the table that the addition human labor cost added for additional inputs with the access of information technology was around Rs. 1,078, Rs. 713 and Rs. 895 per farm in Panchrukhi, Nagrota Surian and overall farm situations respectively. The human labour cost with the access of information technology through time consumption was around Rs. 46.5,

Rs. 21.25 and Rs. 33.88 per farm in Panchrukhi, Nagrota Surian and on an average farms situation respectively. Total addition cost of human labour was around Rs. 1,124.10, Rs. 734.25 and Rs. 929.18 per farm in Panchrukhi, Nagrota Surian and on an average farms situation respectively. Cost of additional critical inputs was also, noted higher in Panchrukhi (Rs 2, 068.80 per farm), as compared to Nagrota Surian (Rs. 1, 536.20 per farm). On an average farms situation the cost of additional critical inputs with access of information technology was Rs. 1,802.50 per farm. The higher net additional costs of human labor and critical inputs in Panchrukhi area indicated that the farmers of forward area were more conscious about new technology and inputs than the backward area of the study area. Cost of information technology charges were around Rs. 416, Rs. 324 and Rs. 370 in Panchrukhi, Nagrota Surian and overall farm situations in the study area, respectively. It revealed that the farmers of advanced area were more aware about the use of farm information technology as compared to the backward area. The total additional cost with the access of information technology was higher in Panchrukhi area (Rs. 3,608.60/ farm) as against the Nagrota Surian (Rs. 2,594.45/farm). On overall farm situation per farm cost was Rs. 3,101.58.The net additional returns over total cost of information technology and additional inputs were Rs. 44,208.30, 30828.99 and 36935.87 per farm in Panchrukhi, Nagrota Surian and overall farm situations respectively. Net contribution of information technology in total farm income was 30.40, 27.15 and 28.53 per cent in Panchrukhi, Nagrota Surian and overall farms situation respectively. The output-input ratio analysis of the information technology indicated its superiority, it contributes 13 times more with per rupee cost. As with the investment of one rupee on information through technology, it will return around Rs. 13 per farm on all the farm situations of the study area. Therefore, information technology enhancement should be adopted as a major policy.

**Table 7:** Net contribution of the information technology (IT) on sample farms (Rs/farm)

| Sr. No. | Particulars | Panchrukhi | Nagrota Surian | Overall |
|---|---|---|---|---|
| 1. | Gross farm income | 145413.00 | 113553.00 | 129483.00 |
| 2. | IT Contribution on gross farm income | 47816.90 | 33423.44 | 40037.45 |
| 3. | Cost addition through IT | | | |
| 3.1 | Additional human labour cost to use critical inputs | 1077.60 | 713.00 | 895.30 |
| 3.2 | Human labour cost through IT use | 46.50 | 21.25 | 33.88 |
| 3.3 | Total additional cost of human labour (3.1+3.2) | 1124.10 | 734.25 | 929.18 |
| 3.4 | Cost of addition of critical inputs on farm | 2068.80 | 1536.20 | 1802.50 |
| 3.5 | Cost of information technological sources | 415.70 | 324.00 | 369.90 |
| 4. | Total additional costs (3.3+3.4+3.5) | 3608.60 | 2594.45 | 3101.58 |
| 5. | Net additional income through IT | 44208.30 | 30828.99 | 36935.87 |
| 6. | Net per cent contribution in total income through IT | 30.40 | 27.15 | 28.53 |
| 7. | Out- input ratio ( sr.no.2/4) | 13.25 | 12.88 | 12.91 |

*Suggestion and policy Implications*

Majority of the respondents in advanced and backward areas of the state (H.P.) were getting agricultural related information through mobiles, television, landlines and radio which accounted more than three-fourth of the total expenditure on information technology. Whereas vast majority of the respondents did not use internet and email services, accounted only about 6 per cent of the total cost on information technology (IT) services in farming. Therefore, to increase the use of these facilities the state Government should provide subsidy to the farmers. The significantly higher time saved with the one unit through information technology has more utility in backward area as compared to forward area in the study area. Therefore it is suggested that there is a need of deep penetration of information system like mobile phones and other facilities through joint venture with the private sector, NGO and government to enrich information technological system in terms of both hardware and software and the relevant content creation relating to farming support in rural area.

A critical analysis of the results revealed that with the marginal saving of time through information

technology generated additional employment in farming. The addition was higher in forward area (Panchrukhi block) as compared to backward area (Nagrota Surian block). This, calls for taking necessary steps to provide easy cases of information technological knowledge to the farmers through rural information clinics or rural Internet *chaupals* by the enthusiastic young entrepreneurs well trained information communication technology agents, SAUs, and ICAR Institutes located in the study area in particular and state/ country in general.

Contribution of information technology on farm production and productivity showed substantial impact of information technology in enhancing productivity and production of all crops in the study area. Net contribution of IT in the total farm income was 30.40, 27.15 and 28.53 percent in Panchrukhi, Nagrota Surian and overall farm situations respectively.

The out- input ratio analysis of the IT indicated its superiority, it contribute 13 times more with per rupee cost on farming. As with the investment of one rupee on information through IT, it will return Rs. 13 per farm on all the farm situations of the study area. Therefore, information technology enhancement should be adopted as a major policy for the agricultural development in hill area of the state and country.