

A Study on Impact of ICT Enabled Web Portal (Krishinet) on Farmers

Vinod Singh* and V.L.V. Kameswari

Department of Agriculture Communication, G.B.P.U.A & T. Pantnagar, Uttarakhand, India

*Corresponding author: vinodsingh20081986@gmail.com (ORCID ID: 0000-0003-0748-5883)

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ABSTRACT

In recent years, there has been extensive investment in e-governance throughout the developing world. Still, little is known about the impact of those investments, partly due to a lack of assessment guidance. In this study modified sustainable livelihood framework approach was used for studying impact of the project on farmers. Before and after data was collected from the registered farmers using recall method to assess the impact of the project on all five types of capital (Natural capital, financial capital, human capital, physical capital and social capital). It was found that after implementation of the project, in the category of natural capital, average production and average sold quantity of rice, wheat, pigeon pea, mustard, and green gram has been significantly increased and in the category of financial capital, respondents' average family income, earning from agriculture and allied sector and benefit from government schemes has been significantly increased and in the category of human capital, average number of training received by respondents and average number of extension contacts made by respondents has been significantly increased and in the category of physical capital, average storage facility has been increased by respondents and in the category of social capital, average number of meetings attended by respondents in Krishi Gyan Kendra has been significantly increased.

Highlights

- ① This research paper assesses the direct and indirect contributions of ICT interventions in agriculture on final beneficiaries.
- ② This research paper is analyzed both qualitative and quantitative data to know whether and how an intervention is responsible for particular changes.

Keywords: Impact assessment, web portal, information communication technology, human capital, social capital, natural capital

In recent years, a number of developing countries have launched e-governance programs, and several development agencies and governments have identified e-government implementation as a key policy priority. ICTs can play a significant role in achieving societal transformation as it can be applied for processing, exchanging and managing data, information and knowledge. Recent developments in ICTs offer a great opportunity to facilitate flow of information and technology service delivery, especially to the farmers (Maningas 2006). Driven by the success of a few projects in improving delivery of services to citizens and businesses, an increasing number of governments are making ICT

investments in the public sector. On the other hand, evidence of failed projects has drawn attention to the level of risk involved in implementation. A failure rate of more than 50% is widely cited in this context (Heeks 2008). A study undertaken by Basant *et al.* (2006) researched firm-level impact of ICT in developing countries, but similar studies have not been undertaken for the public sector. A report by the United Nations (2003) laments the fact that documented research on the social or economic impact of e-government is virtually non-existent. A World Bank report (2002) notes that the largest, yet least monitored investments are ICT components of projects in different sectors, highlighting the



relevance of systematic assessment of the impact of these applications. One such initiative taken by the government is Krishinet portal. This portal was started by Government of Madhya Pradesh in July 2008 in all the 48 districts of Madhya Pradesh. More than 4000 employees have been trained in different operational modules to operate the portal and deliver intended services. Krishinet is the only 24X7 portal in Hindi, specifically addressing the information and advisory needs of more than 70 lakh farm families (about 75% of total population) of Madhya Pradesh and can be accessed at any place having internet connectivity. Krishinet is an ICT based project to provide information to farmers in their local (Hindi) language for improving their living standards by increasing their income from farming. Krishinet project mainly targets farming community, agriculture related agencies, agriculture related societies, NGOs, trainings centres, students, research workers, Agricultural Universities and *Krishi Vigyan Kendras*, traders, processing industry, government departments, extension workers and policy makers.

All the ICT initiatives are not uniform and there are disparities between regions in the level and quality of telecommunication, information and the efforts of individuals, public and private organizations and differential nature of demand of the farmers in the different areas. While these initiatives are intended to address the needs of the farmers through ICTs, their actual usage and ability to bring significant change on farmers need to be understood in greater detail. Heeks and Molla (2009) noted that ICTs are not fully utilised in agriculture. Scaling up of delivery, monitoring and evaluation still remains at experimental stage. There is much scope for sustainable impact arising from developmental-oriented ICT interventions, especially in the field of agriculture. One such ICT initiative was Krishinet portal of Government of Madhya Pradesh. The portal was started in 2007. It has several unique features that can help the farmers. Krishinet is an ICT based project to provide information to farmers in their local language (Hindi) round the clock, it means farmers can access the information at any time. Krishinet portal equips farmers and field level extension workers with information on weather, pest management current market price, etc. which is likely to increase their risk taking capacity. Krishinet

portal also provides online help desk for various departmental schemes and programmes. The portal has a grievance redressal mechanism to reduce time, cost and energy spent by farming community on lodging complaints and getting a solution to their problems.

Hence, there is a need to study how and if greater accountability of agricultural information and other features of the portal had impacted the main target group i.e. the farmers. Keeping all the things in mind the present study has been undertaken with a view to know the Impact of Krishinet Portal on Farmers of Madhya Pradesh.

Literature Review

A number of such approaches were analyzed for impact assessment of ICT initiatives in India which are:

- (a) In a study on “Impact of Information and Communication Technologies in Agriculture Perception of the Farmers in Ramanathapuram District” found that 44.0 percent farmers had improvement in productivity after availing ICT application in agriculture and 33.7 percent farmers had change in the production of crops after availing ICT application in agriculture. It was also found that 50.0 percent farmers had improvement in the knowledge of modern agriculture after availing ICT application in agriculture (Kumar and Kumar 2012).
- (b) In a study on modern ICT for agricultural development and risk management in small holder agriculture in India found that farmers had been able to make profits by using different types of messages sent by RML. It was found that 40 percent of the farmers were able to increase their profits because of weather forecasts, commodity news and crop advice they received. By using the commodity price updates, about 60 percent of the farmers using RML services were able to earn profits (Mittal 2012).
- (c) In a comparison of e-Arik advisory services delivered to 500 farmers with traditional extension system using time and cost indicators found that sixteen fold less time was required for availing the services by



- the farmers and three fold less time was required to deliver the services to the farmers compared to the conventional extension system (Sravanan 2012).
- (d) In a study on the role of ICTs in poverty alleviation among rural farmers in Abia State, Nigeria found that 66 percent farmers enjoyed greater negotiating power through direct contact with the buyers and by eliminating middlemen. It was also found that farmers had increased access to market (64%) and small holders profit increased by 68 percent (Isife *et al.* 2013).
- (e) In a study on farm household level impact of Information and Communication Technology based agricultural market information in Ghana found more number of participants than non participants used improved seeds, attained higher level of food security indicators and spent more on pesticides (Ramatu *et al.* 2013).
- (f) In a study on impact of Programme called “Knowledge Help Extension Technology Initiative” (KHETI) in Madhya Pradesh, India and found that those in the KHETI group had more awareness and knowledge of extension services compared to the control group. Before and after comparison of beneficiaries, indicated that they perceive KHETI as a useful, faster, and better quality tool than other services (Fu and Akter 2012).
- (g) In a study on impact assessment of agri-portals found that farmers started following practices related to land preparation (20.48%), seeds/varieties (28.91%), seed treatment (36.14%), sowing method (29.915), spacing (24.09%), weeding (27.71%) and plant protection (24.09%) after being exposed to agri-portals (Yadav 2011).
- (h) In a study on e-Arik project found that 44 percent and 92 percent of farmers implemented the information on sustainable farm practices on paddy (*Oryza sativa*) and Khasi mandarin (*Citrus reticulata*) crops, respectively. After two years of project initiation, 55 percent of farmers developed new Khasi mandarin orchards in their Jhum fields, which means they permanently moved from old slash and burn agriculture (shifting cultivation) methods to settled cultivation (Drishti 2011).
- (i) In a study on the impact of mobile phones on Indian agriculture found that in Maharashtra, farmers reported a diverse set of benefits accruing from mobile phone usage including yield improvements, price realisation and increased revenues through better adjustment of supply to market demand. Further, the areas where farmers benefited from improved access to information included seed variety selection, best cultivation practices, protection from weather related damage, handling plant diseases and price realization (Mittal *et al.* 2010).
- (j) In a study on e-choupals in Madhya Pradesh found that e-choupals led to a reduction in price dispersion (Goyal 2010).
- (k) In a study on the effect of mobile phone coverage on farm-gate prices in West Africa found that the introduction of mobile telephony reduced producer price dispersion for cowpea by six percent, and that the effect was stronger for markets that are farther apart and for those linked by unpaved roads (Aker and Fafchamps 2010).

Research Methodology

The present study was purposively conducted in Jabalpur, patan, sihora and panagar block of Jabalpur district of Madhya Pradesh to study the relationship between profile characteristics of farmers and impact of krishinet portal on farmers. Total 280 farmers were selected for the present study to simple random sampling by using chit method. Eight percent farmers from the registered list of users from the selected blocks were chosen for the study. Impact can be conceptualized as the difference between what happened due to the project or program and what the situation would have been if the intervention had not been made, i.e., the counterfactual situation. For this study of impact of Krishient portal modified sustainable livelihood framework was used. Before and after data was collected from the registered farmers using recall method to assess the impact of the project on all five types of capital (Natural capital, financial



capital, human capital, physical capital and social capital). In present study for analysis of the impact of the portal on respondents in the study area, before and after data was analysed using paired t-test and Z-test was used for parameters which required a dichotomous response of yes or no.

RESULTS AND DISCUSSION

Krishinet portal offers a variety of information related to agriculture and allied sectors for the benefit of farmers. An assessment of the impact was essential so as to determine whether the portal was meeting the objectives set forth initially. Impact assessment would also help in measuring the changes that have occurred due to the portal. Impact of Krishinet portal was studied in terms of five capitals; viz: natural capital, social capital, human capital, physical capital and financial capital outlined in the Sustainable Livelihood Framework used for the present study. Impact of Krishinet portal on each of these capitals has been given below:

1. Natural Capital

Natural capital refers to natural resource stocks from which resource flows and services useful for livelihoods are derived (DFID, 2000). Under natural capital, four aspects; viz: production, quantity of crop sold, number of livestock and milk production per household were studied.

Table 1: Impact of Krishinet (paired t-test)

Sl. No.	Capitals	Production		t (cal)
		Before	After	
1. Natural Capital				
(A) Average production (in quintals)				
(a)	Rice	38.18	49.17	7.091*
(b)	Wheat	34.80	47.29	9.280*
(c)	Chickpea	11.57	12.39	1.640
(d)	Soybean	12.98	11.94	-1.812
(e)	Pigeon pea	4.45	6.88	7.570*
(f)	Mustard	4.39	6.74	4.640*
(g)	Green gram	3.05	4.65	3.230*
(B) Average quantity sold (in quintals)				
(a)	Rice	31.00	40.98	9.933*
(b)	Wheat	22.94	33.38	8.533*
(c)	Chickpea	10.71	11.67	1.444
(d)	Soybean	9.21	8.25	-1.499

(e)	Pigeon pea	3.01	5.65	9.782*
(f)	Mustard	3.08	4.44	4.944*
(g)	Green gram	2.57	3.59	2.566*

2. Financial Capital

a)	Average family income (in ₹)	41273.00	67358.00	9.788*
b)	Average credit availed (in ₹)	30091.00	35321.00	1.843
c)	Total earning from agriculture and allied sector (in ₹)	34857.00	55039.00	10.13*
d)	Average number of Government schemes availed (in numbers)	1.37	1.45	5.925*

3. Human capital

(a)	Average Number of trainings received (per year)	2.03	2.43	11.55*
(b)	Average number of extension contacts (per year)	1.51	2.27	14.22*

4. Physical capital

(a)	Average storage availed (in quintal)	43.33	65.87	7.102*
(b)	Average number of irrigation sources	1.18	1.25	1.154

5. Social Capital

(a)	Average number of social gatherings attended by respondents	1.11	1.23	1.269
(b)	Average number of meetings attended by respondents in Krishi Gyan Kendra	1.51	1.77	8.987*

*Significant at $p < 0.05$ level.

(A) Average production

(a) Rice: Out of 280 farmers 277 farmers cultivating rice and remaining farmers were not cultivating rice because of non availability of proper irrigation facility. It was found that before implementation of the project average production of rice was 38.184 quintals but after implementation of the project it increased upto 49.173 quintals. Production of rice increased because respondents were getting information related to new and hybrid variety of rice, modern technology, field preparation, integrated pest management, disease management and also some success stories of farmers from Krishinet portal. Paired t-test revealed that the t



value of 7.09 was greater than the t critical value of 1.96 at 0.05 level of significance for 276 degrees of freedom. Hence, it was concluded that there was significant increase in production of rice after implementation of the project.

(b) Wheat: Out of 280 farmers, only 270 farmers were cultivating wheat and remaining farmers were not cultivating wheat because of unavailability of proper irrigation facility. It was found that before implementation of the project average production of wheat in the study area was 34.800 quintals but after implementation of the project it increased to 47.296 quintals. Paired t-test revealed that the t value of 9.28 was greater than the t critical value of 1.96 at the 0.05 level of significance for 269 degrees of freedom. Hence, it was concluded that there was significant difference in the production of wheat before and after implementation of the project.

(c) Chickpea: Out of 280 farmers only 222 farmers were cultivating chickpea and remaining were not cultivating because they found farming of chickpea was more costly and the market rate of the crop was also not good. It was found that before implementation of the project average production of chickpea was 11.57 quintals but after implementation of the project it increased upto 12.39 quintals. Production of chickpea increased because following Krishinet Portal as farmers were getting information related to new market price, hybrid variety of chickpea seed, better agronomic practices, modern technology, irrigation management, sowing method, field preparation, integrated pest management and disease management. Paired t-test revealed that the t value of 1.64 was less than t critical value of 1.97 at 0.05 level of significance for 221 degrees of freedom. Hence, it was concluded that the increase in production of chickpea after implementation of the project was not significantly greater than its production before implementation of the project.

(d) Soyabean: Out of 280 farmers only 184 farmers (65.71%) were cultivating soyabean and remaining farmers were not cultivating because of its disease prone nature. It was found that before implementation of the project average production of soyabean in the study area was 12.983 quintals but after implementation of the project it decreased to 11.948 quintals. Production of soyabean decreased because there were frequent occurrences of disease

in the crop. As a result, many farmers left cultivation of soyabean. It was also found that the information related to control measures provided on portal were not effective. Paired t-test revealed that the t value of -1.812 was less than t critical value of 1.97 at the 0.05 level of significance for 183 degrees of freedom. Hence, it was concluded that there was no significant difference in the production of soyabean before and after implementation of the project.

(e) Pigeonpea: Out of 280 farmers only 137 farmers (48.73%) were cultivating the crop and remaining farmers were not cultivating the crop because of the problem of destruction by wild animals (especially Nilgai). It was found that before implementation of the project, average production of pigeonpea was 4.456 quintals but after implementation of the project it increased to 6.886 quintals. Increase in production of pigeonpea can be attributed to information provided regarding field selection, field preparation, varietal selection, sowing time, sowing method, seed quality, seed treatment, irrigation, disease management, pest management and harvesting technology by the portal. Paired t-test revealed that the t value of 7.570 was greater than the t critical value of 1.97 at 0.05 level of significance for 136 degrees of freedom. Hence, it was concluded that there was a significant increase in production of pigeonpea after implementation of the project.

(f) Mustard: Out of 280 farmers only 105 farmers (37.50%) were cultivated mustard crop and remaining were not cultivating because they believed that it reduced the production of wheat during intercropping crop which was their main crop. It was found the average production of mustard before implementation of the project was 4.391 quintals but after implementation of the project it increased upto 6.740 quintals. Production of mustard increased because after implementation of the project respondents were getting information related to field selection, crop rotation for irrigated and unirrigated areas, seed treatment, sowing time, sowing method, fertiliser application and disease management from Krishinet portal. Paired t-test revealed that the t value of 4.640 was greater than the t critical value of 1.98 at 0.05 level of significance for 104 degrees of freedom. Hence, it was concluded that there was a significant increase in production of mustard after implementation of the project.



(g) Green gram: Out of 280 farmers only 56 farmers (20%) were cultivating greengram. Remaining were not cultivating the crop because of its disease prone nature and less domestic use of crop. It was found that before implementation of the project, average production of moong was 3.050 quintals but after implementation of the project it increased to 4.650 quintals. Paired t-test revealed that the t value of 3.230 was greater than the t critical value of 2.004 at 0.05 level of significance for 55 degrees of freedom. Therefore, it was concluded that there was a significant increase in the production of moong after implementation of the project.

(B) Quantity of crop sold

(a) Rice: All the farmers who cultivated rice (277) sold some of the produce to earn cash. It was found that the average quantity of rice sold before implementation of the project was 31.003 quintals but after implementation of the project it increased to 40.981 quintals. There was an increase in the quantity of rice sold because farmers had greater surplus and got higher price due to availability of price information on Krishinet Portal. Paired t-test revealed that the t value of 9.93 exceeded the t critical value of 1.968 at 0.05 level of significance for 276 degrees of freedom. Hence, it was concluded that the quantity of rice sold by the farmers after implementation of the project was significantly more than the quantity sold before implementation of the project.

(b) Wheat: All the farmers who were cultivated wheat (270 farmers) sold some portion to earn cash. Data indicated that 22.944 quintals of wheat was sold prior to the implementation of the project but after implementation of the project it increased to 33.381 quintals. There was an increase in quantity of wheat sold because farmers had greater surplus and received higher price due to availability of price information on Krishinet Portal. Paired t-test revealed that the t value of 8.533 exceeded the t critical value of 1.968 at 0.05 level of significance for 269 degrees of freedom. Hence, it was concluded that significantly greater quantity of wheat was sold after implementation of the project.

(c) Chickpea: All 222 farmers who cultivated chickpea, sold the crop in the market. It was found that on an average 10.71 quintals of chickpea was sold by the farmers before implementation of the

project but after implementation of the project it increased to 11.67 quintals. Paired t-test revealed that the t value of 1.44 was less than the t critical value of 1.97 at 0.05 level of significance and 221 degrees of freedom. Hence, it was concluded that the increase in quantity of chickpea sold after implementation of the project were not significantly more than before implementation of the project.

(d) Soyabean: Out of total 280 farmers, 184 farmers who cultivated soyabean sold the crop in the market. Average quantity of soyabean sold was 9.211 quintals before the project but after implementation of the project it decreased to 8.255 quintals. There was a decrease in the quantity of soyabean sold because farmers had less production and the low quality of soyabean was also poor due to which they were not getting right price. Paired t-test revealed that the t value of -1.444 was less than t critical value of 1.97 at 0.05 level of significance for 183 degrees of freedom. Hence, it was concluded that decrease in the quantity of soyabean sold after implementation of the project was not significantly less than before implementation of the project.

(e) Pigeonpea: Only 137 farmers, out of the 280 cultivated pigeonpea and all of them sold the crop in the market. It was found that the average quantity of pigeonpea sold before the project was 3.014 quintals but after implementation of the project it increased to 5.656 quintals. Paired t-test revealed that the t value of 7.782 was greater than the t critical value of 1.977 at 0.05 level of significance for 136 degrees of freedom. Hence, it was concluded that increase quantity of pigeonpea sold after implementation of the project was significantly greater than before implementation of the project.

(f) Mustard: All 105 farmers who cultivated mustard in the study area sold the crop in the market. Average quantity of mustard sold before implementation of the project was 3.084 quintals but after implementation of the project it increased to 4.443 quintals. Quantity of mustard sold increased because farmers had greater surplus and they were getting price information on market price from Krishinet portal. Paired t-test revealed that the t value of 4.94 was greater than the t critical value of 1.98 at 0.05 level for 104 degrees of freedom. Therefore, it was concluded that the quantity of mustard sold after implementation of the project



was significantly more than the quantity sold before implementation of the project.

(g) Green gram: Out of 280 farmers only 56 farmers cultivated green gram and all of them sold the crop in the market. The average quantity of green gram sold before implementation of the project was 2.571 quintals but after implementation of the project it increased to 3.598 quintals. There was an increase in the quantity of green gram sold because there was a significant increase in production and hence farmers had surplus. Paired t-test revealed that the t value of 2.566 exceeded the t critical value of 2.004 at 0.05 level of significance for 55 degrees of freedom. Therefore, it was concluded that increase in quantity of green gram sold after implementation of the project was significantly more than before implementation of the project.

2. Financial Capital

Financial capital denotes financial resources that people use to achieve their livelihood objectives (DFID, 2000). Farmers' access to financial capital can directly affect their access to real capital. Without efficient financial capital markets, farmers might delay adopting more efficient technologies even if they become available. In this study we analyse the difference in components; viz: family income, credit availability, type of house, engagement in agri based enterprises, earning from agriculture and allied sectors, crop insurance, Kisan Credit Card, credit availed by family members, market information, subsidy availed, government scheme availed and insurance claim before and after implementation of the project were studied under financial capital.

(a) Average family income

It was found that before implementation of the project average family income in the study area was ₹ 41,273. But after implementation of the project with an increase of ₹ 26,085 it had become ₹ 67,358. Paired t-test revealed that the t value of 9.788 exceeded the t critical value of 1.96 at 0.05 level of significance for 279 degrees of freedom. Hence, it was concluded that there was significant increase in the average annual family income of respondents after implementation of the project. This can be attributed to the fact that Krishinet portal provided information to farmers on a variety of topics like agricultural practices, marketing, storage, crop

rotation, animal husbandry, government schemes, subsidy, etc. which directly or indirectly contributed to increase in household income.

(b) Credit availed

Out of 280 farmers only 113 farmers (40.36%) availed credit facility and the main purpose was purchase of inputs, such as seeds, fertilizers, diesel for tractor, cost of transplanting, etc. According to responses received from the respondents, it was found that before implementation of the project, average credit availed was ₹ 30091 but after implementation of the project, it increased to ₹ 35321. This was due to greater awareness about government schemes as the portal provided information related to credit facility in different sectors such as agriculture, horticulture, animal husbandry, agri business, agriculture machinery, etc. and procedure for availing them. However, paired t test revealed that the t value of 1.843 was less than t critical value of 1.982 at 0.05 level of significance for 112 degrees of freedom. This indicates that there was no significant increase in the credit availed by respondents after implementation of the project. This was because though the portal provided information on various schemes, the information was often incomplete due to which the farmers were not able to take full advantage and the process was long and cumbersome.

(c) Earning from agricultural and allied sector

As reported earlier, agriculture was the primary occupation of all the respondents and some of them were also engaged in secondary occupation. According to responses received from the farmers it was found that before implementation of the project earning from agricultural and allied sectors was ₹ 34,857. But after implementation of the project it increased to ₹ 55,039. Paired t-test revealed that the t value of 10.13 exceeded the t critical value of 1.96 at 0.05 level of significance for 279 degrees of freedom. Hence, it was concluded that there was significant increase in earning from agriculture and allied sector after implementation of the project. This was due to information on inputs available on the portal and market information that helped the farmers realize better prices for their produce. Information available on the portal also reduced the cost of cultivation, helped in diversification of agri entrepreneurship.



(d) Number of farmers availing government schemes

It was found that about half of the respondents (50.36%) had availed benefit of government schemes in the form of Price Support Scheme, *Pradhan Mantra Krishi Sinchai Yojana*, *Pradhan Mantri Fasal Bima Yojana*, *Mukhyamantri Krishak Samridhi Yojana*, *Annapurna Yojana*, *Nalkoop Khanan Yojana*, *Balram Tal Yojana*, Integrated Farming Scheme, Agricultural Marketing Schemes, etc. In the study area, it was found that before implementation of the project, average number of government schemes availed by the respondents was 1.37 but after implementation of the project it increased to 1.45. Paired t-test revealed that the t value of 5.925 exceeded the t critical value of 1.977 at 0.05 level of significance for 140 degrees of freedom. It was concluded that the increase in average number of government schemes availed by the farmers after implementation of the project was significantly greater than before implementation of the project.

3. Human Capital

Human capital represents the skills, knowledge, ability to work, good health, etc. that together enable people to pursue different livelihood strategies and achieve their livelihood objectives (DFID, 2000). Under human capital number of trainings received, number of innovations adopted, extension agencies contact, and number of migrant members in the family before and after implementation of the project were studied.

(a) Number of training received/acquired by respondents

Out of total 280 respondents, it was found that 210 farmers (75%) had received training. Remaining farmers did not receive any training as they were not selected by training organization and training camp programme was also not organized in their village. It was found that average number of trainings received by the respondents before implementation of the project was 2.03 but after implementation of the project it increased to 2.43. Paired t-test revealed that the t value of 11.55 exceeded the t critical value of 1.97 at 0.05 level of significance for 209 degrees of freedom. Hence, it was concluded that there was significant increase in number of trainings received by respondents after implementation of the project.

Most of the people who had received training were trained under the skill development initiative of the government.

(b) Extension agency contact

Out of total 280 farmers, it was found that 204 farmers (72.86%) contacted different extension agencies like *Krishi Gyan Kendra*, *Krishi Vigyan Kendra*, *Gram sevak*, extension officers, *Kisan Call Centre*, Subject Matter Specialist, Block Technology Manager, *Kisan Mitra* and *Kisan Didi*. Remaining farmers had not made any extension contact because of unaccessibility of these extension sources. It was found that before implementation of the project average number of extension contacts made by the respondents was 1.517 but after implementation of the Krishinet project it increased to 2.274 per year. Paired t-test revealed that the t value of 14.225 exceeds the t critical value of 1.971 at 0.05 level of significance for 203 degrees of freedom. Therefore, it was concluded that there was significant increase in number of extension contact by the respondents after implementation of the project. This can be attributed to the information on latest technologies provided on the portal and contact list of all agriculture related institutions.

4. Physical Capital

Physical capital comprises of basic infrastructure and goods needed to support livelihoods. Infrastructure consists of physical environment that helps people to meet their basic needs and to be more productive. Producer goods are tools and equipments that people use to function more productively (DFID, 2000). In this study, components; viz: godown facility, availability of hybrid seeds, grain storage capacity, irrigation sources, availability of food grain at household level, pest infestation and availability of experts at nearest KGK were studied.

(a) Grain storage capacity

In the study area out of 280 farmers, 195 farmers (69.64%) had grain storage capacity in the form of *kuthila* and *pala* and the remaining farmers did not have any grain storage facility in their homes because of shortage of space. During the study it was found that before implementation of the project grain storage capacity per household was 43.33 quintals but after implementation of the project it



increased to 65.871 quintals. Paired t-test revealed that the t value of 7.102 exceeded the t critical value of 1.972 at 0.05 level of significance for 194 degrees of freedom. Therefore, it was concluded the average grain storage capacity after implementation of the project was significantly more than before implementation of the project due to increase in production of various crops cultivated in the area.

(b) Number of irrigation sources

Out of 280 farmers, 75.71 percent respondents (212 farmers) had irrigation facilities in the form of well, borewell etc. whereas the remaining farmers were dependent on other farmers for irrigation. According to response received it was found that before implementation of the project number of irrigation sources per household was only 1.18 but after implementation of the project, the number of irrigation sources per household increased to 1.25. During interaction with the farmers it was found that those farmers who did not have their own irrigation facility before implementation of the project were now aware of irrigation schemes like *Nalkoop Khanan Yojana*, State Micro-irrigation Mission and *Balraam Tal Yojana* started by the government. However, paired t test revealed that the t value of 1.154 was less than t critical value of 1.971 at 0.05 level of significance for 211 degrees of freedom. Leading to the conclusion that the number of irrigation sources per household after implementation of the project was not significantly greater than the number before implementation of the project. While there had been an increase in the number of irrigation facilities, it was not significant because Krishinet Portal provided information related to different irrigation schemes started by state government but at the farmers' level they found it difficult to get assistance from the government for these schemes.

5. Social Capital

In the context of Sustainable Livelihoods Framework social capitals refers to social resources upon which people draw in pursuit of their livelihood objectives. These are developed mainly through networks and connectedness, either vertical (patron/client) or horizontal (between individuals with shared interests) that increase people's trust and ability to work together and expand their access to wider institutions, such as political or civic bodies; and

membership of more formalized groups which often entails adherence to mutually-agreed or commonly accepted rules, norms and sanctions; and relationships of trust, reciprocity and exchanges that facilitate co-operation, reduce transaction costs and may provide the basis for informal safety nets amongst the poor (DFID, 2000).

(a) Number of social gatherings attended

Out of the total 280 respondents, it was found that 151 respondents (53.93%) had participated in social gathering in the form of community work, animal control during crop season, etc. It was found that before implementation of the project average number of social gathering attended by respondents was 1.11 but after implementation of the project it increased to 1.23. Paired t test revealed that the t value of 1.269 was less than t critical value of 1.975 at 0.05 level of significance for 150 degrees of freedom. Hence, it can be concluded that while there was an increase in the number of social gatherings attending, it was not significant.

(b) Participation in meetings organised by *Krishi Gyan Kendra*

Out of total 280 respondents, it was found that 102 farmers (36.43%) had attended meetings organized by *Krishi Gyan Kendra*. The meetings were related to new crop varieties, disease and pest management, fertilizer application, harvesting and market. During the study it was found that before implementation of the project average number of meetings attended was 1.51 but after implementation of the project it increased to 1.77. Paired t-test revealed that the t value of 8.987 was more than the t critical value of 1.983 at 0.05 level of significance for 102 degrees of freedom. It was concluded that there was a significant increase in average number of meetings attended by respondents in *Krishi Gyan Kendra* after implementation of the project was. Under this project, interpersonal contacts through *kisan mitra* and *kisan didi* were more intensive. As a result, the farmers not only received information about the meetings and trainings programmes but were also keen to attend them as the government machinery was more prompt and responsive.

In this study some responses collected from the respondents in the form of yes or no answers and



for the analysis of these types components z-test was used. This has been given below:

Table 2: Impact of Krishient (z-test)

Sl. No.	Capitals	Before (%)	After (%)	Z(cal)
1. Financial capital				
(a)	Crop insurance	22.85	47.85	6.20*
(b)	KCC	31.07	68.21	8.80*
(c)	Market information	23.57	64.64	9.79*
(d)	Subsidy availed	30.00	57.50	6.56*
(e)	Engagement in agri based activities/enterprises	16.07	36.42	5.48*
2. Physical capital				
(a)	Uses of warehouse/godown/ cold storage facility	19.64	47.14	6.15*
(b)	Use of hybrid seeds	38.57	77.50	9.33*
3. Social capital				
(a)	Filing of online complaints	40.00	74.28	8.19*
(b)	Grievance redressal	16.78	59.64	10.45*
(c)	Membership to community organisations	40.35	59.64	7.22*

* Significant at $p < 0.05$ level.

1. Financial capital

(a) Number of farmers having crop insurance

Before implementation of the project only 22.85 percent respondents had crop insurance but after implementation of the project their number increased to 47.85 percent. z-test revealed that there was significant increase in number of respondents having crop insurance after implementation of the project. This can be attributed to the detailed crop insurance schemes such as *Pradhan Mantra Fasal Bima Yojana* and Unified Package Insurance Scheme given on the project. The portal carried information on these schemes along with details about operational guidelines, cost of kharif and rabi crop per hectare and scale of finance for each crop per hectare which increased farmers awareness towards crop insurance.

(b) Kisan Credit Card

In the study area, before implementation of the project only 31.07 percent farmers had KCC but after implementation of the project it increased to 68.21 percent. It was found that there was a significant

increase in the number of respondents having KCC after implementation of the project. Detailed information about *Kishan Credit Card* such as loan amount, time for repayment and interest rate was available on Krishinet portal.

(c) Market information

It was found that before implementation of the project only 23.57 percent respondents were availing market information but after implementation of the project their number increased to 64.64 percent. It was found that there was a significant increase in the number of farmers who sought market information after implementation of the project. Krishinet portal had a specially designed content "*AAJ KA MANDI KA BHAV*" (means today's market rate), which provided complete market information on minimum and maximum price, number of mandies and daily rate details, etc the respondents used this feature to get the best price for their produce.

(d) Subsidy availed

Before implementation of the project, only 30.00 percent respondents availed subsidy under various schemes but after implementation of the project it increased to 57.50 percent. That there was a significant increase in the number of respondents who availed subsidy after implementation of the project because they received detailed information about different subsidy schemes such as Price Support Scheme, *Mukhya matri Krishak Samridhi Yajana*, *Mukhya mantra Bhawantar Bhugtan Yajana*, National Food Security Mission, National Mission on Sustainable Development, *Rashtriya Krishi Vikas Yojana*, *Pradhan Mantra Krishi Sinchai Yajana*, *Paramparagat Krishi Vikas Yajana*, Soil Health Card Yojana, *National Biogas Yojana*, *Nalkoop Khanan*, State Microirrigation Mission etc. It was also scene that the portal made it easy to contact the concerned offices/officers.

(e) Engagement in agri based activities/ enterprises

In the study area, it was found that before implementation of the project only 16.07 percent respondents were engaged in agri based activities/ enterprises but after implementation of the project it increased to 36.42 percent. It was found that there was a significant increase in the number



of respondents who were engaged in agri based activities/enterprises after implementation of the project. The portal gave information on a variety of agri enterprises like certified seed, organic farming, dairy business, enterprises related to women, horticultural enterprises and food processing enterprises. This coupled with the ease of getting a loan may have led to increase in the number of people engaged in agri-enterprises.

2. Physical capital

(a) Use of Warehouse/Godown/Cold storage facility

It was found that before implementation of the project only 19.64 percent farmers were using the facility of Warehouse/Godown/Cold storage facilities but after implementation of the project it increased to 47.14 percent. It was found that there was a significant increase in the number of farmers who used such facilities after implementation of the project due to availability of information on such facilities, schemes, launched by the government and price information.

(b) Number of respondents using hybrid seeds

In the study area, it was found that before implementation of the project only 38.57 percent farmers were using hybrid seeds on their farms but after implementation of the project it increased to 77.50 percent. It was found that there was a significant increase in the number of farmers who were using the hybrid seeds in study area after implementation of the project. During the interaction with respondents it was found that earlier farmers were not using the hybrid seeds on their farm but after implementation of the project they were getting information about variety of seed, seed quantity, seed treatment with images on the portal along with detailed information about disease control measures and prevention of pest infestations which motivated the farmers to use hybrid seeds on their farming. Another important factor was the easy availability of hybrid seeds.

3. Social capital

(a) Filing of online complaints

It was found that before implementation of the

project only 40.00 percent respondents had filed online complaints regarding their grievances but after implementation of the project it increased to 74.28 percent. It was revealed that there was a significant increase in the number of online complaints filed by the farmers after implementation of the project because Krishinet portal provided easy platform to farmers to file online complaints.

(b) Grievances redressal

The study showed that earlier only 16.78 percent respondents received reply to their grievances but after implementation of the project it increased to 59.64 percent. The significant increase in grievances redressal was due to the complaints being in a public domain through Krishinet portal. Concerned officers were aware of the fact that information can be accessed by higher authorities and lack of response on their part can have serious repercussions.

(c) Membership to community organizations

It was seen that before implementation of the project only 40.35 percent respondents belonged to a community organizations but after implementation of the project their number increased to 59.64 percent. It was found that there was a significant increase in the number of respondents having membership to community organizations after implementation of the project. Information on various community organizations was available in public domain provided by Krishinet portal. Also, farmers now had digital platforms which they could use to contact one another and form networks.

CONCLUSION

The study was conducted on the impact of Krishinet portal on farmers of Madhya Pradesh. On the basis of findings it was concluded that maximum number of the respondents (87.50%) were male belonged to 38 to 51 years age group had education upto high school level, were living in semi-pakka house and belonged to OBC caste. It was found that respondents main occupation was farming, were living in medium size joint family, and earned less than ₹ 55000 annually. Maximum number of respondents had landholding of less than five acres, and major crops cultivated by them were paddy, wheat, chickpea, soyabean, pigeonpea and mustard. In the category of natural capital it was found that



there is significant increase in the production of rice, wheat, pigeonpea, mustard and greengram after implementation of the project. There was also significant increase in the quantity of the above crops sold. After implementation of the project. In the category of financial capital it was found that there was significant increase in average family income, total earning from agriculture and allied field, crop insurance, KCC holder, credit availed by members in the family, availability of market information, subsidy availed, number of insurance claim made and number of pakka houses after implementation of the project. In the category of human capital, it was found that there was significant increase in number of trainings received by farmers, number of extension contacts and engagement in agri based enterprises by respondents after implementation of the project. In the category of physical capital it was found that there was significant increase in the grain storage capacity and use of warehouse/godown/cold storage facility by respondents and uses of hybrid seed by respondents after implementation of the project. Lastly, under the category of social capital, it was found that there was significant increase in the number of meetings attended by respondents in *Krishi Gyan Kendra*, filing of online complaints for their grievances, grievance redressal and membership to community organisations after implementation of the project.

Results of the study also revealed that there was significant relationship between education, annual income, operational landholding, information seeking behaviour, attitude towards KKG, attitude towards ICTs and impact of portal. It was found that in the study area main constraints faced by respondents were lack of accessibility of Krishinet portal followed by slow internet speed, lack of training on use and application of portal, lack of experienced trainers and lack of technical support from the extension personnel.

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