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Performance of Pradhan Mantri FasalBima Yojana in Odisha: Some Micro-evidence from Bolangir District

Mamata Swain* and Basanti Renu Hembram**

Abstract

This paper assesses the operational efficiency of PMFBY as a risk management tool in Odisha on the basis of primary data collected from 80 loanee and 80 non-loanee insurance users and 40 non-users from drought prone Bolangir district. The paper finds that the farmers who are more dependent on cultivation to earn their livelihood are more exposed to risk and hence go for crop insurance. Farm size and household income significantly and positively influence the adoption behaviour of the farmers.PMFBY has not gained wide acceptance among the insurance users. Most of the insurance users remained neutral or were dissatisfied with the scheme. Delay in compensation payment, large loss assessment unit and non-coverage of individual and independent risk lead to dissatisfaction among the users. However, the non-users had not adopted the insurance as they were lacking in premium paying capacity and considered documentation of PMFBY to be complex.

Keywords: Crop Insurance, Agricultural Risk, Performance, Odisha

Introduction

In India, agriculture is a highly risky venture primarily due to uncertainty in crop production.Contrary to industrial production, crop production takes place in the open field and depends on various climatic parameters such as rainfall, temperature, sunshine, humidity etc. Any deviation from the requisite quantity at various growth stages of plant affects crop production adversely. Extreme weather events such as drought, flood, cyclone and storm surge inflict huge crop loss and destabilise rural livelihoods. Moreover, infestation of pest attack and plant diseases causes crop failure. Sometimes, erratic input supply and technology failure also reduce the crop yield. Thus, the small holder farmers operate in a very risky environment and these risks are unpredictable and thereby non-preventive in nature. Therefore, the government takes many measures to reduce risk and provide resilience to agriculture. Various risk mitigation measures taken by the Government include promoting cultivation of drought and flood resistant crop varieties, intercropping, extending irrigation facility, drought proofing, flood control, watershed management and launching crop insurance schemes.

Farmers often adopt various strategies to manage agricultural risk (Singh, 2010). Risk can be managed by avoiding, preventing, sharing, transferring and spreading it. Risk can be avoided by opting for alternative livelihood opportunities in non-farm sector. Some risks can be prevented by taking advance action like preventive pest control. Risks can be shared by giving lease of land to tenants. Risk can be transferred by insuring the crop yield and through forward contract. Risk may be spread through diversified farming and mixed cropping.

In spite of taking all precautionary measures when there is crop loss crop insurance comes to the rescue of the farmer. Crop insurance is a risk transfer mechanism and a risk adaptation measure that transfers the risk from the insured farmer to the insurer company. Farmers pay a small nominal amount as premium for insuring their output against an uncertain larger amount of loss, which will be compensated by the insurance

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company in the event of crop damage due to non-preventable risks. Insurance has great potential to provide income support to farmers, both by protecting them when shocks occur and by encouraging greater investment in crops that increases their yield and farm income. Therefore, there is a great need for crop insurance to provide economic support to farmers, stabilize their farm income, induce them to invest in agriculture, reduce their indebtedness and decrease the need for relief measures in the event of crop failure(Hazell, 1992).

In India, during the last two decades climate change has emerged as a major threat to agricultural development and rural livelihood (Swain, 2014). Climate change has manifested itself in terms of gradual increase in temperature, variability in rainfall and more importantly increase in frequency, intensity and duration of extreme weather events such as flood, drought, cyclone and storm surge. As a result, production risks have increased substantially. Odisha, located on the east coast of India is considered as the climate change hot spot of the country because of its long coastline, high dependence on agriculture, low irrigation coverage and high incidence of mass and chronic poverty.

Various crop insurance schemes have been implemented by Government of Odisha since 1981: Pilot Crop Insurance Scheme, Comprehensive Crop Insurance Scheme (CCIS), National Agricultural Insurance Scheme (NAIS), pilot Weather Based Crop Insurance Scheme (WBCIS), pilot Modified National Agricultural Insurance Scheme (MNAIS), and the latest Pradhan Mantri FasalBima Yojana (PMFBY). In the increased risky environment of climate change, globalisation and commercialisation of agriculture, there is a need to analyse the effectiveness of the latest crop insurance scheme i.e. PMFBY, currently under implementation in Odisha to suggest innovative insurance products to cater to the changed needs of the farmers.

Operational Mechanism of PMFBY

PMFBY was launched by Prime Minister Narendra Modi on 13thFebruary 2016. This scheme replaced National Agricultural Insurance Scheme (NAIS) and Modified National Agricultural Insurance Scheme (MNAIS) from Kharif 2016. Following the guidelines of the Government of India, Odisha has implemented PMFBY in all the thirty districts since 2016. PMFBY provides comprehensive insurance coverage against crop loss on account of non-preventable natural risks such as (i) Natural Fire and Lightning, (ii) Storm, Hailstorm, Cyclone, Typhoon, Tempest, Hurricane, Tornado etc. (iii) Flood, Inundation and Landslide (iv) Drought, Dry spells (v) Pests/ Diseases etc. This scheme is compulsory for loanee farmers who have availed crop loans from institutional sources of finance and non-loanees farmers can also insure their crops voluntarily. The objectives of the scheme are to provide financial support to the farmers in the event of failure, to stabilise their income, to encourage them to adopt innovative and modern agricultural practices and to ensure flow of credit to the agriculture sector.

The risk coverage of crop cycle has increased which include not only crop loss during plant growth stage but also prevented-sowing and post-harvest losses. Inundation has been incorporated as a localized calamity in addition to hailstorm and landslide for individual farm level assessment. An area approach has been adopted for settlement of claims for widespread damage. Notified Insurance unit has been reduced to Panchayat for major crops. Uniform maximum premium of only 2%, 1.5% and 5% is to be paid by farmers for all Kharif crops, Rabi Crops and Commercial/ horticultural crops respectively. There is provision of individual farm level assessment for Post-harvest losses against the cyclonic and unseasonal rains for the crops kept in the field for drying up to a period of 14 days.

The scale of finance in each district for each crop forms the basis for calculation of sum assured. This roughly corresponds to costs incurred in cultivation of crops and gives farmers adequate financial protection without any capping as followed in earlier schemes. The sum assured has doubled in the case of PMFBY in comparison to earlier schemes.

Private participation in crop insurance has been encouraged. A cluster approach has been adopted under which a group of districts with variable risk profile are allotted to an insurance company through bidding for a longer duration up to 3 years.

PMFBY is an actuarial model-based scheme where token premium is charged from the client farmers, and government pays the balance premium quoted by insurance companies selected by states through transparent bidding. However, the full liability of payment of claims lies with the insurance companies.

The claim amount is credited electronically to the individual farmer's bank account. Remote Sensing Technology, Smart phones and Drones are used for quick estimation of crop losses to ensure early settlement of claims. A Crop Insurance Portal has been launched. This is used extensively for ensuring better administration, co-ordination, transparency and dissemination of information. Focused attention and adequate publicity are given on increasing awareness about the schemes among all stakeholders and appropriate provisioning of resources for the same. Government is keen to improve the implementation of scheme by focusing on timely settlement of claims. There are penal provisions on agencies which cause delays in release of claims to farmers.

Objectives

In the above backdrop, the objectives of the study are

(i) To assess the operational efficiency of PMFBY in the state of Odisha;

(ii) To assess the satisfaction level of farmers with PMFBY and identify the causes of dissatisfaction if any;

(iii) To make suggestions for improving the efficacy and effectiveness of the scheme for managing agricultural risk.

Methodology and Study Area

In order to understand the effectiveness of PMFBY as a risk management tool at the ground level, a field survey was conducted in drought prone Bolangir District in Western Odisha, which is a part of the most backward KBK districts as designated by the Planning Commission. Bolangir is known for its high incidence of mass and chronic poverty and dominance of tribal population. Persistent crop failure, lack of access to the basic services and entitlements, starvation, malnutrition and migration are the leading manifestations in Bolangir. Severe droughts very often visit this region in quick succession.

Agriculture is very much vulnerable to agricultural risks because of low rainfall and variability in rainfall pattern. The annual normal rainfall in the district is 1289.8 mm which is lower that the state average rainfall of 1451.2 mm. Only 20.6 per cent of gross cropped area was irrigated during 2013-14, which was lower than the State average (38.9%). Thus, agriculture is still considered as a gamble in the monsoon. Farmers mostly follow mono-cropping and grow paddy in the Kharif season. During 2013-14, the cropping intensity of the district was 168 per cent and the yield rate of paddy was 4837 quintals per hectare. The consumptionof fertiliser was also low at 45.83 kg / ha.

In order to assess the performance of PMFBY, a multi stage stratified random sampling technique was followed to select the households for field survey. In the first stage, Bolangir district has been chosen as the study area because of its high vulnerability to drought as compared to other districts in Odisha.In the second stage, Bongomunda block was selected from the district. In the third stage, from this block, a cluster of six villages namely, Bhalumunda, Jurabandha, Sangamada, Turekela, Tentelpada, Kutrabeda were selected because of high coverage of PMFBY. Finally, 80 loanee PMFBY users, who were compulsorily covered under PMFBY and 80 non-loanee PMFBY users, who voluntarily purchased PMFBY were randomly chosen from the selected villages. To explore the reasons for non-adoption of crop insurance, 40 non-users of PMFBY were also randomly selected. Thus, a total of 200 households were included in the study. Primary data was collected from these households by direct interview method with the help of structured questionnaires.

Survey Findings

Socio-economic Profile of Insurance Users and Non-users

The functional efficiency of any agricultural insurance scheme depends on its adoption rate. The adoption of insurance in turn depends on various socio-economic characteristics of farmers which include their social composition, educational attainment, occupation and sources of income, land holding pattern, asset position and net farm income. Therefore, the socio-economic profile of insurance users and non-users in the study area has been examined and presented in Table 1.

A comparison of the socio-economic characteristics of users and non-users of crop insurance reveals that the majority of the loanee (80 per cent) and non-loanee (60 per cent) PMFBY users and non-users (77.5 per cent) belong to SEBCs. However, the percentage of SCs and STs insurance users is greater in the case of non-loanee (37.5 per cent) than that ofloanee (18.5 per cent) insurance users. Thus, the lower castes are more risk averse, and voluntarily adopting crop insurance as a risk management strategy. The proportion of farmers having education of primary level (class 5) and above is 51.2 per cent in case of loanees, 36.3 per cent in case of non-loanees and 57.5 per cent in case of non-users. Thus, it cannot be concluded that farmers with higher literacy rate have opted for insurance. As regards size of land ownership, a higher percentage of non-users are marginal and small farmers (62.5 per cent), owning land less than two hectares in comparison to loanee (42.5per cent) and non-loanee (32.5per cent) insurance users. With regard to sources of income, cultivation is the major source of income for all the sample households. Nevertheless, the percentage of income from cultivation to total income is significantly greater for loanee(56.5 per cent) and non-loanee(49.9per cent) insurance users than for non-users (32.5 per cent). Thus, the farmers, who are more dependent on agriculture to earn their livelihood, are buying insurance.

Table 1: Socio-Economic Profile of Insurance Users and Non-Users

Characteristics	PMFBY Users		PMFBY Non-Users
	Loanee	Non-loanee	
I. Caste in %			
a) General	1.2	2.5	7.5
b) SEBC	80.0	60.0	77.5
c) Scheduled Castes	10.0	27.5	7.5
d) Scheduled Tribes	8.8	10.0	7.5
II. Education in %			
a) Below Primary	48.8	63.7	42.5
b) Primary and above	51.2	36.3	57.5
III. Farmer Class in %			
a) MF/SF	42.5	32.5	62.5
b) Others	57.5	67.5	37.5
IV. Sources of Income			
a) % of Income from Cultivation	56.5	49.9	32.5
b) % of Income from Non-agricultural Wages	11.4	17.2	25.3
c) % of Income from Other Sources	32.1	32.9	42.2
d)Yield rate of Paddy (Qtls/Ha)	11.54	16.16	14.88
V. Farm Income and Cost of Cultivation Rs./Ha)			
a) Gross Income	13229	13758	15955
b) Total Cost of Cultivation	27824	36581	36091
c) Imputed Value of Family Labour	12788	16318	13019
d) Paid-out Cost of Cultivation	15036	20263	23071
e) Net Income	-1808	-6506	-7117

Source: Field Survey

Crop Yield and Farm Income

Paddy is the staple cereal crop grown in the study area. Paddy is cultivated during the Kharif season. Also, some farmers cultivate other crops like cotton, maize, arhar, ground nut, ginger, turmeric and sunflower. But most of the farmers depend upon paddy cultivation for their sustenance. They mainly practise rain-fed farming as irrigation facility (both surface and ground water) is not available in the study area.

During Kharif 2017, the per hectare yield rate of paddy for loanee and non-loanee insurance users and non-users was11.54 quintals, 16.16 quintals and 14.88 quintals respectively (Table 1). The non-loanee insurance users thus have a higher yield rate, demonstrating that progressive farmers come forward to insure their crops voluntarily.As the survey year was a drought year, almost all the households had a below normal yield. According to the farmers, the normal yield of Kharif paddy in their villages is 29 qtls/ha. Thus, in rainfed agriculture, farming is not profitable and subject to risks associated withrainfall variation.

Moreover, because of low yield owing to drought condition, the net income per hectare of Kharif paddy arrived at by deducting the cost of cultivation from gross income is found to be negative for all sample households. Among the users of crop insurance, the amount of loss met by the non-loanees (Rs.6506) is higher in comparison to loanees (Rs.1808), which has prompted them to adopt crop insurance voluntarily. However, it is observed that the highest amount of loss is borne by the non-users (Rs 7117/ha).

Who are Buying Insurance?

The survey attempted to find out the factors that positively influence the purchase of insurance. The loanees are compulsorily covered under PMFBY, therefore the option of buying insurance does not arise for them. But the non-loanees have adopted crop insurance voluntarily, whereas the non-users have not gone for insurance. Therefore, to identify the factors that influence the adoption of crop insurance, the t-test was applied to find out the level of significance between mean difference of various socio-economic variables of the non-loanee users and non-users of PMFBY. The results are shown in Table 2.

The t-test results show that there is significant difference in variables such as farm size, family size, age, livestock, household income and income from cultivation between non-loanee users and non-users of crop insurance. Thus, aged farmers with larger farm size, family size, livestock, household income and income from cultivation are more inclined to purchase insurance.However, there is no significant difference in education level, yield and income from other sources between non-loanee users and non-users of crop insurance. Contrary to usual expectation the non-users were having higher level of education than that of the non-loanee users. This may be due to occupational diversification adopted by the educated non-users to manage risks, as the share of non-farm income in total household income is greater for them than non-loanee insurance users.

Table 2: Socio-Economic Characteristics of Non-Loanee Users and Non-Users of PMFBY

Parameters	Non-Loanee Users		Non-Users		Mean Difference	T	Significance
	Mean	S.D.	Mean	S.D.			
Farm size (Acres)	1.06	0.68	0.61	0.34	0.45	4.82	**
Age (Numbers)	47.69	10.63	44.58	8.47	3.11	1.74	*
Family size (Numbers)	5.35	2.14	4.83	1.43	0.52	1.60	*
Education (Years)	3.49	4.40	3.98	3.78	-0.49	-0.63	NS
Livestock (Rs.)	34651	27029	21345	16415	13306	3.43	**
Yield (per hectare)	16.16	7.72	14.88	3.56	4.16	1.24	NS
HH Asset	253015	131710	178406	162210	74609	2.52	**
Household income (Rs.)	110266	28754	79300	26438	30966	5.82	**
Income from Cultivation (Rs.)	55081	19493	25850	18749	29231	7.94	**
Income from Others (Rs.)	55185	23892	53450	19089	1735	0.36	NS

Source: Based on data collected through Field Survey

Note: ** Significant at 1 per cent; * Significant at 10 percent level; NS Not Significant

Risk Management Tools

Farmers face different types of production risks in agriculture. As reported by the respondent's drought is the major risk factor in the study area. In the study villages, drought conditions are not created by just deficits in rainfall but also variability in rainfall. Drought is a chronic phenomenon in the area and occurs almost every alternate year. Other important risk factors in the study area are pest attacks, plant diseases and variability in rainfall.

The farmers adopt various strategies to manage risks in case of crop loss due to occurrence of natural calamities, pest attacks or plant diseases.Crop insurance is considered as one of the important tools to manage risk by loanee insurance users. Off farm employment is considered most effective tool by non-loanee insurance users, but non-users regard maintaining financial/credit reserves and employment as more effective in managing risk.

Reasons for Adopting Crop Insurance

The sample farmers have given various reasons for adopting crop insurance. The non-loanees users of PMFBY were found to be more inclined to avoid risk because of which they had voluntarily opted for crop insurance. Both the loanee and non-loanee insurance users considered the premium amount charged was low which induced them to go for crop insurance. Some users also indicated that they were influenced by the advice by the progressive farmers. Moreover, they also considered crop insurance as an instrument for reduction of risk and providing financial security and viewed this as the main reason for insuring their crop.

The farmers expect that crop insurance should cushion the shock of crop loss by assuring them protection against natural hazards beyond their control. Even if there is a need for crop insurance in the risky environment of the study area, farmers are not coming forward in large numbers to insure their crops. Hence, the efficacy of the existing insurance scheme is assessed by eliciting the satisfaction and dissatisfaction level of insurance users. Also, an attempt has been made to explore the reasons for dissatisfaction and how to improve the functional efficiency of the scheme.

Satisfaction with Crop Insurance Scheme

The farmers were asked to rate their level of satisfaction with the insurance schemes, the results of which appear in Table 3. The results show that only 6.2 per cent of the total loanee PMFBY users and 3.8 per cent of the non-loanee PMFBY users expressed satisfaction with the scheme. Thus, most of the insured farmers were either neutral having no strong opinion on the schemeor were dissatisfied with the scheme.

Table 3 : Satisfaction of Insurance Users with PMFBY: Frequency of Responses of Insurance Users

Number of Households

Level of Satisfaction (1)	Loanee (2)	Non-Loanee (3)
Strongly Dissatisfied	0 (0.0)	1 (1.2)
Dissatisfied	19 (23.8)	9 (11.2)
Neither Satisfied nor Dissatisfied	56 (70.0)	67 (83.8)
Satisfied	5 (6.2)	3 (3.8)
Strongly Satisfied	0 (0.0)	0 (0.0)
Total	80 (100.0)	80 (100.0)

Source : Field Survey

Note : Figures within parentheses indicate percentages of total.

In order to find out the reasons for their dissatisfaction, the insurance users were asked to rank the three most important reasons as 1st, 2nd and 3rd.The percentage weighted score is calculated by assigning the value of 3, 2 and 1 to first important, second important and third important rank, respectively. Table 4 gives the data on the frequency of responses and the percentage weighted score on various causes of dissatisfaction.

Both loanee and non-loanee insurance users were not satisfied with crop insurance mainly because of delay in compensation payment with weighted score of 48 per cent and 27.9 per cent respectively. Moreover, users of PMFBY also complain about individual, independent risk not being coveredunder the scheme and express their dissatisfaction relating to the unit area being very large for loss assessment. The non-loanees (27.1 per cent) were also dissatisfied because of non-availability of proper facilities at financial institutions (Table 4).

Table 4 : Reasons for Dissatisfaction with Crop Insurance Scheme: Frequency of Response of Insurance Users

Number of Households

Sl. No.	Reasons	Loanee-Rank				Non-Loanee-Rank			
		1st Reason	2nd Reason	3rd Reason	Weighted Score in%	1st Reason	2nd Reason	3rd Reason	Weighted Score in%
1.	High Premium	69	4	1	4.2	39	3	2	5.8
2.	Delay in Compensation Payment	4	41	31	48.0	32	15	3	27.9
3.	Loss assessment unit is very large	2	27	29	27.8	5	26	15	17.7
4.	Individual, independent risk is not covered	0	3	13	19.8	1	29	9	15.2
5.	Proper facilities are not available at financial institutions	0	0	1	0.2	0	2	23	27.1
6.	Payout is very low	0	0	0	0.0	0	2	25	6.3
7.	Total	75	75	75	100.0	77	77	77	100.0

Source : Field Survey

Note : The total number of dissatisfied loanee users is 75 and dissatisfied non-loanee users is 77 asshown in Table 3.

During personal interaction with insurance users, it was observed that many loanee farmers compulsorily covered under PMFBY indicated ignorance about the coverage of their crops under crop insurance. Moreover, there was undue delay (more than six months) in payment of compensation as the assessment of yield on the basis of crop cutting experiments was a time-consuming process. Overall the PMFBY failed to stabilise income of the insurance usersand provide them economic support during adverse circumstances.

Reasons for Non-adoption of Crop Insurance

The sample non-users of crop insurance were interviewed to explore the reasons for non-adoption of PMFBY. Table 5 gives the data on the frequency of responses and the percentage weighted score on various causes of non-adoption by the non-users.The farmers cited two most important reasons for not taking up insurance: lack of premium paying capacity (37.9 per cent) and complex documentation (34.2per cent). Moreover, they also affirmed that the time duration within which they must go for insurance was too short. Few non-users also reported other reasons such as delay in payment of the claims, dissatisfaction with indemnity level and difficulty in opening bank accounts for non-adoption of crop insurance. None of respondents suggest unawareness as a cause of non-adoption of PMFBY. However, the farmers have not understood the operational mechanism of the scheme.

Table 5 : Reasons for Not Availing Crop Insurance Scheme:Frequency of Responses of Insurance Non-Users

Number of Households

Sl. No.	Reasons	Non-User-Rank			Weighted Score in%
		1st Reason	2nd Reason	3rd Reason	
1.	Not aware of crop insurance	0	0	0	0.0
2.	Too complicated to understand and use	0	0	0	0.0
3.	Govt. will provide disaster relief/aid	0	0	0	0.0
4.	Lack of premium paying capacity	22	8	9	37.9
5.	Not aware of the facilities available	0	0	0	0.0
6.	Not satisfied with crops covered	0	1	0	0.8
7.	Not satisfied with area approach	0	0	0	0.0
8.	Inadequate publicity of the scheme	0	2	0	1.7
9.	Complex documentation	8	26	6	34.2
10.	Lack of service/co-operation from the bank	0	1	0	0.8
11.	No faith in scheme	0	0	0	0.0
12.	No faith in agency	0	0	0	0.0
13.	Delay in claim payment	0	1	10	5.0
14.	Not satisfied with indemnity level	1	0	6	3.8
15.	Difficulties in opening bank accounts	1	0	5	3.3
16	I am tenant	0	0	0	0.0
17.	Others, specify	8	1	4	12.5
18.	Total	40	40	40	100.0

Source : Field Survey

Improving Scheme Performance

The sample farmers were interviewed to suggest measures to improve the operational efficiency of the scheme. Table 6 throws light on various suggestions given by the respondents with their weighted scores. The majority of the loanees with weighted score of 40.8 per cent suggested that covering more crops will improve the operational efficiency of the scheme. Many loanees (with weighted score of 23.5 per cent) also expressed that the premium rate charged for insuring crop must be reduced and individual assessment of crop loss (19.6 per cent) should be considered. Similarly, the non-loanees suggested a number of measures, which include reduction of premium (29.4 per cent), individual assessment of crop loss (26.9 per cent) and covering more crops (17.9 per cent) for improvement in the scheme.

Table 6 : Suggestions for Improving PMFBY by Insurance Users and Non-Users: Frequency of Responses

Number of Households

Sl. No.	Suggestions	Loanee Suggestion				Non-Loanee Suggestion				Non-User Suggestion			
		1st	2nd	3rd	W. Score in%	1st	2nd	3rd	W. Score in%	1st	2nd	3rd	W. Score in%
1.	Cover more crops	65	-	1	40.8	23	8	1	17.9	2	-	2	3.3
2.	Individual assessment	10	32	-	19.6	38	7	1	26.9	12	12	6	27.5
3.	Reduce premium	4	39	23	23.5	18	41	5	29.4	1	-	1	1.7
4.	Quick settlement of claims	1	7	29	9.6	1	12	30	11.9	16	1	1	21.3
5.	Making scheme voluntary	-	1	21	4.8	-	11	19	8.5	5	10	6	17.1
6.	Gram panchayat as unit of loss assessment	-	1	5	1.5	-	-	12	2.5	2	15	9	18.8
7.	Insurance service at your doorstep/at village level	-	-	1	0.2	-	1	7	1.9	-	-	7	2.8
8.	CCEs to be conducted in the presence of villagers/ insurance company's representatives	-	-	-	0.0	-	-	4	0.8	-	-	4	1.7
9.	Raisethe indemnity level from 60 % to 80-90%	-	-	-	0.0	-	-	1	0.2	2	2	4	5.8
10.	Others (specify)	-	-	-	0.0	-	-	-	0.0	-	-	-	0.0
11.	Total	80	80	80	100.0	80	80	80	100.0	40	40	40	100.0

Source : Field Survey

Note : W. Score denotes Weighted Score.

The non-users mainly proposed that along with individual assessment (27.5 per cent), settlement of claims should be quick (21.3 per cent). Many non-loaneesand non-users wanted the scheme to be voluntary with percentageweighted score of 11.9 and 21.3 respectively.Comparing the responses of both the users and non-users, more proportion of non-users desired that insurance service should be provided at the door step of farmers.

Many economists also attribute the low coverage of insurance to the insufficient attention paid by insurance agencies to awareness generation activities. The state government does not allot any funds to the Agriculture Insurance Company of India (AICI) to undertake awareness creationcampaign for popularisation of the scheme. According to the insurance users, the major sources of information on insurance schemes were bank representatives, progressive farmers, and friends and neighbours. They expressed their preference in fact for different types of media for the dissemination of information on the schemes, such as farmers' meeting (*kisansabha)*, the village fair, television and newspaper. The survey also asked questions about their preference for service providers for information dissemination on insurance schemes, in response to which they identified rural agents at their doorstep, rural agent at the village level, and the cooperative bank.

Conclusions and Policy Implications

Drought is the major risk factor in the study region of Bolangir district. Farmers recognise crop insurance as a basic instrument for maintaining stability in farm income. An analysis of the factors that influence the adoption behaviour of crop insurance reveals that farmers who are more dependent upon cultivation are more exposed to risk and hence are insuring their crops. Also, other factors such as farm size and household income significantly and positively influence the adoption of insurance.

The survey findings on performance of PMFBY reveal that a significant proportion of insurance users were not satisfied with the scheme. As low as 6.2 per cent of loanees and 3.8 per cent of non-loanees expressed their satisfaction with the scheme.The important reasons for dissatisfaction with the scheme as reported by

insurance users are delay in compensation payment, very large loss assessment unit. The users also complain about individual and independent risk not being covered under PMFBY. The non-users had not adopted insurance due to lack of premium paying capacity and its complex documentation. In the study area, insurance facility was available only for cultivation of paddy, however the farmers expectedthat insurance coverage should be extended to cash crops such as cotton and sunflower grown in the area.

As PMFBY is an area-based agricultural insurance scheme, it does not cover independent, idiosyncratic and individual risk. To make this possible, the private sector needs to be encouraged to provide insurance products for less severe events and for individual, independent, idiosyncratic and localized risk at actuarial premium. However, the public sector may continue to address catastrophic systemic risk and provide multi-peril insurance where the subsidy requirement is high.

To increase the coverage of the schemes, steps need to be taken to explain the operational mechanisms of different insurance schemes to farmers in simple terms in their local language. Rural agents who can come to individual household and the village can act as better service providers of insurance.There is a requirement for awareness creation by not only implementing agencies, but also PRIs, NGOs, CBOs and SHGs functioning in rural areas need to be encouraged to play an important role. Government has to promote adoption of crop insurance through advertisement via print and electronic media for sustainable livelihood of farmers and stabilising their income.

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A unique nexus between Human Development and ICT: An empirical evidence from selected South Asian Nations

Megha Jain* and Aishwarya Nagpal**

Abstract

In the era of the industrial revolution of the late 18th and 19th centuries, one seminal force has impacted everything. Today, the world is witnessing an even more histrionic turnaround due to the consolidation of many pervasive disruptive forces, especially in the domain of technology. Where human development has witnessed a propagation of innovation in technology-driven space in most of the eastern and westernized nations. Despite our awareness of all these alterations, most of the current studies have failed to comprehend its 2nd and 3rd order effects that might result. The indubitable realism is that technology strategy has to be made the business strategy in the era of IoT (Internet of Things) revolution. Taking this perspective, we contemplate the emergent prerequisite of the network society for human capital development in Asia due to its pervasive reach in a global society. Human intangible capital resources (being referred as an epitome of measuring 'New Wealth of Nations' by neo and contemporary economists) play a vital role to ensure the holistic economic development where per capita GDP may be a narrow indicator to map the economic well-being of any nation. Therefore, the current study focuses on how advanced information and communication technologies (ICTs) could promote human capital development with special reference to South Asian Region (SAR). The research methodology chosen is principally empirical along with descriptive analysis using fixed effects panel modeling. Where, social human capital is proxied by the Human Development Index (HDI) and the emergence of the network society is by key ICT parameters like technological readiness, mobile cellular subscriptions, and internet penetration. The same is supplemented by other key macroeconomic control variables like population growth, urbanization sprawl, etc. in order to obtain an umbrella view. The panel testing results hint towards the strong associations of (square transformations of) internet penetration, technological readiness, and (square root transformations of) mobile usage to the human development index. Furthermore, per capita GDP, birth life expectancy and school enrollment rate (components of HDI) are also tested separately in order to have an in-depth understanding of individual component level linkages of HDI with ICT and other macroeconomic demographic indicators. The overall results are found to be in sync with the key findings. Therefore, the study recommends a cohesive ecosystem that could amalgamate digital space with HDI. Additional steps shall be to nurture through skilled-human driven innovation that has the potential to generate economic value through a number of channels - internal as well as external towards the economic business of any nation. Since information without accountability could prove to be disastrous, so the best way forward is to place personnel first and then empower them. Consequently, the creation of social intangible capital could only be realized fully with the skill development and skill premiums upliftment to flag the sustainable global presence.

Keywords: ICT, Human Social Capital Development, Innovation, Mobile, Internet, India, South Asia

Introduction

In the 21st century, the existing literature supports the growing eminence of 'network society' as a key to human capital development (Tchamyou, 2017; Kuada, 2015). This new society is comprised of networks

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which often reflects the global society since networks don't have confined boundaries. In the saga of humanity, this era is expressed as 'the Information Age' - a distinguished phase of rising digital knowledge to facilitate access to, and administration of information (Mason 1986; Castells 2010). In fact, IT and ITeS are considered to be the most powerful tools as per the World Bank's 'knowledge economy index' to exercise impact on human capital development due to its ability of penetration. Rather, ICT is viewed to exert desired effects due to its possible ripple effects across innovative capacity and income levels. In this area, one of the remarkable feats includes the digital opportunity initiative (DOI) as was announced at the G-8 Okinawa Summit in the year 2000 that aims to ascertain the ICT roles in enhancing social equity and cultivating sustainable economic development.

Earlier in the 1990s, technological advancement used to account for a mere fifty percent of the mortality decline. However, today's landscape of such revolution is far more precipitous in comparison to the past, notably in the technology domain like memory storage, telecom costs, processor power (Moore's law), and bandwidth (Gilder's law). Still, there are vast North-South gaps that separate within South and North too. The same is generally termed as "digital divide". The incidences of 'Digital Divide' with a special reference to South Asian Region (SAR) already exist in the form of disparities within the cultures that need careful examination in terms of differing modes of distribution of resources and also technological ownership patterns of developing nations' societies.

In general, the concepts of 'societies'/ 'cultures'/ 'human development' are highly debated and largely remains misperceived. Still, GDP is considered to be the most popular proxy to depict and measure the magnitude of economic advancement by most of the nations. It is often said that the challenge lies in not only to manage the asset volume portfolio but also the constitution of the portfolio to require different types of capital like institutions, governance; in short the Social intangible capital. Human Development Index (HDI) is a composite qualitative indicator that depicts the level of social and economic development (well-being) of a country, coined by UNDP in 1990.

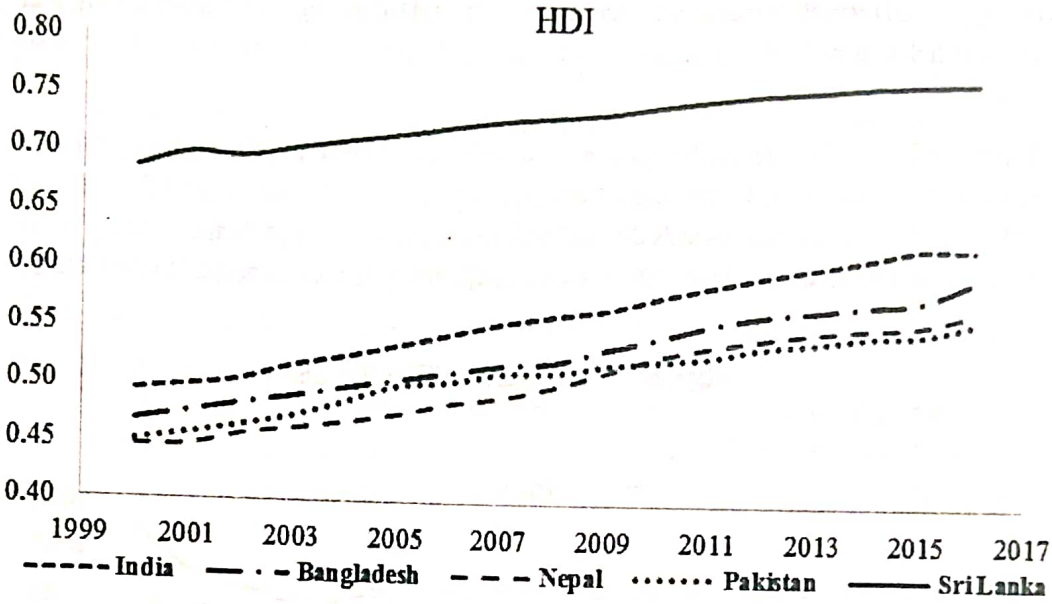
India is considered to be the Asian powerhouse on most of the key macro fundamentals (GDP growth, urbanization, job creation, etc.), still, human capital development issues prove to be the paradox of plenty. There are a few studies that correlate information technology investments with economic growth via shifting jobs from intermediary skill to high skill jobs (by building the human capital). While technology has essentially witnessed to a subsequent proliferation in the capital intensity, yet overall it has not squeezed aggregate employment in Indian manufacturing industries. Rather network society could contribute to economic growth through different mediums like production and investment mediums. Production medium shall definitely be benefiting the factor productivity growth (labor) through rapid technological change. Several quantitative research reports on westernized nations' dataset have proved the existence of correlation (if not causation) between technology usage and worker's skill-set .

From Fig-1, it can be observed that HDI of all selected South Asian Nations is indicating an upward sloping trend between the year 2000 and 2016. Sri Lanka and India top the region with higher HDI values.

Theoretical Framework

Today, the pace and presence of ICT are indispensable in all the fields of human activities. ICT development has generated a major change in the world map (Castells, 2000). Parallely, the involvement of

Figure 1 : Human Development Index Time Trends for South Asian Region



Source: Authors' representation using UNDP Human Development reports[1] and reviews on qualitative indicators

of technology to improve not just growth and efficiency but human wellbeing too; is discussed on the broader platforms of both developing and developed nations. Even the World Economic Forum (WEF) recognizes the ICT role as a crucial enabler in order to ensure sustainable and balanced socio-economic development. ICT is also taken as an imperative component for desirable regional harmonization in the formation of larger competitive markets. ICT is proved to be instrumental in impacting various realms including the intangible (human) capital creation. The internet usage is suitably detailed to encourage and protect human rights in democratic control.

Areas like education, human development, and health have adopted the urge of emancipation and shall continue to discover the new advanced usage of digital knowledge as a key catalyst of behavioral transformations e.g., telemedicine investments (Rosser et al. 2009). By means of ICT both domestically and globally, human capital is progressively producing a sense of experience that is beyond the constraints of geographical space. It is only via ICT that people have multi-fold revelation to outward influences that have profound effects on identity and culture (Appadurai, 1996; Greig, 2002). In the words of Castells (2000), people are enjoying *timeless time* (the ability to operate real-time across nations) without interruption with convenience and without absolute difference between digital and physical proficiencies.

From above, it is apparent that the digital technology used for human capital creation still remains debatable and challenging. Such inadequacies could be addressed by appropriate digital tools in a cordial involvement of community and MNCs both throughout the transformation process.

ICT, Human Development, and the Digital Divide

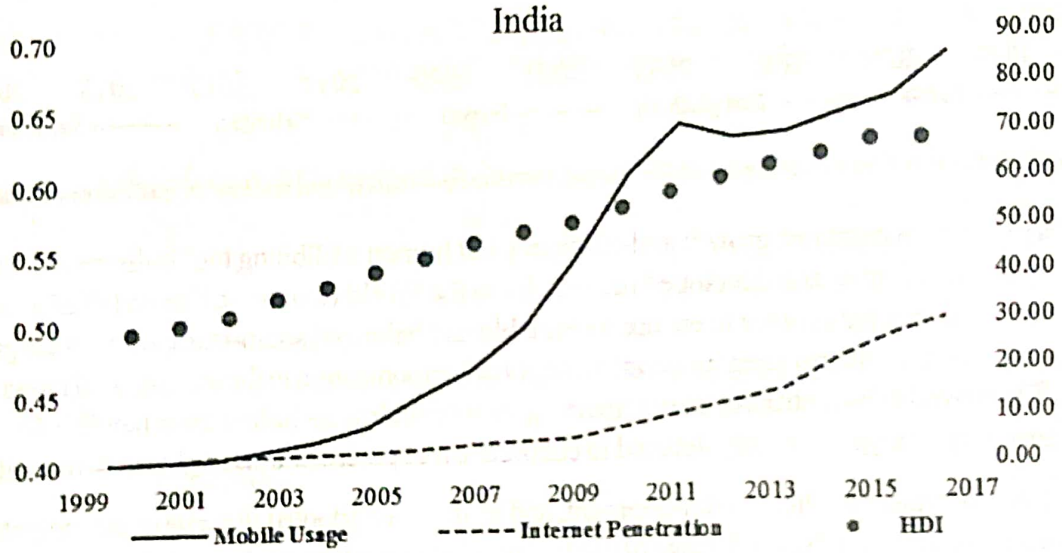
All said and done, the digital sub-divide of South-North actually hampers the perceived potential dividends associated with IT and ITeS. The same still remains unavailable for people in the world (Shields, 2003). Though, the same cannot outweigh the ones that are truly impacted by the IT and ITeS advancement via virtual networks (Lim, 2003). Today, the digital divide is extremely appropriate to those who understand and hence value the elemental role of ICT (Guillen and Suarez, 2005).

One has to be exceptionally conscious to deal with the distributional inequalities to use and access among groups and nations while taking into account the effect of ICT on human capital as these could exert grave consequences on human capital creation. IT and ITeS could harness and nurture human capital development via information access and greater possibilities of communication. The very objective of growth is to broaden

people's alternatives by the expansion of existing knowledge of ICT (Haq, 1995; Sen, 1989; Hill, 2007). It is in this context, the current study explores the possible prime interlinkage between human development and internet of things (IoT), proxied by mobile usage, internet penetration, and technological readiness along with co-existing simultaneous sub-linkages with other macroeconomic factors like population growth and density and urbanization & its growth.

From Fig-2, it can be noticed that the human development index and ICT indicators (mobile usage and internet penetration) have the pertinent rising trend, more pronounced after the year 2008 for India over the period 2000-2016. The same hints towards the probable association amongst them. Notably, the mobile usage time trend indicates a much early and substantial increase all throughout as compared to the internet penetration rate.

Figure-2 : HDI and ICT Time Trends



Source: Authors' depiction using data sourced from ITU World Telecommunication/ICT Indicators and UNDP databases. HDI is plotted on the primary axis whereas mobile usage and internet penetration on the secondary axis.

In light of the above, this article identifies the roles of the network society (ICT enabled) in human capital development, especially in South Asia. The rest of the paper is structured as follows. Section 2 presents the existing literature review on correlates of HDI like ICT, technological readiness, urbanization, population density, etc. Section 3 mentions the prime rationale and underlying objective of the paper. Section 4 includes the descriptive qualitative analysis and details of the data sources and selection. Section 5 entails the empirical research methodology adopted in the paper in order to establish the possible linkages between HDI and ICT tools. Section 6 encloses the key results of the empirical analysis, followed by conclusion and key policy implications in Section 7.

Literature Review

In light of the above background, the current paper digs deeper to investigate the existing strand of literature that associate ICT with Human Development. There is scarcity of studies that assess empirically the impact of ICT investments on human development. Majority of the studies have explored the effect of ICT on economic development so far. And whatever nominal that has been conducted, is mostly confined to developed nations with a lot more such untapped areas to be directed in the context of developing nations.

Many global institutions like World Bank, International Telecommunication Union (ITU), and International Monetary Fund (IMF) have pinpointed ICT as a powerful catalyst in the development process of emerging

economies. As per a recent report by UNDP, the increasing role of ICT infrastructure in empowering human capital growth is at the priority agenda list of many ICT practitioners, policy think-tanks, and government bodies.

Theoretical Framework

It is worth discussing the theoretical background before the exisiting literature to link HDI and ICT. The contemporary theories of growth apprehends the role of IT and ITeS within the ambit of excluded goods, private goods. Infact, as per Solow (1994), creation of intellectual property rights (patents) and also different forms of compensation for technology could also be counted a private good. While the secluded kinds of IT (like monopolistic power and patents) are expressed in certain versions of economic growth and expansion, yet most of the versions especially enunciating from monopoly are found to be temporary (Uzawa, 1965). As per Romer (1990), technological advancement could be both concurrently endogenous and exogenous. In the process, some of the IT and ITeS features may prompt technology to turn out to be a public good (or service) over a period of time. The author also confirms that the technological paybacks by different nations are heterogeneous due to the presence of intercountry technological spillovers. Obviously, the same would cause disequilibrium in the processes of human and economic development to produce intercountry alterations in economic development (Verspagen, 1997).

Outcomes emanating from ICT depict the importance to determine inclusive and sustainable growth from commercial and national outlooks. It is due to the fact that these are influenced by further progress in ICT. Therefore, the vital factor that emerges from here to make relevance for ICT improvement is human capital development (depicted by individual's knowledge, expertise and skills) as per Coleman (1998). It is also proposed that ICT should not be recognized as a silver bullet of holistic growth in the absence of substantial empirical studies (Mpogole et al., 2008).

A part of existing literature entails the potential outcomes of ICT specifically in the area of inclusive growth, remarkably, in terms of: enhancing financial inclusion levels (Singh, 2012; Kirui et al., 2013); social change and developmental effects (Islama & Meadeb, 2012; Mira & Dangersfield, 2012); extenuation of urban-rural sub-divide (Chan & Jia, 2011; Qiang et al., 2011); women empowerment (Ojo et al., 2012; Maurer, 2008); better reach to health care amenities by the low economic strata of the society (Kliner et al., 2013); and opening up of potential business avenues, especially for SMEs (Asongu, 2015b; Ondiege, 2010; Mishra & Bisht, 2013).

Mostly, all the studies in this field have probed the influence of ICT investments on economic growth (Jalava and Pohjola, 2002; Daveri, 2002 and Stiroh, 2000). In general, the findings reflect the positive stimulus of ICT penetration on economic expansion in different settings across developed countries (Kuppusamy and Santhapparaj, 2005; Kim, 2008; Oulton, 2001; Wang, 1999; and Colecchia and Schreyer, 2002). Unfortunately, there are a fewer studies that explore such an association in the context of developing nations (Mbarika et al., 2005; Bolou, 2006; and Ngwenyama et al., 2006).

Bankole (et. al. 2011) study the relationship between four components of ICT infrastructure (hardware, software, telecommunication and internal spending) and three facets of human development (education, health, per capita GDP and school enrollment rates) in 51 nations classified into high-income, middle-income and low-income countries based upon their respective presence in the area of ICT across the globe over the period 1994 to 2003, deploying 3SLS regression technique. The study confirms the substantial impact of ICT investments on the standard of living, level of education and health in the sample of considered country-set, however, the impact is found to be varying across different classification of the nations.

Asongu & Roux (2016) explores the linkage between ICT and human development using a sample of 49 nations by employing instrumental variable Tobit regression in Sub-Saharan Africa (SSA) over the period 2000-2012. The study confers it by incorporating different aspects of human development such as income levels, resource-wealth, religious dominations, legal origins, etc. The key finding of the study suggests that increasing

ICT penetration will enhance inclusive human development and hence will push SSA in its quest to attain sustainable development goals, (SDGs).

Objective and Rationale of the Paper

The study aims to provide a comprehensive overview of the role of ICT to raise human development, in the backdrop of the impact of technological disruptions on reaching individuals. Trend analysis exhibits a much rapid growth in mobile telecommunication services, hence proffering the opportunities this strand of ICT development has for speeding up human capital growth through mobile financial services. The study is an attempt to present *novel evidence* regarding the role of ICT (considered as the *digital financial services*), mobile rollout and internet usage in advancing human / intangible capital of South Asian Region. It also investigates numerous factors influencing the pace of human development like urbanization, technological readiness, etc. in the economy. Through this paper, the authors principally attempt to ascertain the role of advanced IT and ITeS (ICT tools) to promote human capital development in the context of South Asia in specific. This shall further enable to look into conceivable choices to such IT tools to foster human development in the region. The two prime notions that are examined in this paper are human development and the role of ICT.

Qualitative Analysis and Data sources & Selection

Descriptive (Qualitative) Analysis

The current section conducts the preliminary analysis to understand the basic features of data behavior and validity of the sample considered with respect to the existing inter-linkages and causality relationships.

Some of the pertinent interpretations from above tabulated values (from table-1) are listed below for the variables that we intend to study empirically in the next section:

- Table-1 results indicate that dependent variable, HDI varies from 0.45 to 0.77 with an average value of 0.57.
- The distribution of the sample around mean values seems to vary widely. The same is supported by their average and measure of dispersion values in Table 1.
- Among the explanatory variables, mobile usage, internet penetration, urbanization growth, technological readiness index indicators depict the wide range of variations for the seclected South Asian nations over the period 2000 to 2016.

Table-1 : Summary Statistics of selected variables

Variables	Obs	Mean	Std. Dev.	Min	Max
HDI	85	0.57	0.09	0.45	0.77
Mobile_sqrt	85	5.35	3.40	0.21	11.14
Internet_square	84	119.44	212.68	0.01	1027.27
FixedBroad	65	0.79	0.95	0.00	4.29
Pop_Growth	85	1.39	0.48	0.54	2.28
UrbanPop_G	85	2.76	1.19	0.47	5.99
TRI	50	2.87	0.35	2.21	3.46
Life_Expectancy	85	68.04	3.79	62.39	75.28
School_Enrollment	70	105.23	16.63	73.83	145.13

Source Author's own computation on Stata 13 for selected variables for South Asian nations from the year 2000 to 2016, conducted on database extracted from UNDP, ITU indicators, WDI (the World Bank) and WEF (World Bank)

Cross-Correlation

This section precisely helps in understanding the degree of endogeneity existing among the selected variables. Additionally, this section helps in identifying the level of criticality of the factors for the tested variable dependence.

Table-2 displays the correlation testing outcomes on the variables taken into account for the purpose of the study. Pertinent observations that emerge out of Table-2 results are:

1. Human Development Index (HDI) is found to have a positive strong and significant relationship with mobile user subscriptions (ICT indicator), internet penetration (ITU indicator), fixed broadband subscriptions (teleinfrastructure indicator) and technological readiness index (IT & ITeS indicator).
2. Due to a mixed country set in the South Asian region, urban population growth and population growth (macroeconomic demographic indicators) are found to negatively impact the human capital development in the selected South Asian nations.
3. Other components of dependent variable (HDI) tested in Model (1) to (3) such as school enrollment (primary), per capita GDP and birth life expectancy are not presented in the tabulated results in Table-2 since these variables are found to have weak association as compared to HDI directly for the selected group of nations over the period from the year 2000 to 2016.

Data Sources and Sample Selection

The data for macroeconomic demographic indicators is obtained from World Development Indicators, World Bank. International Telecommunication Union's ICT statistics have been utilized to gather data on mobile cellular subscriptions and internet usage.

Table-2 : Correlation Matrix

Variables	HDI	Mobile_sqrt	Internet_sq	UrbanPop_G	Pop_G	FixedBroad	TRI
HDI	1						
Mobile_sqrt	**0.5642*** **	1					
	0.0000						
Internet_sq	**0.5035*** **	0.6461	1				
	0.0000	0.0000					
UrbanPop_G	**-0.8791*** **	-0.3166	-0.2938	1			
	0.0000	0.0016	0.0067				
Pop_Growth	**-0.7513*** **	-0.36	-0.1697	0.6292	1		
	0.0000	0.0007	0.0220	0.0000			
FixedBroad	**0.4606*** **	0.7209	0.7813	-0.1712	-0.2176	1	
	0.0001	0.0000	0.0000	0.1728	0.0817		
TRI	**0.6757*** **	0.4867	0.3056	-0.7096	-0.1116	0.3808	1
	0.0000	0.0003	0.0309	0.0000	0.4404	0.0064	

Source Authors' testing results using Stata 13 on correlation exercise on studied variables where '***' is 1% significance, '**' is 5% significance and '*' is 10% significance.

HDI data is collected from UNDP Human Development reports and reviews on qualitative indicators. Technological Readiness Development Index (TRI) database is taken from the World Economic Forum (WEF), the World Bank Global Competitiveness database (TCdata360).

The sample is purposively considered to be of selected South Asian (developing) nations in order to examine any pertinent distinction on the association among the studied variables due to differences in the stage of development that is unique for this region only. The period considered for the study is from *2000 to 2016* so as to investigate the recent reversals (if any) for developing nations for human development with positive impact due to ICT wider usage.

Research Methodology

In order to conduct an empirical examination of the linkage among the variables, the study has applied *fixed effects panel modeling (FE-Model)* technique on the selected country set. Fixed effects model eliminates the probable impact of time-invariant attributes so as to evaluate the net impact of the explanatory variables on the key (left-hand side) outcome variable. Each firm is distinct, therefore the firm's error term and the constant (that captures discrete properties) must not be associated with the remaining. In case; the error terms are linked, fixed effects model may not give the true, correct and realistic inferences and the only option left is to probably use random-effects modeling. This is the key reasoning behind the Hausman[10] specification test (current empirical estimation results mentioned in the explanation section below). Additionally, cross-sectional dependence problem is automatically taken care with usage of micro (short) panel (a large number of entities with fewer years).

Econometric Model Specification

$Y_{it} = \beta_1 X_{it} + \alpha_i + \mu_{it}$ (Common FE Model Regression Equation)……..

Where, (I = 1……n) captures the individual firm level traits via unknown intercepts of each firm, represents the dependent variable (DV) over time (t) and entity/ firm (i); X_{it} is the list of independent variables (IVs) used in the model; β_1 is the regression coefficient of the respective IV and is the error term. Thus, it is often suggested to use panel fixed effects modeling wherever firms' individual characteristics are to be kept intact.

In order to capture the holistic view, the authors have extended the model specifications with different dependent variables. Therefore, the current paper tests the impact of ICT indicators on HDI and other components of HDI like per capita GDP, school enrollment, life expectancy in the empirical analysis results; tabulated in Table-3.

Variables used in the Econometric Model:

Dependent Variable(s): Human Development Index (HDI) represents the social cum economic growth indicator to estimate the magnitude of influence due to improvement in the standard of living and per capita income level of the people staying in the selected developing nations group. Alternatively, HDI includes a decent standard of living (given by GNI per capita), knowledge (given by expected years of schooling) and long & healthy life (with a holistic mix of qualitative and quantitative growth parameters).

The net school enrollment rate is the ratio of children of official school age who are enrolled in school to the population of the corresponding official school age.

Life expectancy at birth indicates the number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life.

Independent Variable(s): The key IVs are Information & Communication Technology (ICT) indicators, i.e. mobile phone penetration, fixed broadband usage and internet usage per 100 inhabitants denoted by X_{it}

The technological readiness index pillar of GCI encapsulates this competence via components on the latest techniques availability, technology absorption at firm-level, tech transfer and FDI, etc. The index takes into account the innovation capacity as well.

The annual population growth rate for year t is the exponential rate of growth of midyear population from year 't-1' to 't', expressed as a percentage. The population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship. Urban population refers to people living in urban areas as defined by national statistical offices. It is calculated using World Bank population estimates and urban ratios from the United Nations World Urbanization Prospects.

Empirical Analysis and Results

Table-3 includes the panel regression results of empirical testing on selected South Asian nations dataset over the period from the year 2000 to 2016 as per trailing regression equation:

$$HDI_{it} = \alpha + \beta_1 (Mobile\_sqrt_{it}) + \beta_2 (Internet\_sq_{it}) + \beta_3 (Pop\_growth_{it}) + \beta_4 (UrbanPop\_G_{it}) + \beta_5 (FixedBroad_{it}) + \beta_6 (TRI_{it}) + \varepsilon_{it}$$

$$Per\_Cap\_GDP_{it} = \alpha + \beta_1 (Mobile\_sqrt_{it}) + \beta_2 (Internet\_sq_{it}) + \beta_3 (Pop\_growth_{it}) + \beta_4 (UrbanPop\_G_{it}) + \beta_5 (FixedBroad_{it}) + \beta_6 (TRI_{it}) + \varepsilon_{it}$$

$$School\_Enrol_{it} = \alpha + \beta_1 (Mobile - sqrt_{it}) + \beta_2 (Internet\_sq_{it}) + \beta_3 (Pop\_growth_{it}) + \beta_4 (UrbanPop\_G_{it}) + \beta_5 (FixedBroad_{it}) + \beta_6 (TRI_{it}) + \varepsilon_{it}$$

$$Life\_Expect_{it} = \alpha + \beta_1 (Mobile\_sqrt_{it}) + \beta_2 (Internet\_sq_{it}) + \beta_3 (Pop\_growth_{it}) + \beta_4 (UrbanPop\_G_{it}) + \beta_5 (FixedBroad_{it}) + \beta_6 (TRI_{it}) + \varepsilon_{it}$$

We have run several different specifications of the regression equations, however, the significant key results are listed here in Table-3. To correct the panel's heteroscedasticity drawback, the robust standard errors estimates are considered. Although FE panel modeling takes care of the multicollinearity problem, it is advisable to check the multicollinearity (VIF <10) for the variables of key interest. Table-3 encapsulates the key findings of the empirical regression analysis. To conduct the regression on the selected panel dataset, we have utilized STATA 13.0 MP for regression coefficients computation.

Table 3 FE Regression Results

Selected South Asian Nations Panel Results						
Dependent Variable	Per Cap GDP	Life_Expec	Sch_Enro_Rate	HDI	HDI	HDI
Control Variables	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Mobile_Sqrt	2.4323** (1.7906)	0.5921*** (0.0580)	0.5416* (0.3474)	0.0111*** (0.0011)	0.0089*** (0.0011)	0.0089*** (0.0012)
Internet_Sq	1.1962*** (0.1021)	0.0001* (0.0004)	0.0047** (0.0023)	0.0001** (0.0008)	0.0005* (0.0007)	0.0001* (0.0008)
Population Growth	-1.7751 (1.9968)	-1.0119** (0.5419)	-0.1348 (0.8130)	-0.0319*** (0.0119)	-0.0343*** (0.0096)	
Urban Population Growth						-0.0216*** (0.0068)
Fixed Broad Band_sq					0.0168*** (0.0044)	0.0133*** (0.0045)
TRI	4.6442*** (1.0738)	1.0008* (0.4163)	6.8692** (1.1218)	0.0139** (0.0181)	0.0171** (0.0077)	0.0181** (0.0079)
Constant	5.9697** (2.9147)	8.7967** (0.9813)	7.6914** (1.2570)	0.5822*** (0.0405)	0.6007*** (0.0189)	0.6183 (0.0221)
R-square	0.7011	0.5775	0.6214	0.5741	53.4211	0.8333
F-Stats	74.14	76.46	72.98	87.85	96.43	91.21
Probability	0	0	0	0	0	0
rho	0.9843	0.9846	0.9692	0.9949	0.9926	0.9886
No of Obs.	50	50	44	50	50	50
No of Groups	5	5	5	5	5	5

Source Author's regression results based on FE modeling using STATA 13 testing.

1. *** signifies 1%, ** 5% and * 10% level of significance (*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$).
2. Standard errors in parentheses.

Although R-square is found to be as low as nine percent in some of the initial basic regression models listed in Table-3, the same is reasonable with the large heterogeneous panel of firms considered in the sample. The F statistics and the DW test statistics have turned out to be highly significant. The specification tests under regression diagnostics (post-estimation testing), especially testing for heteroscedasticity (hettest & szroeter) and serial correlation (xtserial) are found to confirm the presence of strong homoscedasticity for DV (dependent variable) series and no auto serial correlation among IV (independent variable) series.

From Table-3, the following pertinent observations could be noted:

- ✓ All ICT infrastructure indicators, fixed broadband, and mobile subscriptions, and internet penetration are found to impact positively and significantly all the key dependent variable, HDI and its components like net school enrollment rate, birth life expectancy and per capita GDP (Model 1 to 6). The same corroborates with existing studies that have propagated that IT and ITeS have a crucial role to determine the prospective human capital development, especially in the context of developing nations (Hettiarachchi, 2006; Bankole et al. 2011).

- ✓ Population growth, annual (in %) and urban population growth (in %) are found to impact HDI significantly and negatively (Model 4 to 6). Instead, these demographic macroeconomic variables for selected developing South Asian nations are adversely influencing rather hampering the path of creation of skilled manpower (resources) in these nations (Hettiarachchi, 2006).

✓ Another global competitiveness indicator, technological readiness is found to impact the coefficient of HDI (and other dependent variables tested) positively and significantly (Model 1 to 6). This indicates that the adaptation and availability of basic infrastructure in the selected group of developing nations are mandatory pre-conditions for having a positive contribution of technological advancement in the human capital creation of these countries.

Conclusion and Policy Implications

Undoubtedly so far, ICT tools have proved crucial and advantageous for the regions like South Asia. Historical pieces of evidence have vested in high hopes of the relevance of such technologies. Despite prevailing usage of the same are not essentially determined towards human capital development. Formulating different notions to explore the influence of ICT investments on human capital creation, delivers a contemporary outline to comprehend how nations could best invest in IT and ITeS for advancement. The empirical analysis has exhibited the distinguishing effect of IT investments on human capital development in developing economies. By selecting only the highly significant results ($p < 0.01, 0.05$), key inferences relevant to the selected South Asian countries of this paper; are revealed. The prime detection from the current paper indicates that the ICT investments are of substantial relevance to impact the (increased level) standard of living and also the education level across the globe.

There is an urgent need to change the entire paradoxical thinking about ICT in order to ensure effective use of ICT in human capital creation in SAR. The same shall include the complete transformation from rethinking of fruitful government policies, integration of ICT policies with broader economic and social goals, and of course, active participation of residents.

In developing nations (as per empirical analysis results in Section 6), the importance of ICT investment can't be denied on the level of education and standard of living. For developing nations like South Asia, the outcome of IT and ITeS investments on human capital creation are more obvious. Measures like health and education in the HDI are possibly more suitable for these nations. Most of the current shreds of evidence indicate that these nations are still attempting to enrich elementary education (primary school enrolments and literacy rates), and health (birth life expectancy). These nations shall consequently undertake conscientious investments in manpower and skill enhancement in their IT financing policies so as to fully exploit the effect of investments in the domain of human capital creation.

End Notes:

[1] Information Technology (IT) and Information Technology enabled Services (ITeS).

[2] Information and Communication Technology.

[3] a public-private partnership of Accenture, the Markle Foundation and the United Nations Development Programme (UNDP).

[4] It primarily comprises three broad indices – education index, income index, and life expectancy index.

[5] United Nations Development Programme.

[6] From *Destruction or Polarization: Estimating the Impact of Technology on Jobs in Indian Manufacturing* by P Vashisht, 2017.

[7] From *Information and communication technology and economic growth in India* by Erumban and Das, 2016.

[8] From *Information technology, workplace organization, and the demand for skilled labor: Firm-level* evidence by Bresnahan, Brynjolfsson & Hitt, 2002.

[9] Available at http://data.un.org/ (Accessed on: 21st May 2019).

[10] Due to the poor properties of Hausman test empirically, it often fails to provide practical results in general.

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Gram Vaani: A Healthy Initiative for Rural Healthcare in India

Ankur D. Amin*

Abstract

Healthcare is the right of every individual but lack of quality infrastructure, dearth of qualified medical functionaries, and non- access to basic medicines and medical facilities blocks its reach to 60% of population in India. A majority of 700 million people lives in rural areas where the condition of medical facilities is miserable. Considering the picture of alarming facts there is a dire need of new practices and procedures to ensure that quality and timely health-care reaches the deprived corners of the Indian villages. This paper is based on the case study of Gram Vaani which provides cutting- edge mobile and IVR solutions to automate processes and applies best practices in the field for health care services. Its services cater to health care sector using simple technologies and social context to design tools to impacting communities- more than 2.5 million users in over 15 Indian States, Afghanistan, Pakistan, Namibia and South Africa. This study analyses the heath campaign of Gram Vaani to review health services for accountability in Jharkhand state.

Keywords: *Rural healthcare, Gram Vaani, Tribal areas*

Background of the problem

Healthcare is a right of every individual but lack of quality infrastructure, dearth of qualified medical functionaries, and non-access to basic medicines and medical facilities thwarts its reach to 60% of population in India. Around 700 million people live in rural areas where the condition of medical facilities is deplorable. Though a lot of policies and programs are being run by the Government, the success and effectiveness of these programs is questionable due to gaps in implementation. In rural India, where the number of Primary Health Care centers (PHCs) is limited, 8% of the centers do not have doctors or medical staff, 39% do not have lab technicians and 18% PHCs do not even have a pharmacist. India also accounts for the largest number of maternity deaths. 31% of the population travels more than 30 kms to seek healthcare in rural India. About 30% of people in rural India did not opt for treatment because of financial constraints. Around 39 million Indians are pushed to poverty because of ill-health every year (National Rural Health Mission Report 2011).

The Rural Health-Care System in India

The rural healthcare infrastructure in India is a three tier system as shown in Figure 1. As on March, 2011, there are 148124 Sub Centers, 23887 Primary Health Centers (PHCs) and 4809 Community Health Centers (CHCs) functioning in the country (National Rural Health Mission Report 2011). According to the National Rural Health Mission (NRHM) report, 700 million people live in 636000 Indian Villages. Majority of people die due to preventable and curable diseases like diarrhea, measles and typhoid.

The key factors that are inhibiting rural healthcare delivery in India include:

- Not attractive enough for private sector considering the distributed population and lack of purchasing power of the customers.

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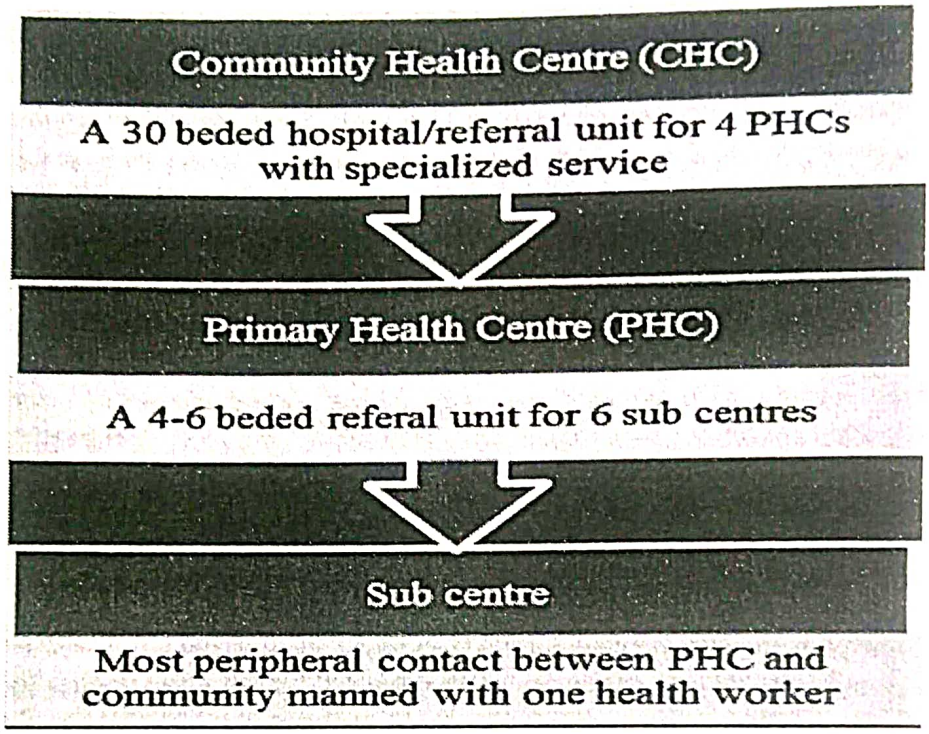
- Less efficient public sector initiatives.
- Inefficient distribution networks and lack of skilled staff.

Figure-1



Source: National Rural Health Mission Report -2011

About 31% of the population travels more than 30 kms to seek healthcare in rural India. Due to this inaccessibility to public health care and low quality of health care services, a majority of people in India turn to the local private health sector. Around 92 percent of healthcare visits are to private providers of which 70 percent is urban population. The rural population is however not in a position to afford this expensive health service. Around 39 million Indians are pushed to poverty because of ill-health every year. Gram Vaani is established with an aim of making a difference to this alarming reality.

The Idea of Gram Vaani and Growth of the Social Enterprise

Gram Vaani Community Media is based out of IIT Delhi and presently, is located inside the campus as one of the units of Technology Business Incubation Unit. It was founded in January 2009 with a team of 3 people, which has now grown into a team of 9 people. Aaditeshwar Seth was a PhD student at the University of Waterloo when he came up with the idea of building voice based technologies to create a social media platform at the bottom of the pyramid. He reached out to his old-time classmate from school, Mayank Shivam, and to a serial entrepreneur, Parminder Singh, to build a business model behind the idea. Mayank had trained as an engineer followed by an MBA and several years of rich consultancy experience with McKinsey Inc. Parminder too had trained as an engineer and had opened several companies in the rural ICT space. Together, the three co-founded Gram Vaani in late 2008 and started operations in 2009, with an initial team of five, together with Balachandran C. and Zahir Koradia, old friends and associates of the co-founders.

The Gram Vaani team was motivated by the tremendous empowerment and accountability impact that Internet-based social media tools such as Facebook and YouTube had had in the developed world. It was really difficult to build similar tools for rural populations of developing countries like India, where there were significant

literacy challenges, social-cultural factors influencing the participation of citizens, poor Internet connectivity, and empowerment differences. Voice-based participatory technologies such as community radio and video seemed appropriate, and this motivated the team of Gram Vaani to work in this space.

Gram Vaani - a radio-over-phone platform in rural hinterland of Bihar and Jharkhand aims to set a perfect example of technology leading to social change, more specifically eliminate the social evil of child marriage.Working at the interface of technology, media and development, Gram Vaani is a social entrepreneurial organization that builds technological solutions for the development sector. In India, the internet penetration is 6%, while the penetration of radio, cable TV and telephony is 41%, 33% and 29% respectively. Therefore, Gram Vaani believes that their technology can help provide people living in remote areas with limited connectivity (and who are therefore excluded from the ongoing information revolution), access to critical information services.

Their work builds upon several years of research on the use of voice-based technologies and on the development of innovative processes to engage citizens and different stakeholders. Most of the technologies developed by Gram Vaani tend to be voice-based, so that they can be used by even poorly-literate populations in villages and slum areas. It works with existing infrastructure in rural areas (so does not require large capital investments in new infra) and is participatory in nature, thereby closely involving the community it is being deployed in. Some of their products include,

- GRINS (Gramin Radio Inter Networking System): Automation system for community radio stations;
- mNews: Grassroots mobile-based news; and
- vAct: Urban citizen engagement platform.

They combine and customize their platforms to suit community needs. Their open-source solutions have won international awards. Gram Vaani's technologies are provided to organisations that would use them to maximize social benefits. This being their first consideration, price points are adjusted for the client's ability to pay when social benefits outweigh the client's financial strength. As a result, they have sold and deployed technologies with individuals who were interested in sponsoring technology for their home villages, with organisations having few full time employees but a large pool of unpaid volunteers, with emerging projects in conflict affected areas like Afghanistan, and many others, who would not be able to purchase comparably customized technology at market rates.

Market size

Gram Vaani has over 25 NGO clients for GRINS, including Development Alternatives, The Restoring Force, Barefoot College, Radio Active, Deccan Development Society, TERI, etc. Clients of their voice applications include Sesame Workshop, iMedia Associates, Satark Nagrik Sangathan, Delhi MCD, and several private players who have set up voice services in their rural communities. Their customers can be categorized to include

(1) Rural consumers, to whom they provide easy access to information that is customized to their needs, and vertical-specific applications like distance education, agriculture consulting;

(2) Corporates, with an aim of accessing the rural market, to whom they provide a platform for reaching out to the rural consumer in a targeted manner and, importantly, measure the impact of their initiatives; and

(3) Government and development agencies, to whom they provide a platform for a more coordinated and targeted information dissemination of their campaigns (e.g., national rural employment guarantee scheme, AIDS awareness programs) and get feedback on their effectiveness. Their activities are supported by the Knight Foundation, USA and FITT, IIT Delhi and their partners include Nomad Networks, PATH, and the University of Washington.

Strategy and Operations

Gram Vaani conducted a Health campaign to review health services for accountability in Jharkhand. In this campaign on **Mobile Vaani** they invited opinions, experiences, information and feedback from public on current Government health facilities in Jharkhand.

People from different districts of Jharkhand left messages on various issues in health care facilities, such as; health facilities available at PHCs, Laboratory testing and Delivery facilities at Government Health Centers,

Social Value Creation

Gram Vaani is employing mobile technology in several health-care projects for leading global organizations. In partnership with the White Rib-bon Alliance for Safe Motherhood, for a program of Merck for Mothers, they are working to upgrade the quality of maternity healthcare in India. There's growing evidence from developing countries confirming that patient's perception of quality of care and satisfaction with care are critical to utilization of health services. To this end, they are building a quality-of-care checklist for expectant mothers (and their families) to answer using mobile phones and rate on factors such as whether they were treated with respect during the delivery, whether they got entitlement for institutional delivery, whether the transportation provided was of good quality, etc. This tool is constructive for:

- Making women aware of their rights to demand good quality of care,
- Bringing accountability by highlighting lapses in the health delivery process, and
- Increasing uptake of appropriate health services at the right venues

As a part of another health-care program Ananya, with NGO's PATH and PCI, we are mobilizing communities using our voice technologies to demand greater accountability from the health delivery infrastructure. Through simple education and discussion programs on mobile we make the marginalized communities aware of best practices in healthcare and sanitation, and about their rights and entitlements from the health delivery system. The community members are encouraged to engage and share their stories with each other on our open mobile platform, and to demand grievance redressal and accountability from the health system.

Gram Vaani provides cutting- edge mobile and IVR solutions to automate processes and applies best practices in the field. Our services cater to health care sector, social sector, and corporate organizations for connecting with the difficult to reach markets at bottom of the pyramid.

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Role of 'Krishi Vigyan Kendra' as an Agent for Rural Agricultural Transformation: A Case Study of Krishi Vigyan Kendra, Valsad

Naresh M Chauhan*

Abstract

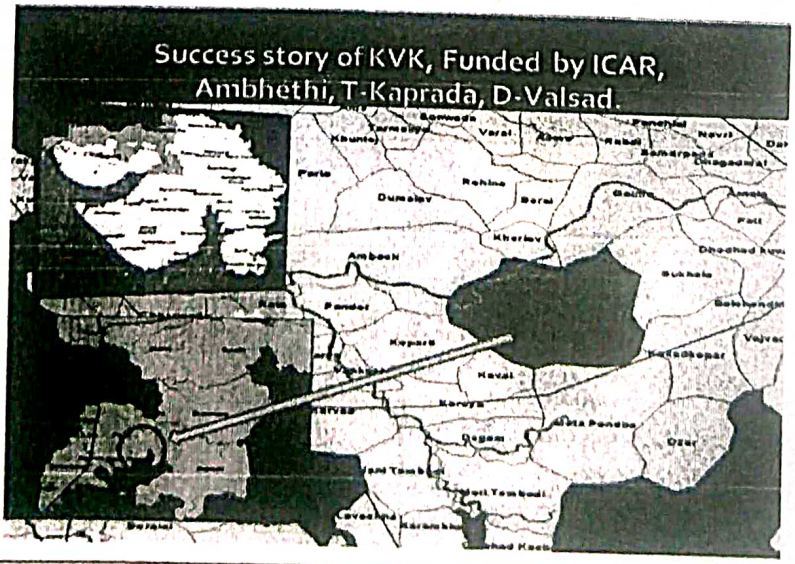
In this case study, paper discuses some success stories of Valsad district following by Way Ahead segment containing the policy implications to replicate such success stories by various KVK in the country. As the title indicate this paper is about the success stories of the krishivigyan Kendra Valsad. This paper mainly contains the stories which had been discussed by KVK valsad's annual reports (various reports). The writer did study various annual reports of the KVK Valsad while providing the guidance for his M.Phil student. He carried out some success stories and also mention them in the district human development report, prepared by department of economics, Gujarat Vidyapith, Ahmedabad and published by Gujarat Social Infrastructure Development Society, Government of Gujarat.

In this research paper the story of NICRA (National Initiative on Climate Resilient Agriculture) mainly focus. The other success stories also discuss in brief. The story of NICRA is about the transformation of farming community. How can KVK works successfully is driven out by these stories. The segment of policy implication also mentions the way ahead /layout plan for replicate the same stories in different KVK around the nation.

Introduction

NICRA project was implemented by Krishi vigyanKendra valsad which is administered by Gujarat Vidyapith, Ahmedabad. Map of Krishi vigyan Kendra, Ambhethi, Kaprada talukaKrishi Vigyan Kendra is an innovative science based institute committed to train farmers, farm women, rural youth and extension functionaries besides transfer of the latest relevant technologies in the district through conducting front line demonstration of newly released or pre released high yielding varieties, technologies and inputs and plan to carry out on farm research or on farm testing to verify, validate and refine location specific technologies generated by the national agricultural research system for its wider adoption among farmers.KVK, Valsad is administered by Gujarat Vidyapith founded by Mahatma Gandhi in 1920 at Ambhethi Village in Kaprada taluka.

Transformation of Farming Community: Success story of Krishi Vigyan Kendra (KVK) Valsad



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Map of Krishi vigyan Kendra, Ambhethi, Kaprada taluka

Krishi Vigyan Kendra is an innovative science based institute committed to train farmers, farm women, rural youth and extension functionaries besides transfer of the latest relevant technologies in the district through conducting front line demonstration of newly released or pre released high yielding varieties, technologies and inputs and plan to carry out on farm research or on farm testing to verify, validate and refine location specific technologies generated by the national agricultural research system for its wider adoption among farmers.

KVK, Valsad is administered by Gujarat Vidyapith founded by Mahatma Gandhi in 1920 at Ambhethi Village in Kaprada taluka.

About NICRA Project: National Initiative on Climate Resilient Agriculture (NICRA)

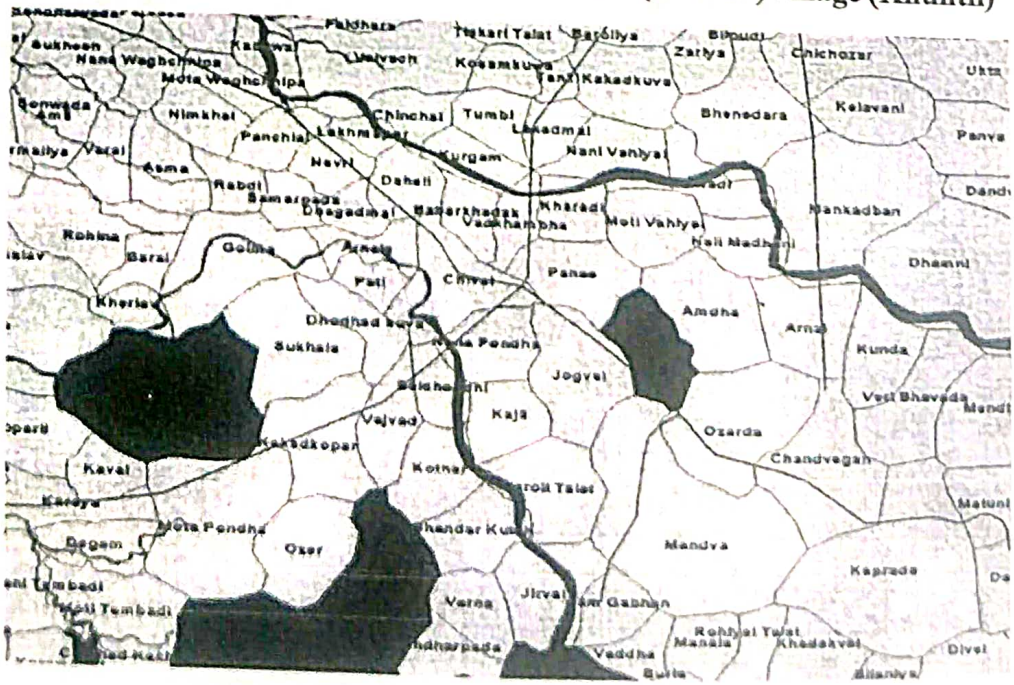
During last five decades, science and technology- one of the culprits to ruin and degrade natural resources base affecting agriculture in a negative manner have been helping the sector. Different technologies developed by the National Agricultural Research Education System were applied in situation challenged by climate variability in different agro-climate environments. A national-wide project National Initiative on Climate Resilient Agriculture (NICRA), has been launched in 100 selected district during the year 2011 through technology demonstration components.

Objectives of the Project

- To enhance the resilience of Indian agriculture covering crops, livestock and fisheries to climatic variability and climate through development and application of improved production and risk management technologies.
- To demonstrates site specific technology packages on farmers' field for adapting to current climate risks.
- To enhance the capacity of scientists and other stakeholders in climate resilient agricultural research and its application.

KVK, Valsad had selected the Khutli as NICRA village, located in Kaprada with total population of 1922 and total cultivated area is 277.38 (ha). Khutli has 349 total farm families.

Map of National Initiative on Climate Resilient Agriculture (NICRA) village (Khuntli)



The application of NICRA Project

The Village Climate Risk Management Committee (VCRMC) composed of 13 members, representing small medium and large farmers created five subcommittees such as Custom hiring center committee, crop demonstration committee, natural resources management committee, livestock management committee to increase effectiveness of the project.

Under the NICRA project the major actions has been taken are as follows.

(A) Natural s Management

1. **Water harvesting through check dam and percolation tank.**
2. **Enhancing water use efficiency through micro irrigation system:** KVK popularized drip and sprinkler irrigation system following public private partnership approach.
3. **Trench cum Bunding:** The plantation of trees like mango, cashew and drum stick was carried out on the sloppy land treated with trench cum bunding.
4. **Burning of crop residue (Rabbing):** In place of traditional system of *Adar,* soil solarisation technology using 75 micron thick plastic sheet was utilized.
5. **Soil health management:** Due to natural slope or typical sub surface characteristics of hilly soil, NRM measures like trenching, bunding, vermicomposting, biogas plant and liquid bio-fertilizers were conducted to raise soil productivity.

(B) Crop Production

Enabling paddy farmers to cope with waterlogged conditions.

1. Economic Impact of Intervention

Table 1: Economic Impact of Intervention in Khuntli village

Variety	Avg. grain yield (kg/ha)	Avg. income from grain (Rs/ha)	Avg. straw yield (kg/ha)	Avg. income from straw (Rs/hs)	Avg. cost of harvesting-manually (Rs/ha)	Additional benefits Rs.
MTU 1010 (Demo plot)	4040	40400	4083	10208	60 labours@ Rs.120 =7200	43408
Other Susceptible varieties	3105	24840	3189	7973	83 labours@ Rs.120 =9960	2283
Difference	935	15560	894	2235	2760	20555

2. Planting technique in bottle gourd

Farmers were trained to raise bottle gourd seedling in polythene bags (3x5cm) in community net house at the village with new scientific technology.

Before intervention	After intervention
Poor Plant population in field condition	Optimum plant condition
Bamboo structure alone could not resist against high wind velocity at full productive stage	Boundary with RCC pole provided extra strength to the bamboo structure thus prevented collapse of structure and prevented crop losses.
Early production was not possible due to late planting in field	Seedlings grown in nursery in poly bags transferred to the field at appropriate stage
Surplus production would fetch lower rate	Early production could earn more profits
GI wire for netting of mandap suffers from corrosion shortening the life of structure.	Plastic rope with good stretching capacity provided longer life to the structure.

3. Polythene munching in vegetables along with drip

A 40-micron polythene sheet on raised beds prepared for plantation of tomato checked growth of weed and conserved moisture. It also enabled less infestation and less water application. The farmers were also encouraged to use paddy straw as a mulch.

4. Protection of harvested paddy for deterioration

Tarpaulin sheets of 25x25 ft size to protect the harvested paddy in field from rain were provided.

(C) Live stock

(1) Gobar-gas and vermin compost from farm waste

KVK installed 45 bio-gas plants where cow dung is used to feed the biogas plant and its slurry to prepare vermin compost.

(2) Balanced diet for improving milk production and health

The livestock owning farmers were motivated to take up perennial fodder grass along with food crops. CO-4 fodder variety increased the nutritive value and palatability. Diagnostic camps and vaccination camps were organized. A series of activities undertaken under NICRA project has resulted in the milk production by 13 per cent (300 lit/day).

(3) Empowering dairy farmers through green fodder production round the year

Farmers use paddy straw as fodder for their livestock which is a poor grade roughage. Perennial fodder varieties viz, CO-1, CO-2, CO-3 and CO-4 varieties have higher nutritive value and can provide green fodder throughout the year utilizing minimum available land and water. Planting material of perennial grass, training about the importance of balance feed increased milk yield.

(D) Institutional intervention

(1) Resource conservation and enhanced crop productivity through custom hiring center

The Custom Hiring Centre (CHC) equipped with modern farm machineries and implements like pump set, power tiller, reaper, brush cutter etc. was established by the villagers. The leader of the VCRMC donated a piece of his own land for shed to keep equipment. The equipment are hired by farmers when required by paying nominal hiring cost.

Table 2: Revenue generated by VCRMC in Khuntli village

S.N	Equipment	No. of	Hrs. used	Users	Total income
1	Power tiller	01	370	187	1,12,441
2	Diesel engine	01	559	18	12,343
3	Winnowing fan	27	--	322	27,000
4	Brush cutter	1	30	10	1,500
5	Reaper	1	12	12	3,462
6	Sprayer	03	10 days	10	200
7	Paddy thresher	02	27 days	22	6750
8	Total	36		528	1,63,696

(2) Community Vegetable Nursery

Brinjal, chilly, tomato, bottle gourd crops are grown round the year. During the project period as many as 160,000 seedlings of preferred variety were produced and made available that generated revenue of Rs. 55,000.

(3) Establishment of Vegetable Collection Centre

Village vegetable collection centre saved time, fuel cost and exploitation. As many as 39000 kg of different vegetables collected at the centre during October 2013 to March 2014.

(4) Paddy Seed Multiplication in NICRA Village

The high yielding, short duration, dwarf, resistant to water logging conditions, pests and diseases variety MTU 1010 gave higher return. It will be a first step towards village level seed self-sufficiency.

Under NICRA project many climate smart technologies on farmers' fields have provided better livelihood option. A multi-enterprise model based on integrated farming system and multiple water-use approach involving components of crops, dairying, horticulture, vegetables, gobar gas plant, soil health managements, natural resources management, custom hiring centre resulted into better livelihood to small and marginal tribal farmers. Survey indicated that the paddy gave a net income of rupees 27000 and vegetable earned rupees 21700 per hectare. For dairying, it was Rs 19000 per animal.

The another achievement of KVK Valsad: Some another achievements also reported by KVK Valsad these are mentioned as below:

(a) The village Climate Resilient Management Committee of the Khuntali village is awarded as "Best VCRMC".

(b) Achievements for Skill oriented long duration vocational training programmes

Rural youth: Nursery management, Tractor and Power tiller driving and maintenance, Oil engine and electric motor repairing and maintenance were successfully organized.

Rural women empowerment: Leaf cup/ Paper dish making, tailoring, fruit and vegetable preservation, bamboo articles, foot mat preparation, sewing, imitation jewelry preparation

Summery and Policy Implications

Krishi Vigyan Kendaras are funded by ICAR (Indian Council for Agricultural Research), New Delhi under the Ministry of Agriculre. The main objectives of this establishments are the same as title of this paper: to make the agent of agriculture transformation. Each district in the country should have its own KVK, But some

how our country does not provide the KVK to each district till the date. The working KVKs are also not working with their full capacity. Due to such reasons KVKs in India are not performing in expecting direction. There are some stagnations and depressions prevailing in most of the working areas. Government should provide environment working enthusiastic environment with such awards and incentives for better performance of KVKs. Government must identify the non-performance areas and must steps toward the proper performance. KVKs are the proper agent for transforming agriculture of the nation and they have to perform as per the expectations.

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A Study of Digital Economy in India

A. B. Barde* and S. L. Padgalwar**

Abstract

India will be the largest consumer of digital technologies in times to come the digital channel in most of the cases remains the only channel of access There is no country in the world today, which has as much at stake in digital technologies, as India has One reason for this is that we have the youngest demographics in the world and this young population prefers to transact and communicate digitally.

Keywords: *Digital economy, digitization*

Introduction

India is one of the largest and fastest growing markets for digital consumers, and the rapid growth has been propelled by public and private sector the growth of its digital economy now exceed those of most other countries. Government and the private sector are moving rapidly to spread high-speed connectivity across the country and provide the hardware and services to put Indian consumers and businesses online. India's lower-income states are bridging the digital divide, and the country has the potential to be a truly connected nation by 2025. Much more growth is possible. India's digital transformation unfolds, it could create significant economic value for consumers, businesses, microenterprises, farmers, government, workers, and other stakeholders. Digital adoption by India's businesses has so far been uneven, but new digital business models could proliferate across most sectors.

There is no country in the world today, which has as much at stake in digital technologies, as India has One reason for this is that we have the youngest demographics in the world and this young population prefers to transact and communicate digitally. India will be the largest consumer of digital technologies in times to come. the digital channel in most of the cases remains the only channel of access and nothing brings it out more powerfully than the Jan Dhan, Aadhaar, Mobile trinity. This, because mobile phone for an average Indian is not just merely a voice device, it is a gateway to many services including banking. Consider the fact that it took us 70 years to take banking to nearly 100 million people, which was the top tier. It took less than two years to bring 250 million people into the banking fold, thanks for Jan Dhan, Aadhaar, Mobile. So, once the digital channels started opening up, we could reach out to a much larger number of people at the bottom of the pyramid, which is why Digital India and digital technologies have assumed such a great importance for India.

Research Methodology

The present study is based on the Secondary data collected from various journal, books, and magazines, websites, newspapers, trade journals, and white papers, industry portals, government agencies, trade associations, monitoring industry news, etc.

Objective of study

1. To study the digitization in India

2. To find out the growth of digitization economy in India

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What is Digital Economy?

Digital economy refers to an economy that is based on digital computing technologies, although we increasingly perceive this as conducting business through markets based on the internet and WWW. The digital economy is also referred to as the Internet Economy, Web Economy. Increasingly, the digital economy is intertwined with the traditional economy, making a clear delineation harder

Digital economy is defined as an economy that focuses on digital technologies, i.e. it is based on digital and computing technologies. It essentially covers all Economy, Social, Cultural and business etc. activities that are supported by the web and other digital communication technologies.

The term was first coined in a book "The Digital Economy: Promise and Peril in the Age of Networked Intelligence" by author Don Tapscott in 1995.

Table 1 : Users of Digitization

Sr. No.	Various Users	2014	2018
1	Smart Phone	5.4 million	26.2 million
2	Internet Users	239 million	560 million
3	Cashless Transaction per Person	2.2	18
4	Monthly Data Consumption per unique connection	86 MB	8320MB
5	Monthly Data price (per 1GB as % of Monthly GDP)	6.1%	0.1%
6	Mobile Data User Consumer		8.3 GB/Month
7	Download new APP		12 Billion
8	Online Shoppers		207.2 Million

Source: McKinsey Global Institute analysis

India is one of the largest growing markets for digital consumers, In year 2014 Smart Phone users were 5.4 million is increased up to 26.2 million in the year 2018. In year 2014 internet subscriber were 239 million is increased up to 560 million in the year 2018. Cashless Transaction per Person in year 2014 were 2.2 is increased up to 18 in the year 2018. In year 2014 Monthly Data Consumption per unique connection were 86 MB is increased up to 8320MB in the year 2018.Indian mobile data users consume 8.3 gigabits (GB) of data each month on average Indians have 1.2 billion mobile phone subscriptions and downloaded more than 12 billion apps in 2018.Online Shoppers 207.2 million in 2018.

Merits of Digital Economy

Digital economy has given rise to many new trends and start-up ideas. Almost all of the biggest companies in the world (Google, Apple, Microsoft, Amazon) are from the digital world. Let us look at some important merits of the digital economy.

Browse more Topics under Emerging Trends in Business-Net Work Marketing, Franchising, Business Process Outsourcing, Aggregator, Knowledge process Outsourcing, E-Commerce.

1. Promotes Use of the Internet

If you think about it, most of your daily work can today be done on the internet. The massive growth of technology and the internet that began in the USA is now a worldwide network. So there is a dramatic rise in the investment on all things related – hardware, technological research, software, services, digital communication etc. And so this economy has ensured that the internet is here to stay and so are web-based businesses.

2. Rise in E-Commerce

The businesses that adapted and adopted the internet and embraced online business in the last decade have flourished. The digital economy has pushed the e-commerce sector into overdrive. Not just direct selling but buying, distribution, marketing, creating, selling have all become easier due to the digital economy.

3. Digital Goods and Services

Gone are the days of Movie DVD and Music CD's or records. Now, these goods are available to us digitally. There is no need for any tangible products anymore. Same is true for services like Banking, Insurance etc. There is no need to visit your bank if you can do every transaction online. So certain goods and services have been completely digitized in this digital economy.

4. Transparency

Most transactions and their payment in the digital economy happen online. Cash transactions are becoming rare. This helps reduce the black money and corruption in the market and make the economy more transparent. In fact, during the demonetization, the government made a push for online transactions to promote the web economy.

Demerits of Digital Economy

1] Loss in Employment

The more we depend on technology, the less we depend on human resources. The advancement of the digital economy may lead to the loss of many jobs. As the processes get more automated, the requirement for human resources reduces. Take the example of online banking itself.

2] Lack of Experts

Digital economy requires complex processes and technologies. To build the platforms and their upkeep require experts and trained professionals. These are not readily available, especially in rural and semi-rural areas.

3] Heavy Investment

Digital economy requires a strong infrastructure, high functioning Internet, strong mobile networks and telecommunication. All of this is a time consuming and investment heavy process. In a developing country like ours, development of the infrastructure and network is a very slow, tedious and costly process.

Digital economy is one collective term for all economic transactions that occur on the internet. It is also known as the Web Economy or the Internet Economy. With the advent of technology and the process of globalization, the digital and traditional economies are merging into one. Let us learn more about this concept of digital economy.

Conclusion and Recommendation

In year 2014 Smart Phone users were 5.4 million is increased up to 26.2 million in the year 2018.In year 2014 internet subscriber were 239 million is increased up to 560 million in the year 2018. Cashless Transaction per Person in year 2014 were 2.2 is increased up to 18 in the year 2018. In year 2014 Monthly Data Consumption per unique connection were 86 MB is increased up to 8320MB in the year 2018.Indian mobile data users consume 8.3 gigabits (GB) of data each month on average Indians have 1.2 billion mobile phone subscriptions and downloaded more than 12 billion apps in 2018.Online Shoppers 207.2 million in 2018

We need to be ready, as an economy and a community, to respond to change and to grasp the opportunities of the digital economy. New and emerging digital technologies are changing the way industries and business work. Digital revolution, also known as 'The Internet Economy' is expected to generate new market growth opportunities, jobs and become the biggest business opportunity of mankind in the next 30 to 40 years.

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5 All papers must use the following layout

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