Research Topic:

Information Communication Technologies (ICT) and Its Impact on the livelihood of Communities Involved in the Fisheries, Agriculture and Livestock: A pilot Study of South Punjab and South Sindh

Indus Consortium, Islamabad, Pakistan

This research work is completed by the JFK Institute of Technology and Management, Islamabad, Pakistan with the help and support of Indus Consortium Pakistan.

Principal Investigator: Dr. Ijaz A. Qureshi, Email: Ijaz@JFK.edu.pk

Research Associate: Khola Ilyas

Research Associate: Ashok Lilani

Research Assistant: Junaid Khan

Acknowledgements

Principal Investigator, Dr. Ijaz A. Qureshi from JFK Institute of Technology and Management, Islamabad, Pakistan is grateful to the executives of Indus Consortium for giving us the opportunity to complete this pilot study in the South Sindh and South Punjab of Pakistan.

It was a challenging assignment as time given to complete this task was limited. However, what our team found very helpful and supportive was round the clock communication with Mr. Ashok Lilani who kindly arranged the support teams in the targeted villages for data gathering and interviews. For sure without his trust and support this job would not have been completed.

Research team is also thank full to Mr. Hussain Jarwar, CEO Indus Consortium and Mr. Khalid Saifullah, National Coordinator of Indus Consortium for attending all the meetings regarding the progress in research report. Mr. Jarwar and Mr. Saifullah kindly honored the research team by joining us in the focus group discussion organized at Islamabad, Pakistan.

Finally research team is also grateful to Mr. Ghulam Abbas, Project Officer ICT Multan, Mr. Sabir Hussain Jarwar ICT Baddin and Thatta, Mr. Muhammad Adeel ICT Rajanpur, Mr. Javed Iqbal, Mr. Jamshaid Farid, Mr. Qaisar Azam, Miss Bilqees Umar, Mr. Nazim Baloch and Mr. Anwar Punjwani for making it possible to complete the field tasks successfully. We know for sure your sincere support and effort made it possible to get the job done in the desired time frame.

Thank you all once again, hope to have some more projects with you soon.

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ABSTRACT

This research, basically a pilot study is about the implementation of Information Communication Technologies (ICTs) in the rural areas particularly south Punjab and south Sindh of Pakistan. Researchers have conducted the field work in the twenty five villages of five districts i.e Rajanpur, Multan, Muzaffargarh, Thatta and Badin. The objective of this research was to see if the implementation of ICT would have any impact on the livelihood of people involved in the fisheries, agriculture and livestock. Another variable "unemployment" was also added in the designed research tools to see if the ICT can be helpful to unemployed members of these communities.

The questionnaire was distributed among the rural population of Rajanpur, Multan, Muzaffargarh, Thatta and Badin on the basis of convenient sampling. In case of fisheries participants filled out 37-item questionnaire. There were 120 questionnaires distributed among the participants and 106 were usable for analysis purpose. For agriculture, participants filled out 36-item questionnaire. There were 250 questionnaires distributed among the participant and 212 were usable for analysis purpose. The participants of the study in livestock filled out a 38-item questionnaire. There were 250 questionnaires distributed. Among 250 questionnaires, 206 were usable for analysis purpose.

In addition to launching the surveys in the twenty five villages, JFK Institute of Technology and Management research team organized focus group discussion in Islamabad where policy makers, ministry officials, civil society representatives and university professors were invited to get their opinion on the implementation of ICT in the stated communities. The panel stressed the need to launch the ICT project on priority basis to enhance the economic opportunities for south Sindh and south Punjab.

Researchers analyzed the data using the SPSS software. Reliability Analysis, Principal Component Analysis and Regression Analysis were conducted to analyze the data collected from the twenty five villages.

Results show that a vast majority of the population is in favor of ICT implementation in the communities, with the perception that it would help in improving the livelihood of those involved in fisheries, agriculture and livestock.

INTRODUCTION

Information and communication technologies (ICT) offer bright prospects for the developing countries in picking up the pace for economic growth, reducing poverty and promoting sustainable micro development. The role of ICTs in rural areas as an impetus for development has long been acknowledged and therefore numerous public/private sector organizations, donor agencies are involved in ICT related projects with the aim to improve quality of rural life. According to infoDev report (2010), as outlined by United Nations Millennium Development Goals, the international donor community has made concerted efforts to bridge the digital gap between the haves and have-nots.

Although Jensen (2007) declared the impact of increased access of ICTs to developing societies unclear but recent evidence suggests that ICTs can play a fundamental role in boosting the livelihoods of rural population (Aker & Mbiti, 2010; Dutta & Das, 2011; Kiiza & Peterson, 2012; Mamaghani, 2010; Omer & Chhachhar, 2012; Stienen, Bruinsma & Neuman, 2007).

Further strengthening the case are the views of Kgalema Motlanthe, Deputy President Africa, regarding the solution of joblessness, poverty and health issues in Africa, "If you look at countries such as India, they invested a lot in education, IT, and ICT and reap the benefits of those investments. That's "what Africa needs to do as well" (Dorr & Fine, 2010).

The research question framed in this study is:

"How does ICT impact the livelihoods of rural population of Pakistan?"

To attend to this research question, this paper provides an overview of the ICT perceptions of rural population of Southern Sindh (Badin and Thatta) and Southern Punjab (Muzafargarh, Multan and Rajanpur) related to daily life usage, agriculture, fisheries and livestock. A further component of "unemployment" is added in the research to see how it would have any impact on the lives of unemployed folks in the targeted areas.

The findings of this study would help the donor agencies and government development bodies to understand the ICT need and perceptions of rural population in order to successfully conduct projects in these poverty struck areas.

LITERATURE REVIEW

ICT and Development

Information and Communication Technologies (ICT) refers to the use of electronic and computers based technologies to access information and communicate with others (Angello and wema 2010). Thus, the transfer of information takes place electronically through the electronic devices like computers, mobile phones and tablets. The role of ICTs as enabler of socio-economic development is being stressed by the international development communities because of the prospects associated to it for the developing countries.

ICT offers major opportunities to the developing world in accelerating the economic growth, encouraging local development and reduction in poverty (Mamaghani, 2010). As a result of this, efforts are being made to utilize ICT for achieving development objectives in healthcare, workforce, education, agriculture, government services etc. to improve the livelihood of poor people. The achievement of these objectives is likely to cause a chain reaction instigating positive impact on the position of developing countries in the global economy as a result of improvement in the individual level income.

Some of the researchers have also contended that other than the economic impacts, the ICTs bear positive spillover effects on various aspects of social life. For example, these technologies have been linked to improving education delivery and e-government (Johnstone, 2007), develop civil infrastructure (Ngwenyama, Andoh-Baidoo, Bollou & Morawczynski, 2006), empower disregarded women (Huyer, 2005), maintain good governance (Meso, Datta, & Mbarika, 2005) and augment health care (Von Lubitz & Wickramasinghe, 2006). Therefore, many researchers argue the significance of ICT infrastructure for the rapid development of emerging economies (Jukka & Pohjola, 2002; Madon, 2000; Pohjola, 2001).

ICT and Rural Societies

The last two decades have been characterized with the evolution in ICTs that have a profound impact on all aspects of life. The developed countries in particular until now have been able to reap the benefits of this revolution. On the other hand developing countries have lagged behind

in adoption of ICT because of unequal access to Internet and wireless telephony between the urban and rural populations. The matter gets further complicated by the fact that this digital divide between the haves and have-nots decreases the value of time as compared to the access costs in developing countries (Mathur & Ambani, 2005). As a result, limited deprived people will invest in ICT (Cecchini & Scott, 2003).

Pakistan has extreme geographical importance because of its unique strategic position. With a population of 170 million, it is the 6th most populous country in the world ("About Pakistan," n.d.) . 67.5 % of the population resides in villages and 55% of population is under the age of 24 which is becoming more and more challenging to provide health, education and jobs to the rural areas of Pakistan (Pakistan Economic Survey, 2011). Although Teledensity of 71.5% depicts healthy trend in the expansion of telecommunication services but the scenario for the rural residents may be different ("Telecom Indicators," 2013). According to Universal Service Fund, 480 cities and towns of Pakistan lack broadband services with the major percentage comprising in the rural areas (Iftikhar, 2012). The long hour power shutdown in the rural areas further complicates the matter. Therefore, even with a flourishing IT industry having an estimated global share of US$2.8 billion, including global sales revenue of US$1.6 billion, ICT expansion in rural Pakistan will be a challenging task ("Industry Overview," n.d.) .The reason can be attributed to the fact that with the evolution of technology extending ICT networks to rural areas has been a persistent challenge (Alleman, Rappoport, & Banerjee, 2010).

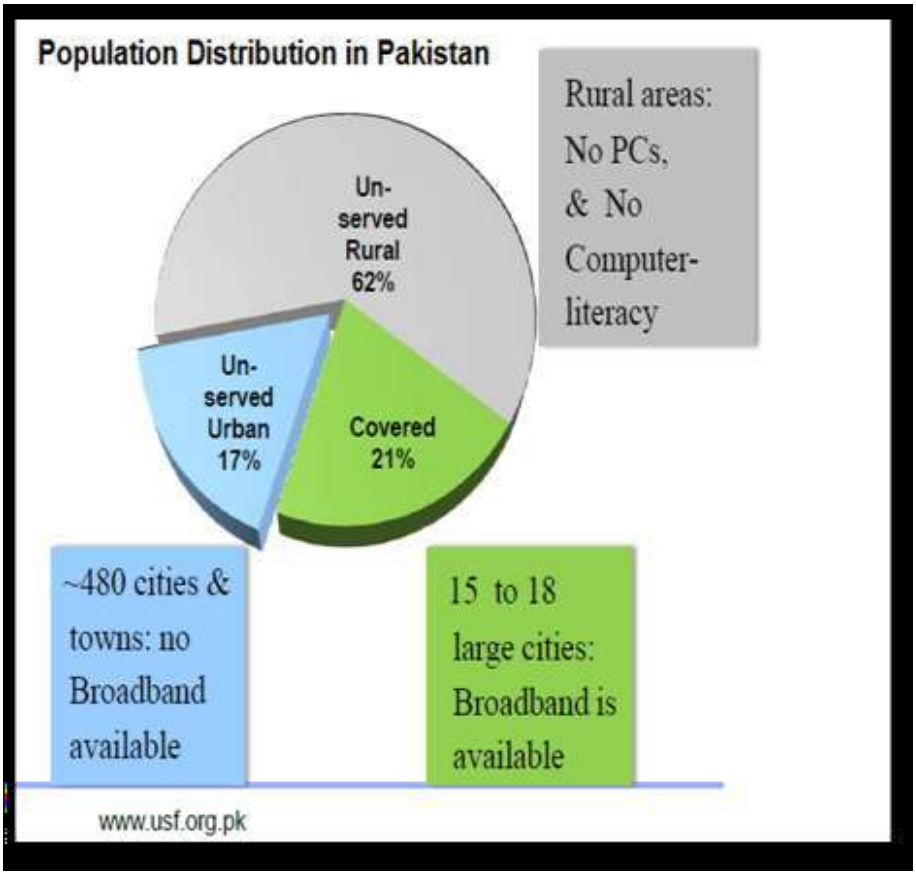


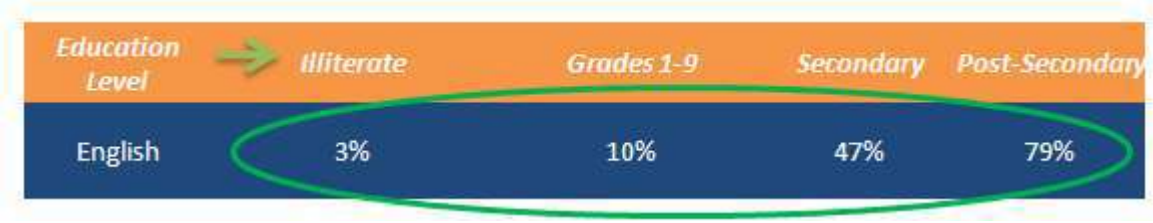
Figure 1. Source: Research report by Iftikhar, USF.ORG.PK 2012.

Figure 1 is taken from the Universal Service Fund report published in 2012. The information published shows that 62% rural population has no personal computer or any skill of how to use the PC. At the same time 17% of the population has no access to broadband which consists of 480 cities and town. Only 21% of the nation has access to broadband in Pakistan as per this report.

Apart from the absence of infrastructure and economic factors, major obstacles are illiteracy and lack of awareness (Mathur & Ambani, 2005). Unlike other mediums of communications like Radio and Television, Internet requires some basic level of literacy in order to communicate with other people. BBC survey conducted in 2008, indicated 52% of respondents identified themselves as illiterate, thus highlighting illiteracy as an important issue in Pakistan.

Furthermore, the digital gender divide clearly exists with low literacy rate among the women as

Table 1: Percent of those respondents who say they understand English



Source: BBC Pakistan 2008: survey of adults (15+) n = 4020

compared to men. Table 1 indicates the danger of permanent backwardness in rural areas. One of the possible reasons could be the socio-cultural issues in the rural societies which do not allow much ICT access to women.

Table 2: Literacy Rate (10 Years and Above)-Pakistan and Provinces (2010-11).

Province	Male %	Female%	Total%
Punjab			
Urban	80	71	76
Rural	64	42	53
Sindh			
Urban	82	68	75
Rural	60	22	42

Source: Pakistan Economic Survey 2012

Transformative Role of ICT

The transformative role of ICT cannot be denied with number of case studies witnessing its power to improve livelihoods by eradicating poverty through empowerment of rural communities. Chapman, Slayaker, and Young (2004) accentuated significance of ICTs for providing information to rural residents in order to make livelihood strategies decisions and institutions for developing policies and process for these strategies. The following case studies highlight the successful application of ICTs in agriculture, livestock, mobile communications, government and education sector.

1. *Computerized Milk Collection Centers*

Lack of access to information about weather conditions, prices and market opportunities are typically very common among farmers living in rural areas. ICT can remedy such situation by timely access to the relevant information in less time. In Gujrat (India) electronic milk collection centers have been set up which have integrated system to measure weights, test fat and plastic card readers in order to ensure fair prices for the farmers who supply milk to dairy corporations (Cecchini & Scott, 2003). Therefore, the farmers have been protected against the traditional intransparent pricing practices and delayed payments. Consequently this initiative has allowed 50,000 farmers to benefit from the transparent and cooperative system on daily basis (Cecchini, 2001).

2. Improving Health Care

The Telecenters deployed by the United Nations Development Program (UNDP) and the Ministry of Science and Technology (MoST) in Menwangzhuang and Pushang, China, meets the information need of the rural population related to health care such as setting hospital appointments and getting basic health advise (Soriano, 2007). Furthermore, the residents also regarded mobile phones as efficient tools for getting information about jobs and the whereabouts of their friends and family members.

Successful projects like Gyandoot Project and N-Logue Communications in India allow for delivery of wide variety of services related to e-governance, health care information and other services through intranet (Gyandoot) and corDect (N-Logue) which is wireless based communication service (Dutta & Das, 2011). Furthermore, in Malawi, patients of HIV and Aids can receive reminder to take their medicines on schedule through text messages (Aker & Mbiti, 2010).

3. ICT in Agriculture

E-Choupal is a cost effective initiative by ITC for direct procurement of export products from the farmers of Indian villages through Internet (Wikipedia 2013). This technology based intervention provides farmers the basic knowledge about risk management and logistic related issues, thereby, empowering them to face global challenges (Dutta & Das, 2011).

According to Aker and Mbiti (2010), mobile phones reduce the search costs for the traders as they are able to know about prices in different regions. For example, in Ghana, farmers are able to learn about the tomato and corn prices over 400 Kilometer away through text messages. Similarly, Muto and Yumano (2009) found that mobile phones coverage resulted in 10 percent increase in the likelihood of farmers involvement in market for bananas as compared to maze, thereby signifying the importance of mobile phones for perishable products.

4. Empowerment of Fisher Women

Patterson, Linden, Bierbrier, Löfgren, Wilhelmsson and Edward (2008) conducted ICT training for the fisher women of Siluvaipatti in Tuticorin district of Tamil Nadu State, southeastern India. Although the literacy rate of the village is generally good when compared to other villages but this particular training aimed to facilitate the uneducated women to get the basic knowledge of getting development loans in order to improve their livelihood. For this reason two coordinators were trained who taught English to low educated women and Tamil alphabets to the uneducated women of the village. As a result of this training several women learned to write their names and short sentences.

METHODOLOGY

A **methodology** is usually a guideline system for solving a problem, with specific components such as phases, tasks, methods, techniques and tools (Irny and Rose, 2005). It can be defined also as follows:

1. "the analysis of the principles of methods, rules, and postulates employed by a discipline" (Merriam–Webster, 2013).
2. "the systematic study of methods that are, can be, or have been applied within a discipline" (Merriam–Webster, 2013).
3. "the study or description of methods" (Baskerville,1991).

This part of research contains analysis of three different segments of rural life i.e. Agriculture, Fisheries and Livestock. Another important variable i.e. Unemployment is accommodated in all three of the questionnaires.

Researchers have focused on knowing the perception of ICT by using the two different methodologies i.e. questionnaires and focus group discussions. A focus group discussion was organized in the city of Islamabad where academicians, policy makers and ministry of information officials were invited to discuss and see the pros and cons of bringing ICT in the rural life of South Sindh and South Punjab. Interestingly, all panel of experts agreed that there is serious need to implement ICT in the described areas to enhance the livelihood of the communities.

Researchers prepared and launched questionnaires for the communities involved in the agriculture, fisheries and livestock. We also focused on the unemployed workforce in the communities. In the unemployed part, it was checked how community member without job can benefit from the ICT implementation in South Sindh and South Punjab.

DATA ANALYSIS

Data gathering method, measurement instrument and method of analysis are described in this section. In this research we developed three different questionnaires based on the specific requirements of our targeted sample. The questionnaires comprised of Likert Scale in which 1 indicated "Strongly Disagree" and 5 indicated "Strongly Agree". The sample population comprised of agriculture, fisheries and livestock of the rural areas of south Punjab and south Sindh in order to identify their ICT perception.

For response taking purpose the enumerators were trained in a 9 hour training session in order to provide full understanding of instrument interpretation and customer services skills. The responses from the target audience were then recorded by the enumerators on the questionnaire in a one on one meeting in 25 villages of south Punjab and south Sindh in Pakistan.

1. Data Analysis of Fisheries Instrument

In case of fisheries participants filled out 37-item questionnaire. There were 120 questionnaires distributed among the participants and 106 were usable for analysis purpose.

1.1 Demographic Details

Demographic information of respondents is presented in table below. Table 3 shows that the respondents comprised of 75.7% of males and 24.3% of females. Most of the respondents (42.7%) were above 32 years of age and 50.5% were found to have no primary schooling. Large percentage of respondents used public transportation or travelled on foot (35.0%; 24.3%). 39.3% of the respondents owned cows and 33% had buffalos in livestock. Furthermore, 92.7% of the respondents use mobile phones in their daily life. This further strengthens our case for the implementation of Information Communication Technologies (ICTs) in the south Punjab and south Sindh.

Graphical Presentation of Fisheries

Table 3: Gender

Male	100

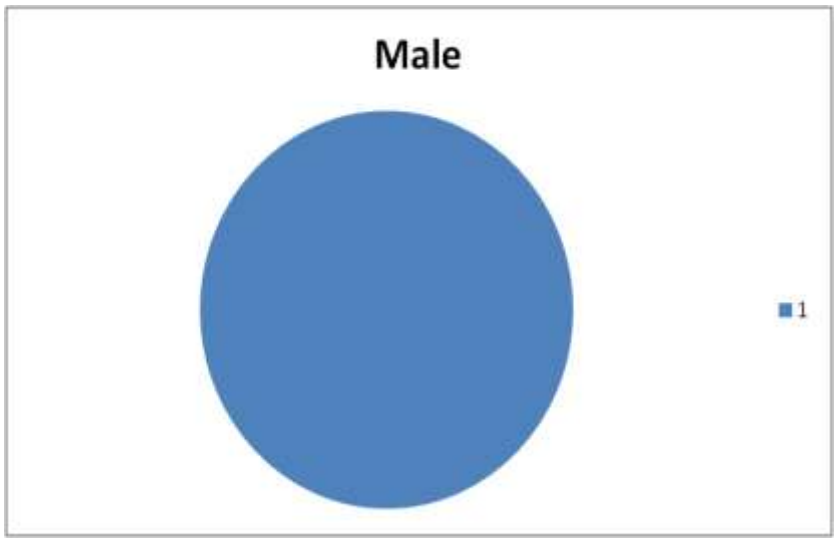


Figure 2: GENDER OF FISHERIES PARTICIPANT

Table 4: Age

15-20 years	12.3
21-26 years	27.4
27-32 years	30.2
Above 32 years	30.2

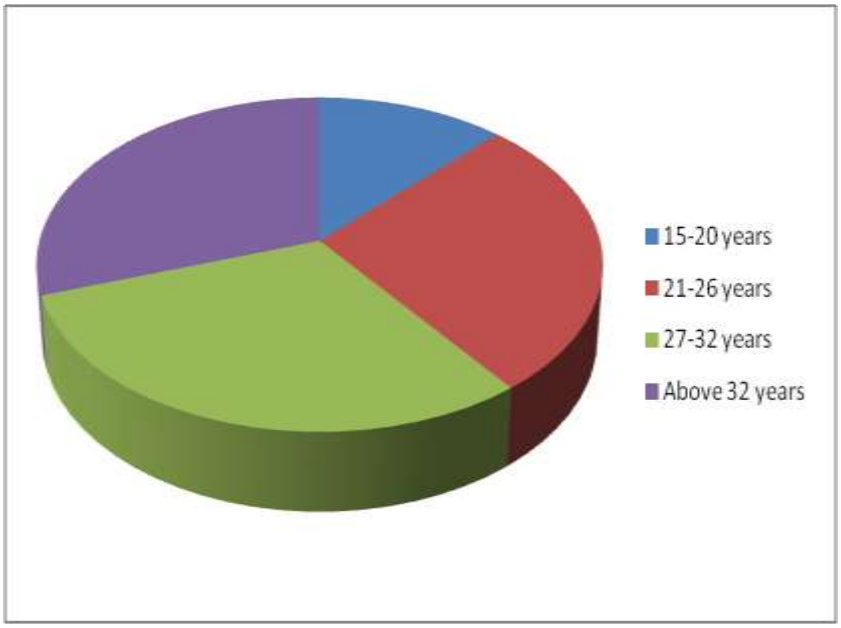


Figure 3: AGE OF THE FISHERIES PARTICIPANTS

Table 5: Education (%)

No formal schooling	36.8
Primary school	27.4
High school	14.2
Matriculation	4.7
Intermediate	11.3
Graduation	3.8
Master	1.9

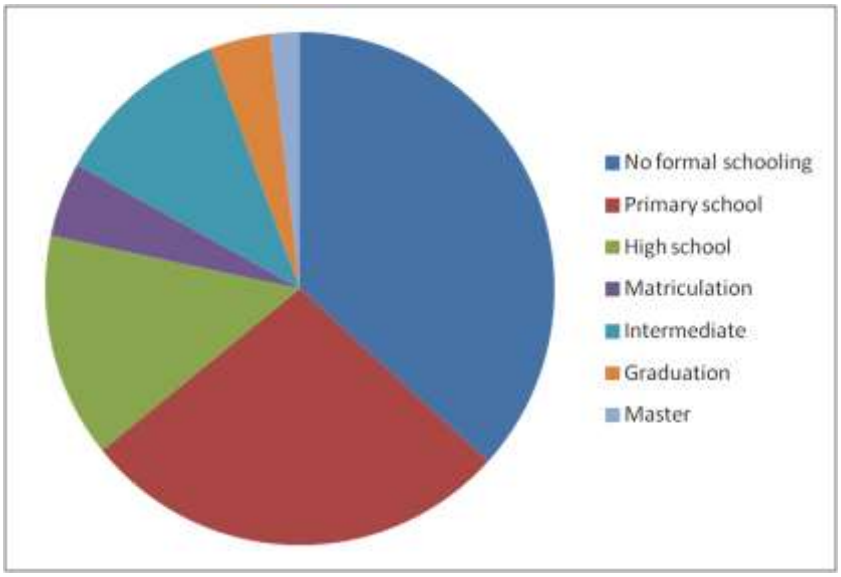


Figure 4: EDUCATION OF THE FISHERIES PARTICIPANT

Table 6: Income Source

Fisheries	100

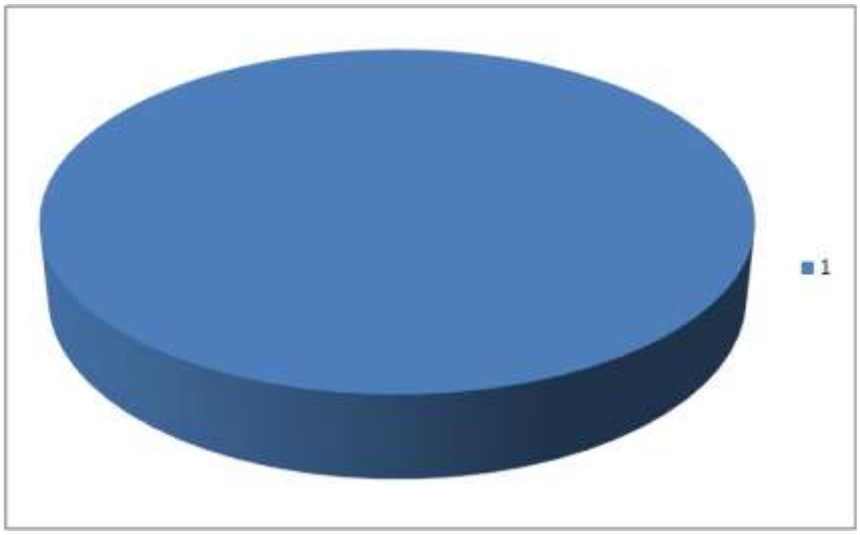


Figure 5: INCOME SOURCE OF THE FISHERIES PARTICIPANT

Table 7: Transportation (%)

on foot	18.9
public transportation	44.3
private vehicle	23.6
2-0r-3 wheel	10.4
vehicle(motorbike, tricycle, bicycle)	2.8

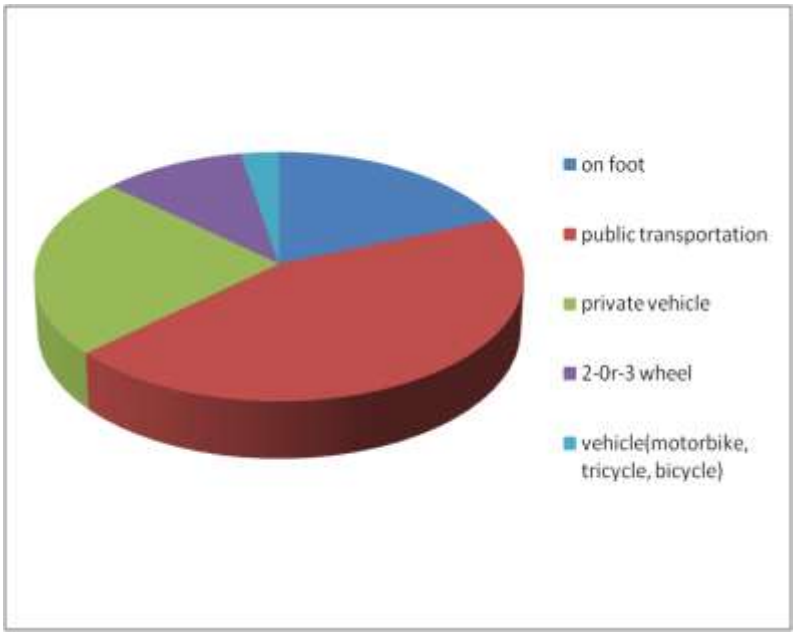


Figure 6: TRANSPORTATION OF THE FISHERIES PARTICIPANT

Table 8: Monthly Income %

5,000-15,000	91.5
16,000-26,000	7.5
27,000-37,000	0.9

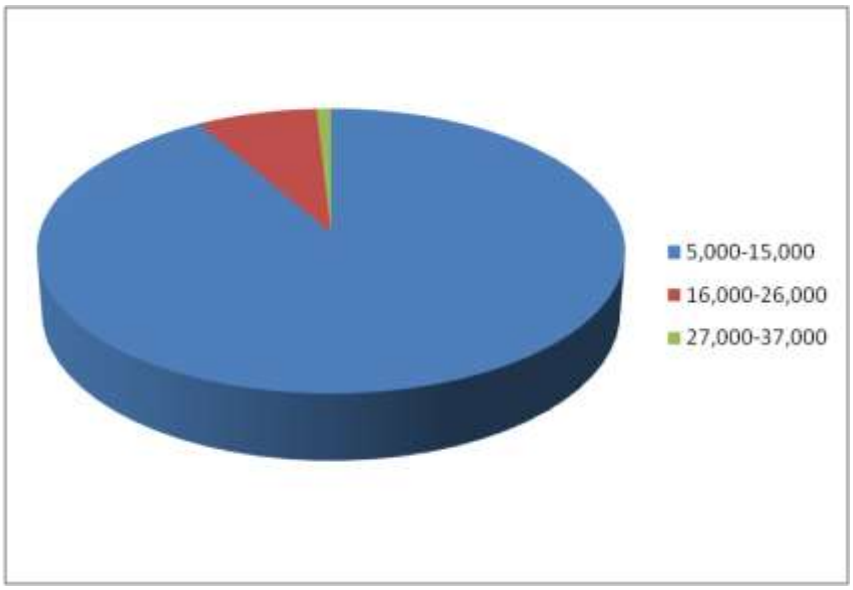


Figure 7: MONTHLY INCOME OF THE FISHERIES PARTICIPANT

Table 9: ICT Services

Land line	0.9
Mobile phones	86.8
System	12.3

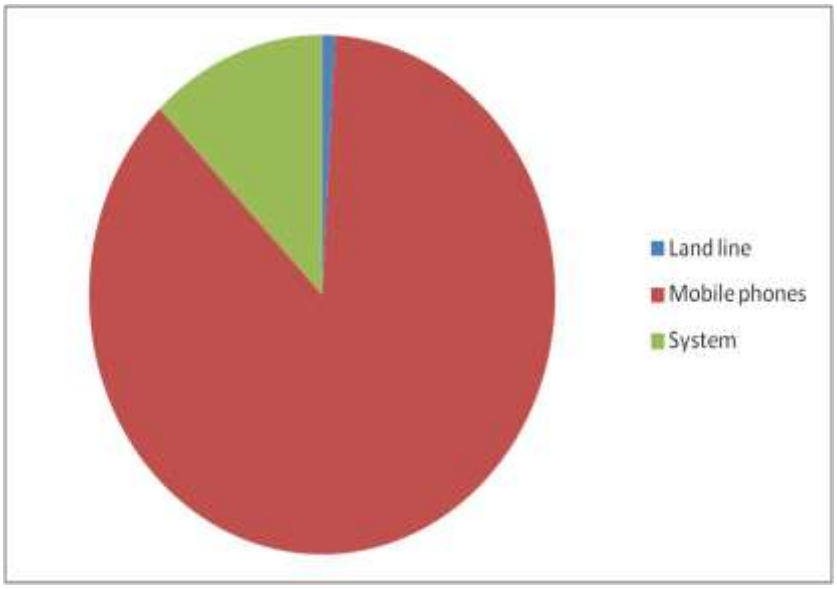


Figure 8: ICT SERVICES OF THE FISHERIES PARTICIPANT

Table 10: Demographics

Variable	Items	Frequency	Percent
Gender	Male	106	100.0
Age	15-20 years	13	12.3
	21-26 years	29	27.4
	27-32 years	32	30.2
	above 32 years	32	30.2
Education	No formal schooling	39	36.8
	Primary school	29	27.4
	High school	15	14.2
	Matriculation	5	4.7
	Intermediate	12	11.3
	Graduation	4	3.8

	Master	2	1.9
Income source	fisheries	106	100.0
Transportation	on foot	20	18.9
	public transportation	47	44.3
	private vehicle	25	23.6
	2-0r-3 wheel	11	10.4
	vehicle(motorbike, tricycle, bicycle)	3	2.8
Monthly_income	5,000-15,000	97	91.5
	16,000-26,000	8	7.5
	27,000-37,000	1	.9
ICT_Services	Land line	1	.9
	Mobile phones	92	86.8
	System	13	12.3

Reliability Analysis:

Reliability analysis is used to make sure that scale of the instrument is consistently measuring the constructs of the questionnaire. It reflects the uniformity of findings of the study. In order to test the internal consistency reliability of the scale items Cronbach's alpha values were analyzed (Cronbach, 1984), which ranges within the value of 0 and 1. According to DeVellis (1991) the value of alpha above .6 is considered acceptable for reliability assessment. However, in table 11 all the variables other than ICT-employment (.543) showed respectable alpha values. The variable was not removed because it is important in the context of this study.

Table 11: Reliability analysis

Variables	**No. of Items**	**Cronbach's Alpha**
ICT Usage in Daily Life	7	.848
ICT – Health	8	.849
ICT - Fisheries	8	.847
ICT - Employment	3	.543
Behavior Intention	3	.613

Principal Component Analysis (PCA)

Principal Component Analysis (PCA) is a statistical method which explains the covariance structure of a set of variables. In particular it allows us to identify the principal directions in which the data varies ("Principle component analysis" n.d). Principal component analysis was conducted on 37 items in order to identify the underlying perception of the rural farmers on behavior intention to use ICT and also to screen the items. The items having factor loading of at least .60 were kept in the measurement scale. PCA resulted in Kaiser-Meyer-Olkin Measure (KMO) value of .838 for ICT-daily usage. Similarly, table 5 shows significant KMO values of ICT-health (.845), ICT-fisheries (.784) and behavior intention (.602). However, ICT-employment revealed the KMO value of .570 which is acceptable because it's closer to the minimum acceptable value of .60. Furthermore, ICT-daily usage explains 52.597% of the total variance; ICT-health 49.21% of the total variance; ICT-fisheries 48.348% of the variance; ICT-employment 52.81% of the variance and behavior intention explaining total variance of 56.52%.

Table 12: Principal Component Analysis (PCA)

Variables	KMO	Factor Loading	Total Variance Explained
ICT_1	**.838**	.739	**52.597**
ICT_2		.685	
ICT_3		.777	
ICT_5		.769	
ICT_6		.738	
ICT_7		.636	
ICT_8		.722	
Health_1	**.845**	.725	**49.21**
Health_2		.730	
Health_3		.704	
Health_4		.800	
Health_6		.658	
Health_7		.639	
Health_8		.691	
Health_9		.650	
Fisheries_3	**.784**	.750	**48.348**
Fisheries_4		.763	
Fisheries_5		.635	
Fisheries_6		.701	

Fisheries_7		.672	
Fisheries_8		.742	
Fisheries_10		.632	
Fisheries_12		.654	
ICT_EMP_1	**.570**	.671	**52.810**
ICT_EMP_2		.816	
ICT_EMP_3		.684	
BI_1	**.602**	.771	**56.52**
BI_2		.653	
BI_3		.821	

Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO).

Regression Analysis

Regression analysis is a statistical procedure used for estimating the relationships between variables. It facilitates identification of the relationship among variables (Sykes, 2011). Therefore, table 13 shows the relationship between the predictor variables and the dependent variables. The coefficient of determination (R^2) measures the degree of variance in the mean of the dependent variable explained by the independent variable. The (R^2) value is 54.5% which means that the regression model explained 54.5% of the variance in behavior intention. The explanatory power of regression model is considered good as the value of R^2 is on the higher side.

Table 13: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.738[a]	.545	.527	.30589

a. Predictors: (Constant), ICT and Employment, ICT Usage in Daily Life, ICT and Fisheries, ICT and Health

Table 14: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	
		B	Std. Error	Beta	Sig.
1	(Constant)	.950	.336		.006
	ICT - Daily Life Usage	-.034	.125	-.037	.788
	ICT – Health	.259	.140	.282	.066
	ICT – Fisheries	.314	.107	.332	.004
	ICT - Employment	.261	.082	.267	.002

a. Dependent Variable: Behavior Intention

Furthermore, table 14 provides the beta value of the variables along with their significance level. The highest the significant value of an item the greatest unique contribution it makes to the dependent variable. The significance value reveals whether the relationship among the variables is significant or insignificant. A value of greater than .05 indicates insignificance and a value of less than .05 explain significance. ICT-fisheries have the highest Beta value of .332 and significance value of .004, meaning that the variable makes significant contribution to behavior intention. Similarly, ICT-employment also makes significant contribution to behavior intention (β=.002, P=.002). ICT- daily usage and health indicated low unique insignificant contribution to behavior intention (p=.788).

OVERALL ANALYSIS OF FISHERIES:

Table 11: The internal consistency reliability measures whether the different items that are proposed to measure the same concept provide similar scores. The chronbach's alpha value in this table reveals appropriate internal consistency reliability among all the variables except ICT-employment as the values are above 0.6. However, ICT-employment having alpha value of .53 was not removed because of its importance in the context of the study.

Table 12:

KMO Value: It explains if the factor analysis is appropriate or not. The KMO values in table 12 lie between the benchmark of 0.5 and 1.0 which shows the appropriateness of factor analysis.

Total Variance Explained: It indicates how much one unit change in independent variable brings change in to the dependent variable.

Table 13:

R: It is the square root of R square.

R Square: It explains "goodness of fit" of the model i.e. how well the observations fit in to the model. The R square in the model is .545 which means that the independent variables (ICT Usage in Daily Life, ICT – Health, ICT – Fisheries and ICT – Employment) can explain 54.5% of change in the dependent variable.

Adjusted R square: It measures the amount of variance in the dependent variable (Behavior Intention) explained by variations in the independent variables. The adjusted R square demonstrates that 52.7% variance was explained in this model.

Std. Error of the Estimate: It explains standard deviation of the error terms (Factors not included in this model which could affect ICT behavior intention).

Table 14:

Coefficients: In regression with multiple independent variables, the coefficient explains the degree to which dependent variable is expected to increase when the independent variable is increased by one unit, thereby holding all the other independent variables constant.

Standardized Coefficients: In order to compare different variables only standardized estimates will be checked as all the variables in it have the same scale.

Beta and Sig : Beta explains the contribution of each independent variable. ICT-Fisheries, with beta coefficient of .332 and sig. value of .004 make the strongest unique contribution in explaining behavior intention to use ICT. Similarly ICT-Employment also explains ICT usage behavior intention significantly (Beta= 267; p = .002). However ICT daily life usage and ICT-Health do not significantly predict behavior intention because the Sig. value is above .05.

Therefore, all the statistical test applied in this research after thorough literature review suggests there is strong relationship between ICT and the fisheries communities. ICT implementation would support communities involved in the fisheries and daily life usage activities will result in positive behavioral intention to acceptance and use of ICT.

Data Analysis of Agriculture Instrument

Demographic Details

In case of agriculture participants filled out 36-item questionnaire. There were 250 questionnaires distributed among the participant and 212 were usable for analysis purpose.

The demographic detail of the respondents revealed that 81.6% of the respondents were male. 47.2 % of the respondents were above the age of 32 and 50.5% received no formal education. On the other hand only 24.1% had primary school level education. Most of the respondents used 2-or-3 wheeled transport (26.9), public transport (23.6) or travelled on foot (23.1). The monthly income level of 84% of the respondents was Rs. 5,000-15,000. Interestingly 88.3 % of the respondents used mobile phones.

Graphical Presentation of Agriculture

Table 15: Gender %

Male	81.6
Female	18.4

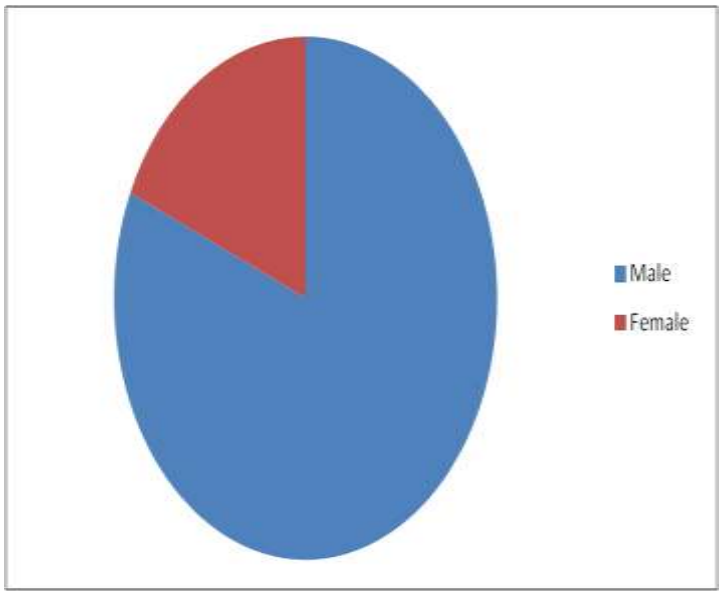


Figure 9: GENDER OF THE AGRICULTURE PARTICIPANT

Table 16: Age %

15-20 years	21 9.9
21-26 years	24.5
27-32 years	18.4
Above 32 years	47.2

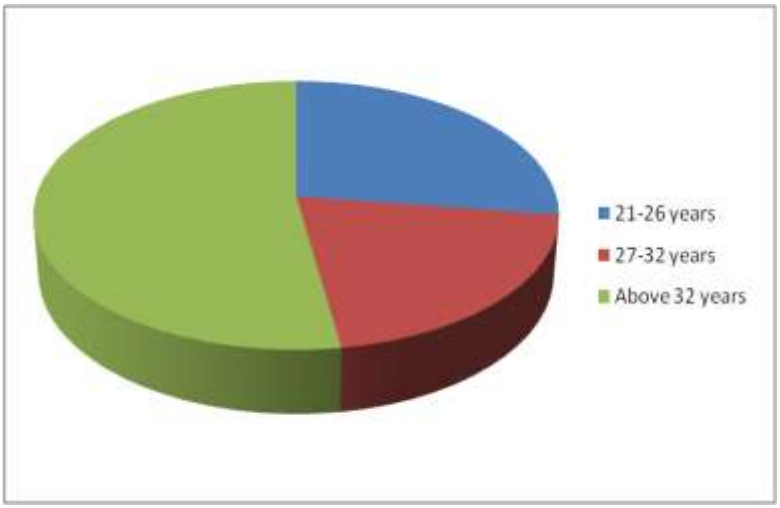


Figure 10: AGE OF THE AGRICULTURE PARTICIPANT

Table 17: Education

No formal schooling	50.5
Primary school	24.1
High school	8
Matriculation	8
Intermediate	7.1
Graduation	2.4

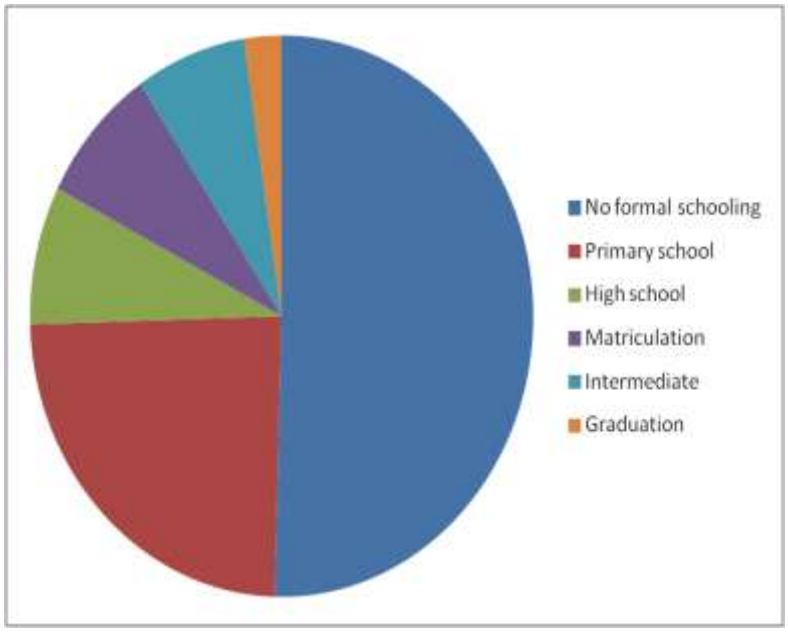


Figure 11: EDUCATION OF THE AGRICULTURE PARTICIPANT

Table 18: Income Source

Crop farming	100

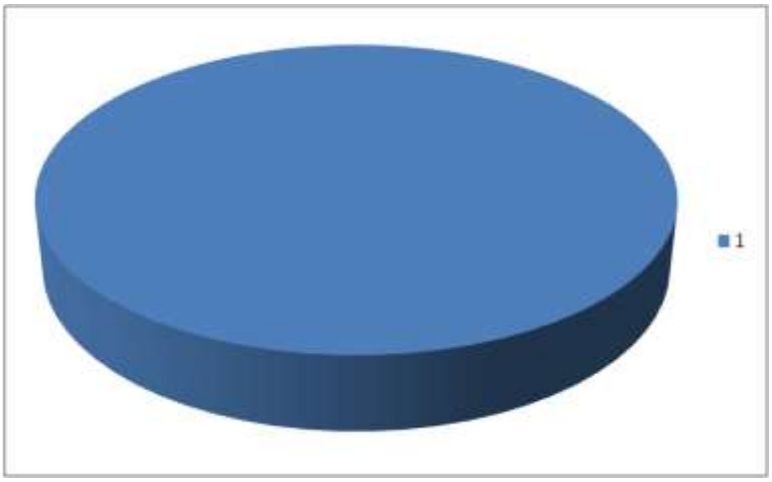


Figure 12: INCOME SOURCE OF THE AGRICULTURE PARTICIPANT

Table 19
Transportation

on foot	23.1
public transportation	23.6
private vehicle	15.6
2-0r-3 wheel	26.9
vehicle(motorbike, tricycle, bicycle)	10.8

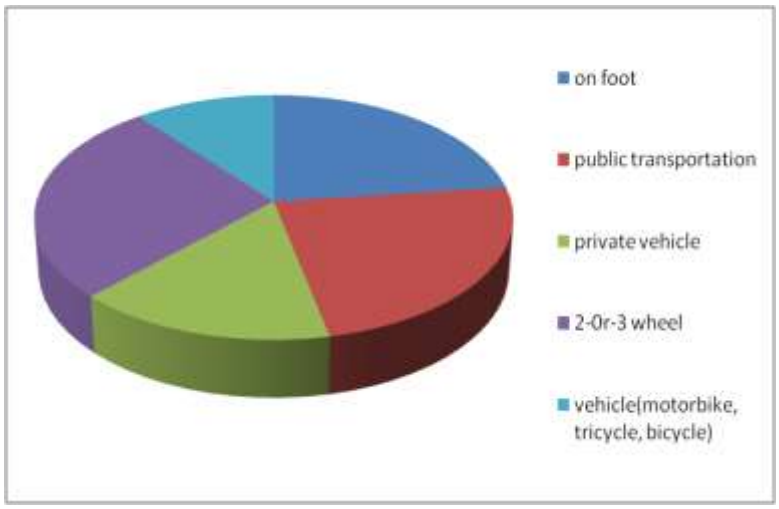


Figure 13: Transportation OF THE AGRICULTURE PARTICIPANT

Table 20: Monthly Income

5,000-15,000	84
16,000-26,000	5.2
27,000-37,000	1.4
Above 38,000	0.5
Missing System	9

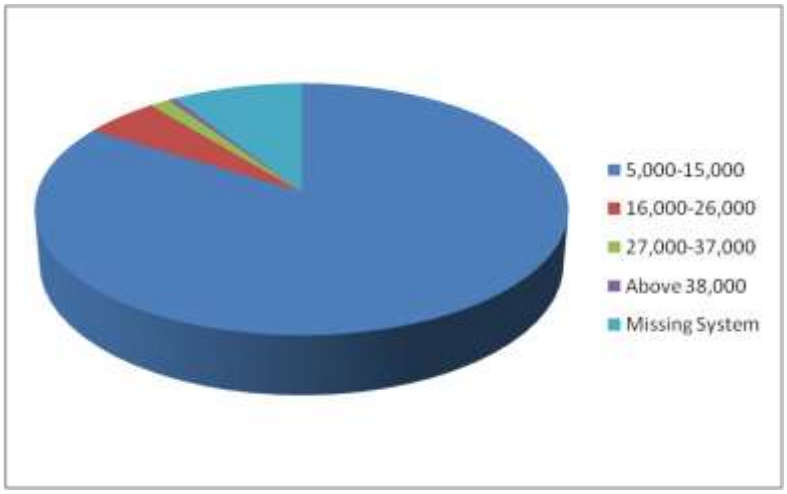


Figure 14: MONTHLY INCOME OF THE AGRICULTURE PARTICIPANT

Table 21: ICT Services

Land line	0.5
Internet	0.5
Mobile phones	88.3
Computer	1.4
Internet Café	0.5
Other	5.1
System	3.7

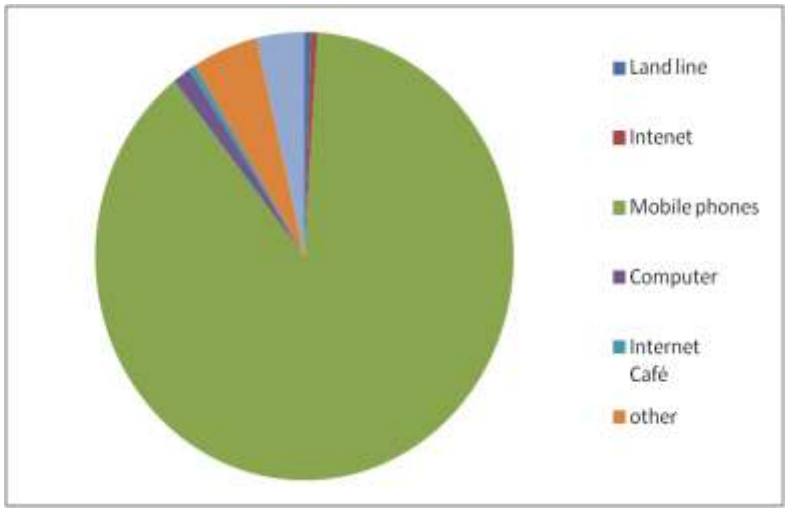


Figure 15: ICT Services for AGRICULTURE PARTICIPANTS

Table 22: Demographics

Variable	Item	Frequency	Percent
Gender	Male	173	81.6
	Female	39	18.4
Age	15-20 years	21	9.9
	21-26 years	52	24.5
	27-32 years	39	18.4
	Above 32 years	100	47.2
Education	No formal schooling	107	50.5
	Primary school	51	24.1
	High school	17	8.0
	Matriculation	17	8.0
	Intermediate	15	7.1
	Graduation	5	2.4
Income source	Crop farming	212	100.0
Transportation	On foot	49	23.1
	Public transportation	50	23.6
	Private vehicle	33	15.6
	2-0r-3 wheel	57	26.9
	Vehicle(motorbike, tricycle, bicycle)	23	10.8
Monthly income	5,000-15,000	178	84.0
	16,000-26,000	11	5.2
	27,000-37,000	3	1.4
	Above 38,000	1	.5
	Missing System	19	9.0
ICT-Services	Land Line	1	.5
	Internet	1	.5
	Mobile phones	189	88.3
	Computer	3	1.4
	Internet Café	1	.5
	Other	11	5.1
	Missing System	8	3.7

Reliability Analysis

Table 23 provided the Cronbach's alpha depicting internal consistency reliability among the items of measurement instrument. The alpha value of ICT- daily life usage (F1).805 and ICT-

daily life usage (F2) .650 was found acceptable. Similarly, ICT-health, ICT-agriculture (F1), ICT-agriculture (F2), ICT- employment and behavior intention exhibit high level of reliabilities.

Table 23: Reliability Analysis

Variables	No. of Items	Cronbach's Alpha
ICT - Daily Life Usage (F1)	4	.805
ICT - Daily Life Usage (F2)	3	.650
ICT – Health	7	.825
ICT- Agriculture (F1)	5	.769
ICT - Agriculture (F2)	3	.618
ICT – Employment	3	.827
Behavior Intention	3	.725

Principal Component Analysis

In order to check the internal consistency reliability among the items the Principal component analysis was conducted on 36 items of the measurement. PCA produced two factors. The KMO value of ICT-daily life usage (F1) is .720 and it explained 63.153% of the total variance. ICT-daily life usage (F2) provided a KMO value of .656 and explained total variance of 58.929%. The total variance explained by ICT-health with a KMO value of .817 is 49.422%. ICT-agriculture (F1) with KMO value of .766 and ICT-agriculture (F2) with KMO value of .581explained total variance of 52.137% and 56.799%. Lastly, ICT-employment (KMO= .725) explained total variance of 75.109% and behavior intention (KMO=.625) explained 64.606% of the total variance.

Table 24: Principal Component Analysis

Variables	KMO	Factor Loading	Total Variance Explained
ICT_5(F1)	.720	.631	63.153
ICT_6(F1)		.773	
ICT_7(F1)		.891	
ICT_8(F1)		.858	
ICT_1(F2)	.656	.781	58.929
ICT_2(F2)		.760	
ICT_3(F2)		.762	
Health_1	.817	.652	49.422
Health_5		.683	
Health_6		.706	
Health_7		.691	
Health_8		.730	
Health_9		.744	
Health_10		.710	
Agriculture_3(F1)	.766	.686	52.137
Agriculture_4(F1)		.673	
Agriculture_5(F1)		.777	
Agriculture_6(F1)		.726	
Agriculture_7(F1)		.743	
Agriculture_9(F2)	.581	.666	56.799
Agriculture_11(F2)		.841	
Agriculture_12(F2)		.743	
ICT_EMP_1	.725	.856	75.109
ICT_EMP_2		.857	
ICT_EMP_3		.856	
BI_1	.625	.700	64.606
BI_2		.831	
BI_3		.871	

Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO).

Regression Analysis

Regression analysis revealed good exploratory power of the model indicating R^2 value of .448 i.e. the model explains 44.8% of the variance in behavior intention. In addition, table 26 suggested significant contribution of ICT- employment (β=.254; p=.001), ICT agriculture (F1) (β=.202; p=.008), ICT daily life usage (F2) (β=.159; p=.024) to behavior intention. However, it suggests insignificant contribution of ICT daily life usage (F1) (β=.092; p=.0276) and ICT-health (β=.054; p=.510).

Table 25: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.669[a]	.448	.431	.33978

a. Predictors: (Constant), ICT and Employment, ICT Usage in Daily Life Factor 2, ICT in Agriculture Factor 2, ICT in Health, ICT in Agriculture Factor 1, ICT Usage in Daily Life Factor 1

Table 26: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	Sig.
		B	Std. Error	Beta	
1	(Constant)	.862	.342		.012
	ICT - Daily Life Usage Factor 1	.065	.060	.092	.276
	ICT- Daily Life Usage Factor 2	.160	.070	.159	.024
	ICT- Health	.049	.075	.054	.510
	ICT-Agriculture Factor 1	.217	.081	.202	.008
	ICT-Agriculture Factor 2	.158	.071	.136	.027
	ICT-Employment	.172	.049	.254	.001

OVER ALL ANALYSIS OF AGRICULTURE

Table 23:

Reliability Analysis: The internal consistency reliability measures whether the different items that are proposed to measure the same concept provide similar scores. The chronbach's alpha value indicates appropriate internal consistency reliability among all the independent variables as the values are above the bencmark 0.6.

Table 24:

KMO Value: It explains if the factor analysis is appropriate or not. The KMO values in table 24 lie between the benchmark of 0.5 and 1.0 which shows the appropriateness of factor analysis.

Total Variance Explained: It indicates how much one unit change in independent variable brings change in to the dependent variable.

Table 25:

R: It is the square root of R square.

R Square: It explains "goodness of fit" of the model i.e. how well the observations fit in to the model. The R square in the model is .448 which means that the independent variables (ICT Usage in Daily Life (F1) (F2), ICT – Health, ICT – Agriculture (F1) F2) and ICT – Employment) can explain 44.8% of change in the dependent variable.

Adjusted R square: It measures the amount of variance in the dependent variable (Behavior Intention) explained by variations in the independent variables. The adjusted R square demonstrates that 43.1% of the variance was explained in this model.

Std. Error of the Estimate: It explains the standard deviation of the error terms (Factors not included in this model which could affect ICT behavior intention).

Table 26:

Coefficients: In regression with multiple independent variables, the coefficient explains the degree to which dependent variable is expected to increase when the independent variable is increased by one unit, thereby holding all the other independent variables constant.

Standardized Coefficients: In order to compare different variables only standardized estimates will be checked as all the variables in it have the same scale.

Beta and Sig.: Beta explains the contribution of each independent variable. ICT-Employment with beta coefficient of .254 and sig. value of .001 makes the strongest unique contribution in

explaining behavior intention to use ICT. Similarly ICT agriculture (F1) (β=.202; p=.008) and ICT daily life usage (F2) (β=.159; p=.024) also impact behavior intention significantly. On the other hand, ICT daily life usage (F1) (β=.092; p=.0276) and ICT-health (β=.054; p=.510) with sig. values above 0.5 indicate no significant impact of behavior intention to use ICT.

The statistical tests applied in case of agriculture also suggest there is strong relationship between ICT and agriculture. Therefore, the farmers perceived that ICT implementation would improve the delivery of information related to markets, products and services to agriculture sector, enhance employment opportunities and daily activities.

Farmers believe that implementation of ICT in their communities would have direct positive impact on their livelihood.

Data analysis of Livestock Instrument

The participants of the study in livestock filled out a 38-item questionnaire. There were 250 questionnaires distributed among the participants based on convenient sampling. Among 250 questionnaires, 206 were usable for analysis purpose.

Demographic

Demographic information of respondents is presented in table below. Table 1 show that the respondents comprised of 100% males with most of the respondents in the age group of 27-32 and above 32. Most of the respondents had no formal schooling (36.8%) and only 27% had received primary school education. Results revealed that 44% of the respondents' used public transportation and 91% had an income level within the Rs. 5000-15000 range. Furthermore, mobile phones (86.8%) were indicated as the most used Information Communication Technology (ICT)

Graphical Presentation of Livestock

Table 27: Gender

MEN	75.7
WOMEN	24.3

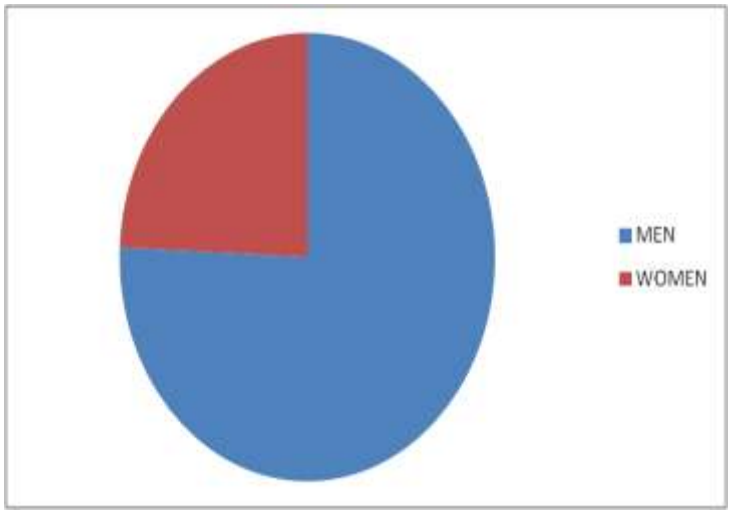


Figure 16: GENDER OF THE LIVESTOCK PARTICIPANT

Table 28: Age

15-20 years	8.3
21-26 years	28.2
27-32 years	20.9
above 32 years	42.7

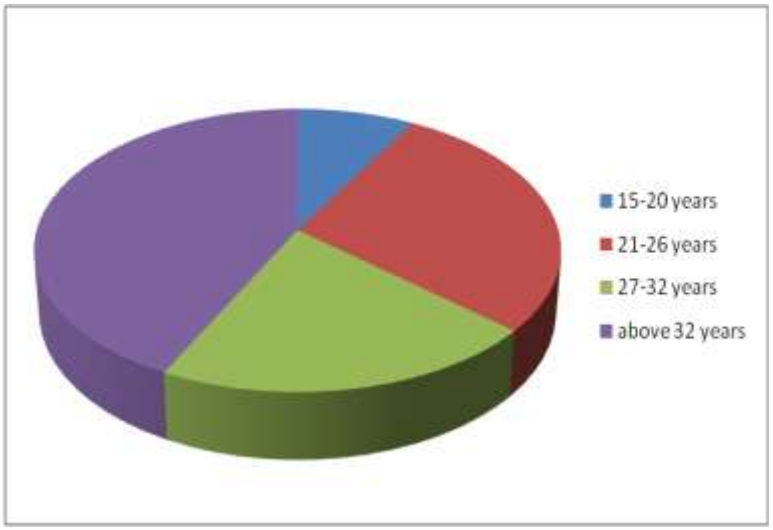


Figure 17: AGE OF THE LIVESTOCK PARTICIPANT

Table 29: Education

No formal schooling	50.5
Primary school	32
High school	7.8
Matriculation	4.9
Intermediate	4.4
Graduation	0.5

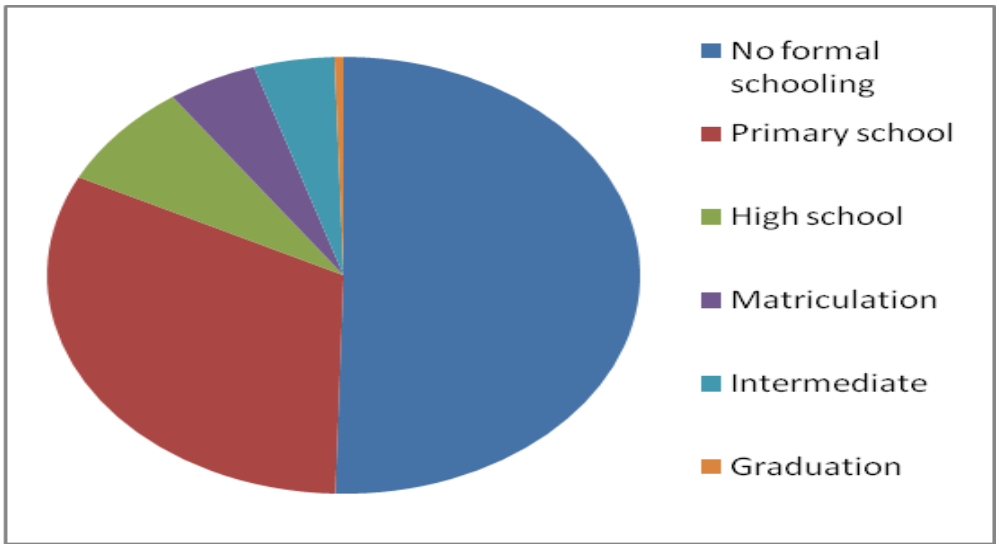


Figure 18: EDUCATION OF THE LIVESTOCK PARTICIPANTS

Table 30 :
Income Source

Livestock keeping	100

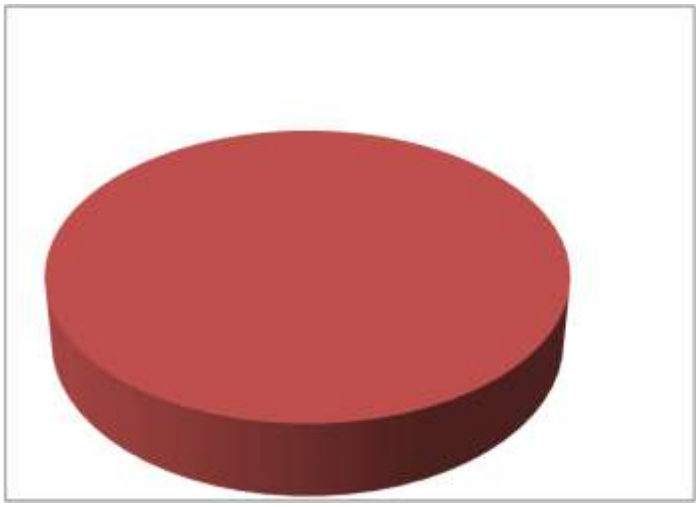


Figure 19: INCOME SOURCE OF THE LIVESTOCK PARTICIPANT

Table 31: Transportation

on foot	24.3
public transportation	35
private vehicle	19.4
2-0r-3 wheel	19.4
vehicle(motorbike, tricycle, bicycle)	1.9

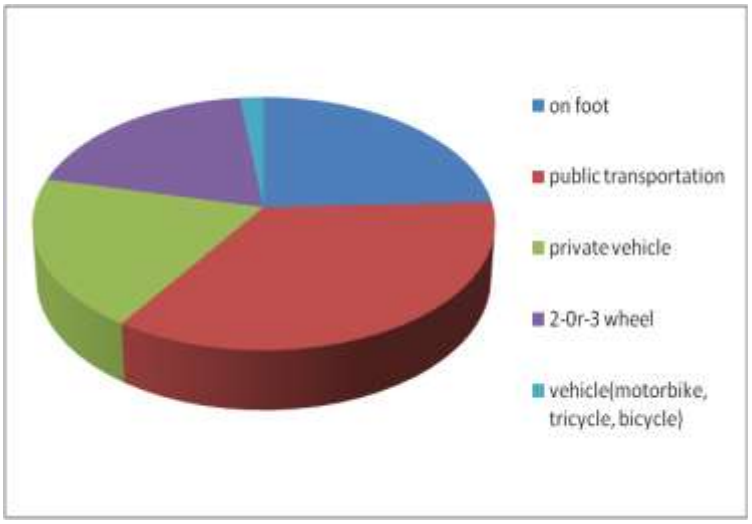


Figure 20: TRANSPORTATION OF THE LIVESTOCK PARTICIPANT

Table 32: Monthly Income

5,000-15,000	86.4
16,000-26,000	6.8
27,000-37,000	1.5
Above 38,000	1
Missing System	4.4

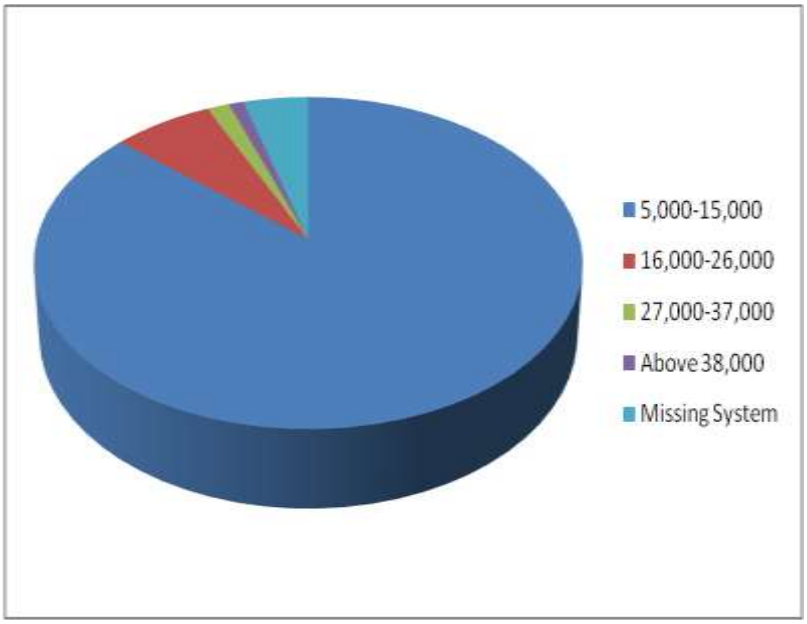


Figure 21: MONTHLY INCOME OF THE LIVESTOCK PARTICIPANT

Table 33 : Livestock

Horses	1
Goats	18.9
Cows	39.3
Buffalos	33
Poultry	7.8

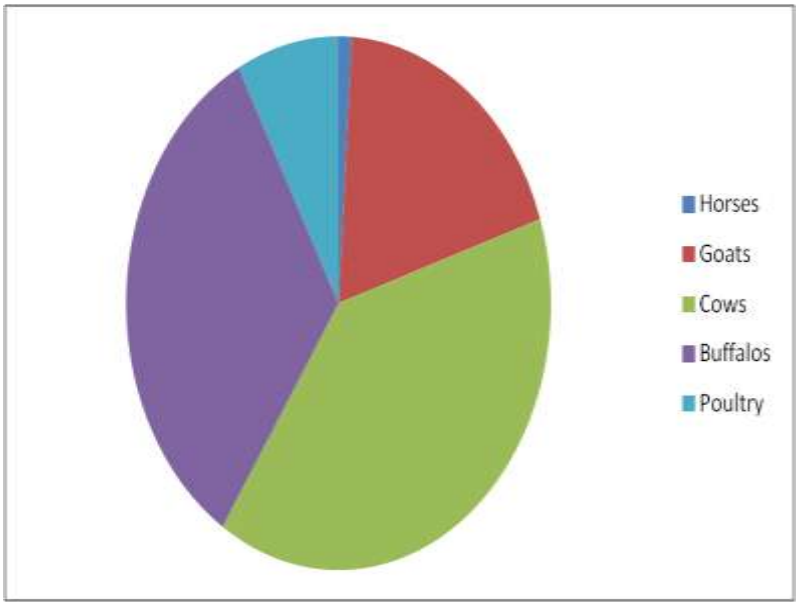


Figure 22: LIVESTOCK OF THE LIVESTOCK PARTICIPANT

Table 34: ICT services

Land line	0.5
Mobile phones	92.7
Computer	1
Other	5.3
System	0.5

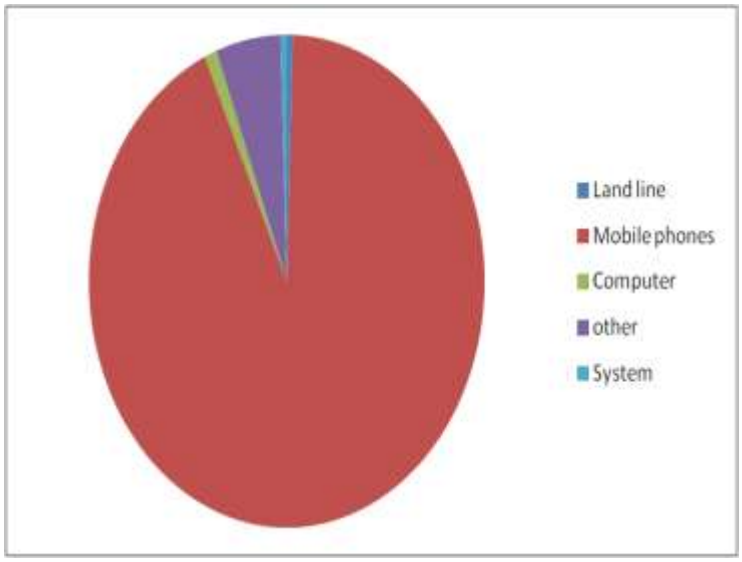


Figure 23: ICT SERVICES OF THE LIVESTOCK PARTICIPANT

Table 35: Demographics

Variable	Items	Frequency	Percent
Gender	Male	156	75.7
	Female	50	24.3
Age	15-20 years	17	8.3
	21-26 years	58	28.2
	27-32 years	43	20.9
	above 32 years	88	42.7
Education	No formal schooling	104	50.5
	Primary school	66	32.0
	High school	16	7.8
	Matriculation	10	4.9
	Intermediate	9	4.4
	Graduation	1	.5
Income source	livestock keeping	206	100
Transportation	on foot	50	24.3
	public transportation	72	35.0
	private vehicle	40	19.4
	2-0r-3 wheel	40	19.4
	vehicle(motorbike, tricycle, bicycle)	4	1.9
Monthly income	5,000-15,000	178	86.4
	16,000-26,000	14	6.8
	27,000-37,000	3	1.5

	Above 38,000	2	1.0
	Missing System	9	4.4
Livestock	Horses	2	1.0
	Goats	39	18.9
	Cows	81	39.3
	Buffalos	68	33.0
	Poultry	16	7.8
ICT Services	Land line	1	.5
	Mobile phones	191	92.7
	Computer	2	1.0
	other	11	5.3
	System	1	.5

Reliability Analysis

The reliability analysis conducted through Cronbach alpha reveals significant alpha values for all the variables. ICT-daily life usage (.844), ICT-health (.861), ICT-livestock (.822), ICT-employment (.804) and behavior intention (.698) showed acceptable Cronbach alpha value.

Table 36: Reliability

Variables	No. of Items	Cronbach's Alpha
ICT Usage in Daily Life	7	.844
ICT and Health	9	.861
ICT and Livestock	7	.822
ICT and Employment	3	.804

Behavior Intention	3	.698

Principal Component Analysis

PCA carried out on the 39 items of the livestock measurement scale revealed the KMO values, factor loadings and total variance explained by the variables. Factor loadings less than .60 were removed from the measurement scale. ICT-daily usage indicated a KMO value of .832 and explained a total variance of 52.165%. Similarly, the results revealed significant KMO value of ICT-health (.850) and ICT-livestock (.802) and explained total variance of 47.883% and 48.999%. Furthermore, the KMO values of ICT-employment (.688) and ICT-behavior intention (.601) were also found significant and explained total variance of 72.130% and 62.913%.

Table 37: Principal Component Analysis

Variables	KMO	Factor Loading	Total Variance Explained
ICT_1	.832	.605	52.165
ICT_3		.675	
ICT_4		.581	
ICT_5		.701	
ICT_6		.728	
ICT_7		.847	
ICT_8		.868	
Health_1	.850	.647	47.883
Health_2		.680	
Health_3		.672	
Health_5		.703	

Health_6		.695	
Health_7		.729	
Health_8		.689	
Health_9		.752	
Health_10		.655	
Livestock_6	.802	.764	48.999
Livestock_7		.615	
Livestock_10		.736	
Livestock_11		.683	
Livestock_12		.760	
Livestock_13		.653	
Livestock_14		.676	
ICT_EMP_1	.688	.823	72.130
ICT_EMP_2		.890	
ICT_EMP_3		.833	
BI_1	.601	.725	62.913
BI_2		.773	
BI_3		.874	

Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO).

Regression Analysis

The R^2 value is 45%, meaning that regression model explained 45% of the variance in behavior intention which indicated a good exploratory power of the regression model. Analysis of Beta value (β= .321) reveals that ICT-livestock makes the most unique significant (p=.000) contribution to behavior intention. Similarly ICT-health and ICT-employment also made a

significant contribution to the dependent variable (β=.227, p=.006; β= .307, p=.000). However, ICT-daily life usage contributed insignificantly to behavior intention (β=.227, p=.595).

Table 38: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.671[a]	.450	.439	.34121

a. Predictors: (Constant), ICT and Employment, livestock, ICT and Health, ICT usage in Daily Life

Table 39 Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	Sig.
		B	Std. Error	Beta	
1	(Constant)	1.324	.269		.000
	ICT usage in Daily Life	-.041	.078	-.050	.595
	ICT and Health	.214	.077	.227	.006
	Livestock	.331	.077	.321	.000
	ICT and Employment	.213	.050	.307	.000

OVERALL ANALYSIS OF LIVESTOCK

Table 36:

Reliability Analysis: The internal consistency reliability measures whether the different items that are proposed to measure the same concept provide similar scores. The chronbach's alpha values in table 36 are above the benchmark .06. Therefore, appropriate internal consistency reliability exists among all the independent variables.

Table 37:

KMO Value: It explains if the factor analysis is appropriate or not. The KMO values in table 36 lie between the benchmark of 0.5 and 1.0 which shows the appropriateness of factor analysis.

Total Variance Explained: It indicates how much one unit change in independent variable brings change in to the dependent variable.

Table 38:

R: It is the square root of R square.

R Square: It explains "goodness of fit" of the model i.e. how well the observations fit in to the model. The R square in the model is .450 which means that the independent variables (ICT Usage in Daily Life , ICT – Health, ICT – Livestock and ICT – Employment) can explain 45.0% of change in the dependent variable.

Adjusted R square: It measures the amount of variance in the dependent variable (Behavior Intention) explained by variations in the independent variables. The adjusted R square demonstrates that 43.9% of the variance was explained in this model.

Std. Error of the Estimate: It explains the standard deviation of the error terms (Factors not included in this model which could affect ICT behavior intention).

Table 39:

Coefficients: In regression with multiple independent variables, the coefficient explains the degree to which dependent variable is expected to increase when the independent variable is increased by one unit, thereby holding all the other independent variables constant.

Standardized Coefficients: In order to compare different variables only standardized estimates will be checked as all the variables in it have the same scale.

Beta and Sig.: Beta explains the contribution of each independent variable. ICT-Livestock with beta coefficient of .321 and sig. value of .000 makes the strongest unique contribution in explaining behavior intention to use ICT. Similarly ICT health (β=.227; p=.006) and ICT employment (β=.307; p=.000) also impact behavior intention significantly. On the other hand, ICT daily life usage (β=.50; p=.595) with sig. value above 0.5 indicate no significant impact of behavior intention to use ICT.

Therefore, the livestock owners perceived that ICT implementation would improve the delivery of information to livestock sector leading to awareness about prices in the local and national markets, enhance employment opportunities and improve/overcome at health related issues to the livestock in the livestock.

CONCLUSION AND RECOMMENDATIONS

Conclusion

This pilot study revealed that the fishermen, farmers and livestock owners of southern Sindh and southern Punjab believe that ICT will bring improvement in their work, health, employment opportunities and hence would develop the efficiency and capacity of rural residents. Along with information dissemination through mobile phones investments in other ICT infrastructure would allow access not only to the national but also International markets.

Reliability Analysis, Principal Component Analysis and Regression Analysis were conducted to analyze the data collected from the twenty five villages. All three areas (fisheries, agriculture, live stock and unemployment) studied for this research show a strong positive relationship between ICT and livelihood of communities involved in the fisheries, agriculture and livestock.

In addition to SPSS results, researchers organized a focus group discussion in Islamabad where policy makers, ministry officials, civil society representatives and university professors were invited to get their opinion on the implementation of ICT in the stated communities. The panel stressed the need to launch the ICT project on priority basis to enhance the economic opportunities for south Sindh and south Punjab.

Mobile telephone usage is almost 90% in all the five districts (twenty five villages) included in this pilot study. It would be extremely important to take advantage of this mobile factor. Communities would be better off if they are provided the opportunity to get their tasks completed through the cell phones they carry.

Low income level, high percentage of uneducated rural population and low level of ICT awareness requires the government and non government agencies to collaborate in building sustainable ICT infrastructures. However, success of such initiatives requires involvement of local population representatives as the decision makers throughout the whole process to gain social acceptance.

In nutshell the results of this research has proved that ICT is an important driver to put the communities on the path of economic sustainability. The implementation ICT would not only help the communities to have better livelihood but total awareness about what's going on in and around their communities.

Recommendations

Based on the results of the pilot study following recommendations are made to the involved stakeholders in the southern Punjab and Southern Sindh.

National level consensus needs to be developed among the stakeholders about such rules and regulations that facilitate the promotion of ICT for improving the livelihoods of rural population. Furthermore, transparency should be maintained in all such initiatives to avoid inequity in the implementation stage.

Dialogues need to be initiated between the government agencies and private development actors to establish standards and protocols for secure information exchange between the involved stakeholders.

Short message service (SMS) in local languages should be used to provide information about market rate of goods; recommended chemicals for pest control; health service reminders; weather forecasts and employment opportunities etc.

Message should be delivered to the rural population in local languages to avoid any resistance to ICT usage. If required such software should be developed that enable display of local language in ICT devices like Cell phones. Moreover, intellectual property should be protected in order to avoid any infringement and ensure fair profits to the developers.

ICT literacy programs should be launched among the farmers, fishermen and livestock owners to highlight the benefits of ICT for increasing their income and eventually improving their living standards. For this purpose training workshops should be organized to ensure that the users exert minimum effort to utilize ICTs for improving their livelihoods.

ICT centers should be established within each village to allow them easy access to computers, printing and fax facilities. Furthermore interactive website could be designed thereby allowing the rural residents to share their issues online and obtain solutions from experts. In this manner access to medical, employment related information resources can be easily provided.

Capacity building for the ICT center mangers should be conducted to facilitate successful assistance to the rural population.

Monitoring and evaluation teams should quarterly visit the ICT centers and share progress reports with the stakeholders.

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APPENDICES

Appendix 1

March 13, 2013

Dear Respondent,

IAQ Consulting (Research wing of JFK Institute of Technology and Management, Islamabad, Pakistan) is conducting a study in South Punjab and South Sindh on "Information Communication Technologies and its relationship with individuals involved in the Farming, Fisheries, and Agriculture." The objective of this research project is to "how implementation of ICT would help the individuals/families involved in the Farming, Fisheries, and Agriculture for making living.

Enclosed with this letter is a brief questionnaire that asks a variety of questions about the role of ICT in the Farming, Fisheries, and Agriculture. You are requested to look over the questionnaire and, if you choose to do so, complete the questionnaire and hand it to the staff.

If you choose to participate, do not write your name on the questionnaire. We do not need to know who you are and no one will know whether you participated in this study. Your responses will not be identified with you personally, nor will anyone be able to determine which community, company or organization you work for. Nothing you say on the questionnaire will in any way influence your present or future employment with your company/community/organization.

I hope you will take a few minutes to complete this questionnaire. Without the help of people like you, research on Information Communication Technologies and its relationship with individuals involved in the Farming, Fisheries and Agriculture could not be conducted. Your participation is voluntary and there is no penalty if you do not participate.

If you have any questions or concerns about completing the questionnaire or about participating in this study, you may contact me through cell +92 51 430 7164 or by email at Registrar@jfk.edu.pk. If you have any questions about your rights as a research subject, you may contact the JFK Institute of Technology and Management, Islamabad, Pakistan, Institutional Review Board (IRB) by e-mail at IjazQureshi@cal.berkeley.edu. This study (IRB #JFK-IC000) was approved by the IRB on March 10th 2013.

Sincerely,

Enumerators in The Field,

In this study, Information Communication Technologies (ICTs) is equal to mobile phones, Computers, Tablets, Smart phones, Laptops, Landline phones.

Questionnaire for Agriculture

Demographics

1. **Gender**
   ☐ Male ☐ Female

2. **Age**
   ☐ 15-20 ☐ 21 -26 ☐27-32 ☐ Above 32

3. **Education**
   ☐No formal schooling ☐ Primary school ☐High school ☐ Matriculation
   ☐ Intermediate ☐ Graduation ☐ Masters

4. **Principle sources of income**
   ☐ Crop farming ☐ Livestock keeping ☐ Fisheries ☐ Education ☐ Banking ☐ Health

5. **Means of transportation to the fair market places**
   ☐ On foot ☐ Public transportation ☐ Private vehicle ☐ 2- or 3-wheel vehicle (motorbike, tricycle, bicycle)

   ☐ 4-wheel motor vehicle (car, van, truck)

6. **Monthly Income**
   ☐ 5,000-15,000 ☐ 16,000-26,000 ☐ 27,000-37,000 ☐ Above 38000

   Bi-annual Income
   ☐ Up to 50000 ☐ 51000- 101,000 ☐ 102,000-152,000 ☐ Above 153,000

7. **ICT Services**

   ☐ Land line phone ☐ Internet ☐ Mobile phones ☐ Computer ☐ Internet cafe

8. **Electricity (If it is not available, please skip question 9)**

   ☐ Available ☐ Not available

9. **Power shutdown**
   Winters: ☐ 2-4 hours ☐ 5-7 hours ☐ 8-10 hours ☐ 11-13hours ☐ More than 13 hours

   Summers: ☐ 2-4 hours ☐ 5-7 hours ☐ 8-10 hours ☐ 11-13hours ☐ More than 13 hours

#	Items	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
	ICT Usage in Daily Life					
1	I use ICT for interaction with community Members					
2	I use ICT for interaction with friends and relatives.					
3	ICT has enhanced general security in the neighborhood					
4	ICT allows me to conduct cash transfers.					
5	ICT allows access to political and entertainment news through mobile phone.					
6	Access to ICT helpline for the villagers to consult with experts such as doctors, agriculturists, lawyers, etc. will reduce vulnerability.					
7	Availability of forms and applications online will be helpful.					
8	Submission of form and applications to the relevant offices online will be helpful.					
	Health					
9	Information on good health practices e.g. AIDS, Malaria, diahorrea etc through ICT will improve villagers health.					
10	Access to ICT helpline for the villagers to consult with doctors will reduce vulnerability.					
11	Information about availability of qualified doctors through ICT will be helpful.					
12	Information about availability of qualified nurses through ICT will improve health services.					
13	Information about the nearest available health centers through ICT will be helpful.					
14	Information about availability of medicine through ICT will be useful.					
15	Reminder about doctor appointment on mobile phone will improve patient care.					
16	ICT based reminders will help the patients to come in for vaccinations timely (Polio, AIDS etc).					
17	Mobile phone based medication reminders will help to improve health.					
18	Being able to call ambulance in case of emergency is helpful.					
	Agriculture					
19	It will be very useful to obtain information on Agriculture inputs like seeds, fertilizers, pesticides through ICT.					
20	Information about commodity prices in far-off mandis through ICT will create market awareness.					

#	Items	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
21	It will be very useful to receive information about weather in advance through ICT					
22	Access to ICT based agriculture helpline for the villagers to consult agriculturists for pest management will reduce vulnerability.					
23	Access to ICT based agriculture helpline for the villagers to consult agriculturists for sowing practices will reduce vulnerability.					
24	Access to ICT based agriculture helpline for the villagers to consult animal husbandry specialist for raising hybrid will reduce vulnerability.					
25	Information on agricultural markets and new procurement avenue for acquiring tools, seeds, pesticides etc through ICT will be helpful.					
26	It will be useful to receive information on Government schemes launched for farmers through ICT.					
27	ICT will help to enhance link between traders, buyers and sellers.					
28	ICT Support and help in case of natural disasters (flood, fire and earthquake) will reduce vulnerability					
29	Acquiring timely information through ICT will reduce the business risk.					
30	ICT will help to reduce the cost of travelling by providing timely information.					
ICT & Employment						
31	ICT will provide employment related opportunities in rural areas.					
32	ICT will provide short term employment opportunities in urban areas (cities) for rural residents.					
33	ICT will provide e-entrepreneurship opportunities.					
Behavior Intention						
34	I intend to use ICT services for elevating agricultural output when it becomes available.					
35	If I were asked to express my opinion of ICT for improving agriculture, I intend to say something favorable.					
36	In the future, I intend to use ICT services routinely for enhancing agricultural efficiency.					

Appendix 2

March 13, 2013

Dear Respondent,

IAQ Consulting (Research wing of JFK Institute of Technology and Management, Islamabad, Pakistan) is conducting a study in South Punjab and South Sindh on "Information Communication Technologies and its relationship with individuals involved in the Farming, Fisheries, and Agriculture*."* The objective of this research project is to "how implementation of ICT would help the individuals/families involved in the Farming, Fisheries, and Agriculture for making living.

Enclosed with this letter is a brief questionnaire that asks a variety of questions about the role of ICT in the Farming, Fisheries, and Agriculture. You are requested to look over the questionnaire and, if you choose to do so, complete the questionnaire and hand it to the staff.

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I hope you will take a few minutes to complete this questionnaire. Without the help of people like you, research on Information Communication Technologies and its relationship with individuals involved in the Farming, Fisheries and Agriculture could not be conducted. Your participation is voluntary and there is no penalty if you do not participate.

If you have any questions or concerns about completing the questionnaire or about participating in this study, you may contact me through cell +92 51 430 7164 or by email at Registrar@jfk.edu.pk. If you have any questions about your rights as a research subject, you may contact the JFK Institute of Technology and Management, Islamabad, Pakistan, Institutional Review Board (IRB) by e-mail at IjazQureshi@cal.berkeley.edu. This study (IRB #JFK-IC000) was approved by the IRB on March 10th 2013.

Sincerely,

Enumerators in The Field,

ICT Questionnaire for Livestock

In this study, Information Communication Technologies (ICTs) is equal to mobile phones, Computers, Tablets, Smart phones, Laptops, Landline phones.

Demographics

1. **Gender**
   ☐ Male ☐ Female

2. **Age**
   ☐ 15-20 ☐ 21 -26 ☐27-32 ☐ Above 32

3. **Education**
   ☐No formal schooling ☐ Primary school ☐High school ☐ Matriculation
   ☐ Intermediate ☐ Graduation ☐ Masters

4. **Principle sources of income**
   ☐ Crop farming ☐ Livestock keeping ☐ Fisheries ☐ Education ☐ Banking ☐ Health

5. **Means of transportation to the fair market places**
   ☐ On foot ☐ Public transportation ☐ Private vehicle ☐ 2- or 3-wheel vehicle (motorbike, tricycle, bicycle)

   ☐ 4-wheel motor vehicle (car, van, truck)

6. **Monthly Income**
   ☐ 5,000-15,000 ☐ 16,000-26,000 ☐ 27,000-37,000 ☐ Above 38000

   Bi-annual Income
   ☐ Up to 50000 ☐ 51000- 101,000 ☐ 102,000-152,000 ☐ Above 153,000

7. **Livestock**
   ☐ Horses ☐ Goats ☐ Cows ☐ Buffalos ☐ Poultry

8. **ICT Services**

   ☐ Land line phone ☐ Internet ☐ Mobile phones ☐ Computer ☐ Internet cafe

9. **Electricity (If it is not available, please skip question 10)**

   ☐ Available ☐ Not available

10. **Power shutdown**
    Winters: ☐ 2-4 hours ☐ 5-7 hours ☐ 8-10 hours ☐ 11-13hours ☐ More than 13 hours
    Summers: ☐ 2-4 hours ☐ 5-7 hours ☐ 8-10 hours ☐ 11-13hours ☐ More than 13 hours

#	Items	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
	ICT Usage in Daily Life					
1	I use ICT for interaction with community Members					
2	I use ICT for interaction with friends and relatives.					
3	ICT has enhanced general security in the neighborhood					
4	ICT allows me to conduct cash transfers.					
5	I get access to political and entertainment news through ICT.					
6	Access to ICT helpline for the villagers to consult with experts such as doctors, agriculturists, lawyers, etc. will reduce vulnerability.					
7	Availability of forms and applications online will be helpful.					
8	Submission of form and applications to the relevant offices online will be helpful.					
	Health					
9	Information on good health practices e.g. AIDS, Malaria, diahorrea etc through ICT will improve villagers health.					
10	Access to ICT helpline for the villagers to consult with doctors will reduce vulnerability.					
11	Information about availability of qualified doctors through ICT will be helpful.					
12	Information about availability of qualified nurses through ICT will improve health services.					
13	Information about the nearest available health centers through ICT will be helpful.					
14	Information about availability of medicine through ICT will be useful.					
15	Reminder about doctor appointment on ICT will improve patient care.					
16	ICT based reminders will help the patients to come in for vaccinations timely (Polio, AIDS etc).					
17	ICT based medication reminders will help to improve health.					
18	Being able to call ambulance in case of emergency is helpful.					
	Livestock Farmers					
19	It will be very useful to obtain information on animal breeding through ICT.					
20	Information about animal prices in far-off mandis through ICT will create market awareness.					

#	Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
21	It will be very useful to receive information about weather in advance through ICT.					
22	Access to ICT based livestock helpline for livestock health care will improve livestock health.					
23	Access to ICT based livestock helpline for quality management of livestock products will reduce vulnerability.					
24	Information on livestock markets and new procurement avenue for acquiring animals, tools, feed etc through ICT will be helpful.					
25	Information about prevalent or emerging livestock diseases through ICT will improve livestock quality.					
26	Information about livestock medicines through ICT will improve livestock quality.					
27	ICT based reminders about livestock vaccinations will improve the livestock heath.					
28	It will be useful to receive information on Government schemes launched for livestock farmers on ICT.					
29	ICT will help to enhance link between traders, buyers and sellers.					
30	Support and help through ICT in case of natural disasters (flood, fire and earthquake) will reduce vulnerability.					
31	Acquiring timely information through ICT will reduce the business risk.					
32	ICT will help to reduce the cost of travelling by providing timely information.					
ICT & Employment						
33	ICT will provide employment related opportunities in rural areas.					
34	ICT will provide short term employment opportunities in urban areas (cities) for rural residents.					
35	ICT will provide e-entrepreneurship opportunities.					
Behavior Intention						
36	I intend to use ICT services for elevating livestock health when it becomes available.					
37	If I were asked to express my opinion of ICT for improving livestock, I intend to say something favorable.					
38	In the future, I intend to use ICT services routinely for enhancing livestock quality.					

Appendix 3

March 13, 2013

Dear Respondent,

IAQ Consulting (Research wing of JFK Institute of Technology and Management, Islamabad, Pakistan) is conducting a study in South Punjab and South Sindh on "Information Communication Technologies and its relationship with individuals involved in the Farming, Fisheries, and Agriculture*."* The objective of this research project is to "how implementation of ICT would help the individuals/families involved in the Farming, Fisheries, and Agriculture for making living.

Enclosed with this letter is a brief questionnaire that asks a variety of questions about the role of ICT in the Farming, Fisheries, and Agriculture. You are requested to look over the questionnaire and, if you choose to do so, complete the questionnaire and hand it to the staff.

If you choose to participate, do not write your name on the questionnaire. We do not need to know who you are and no one will know whether you participated in this study. Your responses will not be identified with you personally, nor will anyone be able to determine which community, company or organization you work for. Nothing you say on the questionnaire will in any way influence your present or future employment with your company/community/organization.

I hope you will take a few minutes to complete this questionnaire. Without the help of people like you, research on Information Communication Technologies and its relationship with individuals involved in the Farming, Fisheries and Agriculture could not be conducted. Your participation is voluntary and there is no penalty if you do not participate.

If you have any questions or concerns about completing the questionnaire or about participating in this study, you may contact me through cell +92 51 430 7164 or by email at Registrar@jfk.edu.pk. If you have any questions about your rights as a research subject, you may contact the JFK Institute of Technology and Management, Islamabad, Pakistan, Institutional Review Board (IRB) by e-mail at IjazQureshi@cal.berkeley.edu. This study (IRB #JFK-IC000) was approved by the IRB on March 10th 2013.

Sincerely,

Enumerators in The Field,

ICT Questionnaire for Fisheries

In this study, Information Communication Technologies (ICTs) is equal to mobile phones, Computers, Tablets, Smart phones, Laptops, Landline phones.

Demographics

1. **Gender**
   ☐ Male ☐ Female

2. **Age**
   ☐ 15-20 ☐ 21 -26 ☐27-32 ☐ Above 32

3. **Education**
   ☐No formal schooling ☐ Primary school ☐High school ☐ Matriculation
   ☐ Intermediate ☐ Graduation ☐ Masters

4. **Principle sources of income**
   ☐ Crop farming ☐ Livestock keeping ☐ Fisheries ☐ Education ☐ Banking ☐ Health

5. **Means of transportation to the fair market places**
   ☐ On foot ☐ Public transportation ☐ Private vehicle ☐ 2- or 3-wheel vehicle (motorbike, tricycle, bicycle)

   ☐ 4-wheel motor vehicle (car, van, truck)

6. **Monthly Income**
   ☐ 5,000-15,000 ☐ 16,000-26,000 ☐ 27,000-37,000 ☐ Above 38000

   Bi-annual Income
   ☐ Up to 50000 ☐ 51000- 101,000 ☐ 102,000-152,000 ☐ Above 153,000

7. **ICT Services**

   ☐ Land line phone ☐ Internet ☐ Mobile phones ☐ Computer ☐ Internet cafe

8. **Electricity (If it is not available, please skip question 9)**

   ☐ Available ☐ Not available

9. **Power shutdown**
   Winters: ☐ 2-4 hours ☐ 5-7 hours ☐ 8-10 hours ☐ 11-13hours ☐ More than 13 hours

   Summers: ☐ 2-4 hours ☐ 5-7 hours ☐ 8-10 hours ☐ 11-13hours ☐ More than 13 hours

#	Items	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
	ICT Usage in Daily Life					

1	I use ICT for interaction with community members					
2	I use ICT for interaction with friends and relatives.					
3	ICT has enhanced general security in the neighborhood					
4	ICT allows me to conduct cash transfers.					
5	ICT allows access to political and entertainment news.					
6	Access to ICT helpline for the villagers to consult with experts such as doctors, agriculturists, lawyers, etc. will reduce vulnerability.					
7	Availability of forms and applications online will be helpful.					
8	Submission of form and applications to the relevant offices online will be helpful.					
	Health					
9	Information on good health practices e.g. AIDS, Malaria, diahorrea etc through ICT will improve villagers health.					
10	Access to a ICT helpline for the villagers to consult with doctors will reduce vulnerability.					
11	Information about availability of qualified doctors through ICT will be helpful.					
12	Information about availability of qualified nurses through ICTs will improve health services.					
13	Information about the nearest available health centers through ICT will be helpful.					
14	Information about availability of medicine through ICT will be useful.					
15	Reminder about doctor appointment on ICT will improve patient care.					
16	ICT based reminders will help the patients to come in for vaccinations timely (Polio, AIDS etc).					
17	ICT based medication reminders will help to improve health.					
18	Being able to call ambulance in case of emergency is helpful.					
	Fisheries					
19	It will be very useful to obtain information on fishery inputs like fuel, nets, bait, ice blocks etc through ICTs.					
20	ICT will allow fishermen to get the best price of their catch from the dealer even before they dock.					

#	**Items**	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
21	It will be very useful to receive					

	information about weather, high waves, tsunami etc in advance through ICT.					
22	ICT will enhance the safety aspects of fishermen in the sea.					
23	ICT will help fishermen to Communicate with their colleague in instant information regarding fish location.					
24	Access to ICT based fishery helpline for fish breeds and fishing season will reduce vulnerability.					
25	Access to ICT based fishery helpline for fishing techniques will improve fishermen output.					
26	Information on fishery markets and new procurement avenue for acquiring tools bait, fuel, nets etc through ICTs will be helpful.					
27	It will be useful to receive information on Government schemes launched for fishermen through ICT.					
28	ICTs will help to enhance link between traders, buyers and sellers.					
29	Support and help through ICT in case of natural disasters (flood, fire and earthquake) will reduce vulnerability					
30	Acquiring timely information through ICT will reduce the business risk.					
31	ICT will help to reduce the cost of travelling by providing timely information.					
ICT & Employment						
32	ICT will provide employment related opportunities in rural areas.					
33	ICT will provide short term employment opportunities in urban areas (cities) for rural residents.					
34	ICT will provide e-entrepreneurship opportunities.					
Behavior Intention						
35	I intend to use ICT services for elevating fishery output when it becomes available.					
36	If I were asked to express my opinion of ICT for improving fishery output, I intend to say something favorable.					
37	In the future, I intend to use ICT services routinely for enhancing fishery output.					