Obstacles of ICT Use in Agricultural Extension Services: A Case Study in Bangladesh

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ARTICLE INFO	ABSTRACT
	Information and communication technology (ICT) is one of the vital factor of development. The present study intended to explore the obstacles of ICT use in agricultural extension service of Bangladesh. The location of the research was five upazila of Mankanj district. A sample of 90 Sub Assistant Agriculture Officers (SAAOs), were selected as respondents following proportionate random sampling method. Statistics like range, mean, percentage, standard deviation, Chi-square test and co-efficient of correlation were used. Majority of the respondents (64.6%) were old aged with a long (more than 20 years) service experience. About 80 percent of the respondents had medium level of perception on ICT. All the respondents (100%) use mobile phone in a regular basis for their personal and official purpose. Telephone (95.0%), fax (98.0%), computer (80%) and voice recorder (80%) had significant higher use for official purpose compared to personal use. Obstacle of ICT use were measured in three perspectives viz. a) collecting information, b) providing services and c) providing services. In all the perspectives, more than 90 percent of the respondents gave their high extent of opinion that "Lack of training related to ICT was their main obstacle". Other key obstacles were, "Limited number of ICT tools in office", "No free helpline for agricultural information for the clients", "Lack of well-trained person in office", "Clients' poor knowledge on ICT". The co-efficient of correlation of age with the obstacle faced by the respondents was found positive and significant at 1% level of probability (r = 0.412).On the other hand training exposure and perception on ICT of the respondents was found negative and significant at 1% level of probability (r = -0.397 and -0.475). The co-efficient of correlation of service experience and educational qualification was found non-significant at 1 percent level of probability (r = 0.062 and -0.143).

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1. INTRODUCTION

In the era of globalization, Information and Communication Technology (ICT) is the most powerful resource for the widespread transfer and sharing of information (Lewis, 2009). It is also a major means of capacity building (Nor Iadah *et al*., 2010). Now a days ICT is everywhere including education, entertainment, business, science as well as in agriculture. It provides learning material and curriculum support in agriculture (Kale et al., 2015). New information technologies involving mobile communications and networks are realizing significant benefits of speed, mobility and efficiency in information exchange (Duncomb, 2016). It has constituted the most transformative innovation of the recent past and playing an important role by sharing agricultural information system to farmers at all level (Singh et al., 2015). ICT offers a network of agricultural sector globally and bring farmers, scientist/researchers and administrators together to achieve common goal and thus strengthening the development of farming activity. Information and Communication Technology is an effective solution to problems that militate against the development of agricultural industry, such as weak marketing linkages, poor information management, low productivity, low income and lack of diversity (Ramli et al., 2015).

Bangladesh's economy largely depends on agriculture despite the top most vulnerable country in respect of experiencing bad consequences of climate change (Hoque et al., 2016). agriculture is a vital issue for sustainable development of Bangladesh (Kabir & Roy, 2015). To attain economically profitable farming operation, farmers must go for technology based farming practices (Hasan et al., 2013). But the farmers' knowledge about the modern technology on production, processing and storage are very limited, as they do not follow the appropriate techniques from the beginning of crop production to post-harvest processing (Hoque et al., 2016) DAE (Department of Agricultural Extension and Rural Development) is the only governmental body to disseminate required information and technology to the farmers. However, total number of extension workers (SAAOs) in each block is very few compared to the number of clients. Hence, the farmers are running their farming activities with deficit of necessary information (Ismali, 2016). In this situation, widespread use of ICTs by the extension service providers can be a noble solution. It offers a means for bridging the gap between developmental professional, rural people and agricultural producers through the initiation of interaction and dialogue (Chauhan, 2016). Moreover, the extension workers are facing different kinds of barriers (Prodhan, 2015) in providing services through ICTs like load shedding, slow speed of internet and inadequate equipments (Shahnewaz et al., 2015).

However, there are also challenges in using digital tools such as machinima-based discussion support systems in agricultural extension programs. First, their effectiveness depends on the availability of suitable technology for dissemination into rural areas. Access to high-speed Internet and wider uptake of smartphones and tablets will be crucial

factors for the delivery of industry-wide extension services (Baldemair et al., 2013; Jespersen et al., 2013). Mobile phone technologies have reasonably good penetration in many developing countries (Aker, 2011; Mittal, 2012; Patel & Shukla, 2014), indicating the potential value in digital tools such as machinimas; however, lack of agricultural advisors to provide follow-up advice and assistance could constrain the tools' effectiveness in terms of the adoption of new farming practices and technologies (Aker, 2011). Access to the internet and telecommunications are mostly limited to urban areas in many developing countries while the rural areas remain beyond the ambit of new technology (Kale et al., 2015). A study by Gelb & Voet (2009) aim to analyze ICT adoption trends in agriculture. It was revealed that the key challenges to ICT implementation were lack of customized ICT applications, increase of sophisticated software with enhanced human capital requirements, lack of harmonization with production, market and essential ongoing end-user extension training that will enhance farmers. Inadequate, and unstable power supply, cost of hardware and software are high with respect of average rural dwellers (Kale et al., 2015). Similarly, Taragona (2005) maintains that awareness, time, cost of technology, system integration, and software availability are the main constraints of ICT adoption in horticulture. the use of specialized ICT devices have not been adequately recognized in agricultural activities due to low investment of ICTs that can be used for teaching and learning modern production techniques in research institutes, (Fanni et al., 2013). irrelevancy of contents, lack of reliability and awareness in ICT, which lead to unwillingness of farmers to adopt ICT as an avenue to acquire information on improved farming techniques as well as data on soil, weather and other elements of climate (Anoop & Ashok, 2015).

The present study focused on the various factors to investigate the barriers of ICT utilization by the agricultural extension workers in agricultural extension service. It is expected that the factors will be clearly identified and it will help extension organizations to enhance the utilization of ICT and overcome the obstacles which hamper proper utilization of ICT in agricultural extension service.

2. METHODOLOGY

The study was conducted in five upazila (Manikganj Sadar, Harirampur, Singair, Saturia and Sibalaya)of Manikganj district of Bangladesh. In those five upazila there were 144 Sub Assistant Agriculture Officers (SAAOs) which constitute the population the study. Out of this population, a number of 90 SAAOs were selected following proportionate random sampling method as the sample of the study.

Primary, secondary, quantitative, qualitative data were collected for the present study. A pre-designed interview schedule was developed for collection of primary data from the respondents and the same was pre-tested before finalization. To measure the level of use of different ICT tools scoring was done according to a) highly use (score 3), b) moderately use (score 2), c) rarely use (score 1) and d)
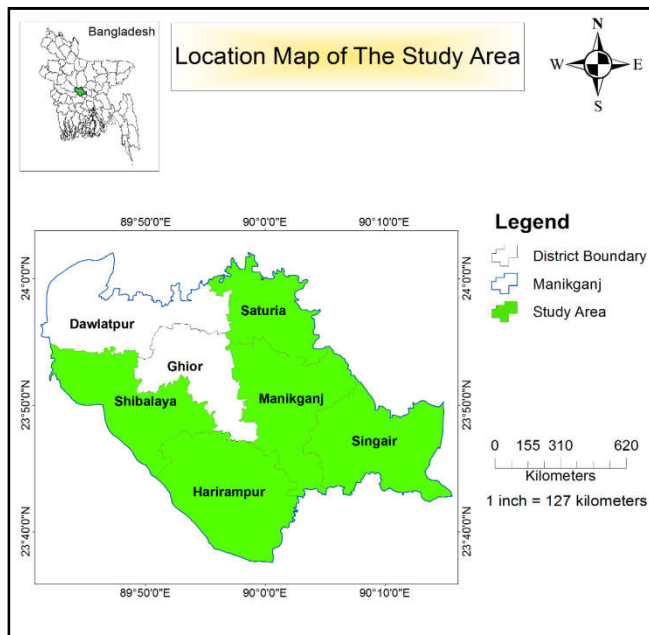
Fig.1 Location map of the study area.

never use (score 0). Ten important ICT tools were selected for measuring their utilization level. The comparison between their use of different ICT tools in official purpose and personal purpose was also calculated by using simple percentile categorization scale.

Obstacles of ICT use in agricultural extension service were classified in three perspectives. The perspectives are i) Obstacles of ICT use for collecting information ii) Obstacles of ICT use for providing services iii) Obstacles of ICT use for processing information

Under each perspective, the respondents gave their extent of opinion against twenty statements. The extent of opinions was scored from 3 as 'high' to 1 as 'low'. Among those statements, top ten statements were selected. The obstacle score could range from 10 to 30, while 0 indicating lowest level of extent of opinion of the respondent and 30 indicating highest level of extent of opinion by the respondents.

For collecting qualitative data, case study technique was used. The researcher visited the respondents and spends several hours for conducting the case study. Then the data was summarized and results were drawn.

3. RESULTS AND DISCUSSION

3.1. Socio Demographic Characteristics
The socio demographic characteristics are presented in in Table 1. Results represented in Table 1 exposed that majority of the responds are middle to old aged. About 89 percent of the respondents were middle to old aged. Most of the respondents had long-term service experiences (77.8%) followed by medium term (12.2%) and short term (10%). As most of the respondents were old aged (64.4%), their service life was expected to be long. In terms of perception on ICT,

mainstream number of the respondents (81.1) had medium level of perception on ICT.

In case of educational qualification majority of the respondents (67.3%) had completed Secondary School Certificate exam and diploma in agriculture as it is the prerequisite for the post of SAAO in Bangladesh. Only 7.8 percent of the respondents had bachelor degree. As there is a minimum scope of growth in their job sector, they were not willing to complete higher study. The respondents had maximum two training related to ICT.

3.2. Use of Different ICT Tools
The respondents use different types of ICT tools in their day-to-day life. Among different ICT tools all the respondents (100%) have used mobile phone for their personal and official work. About 96 percent of the respondents used cable TV in their home.

The respondents use different types of ICT tools in their day-to-day life. Among different ICT tools all the respondents (100%) have used mobile phone for their personal and official work. About 96 percent of the respondents used cable TV in their home. Other ICT tools used by the respondents were digital camera (39%) followed by smartphone (30%) and telephone (21%). It is a matter of concern that only 17.2 percent and 14.5 percent respondents had used internet and computer respectively. Though the country is moving to digitalization very firstly, this phenomenon represents a drawback in agricultural extension sector.

Data of Fig. 3 represents the comparison between use of different ICT tools for personal and official purpose. The telephone (95.0%), fax (98.0%), computer (80%) and voice recorder (80%) had significant higher use for official purpose by the respondents compared to their personal purpose. On the other hand, cable TV (100%) and radio (95%) had higher use for personal purpose than official work. Mobile phone, smart phone and digital camera had higher use (60%) for their personal purpose compared to their official use (40%). Hence it can be settled that majority of the respondents had been using different ICT tools considerably in their personal life compared to their official purpose.

3.3. Obstacle of ICT Use in Agricultural Extension Service
Obstacles of ICT use in agricultural extension service were categorized in three perspectives. The perspectives are i) Obstacles of ICT use for collecting information ii) Obstacles of ICT use for providing services iii) Obstacles of ICT use for processing information.

3.4. Obstacle of ICT Use for Collecting Information
Results shown in Table 2 denote rank order of different obstacles of ICT use for collecting information in agricultural extension service. Findings in Table 2 represented that 'lack of training on ICT use' ranked in the 1st position. About 96 percent respondents gave their high extent of opinion in contrast to this statement. This result

Table 1. Distribution of the respondents according to their socio-demographic characteristics.

| Characteristics	Number of respondents	Percentage of respondents	Mean	SD
Age				
Young (up to 35)	10	11.1	48.7	8.8
Middle aged (36-50)	22	24.4		
Old (above 50)	58	64.4		
Service Experiences				
Short term (up to 10)	9	10		
Medium term (10-20)	11	12.2	24.5	10.2
Long term (above 20)	70	77.8		
Perception on ICT				
Low (up to 35)	10	11.1		
Medium (36-50)	73	81.1	41.1	8.2
High (above 50)	7	7.8		
Educational Qualification				
Diploma & SSC	68	75.6		
Diploma & HSC	15	16.6		
Diploma & Bachelor	7	7.8		
Training on ICT				
No Training	29	32.2		
Single Training	39	43.3		
Two/more than two Training	22	24.4		
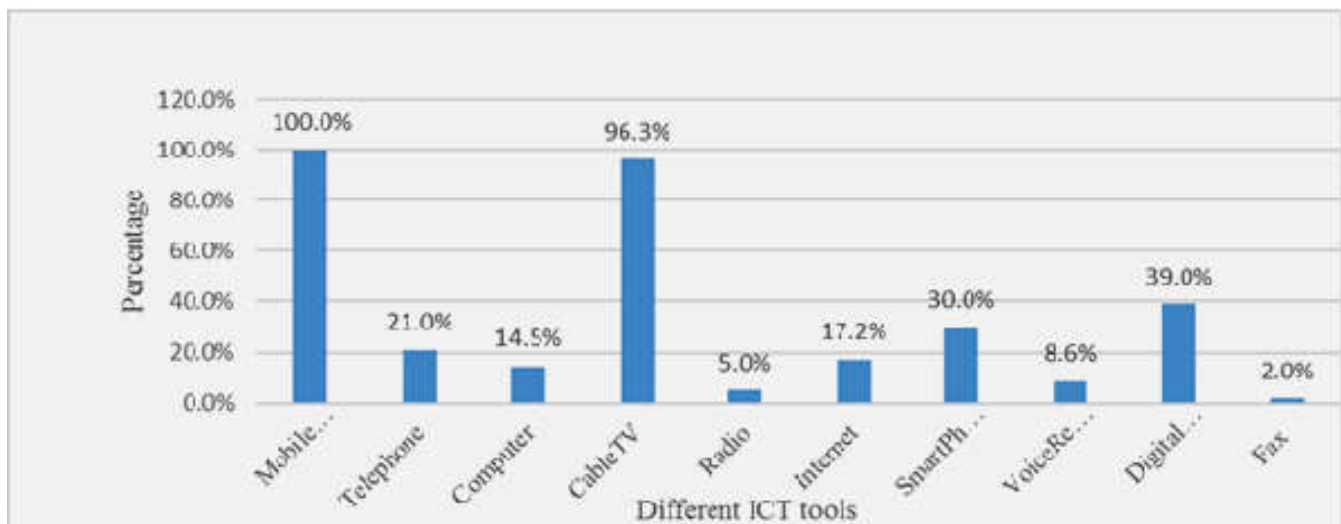
Fig. 2 Extent of use of different ICT tools by the respondents.

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indicates that lack of training was the principal obstacle of ICT use and it must be rectified for proper use of ICT for agricultural extension services. Chi-square value (126.4) showed significant difference among them, indicating lack of training on ICT use is a significant problem. 'Limited number of ICT tools in office', 'Low knowledge on internet', 'Lack of well-trained person in office' and 'Difficulties of operating different ICT tools' ranked on 2nd 3rd 4th and 5th position, respectively. About 72, 68, 63 and 68 percent respondents gave their high extent of opinion on those statements.

Chi square value 86.4, 97.2, 85.2 and 105.6 showed significant difference among them indicating the importance of those problems. Hence, each problem gets more or less equal importance. 'Low speed of internet', 'Limited number of Agricultural program on TV and Radio', 'English language is barrier to use ICT', High price of ICT tools and internet' and 'Lack of technical support from DAE' ranked 6th, 7th, 8th, 9th and 10th position with the Chi-square value 77.5, 112.2, 51.3, 78.4 and 91.2** respectively. All the barriers stated in Table 2, has noticeable impact on utilization of ICT in agricultural extension service. Rad et al. (2015) and Ramli et al. (2015) found similar kinds of
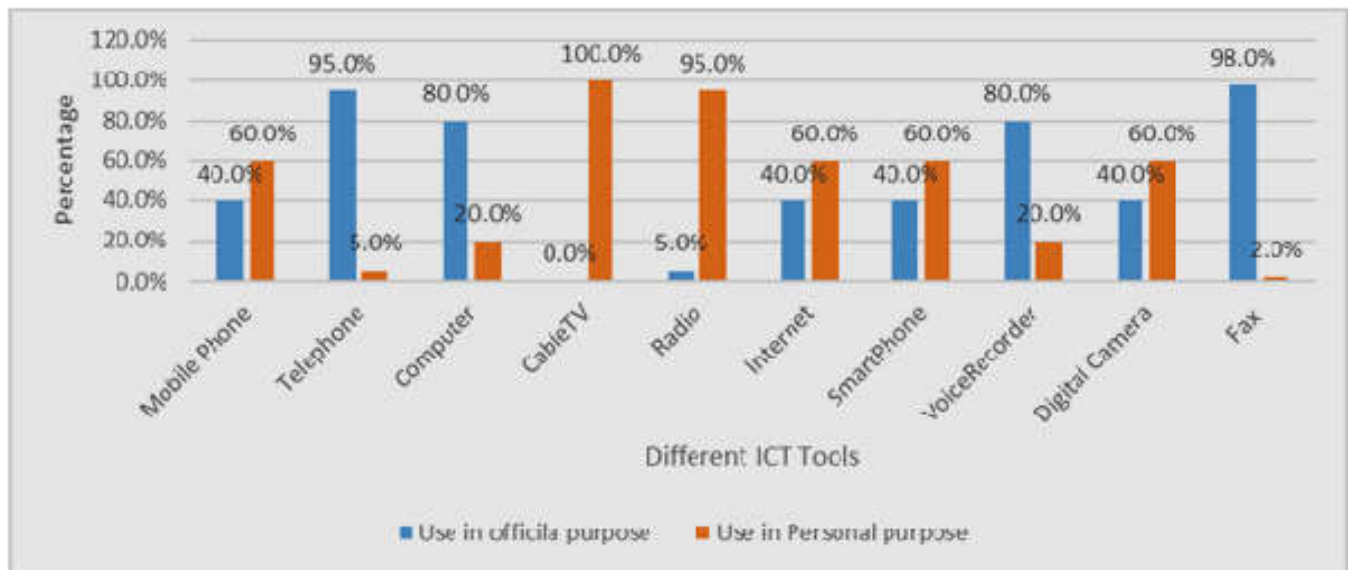
Fig. 3 Comparison between use of different ICT tools for personal purpose and official Purpose.

Table 2. Rank order regarding obstacles of ICT use for collecting information.

SL No.	Problem Statements	Extent of opinion n=90			Chi-square value	Score	Rank
		High	Medium	Low			
1.	Lack of training on ICT use	87	3	0	126.4**	267	1st
2.	Limited number of ICT tools in office	65	18	7	86.4**	237	2nd
3.	Low knowledge on internet	61	11	18	97.2**	222	3rd
4.	Lack of well-trained person in office	56	16	18	85.2**	218	4th
5.	Difficulties of operating different ICT tools	58	7	25	105.6**	214	5th
6.	Low speed of internet	52	18	20	77.5**	211	6th
7.	Limited number of Agricultural program on TV and Radio	14	61	15	112.2**	178	7th
8.	English language is barrier to use ICT	29	22	39	51.3**	170	8th
9.	High price of ICT tools and internet	32	15	43	78.4**	169	9th
10.	Lack of technical support from DAE	23	17	50	91.2**	153	10th

** Significant at 0.01 level of probability

obstacle while working on Agricultural Extension in Isfahan Province of Iran. These obstacles must be overcome for effective utilization of ICT. Government of Bangladesh, DAE and organization should come forward to solve those problems for constructing an ICT based agricultural extension service and for agricultural development of Bangladesh.

3.5. Obstacle of ICT Use for Providing Service
As providing service is related to clients, some problem statements related to clients also came in Table 3. Results shown in Table 3 indicate 'Lack of training among the clients' ranked in 1st position. About 87 percent respondents gave their high extent of opinion in that statement. Similar kind of results was found in case of problem statements of obstacle of ICT use for collecting information. So it can be said that lack of training was one of the major obstacle toward ICT utilization. Howland et al. (2015) also suggest

that training is very essential need for farmers for proper utilization of ICT. The Chi-square value 142.2 showed significant difference among them indicating the importance of training on ICT 'No free helpline for agricultural information for the clients' was the 2nd important problem statements with a Chi-square value of 105.4. Farmers need different kinds of real time agricultural information. Hence a free call service was their extreme need. It can be said that for this important needs the problem statements came to the 2nd place. 'Clients' poor knowledge on ICT', 'Lack of education among clients', 'Poor socio economic condition of clients', and 'high cost of Internet' was ranked 3rd, 4th , 5th and 6th position with the Chi-square value of 118.1, 98.2, 132.8 and 98.1 respectively. About 89, 83, 75, and 66 percent of respondents gave their high extent of opinion in contrast to those statements respectively. Socioeconomic condition of farmers of Bangladesh is poor. Hence they can't afford internet cost and cost of ICT tools. 'Unavailability of

Table 3. Rank order regarding obstacles of ICT use for providing service.

SL No.	Problem Statements	Extent of opinion n=90			Chi-square value	Score	Rank
		High	Medium	Low			
1.	Lack of training on ICT among the clients	78	10	2	142.2**	256	1st
2.	No free helpline for agricultural information for the clients	80	3	7	105.4**	253	2nd
3.	Clients' poor knowledge on ICT	79	1	10	118.1**	250	3rd
4.	Lack of education among clients	74	2	14	98.2**	241	4th
5.	Poor socio economic condition of clients	67	18	5	132.8**	242	5th
6.	High cost of internet for the clients	59	27	4	98.1**	235	6th
7.	Unavailability of clients for getting information n through ICT	51	34	5	121.2**	227	7th
8.	Presence of fear of ICT use among the clients	56	18	16	83.4**	220	8th
9.	Unwillingness of learning ICT use by the clients	35	42	13	93.5**	202	9th
10.	Bad mobile network signal in rural area	45	11	34	83.6	192	10th

** Significant at 0.01 level of probability

Table 4. Rank order regarding obstacles of ICT use for processing information.

SL No.	Problem Statements	Extent of opinion n=90			Chi-square value	Score	Rank
		High	Medium	Low			
1.	Lack of training of SAAOs on ICT use	82	2	6	156.2**	316	1st
2.	Lack of knowledge about data handling	68	14	8	132.1**	303	2nd
3.	Limited number of ICT tools in office	67	16	7	121.6**	293	3rd
4.	Limitation of well trained personnel in office	61	18	11	109.3**	281	4th
5.	Operating computer seems difficult for untrained SAAOs	58	21	11	89.6**	278	5th
6.	Lack of video calling facilities in office	56	22	12	96.1**	274	6th
7.	Low speed of internet	51	30	9	85.2**	271	7th
8.	Workload is an obstacle of proper ICT use	38	42	10	112.9**	253	8th
9.	On internet all agricultural information are not easy to understand	26	52	12	75.5**	238	9th
10.	Lack of encouragement from higher officers	34	26	30	56.2**	224	10th

** Significant at 0.01 level of probability

clients for getting information through ICT', 'Presence of fear of ICT use among the clients', 'Unwillingness of learning ICT use by the clients' and 'Bad mobile network signal in rural area' was 7th, 8th, 9th and 10th ranked problem statement, respectively. Purnomo et al., (2018) also found similar kinds of results while working with agricultural extension workers in Indonesia. Some farmers were totally unknown about ICT use. For this reason, they have fear about it and they have low interest to learn ICT use. If they would well aware about ICT, they would feel interest on it and participate on ICT utilization spontaneously. In some rural area mobile network strength was found weak. Sometimes farmers face difficulties while calling extension workers for agricultural information. All the problem statements must be minimized for better utilization of ICT in agricultural extension services.

3.6. Obstacle of ICT Use for Processing Information
This segment of the study deals with different obstacles to process agricultural information by the respondents. Rank order regarding obstacles of ICT use for processing information is presented in Table 4. Information of Table 4 represents that 'Lack of training of SAAOs on ICT use' and 'Lack of knowledge about data handling' stands in the 1st and 2nd position in among the problem statements. About 92 and 79 percent respondents gave their high extent of opinion on those two statements with Chi-square value 156.2 and 132.1, respectively.

It indicates the need of training of respondents on ICT and data handling. Training increase efficiency and gives new knowledge about a subject matter. 'Limited number of ICT tools in office', 'Limitation of well trained personnel in office', 'Operating computer seems difficult for untrained SAAOs' and 'Lack of video calling facilities in office'

Table 5. Relationship between sociodemographic characteristics of the respondents and obstacle of ICT use in agricultural extension service.

Selected personal attributes	Co-efficient of correlation (r)
Age	0.412**
Service experience	0.062[NS]
Training exposure	-0.397**
Educational qualification	-0.143 [NS]
Perception on ICT	-0.475**

** Significant at 0.01 level of probability, NS = Non significant

ranked in 3rd, 4th, 5th and 6th position, respectively. The Chi-square value 121.6, 109.3, 89.6 and 96.1 showed significant difference indicating the importance of those problems. These problem statements were also related to training and ICT resources. About 75, 68, 65 and 57 percent respondents gave their high extent of opinion in contrast to those statements, respectively. So for better utilization of ICT these problems must be solved. 'Low speed of internet', 'Workload is an obstacle of proper ICT use', 'On internet all agricultural information are not easy to understand' and 'Lack of encouragement from higher officers' were 7th, 8th, 9th and 10th ranked problem, respectively. These problems also have significant impact on obstacle of ICT use. Rad et al. (2015) found similar kinds of obstacle while working on Agricultural Extension in Isfahan Province of Iran.

Finally, it can be concluded that among all the problem statements in different perspectives, training related problem was most dominant problem which have significant impact on proper utilization of ICT in agricultural extension services.

3.7. Relationship Between Obstacle of ICT Use and Selected Characteristics of the Respondents

Coefficient of correlation was computed in order to explore the relationships between the selected characteristics of the respondents and their obstacle of ICT use in agricultural extension service.

The co-efficient of correlation of age with the obstacle faced by the respondents was found positive and significant at 1% level of probability (r = 0.412**) which indicates, the old aged respondents face more obstacles related to ICT compared to the younger ones. On the other hand training exposure and perception on ICT of the respondents was found negative and significant at 1% level of probability (r = -0.397** and -0.475). The data indicates training and perception on ICT has significant impact on obstacles related to ICT. The respondents who had good perception on ICT and had training, they faced less obstacles on ICT use compared to other. The co-efficient of correlation of service experience and educational qualification was found non-significant at 1% level of probability (r = 0.062 and -0.143). Thus, service experiences and educational qualification of

the respondents may have no influence on their obstacle related to ICT use in agricultural extension service.

4. CONCLUSION

Majority of the respondents were old aged with long services experiences, low training on ICT, medium job satisfaction, medium use of information sources and medium level of perception on ICT. Sub Assistant Agriculture Officers use different ICT tools both for official and personal purpose, but the utilization level of different ICT tools is higher in case of personal purpose compared to the official. All of the respondents use mobile phone in regular basis. Other modern ICTs like computer, internet and E-mail had very much limited utilization. All of the respondents face different type's obstacles in terms of proper use of information and communication technology. In all the perspectives, more than 90 percent of the respondents gave their high extent of opinion that "Lack of training related to ICT was their main obstacle". Other key obstacles were, "Limited number of ICT tools in office", "No free helpline for agricultural information for the clients", "Lack of well-trained person in office", "Clients' poor knowledge on ICT". Age, Training exposure, perception on ICT may have influence on their obstacles on ICT utilization in agricultural extension service.

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