

AFITA / WCCA 2012

Asian Federation for Information Technology in Agriculture /
World Conference on Computers in Agriculture

AFITA / WCCA 2012



Program

September 3 – 6, 2012, Taipei, Taiwan



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Monday, September 3, 2012

10:00-10:30	Opening Ceremony	2F, Hall
10:30-11:20	Keynote (1)	2F, Hall
Keynote (1)-01	<i>The Challenges and Opportunities of Agriculture in the 21st Century</i> <u>Bao-Ji Chen</u> , Council of Agriculture, Executive Yuan (Taiwan)	
Keynote (1)-02	<i>Cloud Computing and Agriculture- The Taiwan Adventure</i> <u>San-Cheng (Simon) Chang</u> , Executive Yuan (Taiwan)	
11:20-12:10	Keynote (2)	2F, Hall
Keynote (2)-01	<i>Cloud Computing in the Real World- Sharing of Experiences and Ideas</i> <u>Darryl Chantry</u> , Datacenter & Private Cloud Centre of Excellence, Microsoft Corporation (Australia)	
13:40-15:20	Workshop (1)- Sensor Research	B1, Seminar Room
Chair: Joe-Air Jiang, National Taiwan University (Taiwan)		
Workshop (1)-01	<i>A Sensing Approach to Fruit-Growing</i> <u>Takaharu Kameoka</u> , Mie University (Japan)	
Workshop (1)-02	<i>ICT in e-Agriculture- Case Study</i> <u>Yung-Chung Wang</u> , National Taipei University of Technology (Taiwan)	
Workshop (1)-03	<i>Global Agricultural Cloud a Dream?</i> <u>Takuji Kiura</u> , National Agriculture and Food Research Organization (Japan)	
Workshop (1)-04	<i>Connecting the Mud to the Cloud- Smart Agriculture</i> <u>Cheng-Long Chuang</u> , National Taiwan University (Taiwan)	
15:50-17:30	Workshop (2)- GIS	B1, Seminar Room
Chair: Seishi Ninomiya, University of Tokyo (Japan)		
Workshop (2)-01	<i>Quantifying the Odds in Decision Making in Agriculture</i> <u>Bruno Basso</u> , University of Basilicata (Italy)	
Workshop (2)-02	<i>Real-Time Spatial Information and the Integration Applications of Agriculture Management</i> <u>Tien-Yin Chou</u> , Feng Chia University (Taiwan)	
Workshop (2)-03	<i>Taiwan Agriculture Planting and Marketing Information Cloud Computing</i> <u>Mark Chen</u> , International Integrated Systems, Inc. (Taiwan)	
Workshop (2)-04	<i>GEO Grid: Activities and Direction</i> <u>Satoshi Sekiguchi</u> , The National Institute of Advanced Industrial Science and Technology (Japan)	

Tuesday, September 4, 2012

09:00-10:40 Workshop (3)- KM & DSS B1, Seminar Room

Chair: Gerhard Schiefer, University of Bonn (Germany)

- Workshop (3)-01 *Intelligence Empowered Agriculture and Food System*
Kuan Chong Ting, University of Illinois at Urbana-Champaign (USA)
- Workshop (3)-02 *Key Technologies in Precision Livestock and Aquaculture*
Naoshi Kondo, Kyoto University (Japan)
- Workshop (3)-03 *Precision Cultivation in Greenhouse*
Suming Chen, National Taiwan University (Taiwan)
- Workshop (3)-04 *Innovative Application of IT Knowledge Management at the Taiwan Public Agriculture Sector*
Flora Hu, Galaxy Software Services Corporation (Taiwan)

11:10-12:10 Seminar (1)- e-Agricultural Services (1) 5F, Room 502

Chair: Gerhard Schiefer, University of Bonn (Germany)

- Seminar (1)-01 *Strategy and Concept of Open Cloud Application Platform in Agriculture*
Masayuki Hirafuji, Hokkaido Agricultural Research Center, National Agriculture and Food Research Organization (Japan) Yasuyuki Hamada, Hokkaido Agricultural Research Center, National Agriculture and Food Research Organization (Japan) Tomokazui Yoshida, Hokkaido Agricultural Research Center, National Agriculture and Food Research Organization (Japan) Atsushi Itho, Hokkaido Agricultural Research Center, National Agriculture and Food Research Organization (Japan)
Takuji Kiura, NARO Agricultural Research Center, National Agriculture and Food Research Organization (Japan)
- Seminar (1)-02 *ICT Intervened Agri Advisory Services: A Comparative Study of Four Projects from India*
Kasina V. Rao, SJM School of Management, Indian Institute of Technology Bombay (India) Krithi Ramamritham, Department of Computer Science & Engineering, Indian Institute of Technology Bombay (India) Rajendra M. Sonar, SJM School of Management, Indian Institute of Technology Bombay (India)
- Seminar (1)-03 *eAgromet: A Prototype of an IT-Based Agro-Meteorological Advisory System*
P.Krishna Reddy, IT for Agriculture and Rural Development Research Center (India) B.Bhaskar Reddy, IT for Agriculture and Rural Development Research Center (India) P.Gowtham Sreenivas, IT for Agriculture and Rural Development Research Center (India) M. Kumaraswamy, IT for Agriculture and Rural Development Research Center (India) D.Raji Reddy, Agro Climate Research Center, Acharya NG Ranga Agricultural University (India) G. Sreenivas, Agro Climate Research Center, Acharya NG Ranga Agricultural University (India) M. Mahadevaiah, Agro Climate Research Center, Acharya NG Ranga Agricultural University (India)
L.S. Rathore, India Meteorological Department (India)
K.K. Singh, India Meteorological Department (India)
N. Chattopadhyay, India Meteorological Department (India)

13:40-15:00 Seminar (7)- ICT Adoption 5F, Room 504

Chair: Tien-Yin Chou, Feng Chia University (Taiwan)

- Seminar (7)-01 *e-Initiative for Agricultural Extension: Browsing for Logout?*
Saravanan Raj, School of Social Sciences, College of Post Graduate Studies, Central Agricultural University (CAU) (India)
- Seminar (7)-02 *An Assessment of Farmer' s Information Networks in India- Role of Modern ICT*
Surabhi Mittal, International Maize and Wheat Improvement Center (CIMMYT) India (India)
Mamta Mehar, International Maize and Wheat Improvement Center (CIMMYT) India (India)
- Seminar (7)-03 *A Centralized Subscription and Clientele Management System for Agricultural Extension Programs*
Jiannong Xin, Office of Information Technology, University of Florida/IFAS (United States)
Haufeng Jin, Department of Computer Science, University of Florida (United States)
Pete Vergot III, University of Florida/IFAS Extension (United States)
Theresa Friday, Santa Rosa County, University of Florida/IFAS (United States)
- Seminar (7)-04 *Information Technology Adoption in Indonesian Agriculture and Agribusiness*
Setyo Pertiwi, Department of Mechanical and Biosystem Engineering, Bogor Agricultural University (Indonesia)
- Seminar (7)-05 *Youth Mediated Communication (YMC)- Agricultural Technology Transfer to Illiterate Farmers through Their Children*
Yumi Mori, NPO Pangaeen (Japan)
Toshiya Takasaki, NPO Pangaeen (Japan)
Yasukazu Okano, NPO Pangaeen (Japan)
Tran Ngan Thi Ngan Hoa, Ministry of Agriculture and Rural Development, Vietnam (Vietnam)
Takaharu Kameoka, Graduate School of Bioresources, Mie University (Japan)
Takashi Togami, Graduate School of Bioresources, Mie University (Japan)
Kyoshuke Yamamoto, Graduate School of Bioresources, Mie University (Japan)
Akane Takezaki, National Agricultural Research Center (Japan)
Ryoich Ikeda, Tokyo University of Agriculture (Japan)
Toru Ishida, Kyoto University (Japan)
Donghui Lin, Kyoto University (Japan)
Seishi Ninomiya, Institute for Sustainable Agro-ecosystem Services, The University of Tokyo (Japan)

13:40-15:00 Seminar (8)- Decision Support Systems (1) 5F, Room 505

Chair: Hwang-Jaw Lee, Chien Hsin University of Science and Technology (Taiwan)

- Seminar (8)-01 *Agricultural Weather Inquiry System*
Ming-Hwi Yao, Agricultural Engineering Division, Taiwan Agricultural Research Institute (Taiwan)
Chun-Jen Chen, Agricultural Engineering Division, Taiwan Agricultural Research Institute (Taiwan)

Information Technology Adoption in Indonesian Agriculture and Agribusiness

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ABSTRACT

To date, agriculture is remaining to be a strategic sector in Indonesia. However, besides its growth, there are also several issues and problems being challenged, which, among others, is inadequate access to information. A survey has been carried out to study about the information required by small scale agriculture and agribusiness practitioners in Indonesia, adoption level of information and communication technology (ICT) for accessing the required information, as well as adoption level of ICT for supporting their operations. The survey was conducted by using questionnaires in West Java province. This paper discusses the survey results. Supply side, including the information sources and the availability of ICT infrastructure in rural areas, will be taken in to account in analysing the survey results. ICT adoption constraints as well as the remedial steps required to expedite the ICT adoption are also discussed.

Keywords: information needs, ICT infrastructure, ICT adoption, agriculture, agribusiness

Information Technology Adoption in Indonesian Agriculture and Agribusiness

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ABSTRACT

To date, agriculture is remaining to be a strategic sector in Indonesia. However, besides its growth, there are also several issues and problems being challenged, which, among others, is inadequate access to information. A survey has been carried out to study about the information required by small scale agriculture and agribusiness practitioners in Indonesia, adoption level of information and communication technology (ICT) for accessing the required information, as well as adoption level of ICT for supporting their operations. The survey was conducted by using questionnaires in West Java province. This paper discusses the survey results. Supply side, including the information sources and the availability of ICT infrastructure in rural areas, will be taken in to account in analysing the survey results. ICT adoption constraints as well as the remedial steps required to expedite the ICT adoption are also discussed.

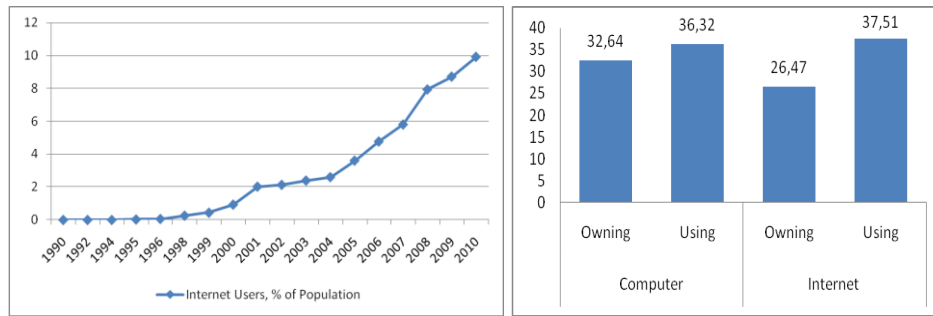
Keywords: information needs, ICT infrastructure, ICT adoption, agriculture, agribusiness

1 INTRODUCTION

With more than 40 percent of about 230 million of population engaged in agriculture, it is justified to say that agriculture remains the largest and the most strategic sector in the Indonesian economy. Therefore, the national economic development policy continuously places agriculture development as a priority and the prime mover of the national economic growth, in which agribusiness is determined as the grand strategy for the agriculture development. The context of agribusiness reflects the complex enterprises that integrate agricultural production, value-added processing, packaging, distribution, and marketing activities. The whole agribusiness activities will be simultaneously developed to gain the added value of agricultural commodities.

A number of problems that hindered the development of agriculture and agribusiness in Indonesia have been identified. These included, among others, the unreliability of raw material supply, lack of infrastructure, poor managerial skills, and inadequate access to information. Agricultural information is one of the most important factors of production and there is no doubt that this can lead to development. Information governs the relationship between suppliers and producers on the one hand and customers and consumers on the other hand. Therefore, opening access to information and knowledge to farmers and agribusiness is indispensable. This means that sustainable agricultural and agribusiness development should not be dissociated with the very fast progress of information and communication technology.

The very fast development of ICT has made ICT very influential in everyday activities. Competition of ICT vendors to gain markets makes the price of ICT hardware as well as software gradually decreased. One of the most popular ICT advancement is the Internet. Internet has become a trend and life style all over the world, also in Indonesia. Figure 1 shows the current status of ICT adoption in Indonesia, represented with (a) growth of internet users since 1990 to 2010 [1], and (b) current status of people access to computer and internet [2].



(a) Growth of internet users

(b) People access to computer and internet

Figure 1: Current Status of ICT adoption in Indonesia

However, despite its importance, the adoption of ICT in agriculture and agribusiness in Indonesia as to compare with its counterparts, i.e., other economic sectors, is left behind [3,4]. The main objective of this study is to make an analysis on the status of ICT adoption in Indonesian agriculture and agribusiness, especially those related with small scale business operators/owners (practitioners). The specific objectives of the study are: 1) to study the information required by agriculture and agribusiness practitioners, 2) to study the adoption level of information and communication technologies (ICT) for accessing the required information as well as for supporting their operations, 3) to identify the factors inhibiting the adoption of ICT as well as the remedial steps required to expedite the ICT adoption. Supply side, including information sources and the availability of ICT infrastructure in rural areas, will be taken in to account in analyzing the survey results.

2 METHODOLOGY

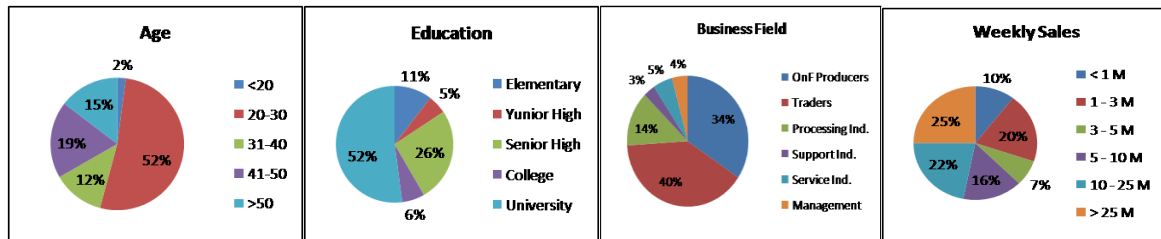
To meet the objectives, a structured questionnaire was prepared to elicit the information from the respondents on various aspects. There were two categories of respondents, i.e., small scale agriculture and agribusiness operators/owners (practitioners) and general consumers. Small business operators or owners are individuals who play important roles in directing the business' policies and directions. The questionnaire included questions on respondent profile (age, education, business field, business scale, occupation, etc), questions on information requirement, use of ICT, and questions on respondents' perception on ICT. The type of ICT is computer and internet. The level of adoption measured in categorical variable, they are user (adopter) and non-user (non-adopter). The sample size (respondents) of this study is 96 practitioners and 89 consumers. Data collection was done through scheduled interview of the respondents by the trained enumerators in the period of February – May 2012. Secondary data had also been collected from journals and relevant web sites to improve the understanding of the concepts of present study. Descriptive analysis is used to provide general pictures of ICT adoption in agriculture and agribusiness.

3 RESULTS AND DISCUSSION

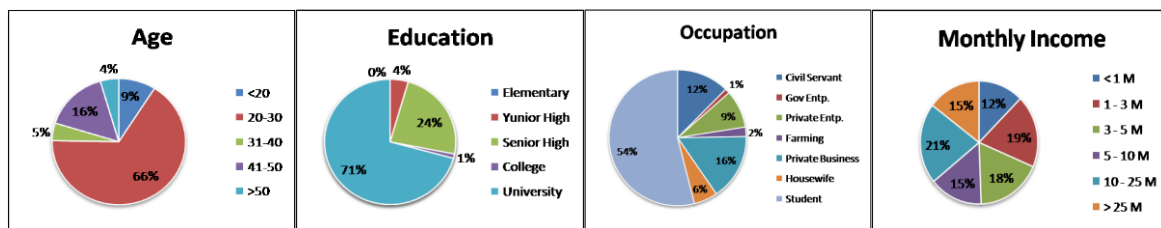
There are three main observations reported in this paper, namely needs of information by sample respondents, ICT adoption by sample respondents, and factors affecting adoption of ICT in agriculture and agribusiness.

3.1 Respondent's Profile and Their Information Needs

There were two groups of respondents, i.e. small scale agriculture and agribusiness operators/owners (practitioners) and general consumers. Figure 2 shows the profile of respondents by age group, education, business field, weekly sales, occupation, and monthly income. About 95.7% of respondents are having telephone, either fix-line phone or mobile phone.



(a) Practitioners



(b) Consumers

Figure 2: Profile of Practitioner and Consumer Respondents

Practitioner respondents were asked for their needs of information related with agriculture and agribusiness to which they deal with. The responses are summarized in Table 1. From those responses it can be understood that the respondents mainly need information for supporting their business operations.

Table 1 The Needs of Information related with Agriculture and Agribusiness

Type of Information	Responses (%)	Type of Information	Responses (%)
Farm products price	71,9	Business opportunity	35,4
Business partner	71,9	Credit facility	35,4
Production factor price	43,8	Production factor price	21,9
Farm products supplier	40,6	Machinery price	20,8
Weather data	39,6	Machinery supplier	10,4
Pest and disease	39,6	Machinery workshop	10,4
New technology	37,5	Others	6,3

3.2 Information Sources and ICT Infrastructures

The issue of information access has become a priority to support Indonesian agribusiness development facing the globalization era. Through the Indonesian Ministry of Agriculture, e-agribusiness was introduced to the public in early 2000. Web portal and mobile phone messages were initiated by the Ministry to serve agribusiness in accessing the most recent agricultural information. The information was freely accessible for farmers at any time. Some telecenters were also developed to support agribusiness located in rural areas [5].

The Ministry, through Pusdatin, also introduced *e-petani*. *E-petani* (e-agriculture) is a portal that designed to facilitate and to be used by agribusiness actors especially farmers and extension workers, traders and government so that they could get information needed in conducting their role as agribusiness actors in their daily activities. It consists of several application systems such as

agricultural statistics database, database on agricultural export-import, information of agricultural prices, agricultural multimedia portal, cyber extension portal and integrated cropping calendar.

Meanwhile, the Ministry of Agriculture through Extension and Human Resource Development Agency (BPPSDMP) in 2010 has been implementing *cyber extension* as a new approach in extension activities. Briefly, *cyber extension* is an internet based agricultural extension information system. It is built to support the supply of extension materials as well as agricultural information to the extension workers so that they can facilitate the learning process of agriculture and agribusiness practitioners in rural areas.

Initiatives from private sectors are also sufficient. Just to mention a few, *Agromaret* is a community-based website dedicated for on-line agribusiness. It may involve producers, suppliers, distributors, exporters, importers and general consumers of various agricultural products (food crops and vegetables, plantations, forest, livestock and fishery's products). *Situs Hijau* is similar one but focusing on horticulture. It is enhanced with various information related with horticulture.

Related with ICT infrastructure, since 2003 the Ministry of Telecommunication and Informatics has developed a policy related with *Universal Service Obligation (USO)*. This is dealing with the provision of telecommunication and informatics access in the nation-wide areas that has not been reached by telecommunication services. It was implemented with involvement of various types of technology such as VSAT, Portable Fixed Satellite (PFS), IP-Based technology, telephony/fax, cellular, radio point to point, etc, and followed with a number of projects to address the ICT gap in rural areas such as Smart Village, Sub-district Internet Service Center (PLIK), and *Mobile PLIK*.

Smart Village (*Desa Pinter*) is a solution to address gaps in access to information and education. The project involving 100 villages is carried out by equipping the villages with computers and internet access, so that people can access any information they need.

Sub-district Internet Service Center (*Pusat Layanan Internet Kecamatan – PLIK*) is dealing with the provision of public internet access facilities in sub-districts' center to ease the people access to the internet. There is about 5.748 PLIK nowadays. It is accompanied with efforts to develop productive *push content* as well as a number of useful portals. Mobile PLIK is a mobile (moving) internet service provider. It was aimed to serve sub-districts which were not reached by PLIK. There is about 1.907 M-PLIK distributed through out Indonesia.

3.3 Adoption of ICT in Agriculture and Agribusiness

About 80.2% of practitioner respondents and 89.9% of consumers are using computer. The rest are not using computer with several reasons: not necessary, costly, computer skill constraints. About 68.8% of practitioner respondents and 83.1% of consumers are using internet. Table 2 presents the typical use of computers and internet by respondents as compared with pattern of use by general small and medium enterprises surveyed by Wachid and Iswari in Yogyakarta [7]. The table indicates that the tree groups have similar pattern of use.

Table 2 Typical Computer and Internet Use by Respondents (%)

No.	Computer Use	Pract.	Cons.	GSME	Internet Use	Pract.	Cons.	GSME
1	Document typing	81,1	87,5	69,0	Information searching	89	97	91,6
2	Internet access	68,9	72,5	34,5	E-mail	82	92	-
3	Computing	51,4	45,0	66,7	Social network	76	86	-
4	Data and information management	31,1	10,0	58,6	Entertainment	64	89	-
5	Running application program	28,4	16,3	-	B-to-C Communication	53	15	23,9
6	Product design	28,4	11,3	43,7	B-to-B Communication	52	16	31,2
7	Game	24,3	53,8	-	Online Selling	44	12	32,3
8	Presentation	-	-	20,7	Website	36	15	-
9					Online buying	33	31	19,8
10					Online banking	29	14	15,6

Several factors are influencing ICT adoption in agriculture and agribusiness. The main factor is type of business or occupation. The others are including age, educational background, sales or occupation, and perception toward ICT. Bi-plot analysis presented in Figure 2 indicates that based on type of business and occupation, both practitioners and consumers separately belong to 4 groups of adopters, each with their certain characteristics. For example, those from support industries tend to be more advance and intensive in using ICT than the others, while those from service industries use ICT less than the others. Employees of private enterprises and students of tertiary education are the advanced and intensive user of ICT, while public servants perceive the highest benefit of ICT use but not fully utilize its sophistication. In general, the four groups closely fit to the ICT adoption ladder proposed by Sudaryanto and Soekartawi [5]. The most important benefits of using internet are supporting business operation, increasing knowledge, and widening social networks, each of which is stated by more than 70% of respondents. About 28% of respondents also believe that using internet benefit them with cost saving.

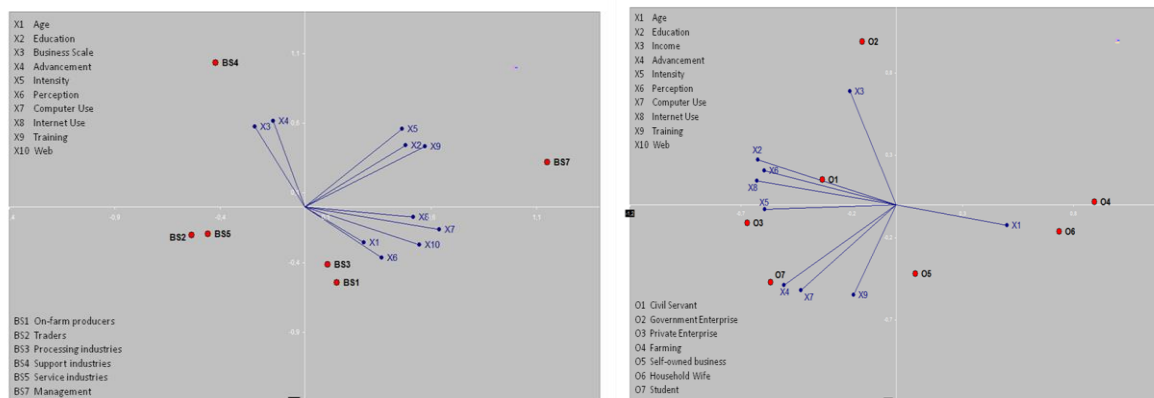


Figure 2: Bi-plot Analysis Indicating Relationship among Research Variables

3.4 Problems and Alternative Solutions

Regarding ICT use to support business operation, the majority of respondents from practitioner category identified constraint on internet connection, which according to these respondents is considerably slow, is the most inhibiting factors. Other factors include internet technology knowledge and skills, costs (installation, maintenance, and operation) which are considered to be expensive, and security risks (viruses, hacking, spam, etc). Similar problems are also identified by the majority of respondents from general consumer category. The summary of identified problems on ICT use is presented in Figure 3.

As a cross reference, Soemardjo et. al. [6] identified several constraints on ICT application for supporting agriculture and agribusiness development. Those, among others, are lack of understanding on the concept of ICT application in small that results to the low ICT application on supporting the daily business activities, lack of infrastructure such as electricity, internet connection and hardware for supporting IT-based operational management and information dissemination to rural areas, limited government funding for operating the ICT-based application system, low ICT skill and capacity of human resources, especially extension officers and rural facilitators, and extremely fast moving ICT sector while adapting speed of people working in rural areas relatively slow and tend to be left behind.

It is readily accepted that increased information flow has a positive effect on agriculture and agribusiness. ICT offers the ability to increase the amount of information provided to all participants and to decrease the cost of disseminating the information. Therefore effort to continuously promoting the adoption of ICT in agriculture and agribusiness is of necessity.

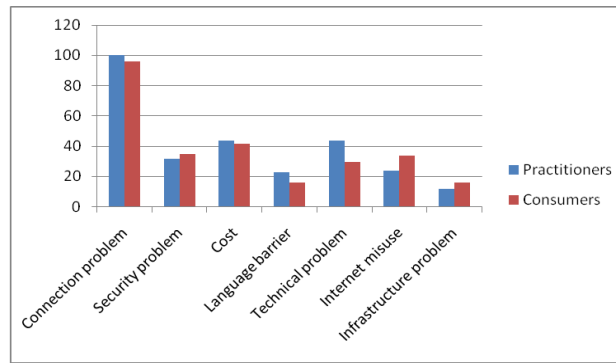


Figure 3 : Problems on Internet Use as Identified by Respondents

Considering all of identified problems on ICT use/adoption, the followings are considered as the alternative solutions for promoting the adoption of ICT in agriculture and agribusiness:

- Improving ICT awareness of people/community through continuous socialization and promotion.
- Strengthening connectivity in the villages with the appropriate technology.
- Active involvement of relevant institutions in the development of content as well as useful application programs for supporting agriculture and agribusiness development.
- Human resource development, especially improving ICT literacy by designing and implementing various training.
- Promoting collaboration and sharing of ICT facilities among small scale businesses to improve ICT use efficiency.
- Adding more additional subject on ICTs in tertiary education considering that the most progressive managers or business-man are young graduates of tertiary education.

4 CONCLUSION

Several factors are influencing ICT adoption in agriculture and agribusiness, i.e., type of business or occupation, age, educational background, sales or occupation, and perception toward ICT. Based on its use, intensity and advancement, agriculture and agribusiness practitioners are grouped in to 4 categories of ICT adopters. Internet connection problems, cost, ICT knowledge and skills, and security risks are the problems that hinder ICT adoption in agriculture and agribusiness.

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