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Abstract: The mobile phone technology is an important tool to enhance farmers’ to access better marketing services, agricultural extension services, health extension services and other mobile services. This study also tried to assess rural households’ mobile phone usage status for different rural innovation services in Gomma Woreda, Southwest Ethiopia. Structured interview schedule, focus group discussion, key informant interview and personal observations were used as a method of data collection tools for this study. Multi-stage sampling technique was used for this study and data were collected by using both primary and secondary source of data. Also the data were collected from 188 sample household head respondents who are using mobile phone for accessing different rural innovation services. Descriptive statistics including frequency, mean, standard deviation and percentage was used for this study. Most of the rural households used mobile phone for marketing services followed by other mobile services (news services, as torch and calculator services). The farmers who were educated more were used different innovation services through mobile phone rather less educated farmers. Finally, the rural household usage of mobile phone for different

ABOUT THE AUTHOR
Berhanu Daniso Lambebo was born on October 1993 in Mirab Badawacho Woreda, Hadiya Zone Southern Nation Nationality and people of Ethiopia. He joined Jimma University in 2012 and graduated with Bachelor of Science Degree in Rural Development and Agricultural Extension in July 2014. After his graduation, he has been employed at Mirab Badawacho Woreda Agricultural development office at Extension agent’s and coordinator position in 2015 and served for two years until he began postgraduate study at Jimma University and he has been graduated with his M.Sc. degree in Agricultural Communication and Innovation in 2018. He has been employed at lecturing position at Wolaita Sodo Agricultural Technical Vocational Education and Training colleges’ for 8 months. Currently, he is a lecturer at Wolaita Sodo University. Rural innovation, communication for innovation and sustainable livelihood analysis are the author’s interest areas of research.

PUBLIC INTEREST STATEMENT
Agriculture takes center stage as the engine that can transform nations’ economies in the world. The sector in Ethiopia is known for employing more than 80% of the total populations live in rural areas and is heavily dependent on rain-fed agriculture; this makes them extremely vulnerable to changes in weather conditions. Mobile phone utilization is believed to play a vital role in disseminating knowledge and information and benefits farmers to have access to up to date knowledge and information on agricultural technologies, markets, health care and other mobile-based information services. Lack of the necessary knowledge, skills and attitude in using mobile phone for rural innovation services are the main factors that affect rural farmers.
rural innovation services needed to be supported by stakeholders to solve the
problems of mobile phone utilization in rural areas.

Subjects: Information & Communication Technology; ICT; Development Communication; Development Studies

Keywords: rural innovation; mobile phone; utilization

1. Introduction
In global level, the sector of agriculture takes center stage as the engine that can transform nations’
economies and the supplier of that basic human need, nutrition is the world’s largest user of land
occupying more than one-third of Earth’s terrestrial surface and also using vast amounts of water.
The sector in Ethiopia is known for employing more than 80% of the total populations live in rural
areas and is heavily dependent on rain-fed agriculture; this makes them extremely vulnerable to
changes in weather conditions (Andersson, Mekonnen, & Stage, 2011 & Mohamed, 2017). However,
the great potential of agriculture, the sector faces many challenges that delay its performance due to
ineffective communication of agricultural information through mobile (Amir & Ewang, 2016).

According to World Bank (2011), the utilization of mobile phone provides market price informa-
tion and agricultural extension services information directly to farmers in Ethiopia. Even if there are
constrains that affect the mobile utilization, the subscribers’ average was increasing now a day
(ITU, 2017). As such, mobile phones have been regarded as the widely accessed tool among the
farmers for communication and also accessing agriculture-related information particularly for the
marketing of produce (Chhachhar, Hassan, Omar, & Soomro, 2014). In this context, mobile tech-
nologies can offer the means for development in developing countries (Rashid & Elder, 2009). It is
also a crucial to facilitate data management; poor evidence-based decision-making and clinical
communication challenges on health-related issues (Soar, Gow, & Caniogo, 2012).

Mobile phone utilization is believed to play a vital role in disseminating knowledge and informa-
tion and benefits farmers to have access to up-to-date knowledge and information on agricultural
technologies, markets, health care and other mobile-based information services. The expansion of
rural electrification helps farmers to have an access to mobile telephone services in recent periods
(Getaw & Godfrey, 2014), but there is evidence that most of the rural peoples lack the necessary
knowledge, skills and attitude in using mobile phone for rural innovation services.

The paper targeted to describe characteristics of rural households and assess the usage status of
mobile phone for major rural innovation services in the study area. Therefore, the findings of this study
would be used in guiding policy makers, development planners, communication experts and research-
ers who are concerned to identify measures and create awareness about using mobile phone.

2. Theoretical background
Mobile phone is one of the modern information technologies that interlink people with information
services. Information could be shared between rural communities within the same country and even
globally decreasingly isolation, flattening the learning curve and removing the need to reinvent the
wheel for every type of community initiative: from education, finance, health, microfinance, private
sector development and many other arenas (Asheeta, Rowena, & Janakiram, 2008). According to
Qiang (2011), mobile applications can also promote agricultural and rural development, including
better access to extension services; better market links and distribution networks; and better access
to finance, including credit, insurance, payment methods and access to information about agricul-
tural technologies and extension services. Also, it raise farmers’ incomes, making agricultural market-
ing more efficient, lowering information costs, reducing transport costs and providing a platform to
deliver services and innovate (Sife, Kiondo, & Lyimo-Macha, 2010).
According to Aker and Mbiti (2010), mobile phones can provide economic benefits to consumers and producers in Sub-Saharan Africa. First, mobile phones can improve access to and use of information, thereby reducing search costs, improving coordination among agents and increasing market efficiency. Second, this increased communication should improve firm’s productive efficiency by allowing them to better manage their supply chains. Third, mobile phones create new jobs to address demand for mobile-related services, thereby providing income generating opportunities in rural and urban areas. Fourth, mobile phones can facilitate communication among social networks in response to shocks, thereby reducing households’ exposure to risk. Finally, mobile phone-based applications and development projects sometimes known as m-development have the potential to facilitate the delivery of financial, agricultural, health and educational services.

3. Research methodology

3.1. Description of the study area
This research was conducted in Gomma Woreda, which is located in Jimma Zone of the Oromiya National Regional State. Jimma Zone is located in the South-Western part of Ethiopia between latitude 6° and 9° north and longitude 34° and 38° east, and between altitude ranges of 880–3,340 meters above sea level (JZARDO, 2008). Gomma Woreda is one of the 18 Woredas found in Jimma Zone of Oromia National Regional State. It is located 395 km south west of Addis Ababa and about 45 km west of Jimma town. It is bordered on the south by Seka Chekorsa, on the southwest by Gera on the northwest by Setama on the north by the Didessa, on the northeast by Limmu Kosa and on the east by Manna. The Woreda has 36 Peasant Kebele Administrations (PKAs) and 4 Urban Kebele Administrations (UKAs). The capital town of the Woreda is Agaro. Total population for this Woreda of 350,882, of whom 172,888 are men and 177,994 are women; 71,018 or 20.24% of its population are urban dwellers. Out of 30,514 household heads, 30,247 male and 267 female live in rural kebeles of Gomma Woreda.

3.2. Target population
The target population for this study was rural households who are using mobile phone for different agriculture-related purpose, marketing services, health services and other mobile services. The household members having at least one mobile phone were considered as sample respondent households for this study.

3.3. Research design
A cross-sectional survey design was used for this particular study based on both qualitative and quantitative data collected from rural households. It allows for collection of information at one point in time, from a selected sample of respondents and it helps to reveal relationships (and non-relationships) among variables that describe a sample. It also focuses on studying and drawing inferences from existing differences between people, subjects, or phenomena. The design generally uses survey techniques to gather data, which is relatively inexpensive when we compare with that of longitudinal design and takes up little time to conduct. Moreover, using cross-sectional research design is an appropriate choice for this study.

3.4. Sampling techniques and sample size determination
A multi-stage sampling procedure was used for this study. At the first stage, Gomma Woreda was selected purposively (based on access to agricultural production and marketing and NGOs working in the area such as AGP in relation to agricultural transformation). At the second stage, from 36 kebeles, three kebeles were selected randomly. At the third stage, a total of 188 households were selected by using simple random sampling technique based on proportional to population size principle (PPS).

3.5. Types, sources and methods of data collection
For this study, both qualitative and quantitative data types were used. Qualitative data were collected on variables that are dummy or nominal in nature, whereas quantitative data were collected on variables that are continuous. Concerning source of data, both primary and secondary sources were
used in gathering valuable data. The needed type of information on demographic, socio-economic, institutional and psychological variables and constraints of mobile phone use was collected from sample households, FGD and KI. Additionally, secondary data sources were collected from journals, reports, published and unpublished academic documents such as thesis work and periodic reports found in Woreda to supplement information gathered from primary sources of data.

Structured interview schedule, focus group discussions, key informant interviews and personal observation were used as a method of data collection. Structured interview schedule was designed to the sample respondents as tool of data collection.

Questionnaire was pre-tested before the actual data collection in order to check for reliability. Both open- and close-ended questions were used to collect data from sample household heads in the selected kebeles. Open questionnaire means the type of question in which respondent is allowed to write or list down about the issue in his or her idea, where close-ended questionnaire is allowed to choose from lists of options about the issue in consideration.

3.5.1. Focus Group discussion (FGD)
Representatives of communities who have good experience and knowledgeable in using mobile phone for rural innovation services were selected purposively to discuss specific issues related to the purpose of the study. Three separate FGDs that each contains 8–10 members were held in Limnu Sappa, Kedemessa and Beshasha kebele on March 2018 in Gomma Woreda were conducted. The composition of the group based on sex, mobile using experience and educational status. The discussion was facilitated by the researcher together with the kebele development agent. A checklist also used to guide the informal discussion conducted to generate data that cannot be collected from individual interviews.

3.5.2. Field observations
They have been conducted in the data collection period. It is a technique that involves systematically selecting, watching and recording behaviors of people or other phenomena and aspects of the setting in which they occur, for the purpose of getting (gaining) specified information about rural innovation services by using mobile. This helped the researcher to clearly know the natural phenomena of rural farmers using mobile phone for rural innovation services.

3.6. Data analysis methods
Data were analyzed using descriptive statistics and econometric model. Ranking techniques were used to find out severity problem of the constraints in mobile use for rural innovation services. Moreover, narrations of scenarios were applied. The collected data were organized, edited and analyzed using SPSS-20 statistical packages. And descriptive statistics such as mean, standard deviation, percentages and frequency were computed depending on the objective to assessing status of mobile phone usage for rural innovation services.

4. Results and discussion
Sex is one of the demographic variables that affect the rural farmer’s use of mobile for accessing rural innovation services. From the total of sample respondents, 95.2% were male headed and 4.8% female headed households (Table 1).

Education is one of the most important demographic variables that influence the rural farmer’s use of mobile for the said purposes. The survey results in Table 1 show that about 25.5%, 17.6%, 22.9% and 22.3% of the sample household heads were illiterate, read and write, Grade (1–4) and Grade (5–8), respectively. However, 10.1% attended Grade (9–12), and whereas the smallest proportion 1.6% above Grade 12.

Frequency of extension contact is an institutional factor that influences rural farmers to access information through contacting DAs. In the study area, 41% of the sample respondents reported
that they had not contact with extension agents through mobile phone. The survey results show that about 11.7%, 29.3%, 8% and 10% were contact extension agents by their mobile in every week, twice in a month, once in a year and twice in a year, respectively (Table 1).

In order to understand farmers’ perception on mobile phone’s ease of use for different rural innovation services, the respondents were asked to match their opinions based on degree of agreement. The Likert scale was reduced to five scales, that is, strongly agree, agree, neutral, disagree and strongly disagree. The farmers who strongly agree, agree, neutral, disagree and strongly disagree were about 50%, 25.5%, 14.4%, 9% and 1%, respectively on the effectiveness mobile phone utilization for rural innovation services (Table 1).

Finance is the crucial element starting from land preparation up to the marketing of the product. As shown in Table 1, only 54.3% of sample respondents had access to credit and 45.7% had no access to credit in the study area in 2016/17.

From the institutional factors, access to power supply is the most important factor that enables rural farmers to use mobile for different rural innovation services. As depicts in Table 1, 83.5% of

| Characteristics                  | Frequency | Percent |
|----------------------------------|-----------|---------|
| Sex                              |           |         |
| Male                             | 179       | 95.2    |
| Female                           | 9         | 4.8     |
| Education level                  |           |         |
| Illiterate                       | 48        | 25.5    |
| Read and write                   | 33        | 17.6    |
| Grade (1–4)                      | 43        | 22.9    |
| Grade (5–8)                      | 42        | 22.3    |
| Grade (9–12)                     | 19        | 10.1    |
| Above 12                         | 3         | 1.6     |
| Frequency of extension contact   |           |         |
| Not applicable                   | 77        | 41.0    |
| Every day                        | 0         | 0       |
| Every week                       | 22        | 11.7    |
| Twice in a month                 | 55        | 29.3    |
| Once in a year                   | 15        | 8       |
| Twice in a year                  | 19        | 10.1    |
| Perception                       |           |         |
| Strongly agree                   | 94        | 50      |
| Agree                            | 48        | 25.5    |
| Neutral                          | 27        | 14.4    |
| Disagree                         | 17        | 9       |
| Strongly disagree                | 2         | 1.1     |
| Credit access                    |           |         |
| No                               | 86        | 45.7    |
| Yes                              | 102       | 54.3    |
| Power supply                     |           |         |
| No                               | 31        | 16.5    |
| Yes                              | 157       | 83.5    |
| Suitable network connection      |           |         |
| No                               | 83        | 44.1    |
| Yes                              | 105       | 55.9    |
| Social participation             |           |         |
| No                               | 48        | 25.5    |
| Yes                              | 140       | 74.5    |
sampled households had access to power supply in the nearby areas to recharge their mobile and 16.5% had not got access to power supply in nearby areas in the study area.

There is an access to network to use mobile phone for different rural innovation services in the study area, but suitable network connection in the area was a problem for rural households to use mobile phone for different services. As the results show in Table 1, 55.9% of sample respondents had access to suitable network while 44.1% of the sampled respondents had not access to suitable network in the study area.

In this study, 74.5% of sample respondents had participated in social organization of while 25.5% of them had not participated in social organization (such as farmers’ association/cooperatives, Iddir and Ikub) in the study area (Table 3). The result shows that about 50%, 25.5%, 14.4%, 9% and 1.1% had strongly agree, agree, neutral, disagree and strongly disagree, respectively to perceived that mobile phone was an important technology to access rural innovation services (Table 1).

4.1. Usage status of mobile phone for major rural innovation services
Age is one of the major demographic factors, measured in years, which affect farmers from using mobile phone for different innovation services. The mean age of farmers who used mobile for marketing, agricultural extension purpose, health extension purpose and for others mobile services were 39, 38, 38 and 41 years, respectively (Table 2). The minimum and maximum age of all innovation service users were 22 years and 70 years, respectively. The result showed that the mean age of farmers who used mobile phone for other mobile services were more than others in the study area.

Distance from sample households’ to nearest market is an institutional factor which affect rural innovation service users. Regarding FGD and key informant data; rural innovation services of marketing, agricultural extension, health and other mobile service areas were found near to the market center in the rural area of the study area. As observed from Table 2, the average distance needed for the sample households who used mobile phone for marketing, agricultural extension services, health and other mobile services were took average walking kilometers of 3.47, 3.58, 3.69 and 3.93, respectively with range from 0.5 to 11.5 km. The result showed that the average distance for other mobile service users were more than others in the study area.

| Variables         | For all services | Marketing services | Agricultural extension services | Health services | Other mobile services |
|-------------------|------------------|--------------------|--------------------------------|----------------|----------------------|
| Age               | 22/70            | 39/9               | 38/9                           | 38/9           | 41/11                |
| Distance          | 0.5/11.50        | 3.47/1.94          | 3.58/1.97                      | 3.69/2.20      | 3.93/2.19            |
| Land size         | 0.13/10          | 1.41/1.375         | 1.57/1.67                      | 1.49/1.54      | 1.75/1.75            |
| Farm Income       | 1,000/40,900     | 12,436.96/8,760    | 13,749.92/9,513/92            | 13,278.09/9,144.75 | 13,465.58/9,707.9    |
| Off/non-farm income | 0/18,800       | 1,652.80/3,629.8   | 1,460.98/3,381.79             | 1,626.91/3,590.94 | 1,099.43/2,647.4     |
| Cost of mobile service | 10/300          | 69.67/57.69        | 75/59.61                       | 76.78/58.95    | 72.5/63.40           |

SD: standard deviation; Max: maximum; Min: minimum.
One of the most socio-economic factors that influence crop production is resource endowment, availability of land for crop production. Land is the basic asset of the sample farmers. The survey result shows that the mean land size of sample households who used mobile for marketing services, agricultural extension purposes, health extension and other mobile services were 1.41, 1.57, 1.49 and 1.75 ha, respectively with the minimum ha of 0.13 and maximum of 10 ha in the study area (Table 2). The result showed that the mean land size of other mobile service users were more than other service users in the study area.

Off/non-farm income is one of the socio-economic variables. In the study area, sale of labour (agricultural wage), petty trade (small shops) and construction were found to be some of the off/non-farm income generating activities in which sample farmers were participating. The mean off/non-farm income of the sample household heads that used mobile for marketing, agricultural extension services, health and other mobile services were 1,652.80, 1,460.96, 1,626.91 and 1,099.43 ETB per year, respectively with the minimum and maximum of 0 and 18,800 ETB, respectively (Table 2). The farmers who had not engaged in any off/non-farm activity had no any income in the study year and the mean income from off/non-farm activities of health service users was higher than others.

In the study area; cash crops (coffee and chat), main crops (maize, teff and sorghum) and livestock’s, livestock products and livestock by products were found to be part of the socio-economic variables of farm income generating activities in farmers were participating. The mean farm income of the rural farmers who used mobile for marketing, agricultural extension services, health and other mobile services were 12,436.92, 13,749.92, 13,248.09 and 13,465.58 ETB per year, respectively, with the minimum and maximum of 1,000 and 40,900 ETB, respectively (Table 2). The mean total income of farmers who used mobile phone for agricultural extension services were more than others in the study area.

Cost of mobile service is one of the socio-economic variables that are challenging rural farmers’ mobile phone use. In Table 2, the mean cost of mobile service for marketing, agricultural extension services, health and other mobile services were (news services, as torch and calculator services) 69.67, 75, 76.78 and 72.52 ETB per month and with the minimum and maximum of 10 and 300 ETB, respectively. The result shows that the mean cost of mobile services of farmers who used mobile phone for health services were higher than others in the study area.

The mobile usage status for marketing services, health services, agricultural extension services and other mobile services (news services, as torch and calculator services) were about 71.8%, 69.1%, 62.8% and 69.7%, respectively. According to this result, most of the farmers were used their mobile for marketing service followed by other mobile services and agricultural extension services. The mobile phone usage status for health services are less than the rest of mobile services in the study area (Table 3). The data collected from FGD and KI indicated that the mobile phone usage of farmers was highly increasing for accessing different rural innovation services in the study area.

Out of less formal educated sample households about 6.9%, 3.7%, 4.3% and 20.7% were used mobile phone for marketing, agricultural extension purposes, health and for other mobile services, respectively (Table 3). From farmers who can read and write sampled households used mobile phone for marketing, agricultural extension purposes, health and for other mobile services were about 9%, 10.1%, 6.9% and 10.1%, respectively. The farmers who were educated from Grade (1–4) used mobile phone for marketing, agricultural extension purposes, health and for other mobile services about 21.8%, 21.8%, 18.6% and 6.9%, respectively. From the farmers who educated from Grade (5–8) used mobile phone for marketing, agricultural extension purposes, health and for other mobile services were 22.3%, 21.8%, 21.3% and 21.9%, respectively. From the farmers who educated from Grade (9–12) used mobile phone for marketing, agricultural extension purposes, health and for other mobile services were about 10.1%, 10.1%, 10.1% and 9%, respectively. The
Table 3. Respondents mobile phone usage status of dummy and categorical variables

| Category                      | Marketing services | Agricultural extension services | Health services | Other mobile services |
|-------------------------------|--------------------|---------------------------------|-----------------|-----------------------|
|                               | N  | %   | N  | %   | N  | %   | N  | %   |
| Sex                           |    |     |    |     |    |     |    |     |
| Female                        | 6  | 3.2 | 6  | 3.2 | 6  | 3.2 | 6  | 3.2 |
| Male                          | 129| 68.6| 124| 66  | 112| 59.6| 125| 66.5|
| Education level               |    |     |    |     |    |     |    |     |
| Illiterate                    | 13 | 6.9 | 7  | 3.7 | 8  | 4.3 | 39 | 20.7|
| Read and write                | 17 | 9   | 19 | 10.1| 13 | 6.9 | 19 | 10.1|
| Grade (1–4)                   | 41 | 21.8| 41 | 21.8| 35 | 18.6| 13 | 6.9 |
| Grade (5–8)                   | 42 | 22.3| 41 | 21.8| 40 | 21.3| 40 | 21.3|
| Grade (9–12)                  | 19 | 10.1| 19 | 10.1| 19 | 10.1| 17 | 9   |
| Above                         | 3  | 1.6 | 3  | 1.6 | 3  | 1.6 | 3  | 1.6 |
| Frequency of extension contact|    |     |    |     |    |     |    |     |
| Not applicable                | 34 | 18.1| 20 | 10.6| 24 | 12.8| 57 | 30.3|
| Every day                     | 0  | 0   | 0  | 0   | 0  | 0   | 0  | 0   |
| Every week                    | 18 | 9.6 | 22 | 11.7| 18 | 9.6 | 15 | 8   |
| Twice in a month              | 51 | 27.1| 55 | 29.3| 45 | 23.9| 28 | 20.2|
| Once in a year                | 14 | 7.4 | 15 | 8   | 14 | 6.9 | 4  | 2.1 |
| Twice in a year               | 18 | 9.6 | 18 | 9.6 | 18 | 9.6 | 17 | 9   |
| Perception                    |    |     |    |     |    |     |    |     |
| Strongly agree                | 72 | 38.3| 64 | 34  | 61 | 32.4| 65 | 34.6|
| Agree                         | 34 | 18.1| 35 | 18.6| 30 | 16  | 33 | 17.6|
| Neutral                       | 18 | 9.6 | 20 | 10.6| 18 | 9.6 | 19 | 10.1|
| Disagree                      | 10 | 5.3 | 10 | 5.3 | 7  | 3.7 | 12 | 6.4 |
| Strongly disagree             | 1  | 0.5 | 1  | 0.5 | 2  | 1.1 | 2  | 1.1 |

(Continued)
| Category                     | Marketing services | Agricultural extension services | Health services | Other mobile services |
|------------------------------|--------------------|---------------------------------|-----------------|----------------------|
|                              | N  | %    | N  | %    | N  | %    | N  | %    |
| Credit access                |    |      |    |      |    |      |    |      |
| Yes                          | 89 | 47.3 | 87 | 46.3 | 89 | 47.3 | 69 | 36.7 |
| No                           | 46 | 24.5 | 43 | 22.9 | 43 | 22.9 | 57 | 30.3 |
| Access to power supply       |    |      |    |      |    |      |    |      |
| Yes                          | 110| 58.5 | 106| 56.4 | 97 | 51.6 | 112| 59.6 |
| No                           | 25 | 13.3 | 7  | 3.7  | 24 | 12.8 | 10 | 5.3  |
| Suitable network access      |    |      |    |      |    |      |    |      |
| Yes                          | 104| 55.3 | 103| 54.8 | 99 | 52.7 | 69 | 36.7 |
| No                           | 31 | 16.5 | 56 | 29.8 | 27 | 14.4 | 64 | 34   |
| Participation in social      |    |      |    |      |    |      |    |      |
| organization                 |    |      |    |      |    |      |    |      |
| Yes                          | 102| 54.3 | 103| 54.8 | 95 | 50.5 | 93 | 49.5 |
| No                           | 33 | 17.6 | 21 | 11.2 | 27 | 14.4 | 25 | 13.3 |
farmers who have educated above Grade 12 used mobile phone for marketing, agricultural extension purposes, health and for other mobile services were about 1.6% for each. This result shows that more composed of education influences rural farmers to use mobile phone for rural innovation services rather than others. The data collected from FGD and KI also confirm that education was factor that influence farmers using of mobile technology for rural innovation service.

As illustrated in Table 3, about 9.6%, 11.7%, 9.6% and 8% had contacted extension agents through mobile in every week for marketing, agricultural extension purposes, health and for other mobile services, respectively. The farmers who had contact extension agents through mobile twice in a month for marketing, agricultural extension purposes, health and for other mobile services were about 27.1%, 29.3%, 23.9% and 20.2%, respectively. The farmers who had contact extension agents through mobile phone once in a year for marketing, agricultural extension purposes, health and for other mobile services were 7.4%, 8%, 6.9% and 2.1%, respectively. The farmers who had contact extension agents through mobile twice in a year for marketing, agricultural extension purposes, health and for other mobile services were 9.6%, 9.6%, 9.6% and 9%, respectively. The result shows that the farmers who had contact extension agents more were used different innovation services rather than others and most of the farmers who had contact extension agents via mobile phone were for agricultural extension service in the study area.

Regarding, credit access the farmers who had access to credit used mobile for marketing services, agricultural extension purposes, and health and for other mobile services were about 47.3%, 46.3%, 47.3% and 36.7%, respectively (Table 3). The result shows that most of the farmers were used their credit access for both marketing services and health services in the study area.

From the farmers who had access to power supply in the nearby areas used mobile for marketing services, agricultural extension purposes, health services and for other mobile services were about 58.5%, 56.4%, 51.6% and 59.6%, respectively (Table 3). This result shows that most of the farmers who had access to power supply in the nearby areas were used mobile for other mobile services in the study area.

The farmers who had access to suitable network connection in the area used mobile for marketing services, agricultural extension purposes and health services and for other mobile services were about 55.3%, 54.8%, 52.7% and 36.7%, respectively (Table 3). The result shows that most of the farmers used mobile for marketing services followed by agricultural extension and health services when there is a suitable network connection in the area and they are less likely to use mobile for other mobile services.

The farmers who had participated in formal or informal social organization used mobile for marketing services, agricultural extension purposes, health extension services and for other mobile services were about 54.3%, 54.8%, 50.5% and 49.5%, respectively (Table 3). This result shows that most of the farmers who participated in different social organization in the study area were used mobile for agricultural and marketing services.

From the rural households who were strongly agree on the effectiveness of mobile phone for marketing service, agricultural extension services, health extension services and other mobile services were about 38.3%, 34%, 17.6% and 32.4%, respectively (Table 3). The rural households who were agree on the effectiveness of mobile phone for marketing service, agricultural extension services and health extension services and on other mobile services were about 17.6%, 18.1%, 18.6% and 16%, respectively (Table 3). The rural households who were neutral on the effectiveness of mobile phone for marketing service, agricultural extension services, health extension services and on other mobile services were about 10.1%, 9.6%, 10.6% and 9.6%, respectively (Table 3). From the rural households who were dis agree on the effectiveness of mobile phone for marketing service, agricultural extension services, health extension services and on other mobile services
were about 6.4%, 5.3%, 5.3% and 3.7%, respectively (Table 3). The result shows most of the farmers in the study were highly perceived on the effectiveness of mobile phone and those farmers who perceived highly were used different rural innovation services rather than others.

5. Conclusion and recommendations

Mobile phone, one of the modern technologies for developing countries, that is used for accessing different rural innovation services. It has the potential to allow rural households to get marketing services, agricultural extension services, health services and other mobile services timely. Most of the rural household used mobile for marketing services (71.8%) followed by other mobile service users (69.7%) in the study area. Most of the farmers in the study area were used mobile phone for marketing service. As it is concerned, the Ministry of ICT should have to develop mobile-based market price information dissemination system to enhance the marketing product and price information delivery to farmers. The farmers who are more composed of education highly perceived on the effectiveness of mobile use were used mobile phone for different rural innovation services rather than others. So, education is highly recommended for farmers to get mobile phone using skills in their village on adult literacy program scheduled by the government, so that they would be able to use the mobile phone technology for accessing different rural innovation services.

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Competing Interests

The authors declares no competing interests.

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