Adoption and Appropriation of Mobile Phones among Rice Farmers of San Juan, Batangas

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ABSTRACT

Information and Communication Technology (ICT) has become an essential tool in the agricultural sector. A mobile phone is one of the eminent ICT tools in this modern time that can receive, process, store, and display texts, images, and sound all together. Mobile phones are not just helpful in connecting with relatives and friends, but also an essential tool in the development of agriculture. The use of mobile phones in the Philippines has brought better information access for farmers. Using the Unified Theory of Acceptance and Use of Technology by Venkatesh et al. in 2003, a quantitative data analysis was used in investigating the adoption and appropriation of mobile phones by means of survey data among 300 rice farmers in the municipality of San Juan, Batangas. Demographic profile such as income and educational attainment, as well as external variables significantly affect mobile phone adoption and appropriation. My Phone is the top mobile phone brand choice of farmers and Globe as network service provider. Based on the results, mobile phones help farmers enhance their work; however, there are features of mobile phones that are difficult to understand.

Keywords: information, communication, farmers, mobile phone, adoption

INTRODUCTION

It has become common to affirm that Information and Communication Technologies (ICTs) have transformed the way people communicate and exchange ideas. ICTs have also improved the lives of individuals, organizations, and undeniably, entire nations. Both developed and developing countries are using ICTs as a means of communication in an easy way for it is believed that they can bring social and economic growth by forming an empowering environment.

The World Bank (WB) in 2012 defined ICTs as technologies involved in processing, collecting, saving, and distributing data and information by means of microelectronics, optics, and telecommunication computers. On the other hand, the Asian Development Bank (ADB) described ICT as a set of activities that facilitate through processing, transmission, and display of information.

ICTs became part of the daily lives of people throughout the world. Since it was invented, it became significant for everyone. Using these technologies, people can connect with other individuals despite the distance; they can get information in the fastest way as well as gain knowledge from it. The distribution of ICTs in developing countries provides much opportunity to transfer knowledge and information by government and private sectors.

Today, ICTs have a large contribution to agriculture and rural improvement (Singh, 2006). They portray an essential role in rural advancement by helping rural farmers gain access to new knowledge, up-to-date information, and entrepreneurial skills.

There are different ICTs which include computers, Internet, geographical information systems, traditional media which are radio and television, as well as mobile phones which are used in delivering agricultural information to the farmers (Stienen et al., 2007).

Consequently, one of the ICT tools that is beneficial nowadays is the mobile phone. It is the most widespread information technology across the world today, even in developing countries. The use of mobile phones has increased rapidly, and this technology has spread to the most distant areas of the least developing countries during the past few years (Furuholt & Matotay, 2011).

For the past decades, the coverage of mobile phones has spread fast in Asian, African, and Latin American countries. In 2016, it was indicated that more than 60 percent of the population of Africa, Asia,

and Latin America has access to mobile phone coverage (Furuholt & Matotay, 2011). Beforehand, the mobile phone was adopted only by rich people in urban areas (Chhachhar & Hassan, 2013). However, nowadays, mobile phones have been adopted not only in urban areas but also in rural regions in both developed and developing countries and are getting good benefits and up-to-date information about the weather, market, and other related issues (Aker & Mbiti, 2010).

The 2016 data from International Telecommunication Union (ITU) shows the growing trend for mobile technology. As of 2016, there are over six billion active mobile phone users worldwide. The rapid development of mobile phones has been one of the most significant trends in the past decades. It proliferated as a powerful means to provide access and connectivity for individuals and organizations. It enabled even the poorest nations to expand telecommunication network coverage among mass of their populaces including the rural areas.

Mobile phones have transformed the lives of millions of people in urban and rural communities by connecting and engaging them in feasible economic activities. As time passes by, mobile phones became affordable, accessible, self-sustaining, and empowering. They provide comprehensive services at a reasonably low cost. Mobile phones are becoming flexible and have different pricing models. This is the reason why it is becoming affordable (Samii, 2008).

In developing countries, the mobile phone is the major mode of communication. Mobile phones are appealing and sustainable tools for a lot of people in developing countries for it provides timely, localized, and relevant access to information.

Nevertheless, the mobile phone is not only limited to its primary function as a means of communication by means of voice or text, but it can also be used for versatile applications and purposes. World Bank (2012) has recognized that mobile phones also offer opportunities to advance human and economic development.

Mobile phones in developing countries, particularly rural areas, have portrayed essential roles for they significantly reduced communication and information costs (World Bank, 2012). In many developing countries like the Philippines, agriculture plays an important part in the national economy (World Bank, 2009). It provides the main source of food, profits, and employment in rural areas.

Mobile phones have imparted more opportunities for rural farmers to acquire knowledge and information about farming issues, difficulties, and its usage for agricultural development (Chhachhar & Hassan, 2013). According to Aker in 2011, ICTs, especially mobile phones, are significant in the agricultural sector for they provide information about the marketplace, weather, transport, and agricultural techniques to contact with concerned agencies and departments.

Additionally, the utilization of mobile phones leads to better social unity and improved social relationships among farmers. Nonetheless, short message service or SMS and voice record have given improvements in social relations. In developing countries, the growing importance of mobile phones is considered influential for agricultural improvement.

There are a lot of recent reviews of practice that have exposed the extensive application of mobile phones in support of livelihoods in rural and emergent areas of developing countries. De Silva in 2008 identifies mobile phones as key innovative tools in support of livelihood, with the indication of growing assimilation into agricultural- extension. Mobile phones are considered a fundamental device for agriculture development. This technology has provided connectivity and offered benefits which include progress and security to owners (Donner, 2006).

The rural community, especially farmers, however, were facing various difficulties and dispute in the exploitation of ICT particularly mobile phones. Illiteracy is one of the big problems among farmers in using mobile phones. A study in Malaysia stated that the levels of usage of ICTs, especially mobile phones, among farmers were low because of lack of education and skills (Musa et al., 2008).

The adoption of technology has been described by the World Bank (2012) as a relation between inputs and outputs. It also described the adoption and appropriation of technology as the use of new mappings between inputs and outputs and the conformation of input distributions using new mappings.

Philippines is an agricultural country. Most of its people still reside in rural areas and their

livelihood is through agriculture where it has four sub-sectors which are the farming, fisheries, livestock, and forestry. Despite being an agricultural country, Philippines has been one of the countries that are resourcefully benefited from ICTs, particularly mobile phones.

In recent years, the Philippines has developed ICT for development applications including e-governance, e-health, and e-education. It is also seen that Philippines has many mobile phone users. It became the texting capital of the world in 2009, with Filipinos sending an average of more than two billion text messages daily (National Telecommunications Commission, 2009).

The use of mobile phones in the Philippines has brought better information access for farmers. According to the report entitled *Information and communications for development: Maximizing mobile*, there were 101 mobile cellular subscriptions for every 100 people in the Philippines in 2011.

In 2006 to 2009, the Farmers' Text Center (FTC) of PhilRice reported an exceptional count of more than 70,000 text messages among farmers (PhilRice, 2010). In past reports, it is indicated that Filipino farmers use mobile phones as a marketing tool and to get price information (Labonne & Chase, 2009).

The introduction and acceptance of mobile phones may increase farmers' bargaining power (Labonne & Chase, 2009). Farmers can use their mobile phones to obtain information about the price from friends and relatives. Furthermore, in Labonne and Chase's study, it was said that the adoption of mobile phones could impact the farmers' decision to travel to the market rather than to sell at farm-gate. One of the agricultural areas in the Philippines is Batangas. San Juan is a municipality in the province of Batangas in the Cavite, Laguna, Batangas, Rizal, Quezon (CALABARZON) region of the Philippines. It has a population of more than a hundred thousand. San Juan has one of the longest shorelines in the Philippines and is a popular tourist destination.

On the other hand, it is still largely considered as an agricultural economy. Seventy-two per cent of the entire land area of San Juan is devoted for agriculture and has the largest area planted for rice and coconuts. There is a total of 17,777 rice farmers in San Juan and 16,493 hectares of land devoted for rice. The results of this study are expected to improve existing mobile and agricultural studies. It will contribute further to theory building, policy issues in mobile application and services development, and the management information services in the agricultural sector.

It will help developers to overcome existing gaps and challenges in mobile telephone technologies. The study will also form a source for future researchers as the trove of information will help advance similar studies acting as reference. The insights from this study can help mobile phone developers on how best to serve an unserved market in the rural areas not yet penetrated.

This study is essential to understand how rice farmers adopt and use mobile phones in San Juan, Batangas. The results of the study are expected to enrich current studies on the adoption and appropriation of mobile phones and in the agricultural sector. It will also contribute further to theory building that will help future studies. The results of the study will help policymakers and national governments to adopt better mobile phones and to achieve faster dissemination rates. This study will also provide a clear picture of the role mobile phone technologies play in the rice sector. It will also show ways in which mobile technologies have had an impact on rice agriculture and agriculture.

Review of literature

Information and communication technologies in agriculture

ICTs are electronic technologies for creating, acquiring, storing, processing, communicating, and using information (Tiamiyu, 2002; Sobalaje & Adigun, 2013). The World Bank in 2002 defined ICTs as the equipment, application, systems, and media for gathering, storing, processing, diffusion, and demonstration of information in the format of voice, data, text, and images.

In 2013, Li gave his own description of ICTs which implies as the combination of Information Technology (IT) and Communication Technology (CT) that integrates the computer and mobile networks together.

ICTs depict inevitable responsibilities in every human activity nowadays, as well as in agriculture. The main participants in agriculture are farmers, and their capability to use technologies identifies the role of ICTs in agriculture (Nwagwu & Opeyemi, 2015).

Tantisantisom (2011) has proved that ICT is the prominent key to improve both agricultural practices and farmers' livelihoods. Information from ICTs may work as an instrument for obtaining knowledge, making decisions, and communicating (Kalusopa, 2005). ICT embraces relevant data processing technologies and then communicates between participants.

As claimed by Heeks and Molla (2009), it is necessary for farmers to get access to market information, land records, accounting, and farm management data, as well as management of pests and viruses. These can be accessed through well-organized programs for rural development and ICT extension services.

The services offered by the ICT extension system can provide farmers with timely and relevant information on new crop varieties and classes of livestock, farming practices, fertilizers, and insecticides that will help them improve agricultural productivity.

ICTs in different parts of the world are considered to have made a positive contribution to rural development. Stienen et al. (2007) indicated that ICTs are used by extension workers to collect, recover, modify, contain, and distribute a wide range of information that rural families require.

With traditional ICTs such as radio and television and modern ICTs such as mobile phones in rural households, the district's agricultural extension system could use this variety of tools to enable the largest number of small-scale producers to access a variety of timely and relevant information on agriculture (Levi, 2015). It is related to a study conducted by Singh in 2006 which indicates that radio and television programs have helped farmers in South Korea to receive support for improved crop production, quality control methods, processing, packaging, and marketing. Moreover, Fu and Acter (2010) found that the quantity, speed, and quality of the provision of extension services have been significantly improved using mobile phone technology. Nwagwu and Soremi (2015) suggest that ICTs offer the potential to increase competence, productivity, efficiency, and growth in various aspects of the agricultural sector in order to improve access to and exchange of information.

ICTs play a prominent role in producing roughly sustainable agricultural development when operated in the proper manner. It can improve the accumulation, storage, recovery, and distribution of a wide variety of information that farmers need. It can provide rural farmers with innovative information assistance where they will have a much greater influence on existing information gateways (Chapman & Slaymaker, 2009).

ICT status in the Philippines

The Philippines ranked 76th out of 165 countries in 2002, corresponding to the study carried out by UNCTAD in 2004. This is a remarkable improvement from its 126th rank in 1995, but it is worth noting that the Philippines has maintained its ranking in 2002 since 1999, except in 2001, when it was 79. This strongly indicates that the country's ICT structure and policy background have not significantly advanced since 1999. Such a conclusion is further supported by another cross-country ranking conducted by the META Group, a globally-known United States-based ICT consultancy firm.

In the 2001 Global Technology Index, the Philippines ranked 32 and 38 to 39 and 45 out of 49 countries in the categories of transformation to digital economy and capacity for technological innovation. The decline in the former category was ascribed "mainly to a decline in the number of computers per capita, low cellular access deployment and a small internet user population" (UNCTAD, 2004).

The Philippines is one of the few countries in which private operators rather than the state own telecommunications services. There are five different mobile operators and 11 international gateways. The country's Technology Achievement Index (TAI) ranked the Philippines 44th in the world, and the country was labeled as a dynamic adopter. Since 1971, when the National Computer Center (NCC) was established, the country has shown its willingness to use ICTs and their adaptability.

The NCC, an agency operating under the President's Office until March 2000, was transferred to

the Department of Science and Technology to ensure that ICT policy and program coordination are supervised and administered more effectively. The NCC coordinates all e-government initiatives and the implementation of IT plans as a member of the Commission on Information and Communication Technology (CICT).

Mobile phones in agriculture

One of the most important advances of recent decades has been the rapid development of mobile phones. It has proliferated as a powerful means of providing individuals and organizations with access and connectivity and has thus brought about significant changes in the ICT landscape (Imran, Quimno, & Hussain, 2016). The International Telecommunications Union (ITU) reported that there were more than six billion mobile subscribers worldwide in 2016.

Mobile phone is one of the ICT devices that can receive, process, collect, and display text, images, and sound together (Sife, Kiondo, & Macha, 2010). Mobile phones transform the lives of different users in third world countries, where they are widely recognized as a potentially transformative technology platform for developing countries. Mobile phones are considered important for development because they provide owners with advantages such as mobility and safety (Donner, 2009).

The potential of mobile phones for improving the condition and use of agricultural information has been well documented (Aker, 2011; Albu & Scott, 2002; Brugger, 2011; Jensen, 2007; Nakasone et al., 2014; World Bank, 2012; Yonazi, Kelly, Halewood, & Blackman, 2012). Although the revolution of ICTs is not driven by mobile phones alone in agriculture (World Bank, 2012), their near-pervasive presence, ease of use, and low cost make them a better tool than other alternatives such as the Internet, newspapers, and radio.

Studies from South Asia (De Silva, 2008) and sub-Sahara Africa (Donner, 2009; Gakuru et al., 2009; Munyua, 2008) describe mobile phones as a fundamentally advanced technology in support of livelihoods, with indication of growing integration into agricultural business, information delivery, and marketing systems. Mobile phones are also widely used to promote and campaign livelihood-oriented development issues (Hellstrom, 2010; Kinclade & Verclas, 2008).

In addition, mobile cellular technologies have enabled even the poorest countries to extend the coverage of their telecommunications networks to the masses of their people, including the rural poor (Duncombe, 2012). Several recent practice reviews have shown that mobile phones are widely used to support livelihoods in rural and less developed regions in developing countries.

Mobile telephones have become the most highly beneficial form of mobile communications in developing countries, as documented in the findings of the United Nations Trade and Development Conference (UNCTAD, 2007). Mobile telephony is the only device that connects them to information services for most low-income populations. It has become the only ICT in which third world countries catch up quickly. The growth of mobile phones and their potential benefits—low cost, large geography, and ease of use (Aker & Mbiti, 2010)—make mobile phones a better tool for disseminating information than traditional ICTs such as the Internet, newspapers, and radio.

Mobile phones play an integral role in the provision of auxiliary services such as payment processing, repayment of loans, and other services to milk farmers (World Bank, 2011). One of the most profound changes in rural Kenya and sub-Saharan Africa is the diffusion of mobile phones in rural regions (GSMA SSA Mobile Telephony, 2013). Mobile phone is an important communication tool for farmers and market players. It is also their instrument in sharing and disseminating information.

Of all ICTs, the mobile phone is a positive choice for most large and small farmers. Mobile phones are cheap, easy to handle, time-saving, efficient, and stimulate personal interactions. It allows farmers to compare rates and charges more productively and to connect with other customers who are not easily reachable.

The mobile phone enhances the connections among agriculturists and merchants, making open doors for little scale makers to pitch in new markets, subsequently expand their livelihoods and reduce the need in the region. The use of ICT in Nigeria's agriculture is still progressing, much the same as in many

developing regions (Nwagwu & Opeyemi, 2015).

When modern technologies, especially mobile phones arrived, farmers in developing countries took advantage of this and included it into their daily activities. In 2009, Karamagi and Nalumansi discovered that many dairy farmers in the Bugerere district of Uganda were able to travel to Kampala to search for buyers. It was difficult and a waste of time for farmers to find and search buyers. However, when farmers started adopting mobile phones, they get connected with FoodNet which enabled them easily to get information on price and interested buyers via SMS (Martih & Abott, 2011).

In Nigeria, most farmers interviewed in 2010 by Pyramid Research showed that they made a profit using mobile phones. Although Nigeria has the lowest mobile phone adoption rate in Africa, farmers who owned mobile phones found it a useful tool for pricing their goods (Aker & Fafchamps, 2011).

Moreover, Mittal and Tripathi conducted a study in India in 2009 and found that mobile phones had generated positive economic benefits and the nature of that impact can be categorized in three ways, which are easy access to customized content, mobility, and time-saving or convenience.

Farmers in India described "easily accessible" and "customized content" as one of the key advantages of information services given by mobile phones. Farmers who followed the development data revealed that they benefited from replacing traditional "common sense" cultivation practices with current development methods. Moreover, climate data that was found in cell phones additionally helped them to avoid seed and harvest misfortunes (Mittal & Tripathi, 2009).

As indicated by Mittal and Tripathi (2009), mobile phones examine diverse focal points, a correspondence interface in disengaged conditions considering its unmistakable element of portability. Mobile phones fill in as a two-way correspondence mode and give information access even in fields. This incorporated the capacity to portray plant maladies from fields to specialists and to arrange better with the employed work.

It was additionally shown in the investigation of Mittal and Tripathi (2009) that most of the questioned farmers revealed a few advantages as far as more noteworthy accommodation, for example, efficient use of a mobile phone as a fundamental correspondence method. For most farmers, a mobile phone is only the right access to communication (Mittal & Tripathi, 2009).

In addition, mobile phones have helped Indian farmers reduce transport costs. They can get information on places where they can sell their products. Furthermore, some farmers reported that they derived greater benefits from the ability to make better decisions about where to sell their output before obtaining market pricing information for several local and remote markets. The use of mobile phones also provided convenience for farmers who started replacing physical meetings with mobile conversations (Mittal & Tripathi, 2009).

An interesting study by Labonne and Chase (2009) shows that access to information has a positive impact on farmers' consumption in the Philippines. The study combines spatially coded data on mobile phone coverage with data from household panels on farmers in some of the Philippines' poorest areas.

The results of the regression show that over the period 2003-2006 studied, farmers who purchased mobile phones experienced higher per capita consumption growth rate, ranging from 11 to 17 percent. The results of this study show that information technologies can help reduce poverty in developing countries.

Kwadwo and Ayalew (2011) indicated that in the Philippines, the Nutrient Manager for Rice Mobile program send the information to rice farmers via their mobile phones about optimum timing of harvest and planting, application of the right quantity and type of fertilizer at each stage of growth. This can help farmers to maximize their crop production and to minimize losses by monitoring rice growth. The farmers and extension workers can dial a toll-free number and hear a voice instruction in their preferred local language, which after prompting them to use their keypad to answer 12 to 15 questions about their rice crop.

Adoption and appropriation of mobile phones

Available data on the adoption of improved agricultural technologies indicates low levels of adoption in developing countries such as most African countries in sub-Saharan Africa. This presents a disparity from other sectors, such as financial services that have exponentially grown (GSMA Sub -

Saharan Africa Report, 2013).

The adoption rate can be attributed to learning; when learning new technology is not as effective, adoption in the next period will therefore be reduced (Foster & Rosenzwig, 2010). This is from the deduction that mobile technologies reduce communication and information for those in the rural areas engaging in agriculture.

Foster and Rosenzweig (1995) show that the adoption of mobile technologies by farmers has two potential opposing effects of social networks. The first is the incentive of individual farmers to adopt increases as they use the new technology in the social network. A farmer in a farmer's or savings cooperative, for example, will probably adopt the technology on the influence of other farmers or SACCO members.

This can also create an incentive to delay adoption due to the free riding behavior and the spill-over of information. Many studies have reached a general consensus on the determinants or restrictions on the adoption of mobile technologies for other reasons. These include education levels, expected returns, samples, wealth, preferences for risks, and access to information and education.

In the Rural Area Technology Acceptance and Diffusion model, Islam and Gronlund (2011) investigate the factors affecting the adoption of mobile telephone technologies in Bangladesh. The model, amongst other studies researches in rural areas to understand the adoption or lack of mobile telephone technologies.

After the success of mobile money platforms like M-Pesa, mobile telephone technologies have been adopted in Kenya. This has led to other forms of mobile technologies, which have changed the face of agricultural practices in the country, including in agriculture such as m-Farm and i-Cow (i-Hub Research and GSMA Sub- Saharan Reports, 2013). Farmers have accepted these technologies to adopt better farming practices. These technologies are also designed to provide marketing services and facilitate access to information.

Conceptual framework

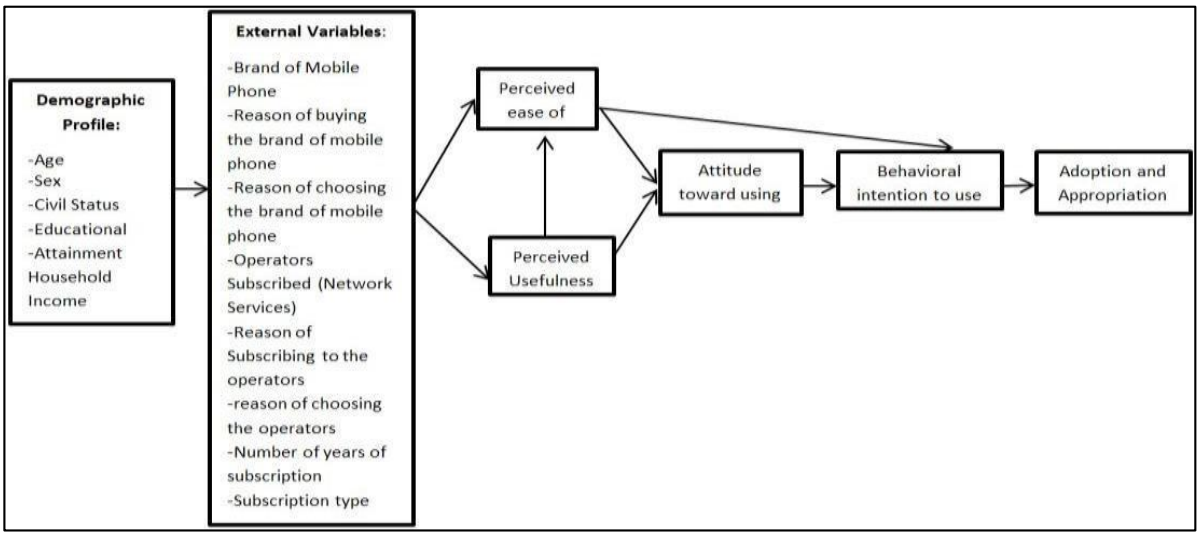

Figure 1. Conceptual framework of the study

The figure explains the relationship between the variables that determine the adoption and appropriation of mobile phones among rice farmers of San Juan, Batangas. The researcher adopted the Technology Acceptance Model (TAM) of Venkatesh and Bala (2003) as a conceptual model to enhance the scope of this framework, covering the influence of demographic profile, external variables, perceived ease of use, perceived usefulness, attitudes, and behavioral intention to use towards the adoption and

appropriation of mobile phones.

Sirajul (2011) described the importance of demographic context in use and adoption of mobile phones. According to Sirajul (2011), variables that are important in this category are age, gender, civil status, education, and household income. The study further hypothesizes the external variables' attributes such as the brand of mobile phone, operators subscribed (mobile phone network services), the type of subscription, and factors that affects the buying and choosing behavior of the respondents such as human influence (friends, relatives, neighbors) and media influence (television, radio, newspaper).

Additionally, external variables such as the technical attributes and network capability of the service have a huge impact on the perceived ease of use and perceived usefulness of mobile phones. The model suggests that perceived usefulness and perceived ease of use, attitudes, and behavioral intention to use are the major factors that influence technology adoption and appropriation.

Objectives of the study

This study aimed to determine the existence, adoption, appropriation, and flow of mobile phones in the rice farming industry. It sought answer to:

1. know the demographic profile of the rice farmers in terms of age, gender, educational attainment, and income
2. determine the external variables affecting the adoption and appropriation of mobile phones by rice farmers
3. find out the perceived usefulness of mobile phones among rice farmers
4. find out the perceived ease of use of mobile phones among rice farmers
5. identify the attitudes of rice farmers towards using mobile phones
6. identify the behavioral intention of rice farmers towards using mobile phones
7. find out the actual system use of mobile phones among rice farmers

METHODOLOGY

The researcher used descriptive-quantitative method in order to determine the adoption and appropriation of mobile phone among rice farmers. This method is used to quantify opinions, attitudes, behaviors, and other variables that the study requires.

The respondents or the main target of this study are rice farmers in San Juan, Batangas that is considered as an agricultural area in CALABARZON. The researcher surveyed seven to eight farmers from each barangay (42) with a total of 300 respondents. The researcher used the simple random sampling technique.

The researcher adopted a survey questionnaire from the study conducted by Islam in 2011. To analyze the data gathered from the survey, the researcher used the following statistical treatments: frequency, percentage, and weighted mean. The researcher used frequency and percentage in describing the demographic profile of the respondents and the technical attributes. To determine the respondents' perceived usefulness, perceived ease of use, attitudes, and behavioral intention of the respondents, the researcher determined them by getting the acquired data's weighted mean.

RESULTS AND DISCUSSION

Demographic profile of the respondents

Table 1 presents that most mobile users are aged 19 to 30 and 31 to 49, young adults and adults, with the same percentage of 32.70 percent followed by respondents in the age group of 50 and above, with 22.00 percent. According to Islam and Gronlund (2011), age is one of the most important demographic factors in adopting technologies for respondents. They suggest, however, that the keyword is not age but rather "functional capacity" that addresses mobile devices and services (Islam & Gronlund, 2011; Mallenius, 2007).

Table 1. Demographic profile according to age

Age	Frequency	Percentage
18 – below	38	12.7
19 – 30	98	32.7
31 – 49	98	32.7
50 – above	66	22.0
Total	300	100

This section discusses the gender of respondents. The results in Table 2 show that the sample composition is 62.30 percent men, and 32.70 percent women. It can be interpreted that there are more male rice farmers in the study area than female rice farmers. According to data reported by the National Statistics Bureau and the United Nations Food and Agriculture Organization (FAO, 2014), however, 51 percent of the Tanzanian farmers are female and are most likely to use mobile phones.

Table 2. Demographic profile according to gender

Gender	Frequency	Percentage
Male	98	62
Female	57	33
LGBT	15	5
Total	300	100

The analysis presented shows that a large part of the sample is a mostly primary-school- educated. Approximately 38.70 percent of the sample received primary education, leaving a small proportion of the sample privileged for college education. Nonetheless, finding people with at least secondary schooling in rural areas is encouraging. According to Ninsiima (2015), farmers, especially in the developing worlds, often face more barriers to mobile phone adoption than other groups due to low levels of education.

Table 3. Demographic profile according to educational attainment

Educational Attainment	Frequency	Percentage
Elementary	116	38.7
Secondary	85	28.3
College	13	4.3
Vocational	86	28.7
Total	300	100

According to the results, most respondents or 53.30 percent are engaged to marital responsibilities or married and there are 33.30 percent who are single. The analysis shows that most of the respondents were married giving an indication of the middle-aged adults and older adults population in the location whereas 65.40 percent of respondents are within the age range of 19 – 49. This study assumed that the marital status comes with more responsibilities.

Table 4. Demographic profile according to civil status

Civil Status	Frequency	Percentage
Married	160	53.3
Single	100	33.3
Widowed	15	5.0
Divorced/Separated	25	8.3
Total	300	100

Table 5 displays the household income of the respondents. Of the respondents, 42.30 percent have a monthly income ranging from PhP7,100 – 9,000 followed by income ranging from PhP5,000 – 7,000 that has 30.70 percent. In Table 2, it is shown that there more male respondents than female respondents. It in the study of the Philippine Statistics Authority (PSA) in 2016, it was found that male rice farmers in the Philippines have a nominal wage rate of PhP300 – 307.40 per day or PhP8,955 – 9,000 a month, and female farmers have a nominal wage of PhP233.27 – 290.65 per day or PhP6998 – 8,720 a month.

Table 5. Demographic profile according to household income

Household Income	Frequency	Percentage
PhP5,000 – 7,000	92	30.7
PhP7,001 – 9,000	127	42.3
PhP9,001 – 12,000	81	27.0
Total	300	100

External variables

Table 6 shows the mobile phone brand used by the respondents. These are the top nine best mobile brands in the Philippines starting in 2018. According to the result, majority of the respondents or 53.00 percent preferred MyPhone as the brand of their mobile phone followed by Cherry Mobile and Samsung with 26.70 percent and 12.00 percent and Starmobile with 7.30 percent. Nevertheless, there are a few of the rice farmers who preferred Oppo, Lenovo, and Asus with the same percentage of 0.30 percent.

Table 6. Brand of mobile phones used by the respondents

Brand of Mobile Phone	Frequency	Percentage
Samsung	36	12.0
My Phone	159	53.0
Oppo	1	0.3
Cherry Mobile	80	26.7
LG	0	0
Sony	0	0
Starmobile	22	7.3
Lenovo	1	0.3
Asus	1	0.3
Total	300	100

Among over a total of 300 respondents, majority of them or 55.30 percent bought the brand of mobile phone because of its affordable price. In the study conducted by Kumar (2012) in Thailand, price is the most influential factor affecting the choice of farmers in buying a mobile phone. The availability of the brand and its long-lasting capacity of battery are the next factors other respondents consider with the same percentage of 14.30 percent. The reputation of the brand, however, and its user-friendly interface are the last to be considered in buying mobile phones.

Table 7. Reason of respondents for buying the brand

Reasons of buying the brand of mobile phone	Frequency	Percentage
Affordable price	166	55.3

Under friendly interface	10	3.3
Long-lasting	43	14.3
Reputation of the brand	38	12.7
Easy availability	43	14.3
Total	300	100

Table 8 illustrates the reason of the respondents for choosing the brand of mobile phone they used. Of the respondents, 50.70 percent reveal that human influence including family, friends, and neighbors are the main factor in choosing the brand of mobile phone. They would ask for suggestions, advice, and experience from people who already bought and used their mobile phones. They may tend to get it from different types of people, especially friends, peers, family members, and spouses (Rahim et al., 2015).

Table 8.Reason of the respondents for choosing the brand

Reason of choosing the brand of Mobile Phone	Frequency	Percentage
Human influence (friends, relatives, neighbors)	152	50.7
Media influence (television, radio, newspaper)	148	49.3
Total	300	100

Table 9 shows the network services used by the respondents. There are 39.00 percent of the respondents who use Globe followed by Touch Mobile with 32.30 percent, and Smart with 27.00 percent. As of 2011, Smart Communications reported a cellular subscriber base of 63.7 million (Philippine Long-Distance Telephone, Co. Annual Report, 2011) while Globe Telecom reported 30 million subscribers (Globe Telecom, Inc. Annual Report, 2011).

Table 9. Mobile network services used by the respondents

Network Services	Frequency	Percentage
Globe	117	39.0
Smart	81	27.0
Sun	4	1.3
Touch Mobile	97	32.3
ABS-CBN Mobile	1	0.3
Total	300	100

Table 10 illustrates the reason of the respondents for subscribing to the mobile network service. As presented, better network stability is the main reason of majority of the respondents in subscribing with 54.00 percent followed by the affordable price of the service with 27.30 percent. According to Wambugu in 2012, network stability is the main factor in choosing mobile network services. Most respondents, therefore, chose Globe as their mobile network service because it has better network stability than the rest.

Table 10. Reason of the respondents on subscribing

Reason of subscribing to Network Services	Frequency	Percentage
Better network stability	162	54.0

Affordable price of the service	82	27.3
Reputation	56	18.7
Total	300	100

Table 11 displays the reason of the respondents in choosing the mobile network service. Majority of the respondents (55.70%) reveal that media influence is the main factor for choosing the mobile network service. Promotions that are shown in media have a big impact on consumers' purchasing behavior and decisions towards that a mobile network service (Freo, 2005). In contrast, according to Blackwell, et al. (2001), consumers will be recognizing the product to be bought after seeing promotions in media.

Table 11. Reason of the respondents for choosing network

Reason of choosing the network services	Frequency	Percentage
Human influence (friends, relatives, neighbors)	133	44.3
Media influence (television, radio, newspaper)	167	55.7
Total	300	100

Based on the results shown in Table 12, most of the respondents subscribed to a mobile network service for five years or more with 33.70 percent while others were subscribed for four years (23.00%) and three years (30.30%). This clearly shows that most of the respondents stayed using a mobile network service for five or more years because it has better network stability and the promo subscription is cheaper than others. Potongsangarun et al. (2012) reported that good service and cheap subscription are the factors that farmers consider in subscribing to mobile network services for a long period of time.

Table 12. Years subscribing to the network

Number of years of Using the Network Services	Frequency	Percentage
One year	6	2.0
Two years	33	11.0
Three years	91	30.3
Four years	69	23.0
Five years or more	101	33.7
Total	300	100

All the respondents use prepaid subscriptions. According to Pertiera (2005), prepaid cards have made mobile phones more accessible with a 28.00 percent penetration rate in the early 2000's. Prepaid subscriptions are the most accessible than the other two because prepaid subscriptions are cheaper than postpaid subscriptions and LTEs are much more costly.

Table 13. Subscription type

Subscription Type	Frequency	Percentage
Prepaid	300	100
Postpaid	0	0

LTE	0	0
Total	300	100

Perceptions

The results in Table 14 show that rice farmers *strongly agree* that mobile phones help them improve their work by a weighted average of 3.69. In addition, the respondents also *strongly agree* that mobile phones help them to have more customers with a weighted mean of 3.66 and it is not time consuming with a weighted mean of 3.56. Mobile phones, which are normally used to communicate with family and friends, are used by rice farmers in San Juan, Batangas in dealing with customers and a good device to establish strong relationships within the agriculture business in the rice industry by communication and SMS; thus, benefiting farmers by decreasing the time for travelling when meeting clients and providing timely market information.

Table 14. Perceived usefulness

Perceived Usefulness	Weighted Mean	Verbal Interpretation
Mobile phone helps me to enhance my work.	3.69	Strongly agree
It is really a need for an operation to have a mobile phone.	3.67	Strongly agree
It is easier to make sales and have more customers.	3.66	Strongly agree
Overall, a mobile phone is a useful tool in my work.	3.61	Strongly agree
Using a mobile phone is not time consuming in doing my work.	3.56	Strongly agree
It is easier and more enjoyable using a mobile phone in work.	3.56	Strongly agree
It is more effective to work using a mobile phone.	3.55	Strongly agree
It is easy to use that is why it lessens the amount of time I work.	3.44	Agree
It is easier to work when using a mobile phone.	3.42	Agree
It is possible to work as much as I can using a mobile phone.	3.37	Agree
A mobile phone helps me to provide the things I need in my work.	3.09	Agree
Composite Mean	3.51	Strongly Agree

The results in Table 15 show that the respondents *strongly agree* that mobile phones are easy to use with a composite mean of 2.98. In spite this, farmers *agree* that there are some parts or features of mobile phones that are sometimes disappointing and are uncomfortable to use with the weighted mean of 3.20 and 2.71. According to Plaza et al. (2013), the common characteristics of mobile devices that are uncomfortable to use by farmers are their small size, portability, processing capability, network connection, and limited memory. These barriers, however, do not encourage the respondents from using a service they deem to be useful. The farmers also *agree* that they should and still need to read the manual first before they use mobile phones. As seen in Table 3, most of the respondents are primary-school educated.

Table 15. Perceived ease of use

Perceived ease of use	Weighted Mean	Verbal Interpretation
I am interested in accessing SMS.	3.61	Strongly agree
I still need to read the manual first before using a mobile phone.	3.36	Agree

Using a mobile phone is sometimes disappointing.	3.20	Agree
It is easier to troubleshoot using a mobile phone.	2.91	Agree
It needs mental effort in order to use a phone.	2.84	Agree
There are parts of the mobile phone that are uncomfortable to use.	2.71	Agree
It is hard to use and to communicate.	2.22	Disagree
Composite Mean	2.98	Agree

Attitudes and behaviors

Table 16 shows the respondents' attitudes towards mobile telephones. The respondents *strongly agree* that a mobile phone is a good idea in agriculture with the highest weighted average of 3.66. Likewise, they also *strongly agree* that mobile phones help them to acquire knowledge in the agricultural sector with a weighted average of 3.65. Using mobile phones as a factor in motivating farmers in their work got the lowest weighted mean of 2.91. It still helps farmers to be motivated in their work though. James (2009) exclaims that a mobile phone is an important factor for farmers to be motivated in their work as they know that using it reduces the amount of time, they need for working and travelling.

Table 16. Attitudes of respondents towards using mobile phones

Attitudes	Weighted Mean	Verbal Interpretation
Using a mobile phone is a good idea in farming.	3.66	Strongly agree
Using a mobile phone helps me to acquire knowledge when it comes to the farming business.	3.65	Strongly agree
Using a mobile phone helps me to communicate with my co-farmers.	3.61	Strongly agree
Using a mobile phone is very useful to me.	3.60	Strongly agree
Using a mobile phone helps me to communicate with my customers.	3.59	Strongly agree
Using a mobile phone is a good experience.	3.34	Agree
Using a mobile phone helps me to be motivated in my work.	2.91	Agree
Composite Mean	3.48	Agree

Table 17 illustrates the behavioral intentions of the respondents towards using mobile phones. Majority of the respondents *strongly agree* that they will always use mobile phones and continue to use mobile phones, with a composite average of 3.63, in the future. As in the results in Table 16, farmers *strongly agree* on the helpful uses of mobile phones in their field. Thus, they *strongly agree* that they will always and continue to use mobile phones in the future for farming. This result is supported by Ninsiima's (2015) study in Uganda, where most farmers (83.00%) indicated that they would continue to use the system because it is a useful tool for them to improve the agricultural sector.

Table 17. Behavioral intentions of respondents towards using mobile phones

Behavioral Intentions	Weighted Mean	Verbal Interpretation
I will always use a mobile phone for farming.	3.64	Strongly agree
I will continue to use a mobile phone for farming in the future	3.63	Strongly agree
Composite Mean	3.63	Strongly Agree

CONCLUSION AND RECOMMENDATIONS

Conclusion

The study concludes that the demographic profile of the respondents is one of the significant impacts in the adoption of mobile phones. Relating to past studies, income and educational background are the two factors that affect mobile phone adoption of farmers as most of them are primary-school-educated. The cost of mobile phone and mobile phone subscription are also factoring that farmers consider in choosing as they only earn a small amount of money in a month. This study also concludes that majority of farmers choose the brand of mobile phone based on its affordability and not the good reputation that the brand has. The influence of their family, friends, relatives, neighbors, and co-workers affects the choice of farmers in choosing the brand of mobile phone and network services as they will find more information and feedback from those who already have the products. All the farmers in this study are prepaid consumers and prefer better service followed by lower tariff. Ultimately, the coordination between service providers and mobile phone manufactures play an important role in satisfying the needs of farmers. Also, evidence from this paper shows that perceived ease of use is a major antecedent to mobile phone adoption. On the other hand, perceived usefulness influences mobile phone adoption positively.

Recommendations

Below are the recommendations based on the conclusions drawn from the study:

The government should create mobile applications that would help farmers improve their work and lessen their expenses in using mobile phones. The government should also organize trainings on how to properly use mobile phones because majority of the respondents are primary-school educated. With this, it will be easier for farmers to manage mobile phones. They should also organize trainings and seminars for rice farmers on how they could enhance the rice farming industry using mobile phones not only for male farmers but also for females.

This study recommends mobile phone companies to decrease the cost of their mobile phones so farmers, not just in San Juan, Batangas, but in other agricultural areas in the Philippines, could afford a good and affordable mobile phone with good features and a user-friendly interface so it would be easy for farmers to understand the mobile phones' features and to manage how they will easily use it in their work. Furthermore, other mobile network services should also reduce their price of services so it would be easier for farmers to avail their services in low cost.

For future researchers, they should do the mixed method to further understand how farmers adopt and appropriate mobile phones. They could compare the survey with their interview and further analyze it. They should also consider not only rice farmers. They should widen the perceived usefulness and perceived ease of use of mobile phones as well as the attitudes of the respondents on how they use mobile phones, comprehend the number of hours farmers spend in using mobile phones, and find the relationship of each variable. They can also formulate a model that would help to understand the adoption and appropriation of mobile phones among farmers.

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