Research Article

Determinants of Mobile Phone Ownership in Sri Lanka: An Analysis of Individual Characteristics

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Abstract

Technology is everywhere in modern human life. In the 21st century, the mobile phone has become a significantly improved communication tool, in both developed and developing economies. The facilities given by mobile telephones and prices of them determine people's purchasing intention. Nevertheless, socioeconomic characteristics of individuals also affect significantly in making the buying decision. This study focuses on characteristics of individuals and how they effect on mobile phone ownership in Sri Lanka. The data of the study were collected from the World Bank Global Financial Database 2017. Probit Regression analysis was used to examine the probability of mobile phone ownership to individual variables of age, gender, income, education level, and employment status. The results indicated that variables of gender, age, income, education, and employment status of people are significant determinants of mobile phone ownership in Sri Lanka and age has a nonlinear relationship with mobile phone ownership. The Probit Regression revealed that females and poor are less likely to own mobile phones in Sri Lanka. Furthermore, employed persons are more likely to own mobile phones than unemployed people in Sri Lanka.

Keywords: *Mobile phone ownership, individuals' socioeconomic characteristics, probit regression, sri lanka*

1.Introduction

The world has changed people's lifestyles with technological innovations in the 21st century. Technology is everywhere in the human life of. People always try to connect with others through technological innovations such as the internet, social media, and smartphones. The demand of individuals towards the smartphone increases with the portability and convenience of products and technology they choose to use. Communication is one of the specific human needs of people, and it has improved with time with the development of new technologies.

Currently, the mobile phone has become a significantly improved communication method globally, in both developed and developing economies. The most used phone in society is the basic phone, which can be used in voice communication and short text messaging services (Subramanian, 2009). People also tend to use a smartphone with technological improvements administrated by the operating system with more innovative features (Sanne, 2009). Those smartphones are supported with software applications and have the capability to use internet-based services, including email, geo-location, streaming video, and social networking with good user experience (Kenny and Pon, 2011). Thus, mobile phones having these facilities make individuals purchase smartphones.

Several changes in the demographic situations in the world have affected the demand for mobile phones, and also the current changes such as the demographic composition of the global population, increased use of technology by the youth or millennial, global level of employment, people with more disposable income, globalization, level of technology, and other socioeconomic characteristics of people (Forenbacher *et al*., 2019). Notably, the demand for mobile phones could be changed as per the changes that may occur within the individuals' socioeconomic characteristics of age, gender, income, education, and employment.

People in both the developing and developed economies have a high trend towards purchasing mobile phones. The highest numbers of smartphone users are in China, India, and the United States, accounting for more than 1.46 billion. In the past years, around 1.37 billion smartphones have been sold per annum worldwide. However, in 2018, mobile subscriptions in the world were 7.9 billion, and 24.43 million in Sri Lanka. According to the 2017 Gallup World Poll data, 93 percent of adults in high-income economies and 79 percent of developing economies have mobile phone ownership.

The above statistics revealed that the individuals' socioeconomic characteristics such as gender, income, and age could influence the mobile phone demand. There is gender gap with the mobile phone usage. Women are less likely to have a mobile phone than men. In developing economies, 84 percent of men and 74 percent of women own a mobile phone. It indicates a gender gap within mobile phone usage. This gender gap becomes larger in some countries like Pakistan, with men possessing mobile phones more than twice as women.

There is also a gap in mobile phone ownership between rich and poor adults, and developing economies have wide gaps within income levels (World Bank, 2017). Thus, this paper will discuss the relationship between individuals' socioeconomic factors on mobile phone demand.

The demand for a product can be simply defined as the willingness and ability of a person to purchase a product or service by paying a specific price (Sexton, 2007). The consumer will choose a product or service based on the feelings, attitudes, tastes, or needs. Therefore, different situations will impact the purchasing intention of a product (Bettman *et al*., 2000). The people who live in the modern world had changed their behavioural patterns with technological innovations. The 'information' has become the most significant resource in the contemporary technological world, and a mobile phone is a communication device basically needed to communicate between two individuals and text messaging (Hakoama and Hakoyama, 2011).

Osman *et al*. (2012) argued that smartphone technology has major effects on the consumers' purchasing intention of mobile phones. Only a few studies have focused on mobile phone demand globally, though the demand for mobile phones is increasing rapidly with time. People have different intentions to purchase a product, such as tastes, needs, and motivations. In the 21st century, developing countries have a high use of information and communication technology, especially mobile phones (Cieslikowsk *et al*., 2009). Individuals' behaviour to purchase mobile phones depends on characteristics such as brand name, price, quality, and social status (Leo *et al*., 2005). This makes it vital to examine the influencing factors that cause the purchasing intention of mobile phones.

The demand for mobile phones in developing economies is influenced by various significant factors (Venkatesh *et al*., 2003). The previous literature on mobile phone usage revealed that individuals' socioeconomic characteristics are influencing on the use of mobile phones in the world, and the use of mobile phones is always influenced by various significant factors (Venkatesh *et al*., 2003; Forenbacher *et al*., 2019). However, the socioeconomic characteristics influencing the use of mobile phones are rarely tested (Nyamba, 2011; Nyamba and Mlozi, 2012). Various studies have identified different socioeconomic factors influencing mobile phone demand. The study of Karjaluoto *et al*. (2005) has identified seven characteristics that determine mobile phone choice as innovative services, multimedia, design, brand and basic properties, outside influence, price, and reliability. Among those, gender and occupation have been noted to be the most significant variables affecting mobile phones' choice. Several scholars identified the primary socioeconomic factors were age, gender, income, education, and employment (Sarraute *et al*., 2014; Hsiao and Chen, 2015; Karjaluoto *et al*., 2005; Mwalukasa *et al*., 2018).

Many studies have identified a positive relationship between the social influence and the purchasing intention of mobile phones (Rahim *et al*., 2016; Suki and Suki, 2013; Ibrahim *et al*., 2013; Ting *et al*., 2011; Park *et al*., 2013; Forenbacher *et al*., 2019). They have also evaluated a significant effect of users' demographic characteristics on mobile phone ownership. Hsino and Chen (2015) assessed the significant

relationship between male and female mobile phone users, and young (students) and older users. The study concluded that the individual socioeconomic factor, *i.e*., gender, significantly impacts mobile phone ownership, but it is not an obvious relationship. The findings further emphasized that individuals' gender, age, employment, and income affect mobile phone demand.

Mwalukasa *et al*. (2018) have focused on examining socio-demographic factors influencing mobile phone use in accessing rice information on climate change adaptation in Tanzania. The findings further revealed that mobile phone demand is significantly influenced by respondents' sex, age, education level, marital status, farm size, farming experience, and off-farm incomes. The study findings reported that mobile phone users are positively influenced by education and marital status, while age and farming experience negatively influence the mobile phone demand. Further, the study concluded that the young, educated, married, and high-income earning farmers have more chance to be a mobile phone user to access rice information on climate change adaptation.

Alam *et al*. (2018) examined the influence of socio-demographic factors on mobile phone adaptation in rural Bangladesh. The researchers mainly focused on the determinants of mobile phone adaptation. The findings identified that the household income positively influences mobile phone adoption, but it is not statistically significant. Factors, such as an individual's age and education effect on mobile phone adoption among rural households to better manage their livelihoods and improved farming decisions.

An individual's age limit could be considered as a significant explanatory variable when determining mobile phone demand. Several authors have pointed out that the lower age group or, the younger individuals have a high demand for mobile phones (Mwalukasa *et al*., 2018; Mtega *et al*., 2016; Hsiao and Chen, 2015). Older people are less interested in adopting novel technological innovations than younger adults (Nyamba and Mlozi, 2012). Nyamba and Mlozi (2012) further revealed that those younger individuals have higher chances of using mobile phones for accessing information than the older ones.

Also, the variable age is an essential factor in forecasting the mobile phone usage of a country. A study in India revealed that most mobile phone users are within the age group of 20 to 40 (Jain and Hundal, 2007). The findings by Andone *et al*. (2016) disclosed that younger participants use mobile phones as they are communicating more and using social and communication apps more than the older participants.

Gender is another crucial factor discussed by several scholars with the demand for mobile phones. Males are more likely to be the users of mobile phones than females (Hong, Chiu, & Lin, 2012; Walsh *et al*., 2011; Hsiao and Chen, 2015), though there is no difference between males and females in their attitudes toward mobile phones (Junco, Merson, & Salter, 2010; Lemish & Cohen, 2005).

The literature identified income also as a significant influencing factor on mobile phone demand (Alam *et al*., 2017; Zanello, 2012). The empirical evidence from South Asian countries like Bangladesh, Nepal, Pakistan, and Sri Lanka suggests that income is one of the significant influencing factors in computer and Internet adoption (Adikari, 2013; Zhou *et al*., 2011; Shaukat and Shah, 2014). Concerning mobile phone demand, income is noted as a prominent determinant in Bangladesh, Pakistan, Sri Lanka, the Philippines, and Thailand (De Silva *et al*., 2011).

The respondents' education level is another most common criterion in the studies on the relationship between the individuals' factors and mobile phone demand. The education level of a respondent enhances the efficient use of mobile phones in accessing the information needed to accomplish the works accurately (Mwalukasa *et al*., 2018; Nyamba and Mlozi, 2012). Educational qualifications may also contribute to individuals' mobile phone usage to a certain extent since academic literacy is needed to access some mobile phone functions (Akinola, 2017).

The occupation of the individuals is also a variable that influences on mobile phone usage. The employment effect has found a significant positive relationship with mobile phone demand (Hsiao and Chen, 2015; Karjaluoto *et al*., 2005). The findings of this study had further revealed that an employed person was more likely to own a mobile phone than an unemployed person.

Although mobile phones are essential for the acquisition of information in any industry, the use of a mobile phone is often influenced by socioeconomic factors such as educational background, age, gender, income, farm experience, family size, and farm size, among others Thus, age, gender, income, education, and employment can be named the essential factors determining the demand for mobile phones. In particular, mobile phone demand has been determined with a quantitative analysis of the individuals' socioeconomic characteristics, with the critical variables of age, gender, income, level of education, and employment.

The main objective of this study is to determine the influence of individuals' socioeconomic characteristics on mobile phone ownership in Sri Lanka. Thus, the research question could be emphasized as "Is there any significant relationship between individuals' socioeconomic characteristics and demand for mobile phones?" The findings of the study will be beneficial to predict the demand for mobile phones based on the individuals' socioeconomic characteristics of age, gender, income level, education level, and employment.

The remainder of the paper is arranged as follows: Section 2 provides materials and methods of the study. Section 3 includes interpretation of results and discussion. The last section concludes the study.

2. Materials and Methods

This study employed quantitative research methodology as the research design of this study using the World Bank Global Findex Database 2017. The study can be classified as an explanatory (descriptive) study in which the impact of one variable was examined against others of interest. The hypothesis testing assists in better understanding the relationship between the variables. The study randomly selected individuals from the Sri Lankan dataset and used the dependent variable of mobile phone demand and independent variables of gender, age, education, income, and employment to analyse the influence of individuals' socioeconomic characteristics on mobile phone demand in the country.

The study sample comprised of 1104 individuals in Sri Lanka, and 1097 individuals were selected after removing the cases with missing values. The dependent variable of demand for a mobile phone was set as the interpreted variable and named Yi, and the influencing factors of individuals' socioeconomic characteristics were set as the explanatory variables named Xi. The influencing factors were classified into five major variables: gender, age, education, income, and employment. The Probit Regression model in this study was run with the following equation.

$$Y_i = \alpha + \beta_1 gender_i + \beta_2 age_i + \beta_3 age2_i + \beta_4 education_i + \beta_5 income_i + \beta_6 employment_i + € \quad (1)$$

Table 1 indicates the measurements of each variable used in the Probit Regression model, analysed using the SPSS to investigate the relationship between the main variables.

Table 1: Measurement of variables used in the study

Variables	Definition
Mobile Phone Demand	1 if has a mobile phone, 0 if do not have a phone
	Independent variables
Age	Age in number of years
Age^2	Square age in number of years
Gender (Female)	1 if female, 0 otherwise (male)
Primary education	1 if primary education, 0 otherwise
Secondary education	1 if secondary education, 0 otherwise
Tertiary education	1 if tertiary education, 0 otherwise
Income-poorest 20%	1 if income is in the first income quintile, 0 otherwise
Income-second 20%	1 if income is in the second income quintile, 0 otherwise
Income-third 20%	1 if income is in the third income quintile, 0 otherwise
Income-fourth 20%	1 if income is in the fourth income quintile, 0 otherwise
Income-fifth 20%	1 if income is in the fifth income quintile, 0 otherwise
Employment	1 if employed, 0 otherwise

Probit Regression is commonly used to model the outcome of a categorical dependent variable. In the Probit model, the inverse standard normal distribution of the probability is modelled as a linear combination of the predictors. The Probit Regression model is a nonlinear model that is used when the dependent variable of the research study is a binary response variable. Thus, a Probit model was chosen as it is considered the most appropriate and simple empirical model with the selected data.

3. Results and Discussion

The first part of this section focuses on descriptive statistics of the study variables while the second part discusses the Probit Regression results of the effect of individuals' socioeconomic characteristics on mobile phone ownership in Sri Lanka.

3.1 Descriptive Statistical Analysis

In most of the world economies, people use mobile phones for many purposes. According to the 2017 Gallup World Poll data, 93 percent of adults in high-income economies and 79 percent of developing economies own mobile phones (Global Findex Database, 2017).

In most countries, women are less likely to own a mobile phone than men. In developing economies, 84 percent of men and 74 percent of women own a mobile phone, which indicates a significant gender gap. This gender gap seems higher in some economies. For example, Pakistan men are using mobile phones as twice as women. Some developing economies, such as Brazil, China, Colombia, Indonesia, and Turkey, have no noticeable gender gap in owning a mobile phone.

A gap in mobile phone usage is noted between the richest and poorest people based on their income. The highest gaps compared to income and mobile phone usage could be found in the developing world. Most affluent adults are more likely to own a mobile phone compared to the poorest people in the world (World Bank, 2017). Table 2 presents the descriptive statistics of the independent and dependent variables of age, age^2, gender, education, income, education, and demand for mobile phones in Sri Lanka.

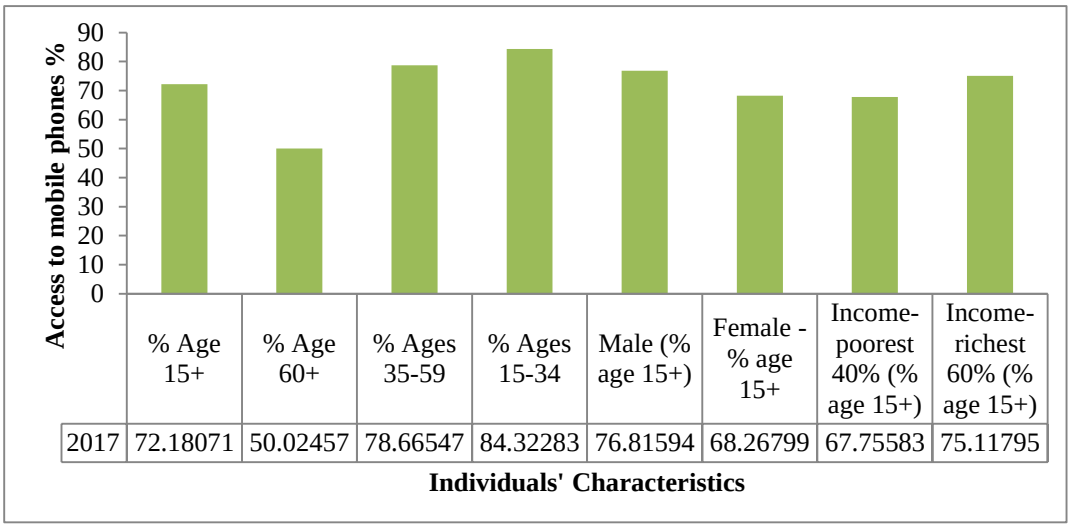
Table 2: Descriptive Statistics of the Variables

	Descriptive Statistics		
Variables	Observations	Mean	St. Dev.
Gender (Female)	1097	0.62	0.48
Age	1097	43.68	17.23
Age^2	1097	2204.9	1622.5
Education Level	1097	1.73	0.55
Primary education	1097	0.33	0.46
Secondary education	1097	0.62	0.48
Territory education	1097	0.06	0.23
Income Quartile	1097	3.18	1.42
Income-Poorest 20%	1097	0.17	0.37
Income-Second 20%	1097	0.18	0.38
Income-Middle 20%	1097	0.19	0.39
Income-Fourth 20%	1097	0.22	0.41
Income-Fifth 20%	1097	0.24	0.42
Employment	1097	0.48	0.50
Mobile Phone Demand	1097	0.78	0.41

Source: Author's calculation from research data

As per Table 2, Sri Lankans have a high demand for mobile phones, amounting to 78 percent of the total sample data. The table indicated the mean values of each variable composition in the Sri Lankan data set. The World Bank data further

evaluated the mobile phone ownership by the population in Sri Lanka based on the individuals' socioeconomic characteristics separately. The summarized data are illustrated in Figure 1, comparing the variables of gender, age, and income (World Bank Data, 2017).



	% Age 15+	% Age 60+	% Ages 35-59	% Ages 15-34	Male (% age 15+)	Female - % age 15+	Income-poorest 40% (% age 15+)	Income-richest 60% (% age 15+)
2017	72.18071	50.02457	78.66547	84.32283	76.81594	68.26799	67.75583	75.11795

Figure 1: Access to Mobile phones % based on Individuals' Characteristics in Sri Lanka
*Source: World Bank Data, 2017

Figure 1 indicates the ownership of a mobile phone compared to the different age limits, gender difference (male and female), and different income levels (richest 60 percent and the poorest 40 percent). The chart further emphasized that the Sri Lankan adults with higher income levels, males, and people between the age limit of 15-34 (younger) have more access to mobile phones compared to the adults with low-income level, females, and the above 60 years of age (older).

3.2 Empirical Estimations

Table 3 presents the marginal effects for the Probit estimations in relation to mobile phone demand and individuals' socioeconomic characteristics in Sri Lanka.

The parameters of model fit measure the likelihood ratio Chi-Square (LR Chi2) tests of the models are significant as associated with a p-value less than 0.0001. Hosmer and Lemeshow (2000) concluded that at least one of the regression coefficients is not equal to zero. As shown in Table 3, the model fit value exists within the model. Thus, further analysis will be performed using Probit estimates. Table 3 presents the marginal effects of Probit estimations concerning mobile phone demand in Sri Lanka. Based on the parameter estimates, the influence of each individual's socioeconomic characteristics on mobile phone use will be further evaluated.

Table 3: Probit Regression results for individuals' socioeconomic characteristics on mobile phone use

Model 1 Mobile Phone Ownership		
Variables	Coefficient value (β)	P-Value (Sig)
Intercept	1.123***	0.004
Gender (Female)	-0.169**	0.097
Age	0.046***	0.001
Age^2	-0.001***	0.000
Primary education	-0.891***	0.002
Secondary education	-0.650**	0.020
Income-Poorest 20%	-0.193	0.179
Income-Second 20%	-0.271*	0.053
Income-Middle 20%	-0.050	0.733
Income-Fourth 20%	0.071	0.623
Employment	0.306***	0.003
Other Estimates		
Observation	1097	
LR chi2	160.044	
Prob> chi2 (sig)	0.000	
Log Likelihood	-439.148	
Categorical variable (yes)	78.2%	

Source: Author's calculation from research data
Notes: Significance levels at 10%*, 5%**, and 1% ***respectively

Age is a significant explanatory variable with a significant negative relationship with mobile phone ownership. The study findings investigate relationships based on Age and Age^2, which indicates a significant negative relationship with mobile phone demand. Previous authors have also revealed that younger people are more likely to be mobile phone owners (Mwalukasa *et al*., 2018; Mtega *et al*., 2016; Hsiao and Chen, 2015). The study findings are consistent with previous findings, which further emphasized that younger people are more likely to use mobile phones than the older people, and concluded that the individuals in the mean age of 43 years are more likely to use mobile phones in Sri Lanka.

The results signified that the female have a significant negative influence on mobile phone demand, which means that females are less likely to own mobile phones in Sri Lanka compared to males. The results are in line with most of the previous scholars (Hong, Chiu, and Lin, 2012; Walsh *et al*., 2011; Hsiao and Chen, 2015). Also, as explained in the literature, authors have argued that gender will not impact the mobile

phone demand. However, as per the study findings, Sri Lankan females are less likely to own a mobile phone than males.

The model uses first to fourth income quintiles to determine the influence of income on mobile phone demand. The findings indicated a negative relationship with the poorest individuals and a positive relationship with high-income respondents, though the effects are not statistically significant. Thus, as expected it can be concluded that the poorest people are less likely to own a mobile phone compared to the richest people. In general, poor people are less likely to have ownership of a mobile phone, which was evident in the previous empirical findings (Alam *et al*., 2017; Adikari, 2013; De Silva *et al*., 2011).

The study employed three education levels, *i.e*., primary, secondary, and tertiary education. The results indicated that both primary and secondary educated people were significantly negatively associated with the mobile phone demand in Sri Lanka. Moreover, when moving from primary education to secondary education, the coefficient values change positively. It further illustrated that more educated people are more likely to use mobile phones compared to less educated people. The results are in line with the previous literture, as most scholars have identified a positive relationship with education and demand for mobile phones (Mwalukasa *et al*., 2018; Nyamba and Mlozi, 2012; Akinola, 2017).

The study also identified a statistically significant positive relationship between employment and mobile phone demand in Sri Lanka. It disclosed that the employed are more likely to use a mobile phone. The findings are in line with Hsino and Chen (2015) and Karjaluoto *et al*. (2005), who indicated a positive relationship between mobile phone demand and employment.

In general, the study found that age, gender, income, education, and employment are related with mobile phone demand in Sri Lanka. It can be indicated here that individuals who are young, male, within high-income levels, educated, and have employment are more likely to use a mobile phone in Sri Lanka. These results are consistent with the recent empirical investigations (Rahim *et al*., 2016; Hsino and Chen, 2015; Mwalukasa *et al*., 2018; Alam *et al*., 2017; Andone *et al*., 2016; Adikari, 2013) elsewhere.

4. Conclusions

This study determines the influence of socioeconomic characteristics of individuals on mobile phone use in Sri Lanka based on the Global Findex Database, 2017 of the World Bank. The study concludes that individuals' socioeconomic characteristics influence the use of mobile phones in Sri Lanka, particularly, age, gender, income, education, and employment. Younger, male individuals tend to have a higher chance of using mobile phones than older ones. Furthermore,

individuals with high income and higher education are more likely to use mobile phones. Furthermore, individuals who have employment have higher chances of owning a mobile phone.

These results can be used further to investigate who is more likely to have a mobile phone. Specifically, the mobile phone owners in Sri Lanka are young, male, well-educated, and have high-income levels and employment. It provides how mobile phone usage can be changed compared to the individuals' socioeconomic characteristics, which would be more beneficial for academics, policymakers, and manufacturers to make their future decisions.

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