



# Do Mobile Phones Empower Women? *Evidence from Rural Egypt*<sup>1</sup>

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## ABSTRACT

*Mobile phones can be seen as a tool for social and economic progress in rural and remote areas of developing countries (Labrique et al., 2012). Despite this importance, little research, especially within the Egyptian context, has tried to investigate this relationship (Badran, 2016). This paper aimed to detect the role of mobile phone on rural women empowerment (WE), with a specific focus on autonomy in decision making, and in accessing or controlling services in health, education and economic opportunities. A cross-sectional survey method was employed to collect data from a sample of 232 women from rural Egypt. After validating the multidimensionality of the WE measure, descriptive and Chi-Square tests confirmed that there is a high association between mobile usage and WE. ANOVA tests confirmed differences in empowerment and usage levels, with different demographic variables as age, education, marital status, and living/job status. The conclusion drawn from these results suggests the importance of having a wide and innovative utilization of ICT services to accelerate the development of women in rural Egypt.*

**Keywords:** Women Empowerment - Mobile Phones - Rural women - Egypt

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## 1- INTRODUCTION

Egypt as a developing country seems to be still struggling to improve the living standards of women, especially those in rural areas. The latest profile of women in rural Egypt issued in March 2018, showed that there are major gender inequalities in many domains of life especially among rural women living in Upper Egypt; particular discrimination was noted with reference to limited access to health, education and economic opportunities. For example, records show that, while 97% of Egyptian women in urban areas had been attended by a qualified health professional, only 89% of women in rural Egypt had this service. Again, significant disparities exist between rural Upper and Lower Egypt as per labor participation, where women's labor market participation remains invisible, especially in rural areas.

Nevertheless, it has been greatly argued that the availability and use of information and communication technologies (ICTs) especially mobile phones are thought to have contributed to women's development in an accelerating way (Labrique et al., 2012). Mobile phone technology has the potential to improve the status and development of women in rural environments in terms of standing in their immediate family and the broader society. Mobile phones can empower women by increasing their awareness, strengthening their social networks and giving them greater opportunities for socio-economic development (Badran, 2016).

The increasing rate of penetration of mobile phones among women in the rural population of Egypt has provided the possibility to reach the poor and disadvantaged and connect them to the wider development potentials at national and global levels, since the coverage of mobile phone use has reached to more than 85 percent of the total population (connected women, 2015).

However, although the gender gap in mobile ownership is small, social norms still affect the way Egyptian women interact with mobile; 40 percent say their family feels uncomfortable with them using a mobile. This is probably driven by harassing phone calls from strangers and other security and privacy matters which over half of the women report as a barrier (connected women, 2015).

Nevertheless, these barriers have not prevented women to own and use mobile phones and give them access to information and development opportunities in terms of income generation, education and health services. Research has flagged that rural women are benefiting most

from mobile phones since they barely have access to any other viable alternative ICTs (Badran, 2012).

## **2- RESEARCH PROBLEM**

Although there has been much praise and recognition around the importance of mobile technology related to sustainable development, and empowerment, there is a dearth of research investigating its real impact or the mechanism by which it is being incorporated into the social and cultural life (Badran, 2016; Schiemer, 2017).

Accordingly, the main purpose of this paper is to study the role of the mobile phone in empowering rural women in Egypt. However, due to the limitation in the literature that addresses the need for a quantitative women empowerment measure (Sharma and Sanchita, 2017), in addition to the continuous debates around its overlapping dimensions and the different ways used for conceptualizing empowerment (Ibrahim and Alkire, 2007), a relatively new quantitative measure of empowerment will be developed in this research.

Moreover, according to our review of women's empowerment studies in Egyptian literature, it became obvious that there are two main gaps needed to be addressed. First, there is a lack of studies that investigated the role of ICT and mobile in specific, on empowerment (Badran, 2014; Schiemer 2017), second, even within those limited studies, there is a lack in studies that tackle determinants of different dimensions of women empowerment other than the economic dimension, and autonomy (Assaad, et al, 2014).

Hence, this research is an attempt to overcome the previously mentioned gaps by tackling five dimensions of women empowerment: namely, freedom of movement; autonomy in decision-making; access to or control over healthcare services; education; and economic opportunities.

## **3- RESEARCH OBJECTIVE**

The study aims at precisely examining if women empowerment can be realized through mobile phones usage. Moreover, given the important correlation between women's demographics, on women empowerment, the current research will consider analyzing demographics such as age, education level and marital and job status as per empowerment and mobile usage.

## 4- Conceptual Background and Literature Review

### 4-1 The Concept of Women Empowerment

The term empowerment emerged in the 1970s in response to the Women in Development (WID) models advocated by western feminists and which has a perspective that mainly focuses on women gaining equal access to education and employment (Moser, 2012).

Empowerment is a relative concept that emerges from social institutions (Mason, 1993). It is fundamentally about women's relative positions to men. In a discussion on women's status and demographic change; Mason (1993) defined women's position as "control over resources, compared to that of men; the degree of their autonomy from men's control; or other aspects of their privilege or oppression that arises from the society's institution".

According to the International Cairo Conference on Population, Development and Women, (cited in; Norwood, 2014), the objectives of empowerment are "achieving equality and equity based on harmonious partnership between men and women and enabling women to realize their full potential; ensuring women's full involvement in policy- and decision-making process at all states and in all aspect ; and ensuring that all women, as well as men, are provided with the education necessary for them to meet their basic human needs and to exercise human rights".

As demonstrated above, empowerment is a multilevel and multidimensional concept. While dimensions of empowerment are highly variable, they usually include some aspect of decision-making autonomy (as it relates to children, purchases, and reproductive choices), mobility, self-efficacy and confidence, legal awareness, political involvement, and freedom from violence. The literature (e.g. OECD-Paris, 2012; Stromquist, 1995; Malhotra, Schuler & Boender, 2002) has summarized these dimensions into five main domains for empowerment, namely: economic empowerment, political empowerment, social empowerment, cognitive empowerment, and psychological empowerment.

From another lens, Kabeer (1999) viewed women empowerment as a process, that can be broken down into 3 key interrelated components: resources, agency, and achievements. Resources are enabling factors that shape conditions under which choices are made and put into effect. Agency includes the ability to make strategic choices and to control

resources and decisions that affect important life outcomes. Finally, achievements refer to the outcomes of choices.

The two most common components of empowerment studied in the literature are resources and agency; these two components have been dealt with and presented in different key terms as control, voice, choice, and power. Generally, these terms refer mainly to women's ability to make decisions and affect outcomes that are of importance to their families and their own selves (Malhotra et al., 2002).

Despite that there is a need for more uniformity in conceptualizing empowerment (Ibrahim & Alkire, 2007), Kabeer (2001a) definition of empowerment as "the process by which those who have been denied the ability to make strategic life choices acquire such ability", is considered a widely accepted definition because of its comprehensibility, and ability to be applied across the range of aspects that development efforts are concerned with (Assad et al., 2014). In addition, scholars in the field (e.g. Malhotra et al, 2002; Mosedale, 2005), see this definition as precise enough to distinguish empowerment from the general concept of "power" exercised by dominant individuals, as it makes it clear that only those previously denied such abilities can be considered to be empowered.

Because empowerment is a multidimensional concept, studies differed in terms of how they measure it. Some used indirect measures, such as women's education, and labor force participation rates as proxy to empowerment, while others used direct measures, which is a combination of observable indicators that are grouped into different dimensions of empowerment including economic decision-making; child-related decision-making; freedom of movement; access to resources; and self-esteem (Assaad et. al., 2014).

Studies also differed with regard to the level of analysis; including three main levels: the household/family, the community, and the market and the state (Sen & Batliwala, 2000), with the majority of them heavily concentrated at the individual/household level. This concentration at the individual/household level could be due to the importance of the household to gender relations and hence empowerment (Malhotra et al, 2002).

As for studies tackling women's empowerment in Egypt, for example, those of Kishor (1995), Khatab and Sakr (2009) and Abdel Mowla (2009), the measure of women empowerment was revolving around two main domains: autonomy, and economic empowerment. For example, Kishor

(1995) used three different direct measures of empowerment; namely the customary autonomy index: used to measure the extent to which women believe they should have the say in family decision; example family planning and children education. Second, the non-customary autonomy index: that measured the extent to which women believe they should have decision-making powers in general; like visits relatives and household budget. Finally, the realized autonomy index: measuring the extent to which women perceive that they have decision-making powers and freedom of movement.

While Kishor (1995) focused on autonomy as a proxy of empowerment, Khattab and Sakr (2009) focused on the economic dimension of women's empowerment as measured indirectly by female participation in the labor market, and Abdel Mowla (2009) measured women's economic empowerment by economic participation, and economic opportunity.

More recent studies on Egyptian women empowerment, as in Assaad et al. (2014), two dimensions of women's empowerment were used, namely: the decision-making and mobility. Also, in Diab and Diab (2016), study, empowerment was measured using five dimensions, these were: economic empowerment, political empowerment, social empowerment, cognitive empowerment, and psychological empowerment.

Practical decision makers and strategy makers seem to view empowerment close to how researchers in the academic field do. For example, the National Strategy for the Empowerment of Egyptian Women 2030, issued in 2017, based empowerment on four main pillars: Women's leadership and political participation; Women's economic empowerment; Women's social empowerment; and Women's protection.

In alignment with empowerment literature and the pillars of the National Strategy for Empowerment of Egyptian women stated above, the current study attempts to measure empowerment using the following empowerment indicators: autonomy in decision decision-making, freedom of movement, access to and control over healthcare services, access to and control over education, and economic empowerment. These indicators were not only chosen to match the indicators common within academia and the strategic vision of Egypt 2030 but also that goes along with the main purpose of this paper which lies in assessing the role of mobiles in empowering women.

Following next is a detailed review in the literature that discusses mobile's role in women empowerment.

#### 4-2 The Role of Mobile Phone Usage in Women Empowerment

Most of the recent literature on mobile phone and development was regarded to the infrastructural and technical prospect of mobile phones over other ICT tools with respect to their implementation in less developed countries. The ease of use for mobile phones, along with required minimum literacy catalyzed the process of economic development in rural communities (Rashid & Elder, 2009).

Several studies examined the indication of mobile phone technology and how does this technology empower women in many countries, especially those developing ones. One of these studies was conducted by Martin and Abbott (2011) and studied implications of the mobile phone technology in a particular social class of rural in Uganda. Their study included investigating farmers of their mobile phones use to improve 'sustainable livelihood initiatives' in agriculture. It concluded that mobile phones became more accessible to more users of men and women to fulfill humans' needs. Another study by Munyua and Mureithi, (2008) pointed out that women's recognition of confidence has been raised due to mobile phones, in addition to improving their economic conditions. A qualitative study by Wyche et al. (2018), investigating rural Kenyan women's interactions with their mobile phones, has flagged to the positive effect mobiles can have on its users and to the importance of the affordances of the handsets used in supporting and/or constraining mobile communication.

USAID carried out a study in 2013, to examine the Afghan women patterns of mobile phone use. The conclusion of this study stated that the technology of mobile phones has rapidly expanded in Afghanistan and as a result, there was a widespread pattern of owning a mobile phone by women, which made it easier for them to reach education and health services and improve the quality of their lives.

Also study conducted by Valk et al. (2010) highlighted that increased education outcomes were the result of using mobile phones in various Asian countries, through easing the access of mobile phones services.

Another study provided by Rahman (2008), in Bangladesh, examined the effect of a community-managed information center and found broader accessing to information by ICTs, the thing that improved the statue of women in the rural area and made them more aware of accessing different services through technology. In a later study, Rahman et al. (2013) listed several elements that were affected by ICT in Bangladesh,

these were; health care facilities, rural economy, women's empowerment, social security, and emergency responses.

Many researchers (e.g. Labrique et al., 2012; Afroz, 2012), have also confirmed the positive effect of owning/using mobile phones on accessing health services and on getting healthcare information.

Although most of the stream of research in this area have found a positive effect of mobile on empowerment, yet there are other few studies that have found little impact of ICT and/or mobile usage on women empowerment, for example, in Murthy (2011) it was indicated that the digital divide among men and women stayed a critical challenge and that in spite that the use of mobile phones has diffused rapidly in countries like Egypt, Kenya, and India, the results manifested that women were deprived of the benefits of mobile phone access because of the struggles appeared from educational, cultural and economic aspects. Also, a very recent study by Ninsiima (2019) has argued that although ICTs and mobile phones may have played an important role helping to reach formerly unreached communities and in bridging the gender digital divide, yet there appears to be still gender inequalities in terms of use and access. Nevertheless, according to Hatik et al. (2019), in order to close these gender gaps and empower women with resources, there should be a leverage increase in mobile phone use and a scale up in mobile financial tools, for women.

#### 4-3 Mobile Phone Role in Empowering Women in Egypt

Egypt since 1985 put great investment in ICT infrastructure to highly support its economic development. ICT as a key sector in improving the economic status in Egypt and as one of the main sectors in the Arab world that gives great attention to the diffuse of mobile phones use were regarded in 1999 as a top priority segment to be invested in. A new ministry was conducted under the name of the Ministry of Communication and Information Technology (MCIT) which was a start to even larger infrastructure investments (Kamel, 2007) Moreover, Egypt's Information Society Initiative (EISI) was established in 2010 to supply a wide view of the strategies of ICT's plan. Later in 2013, EISI was improved to face the changes in both internal and external market needs by a public-private partnership (PPP). By continuous efforts from the government, there was new adoption of various initiatives and policies to spread the ICT wider in Egypt. "Free internet" was part of such initiatives established by IT clubs which includes reducing ADSL installation cost by more than 100% for two years (Kamel et al, 2009)

The usage of ICT for improving the quality of education and eliminating illiteracy contains the most developed projects applied in Egypt. Thus, many projects were launched for the purpose of adopting ICT by teachers and students in enhancing educational progress (Mandor, 2009).

As per mobile phone, Egypt has a unique mobile phone subscriber penetration of 54%, with a small gender gap in ownership, though it is greater among certain segments of the population. The mobile phone market in Egypt is maturing, with 30% of all connections 3G. Vodafone is the market leader, followed by Orange, Etisalat and recently issued We (connected women, 2015).

Studies provided strong evidence in support of the social benefit of using mobile technology in rural regions in Egypt including the reduction of negative phenomena like crime, expensive commodities, and corruption; in addition to increasing positive norms as efficiency and better quality of both health and education (GSMA, 2013). However, despite this importance, according to a review in the literature, it seems that there are very limited studies in Egypt-with the exception of two; the work of Badran (2014; 2017) and Schiemer, (2017)-that had examined the effect of ICT on women empowerment.

In Bardan, (2014) study, it was confirmed that there is an important role for different ICT tools (including mobiles) in empowering Egyptian women. Badran's results were following most of the western results discussed above. However, a mixed result was detected by Schiemer, (2017), study, that examined how accessing and utilizing mobile can contribute to young Egyptian women socio-economic empowerment. Using a qualitative measure via interviews, the study indicated mobile phones was perceived to be both facilitating and frustrating empowerment. Examples of low empowerment caused by mobiles were reflected in the respondents' views that saw the mobile as a device that encourages indolence or disconnect them from people, and also that provides a platform to intimidate, and harass women.

The above discussion has highlighted the importance of mobile technology in empowering women, yet it also flagged the negligent to this importance within the Egyptian academic context, as reflected by a few numbers of researches. And thus, to this end, came this study.

## 5- Research Methodology

### 5-1 Sampling Technique and Data Collection Process

This study used an analytical cross-sectional survey design (Oppenheim, 2000), through developing a relatively new questionnaire that was directed to a convenient sample of rural women living mainly in El-behira and Dakahlia governorates, in addition to other rural areas around Alexandria governorate. A convenient sampling technique was employed in order to reach the sampled elements that are difficult to access because of certain cultural norms that make it difficult to obtain data in rural areas in Egypt, especially from women. However, using a liaison in each of these two sampled governorates has relatively overcome this barrier and also helped a lot in assuring that the convenient sample would involve a fair representation of the population and most importantly guarantee the variation needed in the sample in order to measure the required categorical variables under study as age, education, and marital and living/job statuses.

El-behira and Dakahlia governorates were selected in this study because they compromise a large population of the rural population in Egypt. According to CAPMAS, Statistical Yearbook – Population, 2018, the total population in each of Dakahlia and El-behira governorates is around 6 million, 71.7 percent of these residents are rural population, in Dakahlia, and 81.8 percent in El-behira. Also, the female population compromises nearly half of each of these two governorates' population, with 46.7 percent in EL-behira, and 46.1 percent in Dakahlia.

It was necessary to make sure that the approached sample either have mobile phones or have access to it and also have a good communication system within their area.

Almost 400 questionnaires were distributed, from which only 232 questionnaires were returned, however, this limited size is due to the unfamiliarity of the participants with answering surveys and research in general, and above all due to the conservative nature and traditions within these areas, where most of the women approached were not encouraged to participate. Challenges of conducting research in Egypt were addressed by a number of researches (e.g. Youssef, Badran and Hatem, 1997).

## 5-2 Methods and Questionnaire

Cross-sectional survey design (Oppenheim, 2000) was employed through developing a quantitative self-administered questionnaire (please see appendix). The questionnaire comprises three main sections. The first section collects demographic information, the second section measures the mobile usage variable, and the third section measures the effect of mobile on women empowerment. Next is a detailed explanation of these research variables and their associated measures.

### 5-3 Measures

#### ***Mobile Usage***

In this study, "mobile phone use" was measured using two main factors: frequency and variation. For frequency of usage, the research adapted Vanden-Abeelee et al., (2013) measure, where three main items were assessed. These items are: number of calls, number of texts, and call durations. The number of calls was assessed with two questions: (1) "How many outgoing calls on average do you make on a typical day?" (2) "How many incoming calls on average do you receive on a typical day?" Respondents were asked to choose from the following options: "one call, 2-4 calls, 5-10 calls, and more than 10 calls".

For the number of text messages, again two questions were used: "How many SMS on average do you send during a typical day?" and "How many SMS on average do you receive during a typical day?", options given were: "one SMS; 2-4 SMSs; 5-10 SMSs; more than 10 SMSs".

With regard to the duration of calls: (1) "How many minutes do you spend on the incoming calls per day?", (2) "How many minutes do you spend on outgoing calls per day? Options were: "less than 31 minutes; 31minutes-1 hour; 1-2 hours; 3-4 hours; 5-6 hours; 7-8 hours; more than 8 hours".

Based on the participants' answers, an average daily measure of the number of calls ((incoming calls per day + outgoing calls per day); and average daily duration of calls (incoming minutes per day + outgoing minutes per day), and an average daily number of text messages (incoming texts per day + outgoing texts per day) were computed.

Respondents were also asked to denote whether they use their mobiles for texting, and/or calling, and/or net-surfing. This variable was specifically developed in this research to measure the variation in mobile

usage. The more the choices checked the higher the respondents' usage variation is denoted. If only one item was chosen then variation is low, two items are chosen, a medium level of variation is recorded, and; three items checked to reflect the high level of mobile usage variation.

### ***Women Empowerment***

As discussed previously in the literature section, this variable was extracted using some of the well-established indicators in the literature of women empowerment. These indicators were mainly based on socio-economic dimensions and autonomy as done by previous studies in Egypt (e.g. [Khatab & Sakr, 2009](#); [Abdel Mowla, 2009](#); [Assaad et al, 2014](#); [Badran, 2014](#); [Schiemer, 2017](#)). Namely, the items are: autonomy in decision making; freedom of movement; access to and control over educational services, access to and control over healthcare services, and access to and control over economic opportunities.

Respondents were asked if their use of mobile phones has facilitated any of the above five mentioned dimensions. Respondents were asked to rate their level of agreement using a Likert 5 item scale, where 1) strongly agree and 5) strongly disagree, on 12 statements (2 for autonomy, 2 freedom of movement; 2 healthcare services; 3 education services, 3 economic opportunities) in addition to two more general statements on the role of mobile in facilitating their overall living. Examples of these statements are: "measuring Autonomy": "Mobile phone helps in lessening my dependency on others around"; measuring "Economic empowerment": "Mobile phone helps me in finding employment opportunities".

It is important to note that although the WE dimensions were extracted from the literature, the sentences measuring them were developed specifically for this research. The construction of the sentences wordings and its phrasing was made with care in order to make it simple, short, straight forward and clear for the respondents; also in other occasions, sentences had to be clearly read out, and briefly explained to some respondents- mainly for those who were illiterate.

### ***Demographic Variables***

Four main demographic variables included are; age, education level, marital status, and living/job status.

- Age categories are as follows: 1 = 16 - 29 years; 2 = 30 - 49; 3 = 50 - 60; and 4 = above 60.

- Marital status: 1 = Single; 2 = Married; 3 = Married with children; 4 = Divorced; 5 = Widowed.
- Education level: 1 = Uneducated, cannot read, and write; 2 = Uneducated but read and write; 3 = Primary grade; 4 = Preparatory grade; 5 = Secondary grade; 6 = Intermediate education; 7 = University education.
- Living/job status: 1 = Student; 2 = Housewife; 3 = Working in a job, 4 = Own private work or Small Entrepreneur.

Besides, respondents were asked to state whether they have personal ownership to the mobile phone or they use it through borrowing.

#### 5-4 Data Analysis

First, exploratory factor analysis was run to test for the group configurations of the empowerment measure then, descriptive analysis was run. Third, Cronbach's alpha and factor analysis tested the measure's reliability and content validity, respectively (Hair et al., 2014). Fourth, the chi-square test assessed whether there was a significant association in empowerment with different usage variables. Finally, ANOVA and T-Tests were run to further detect the variation between demographic categories as per empowerment and usage levels.

## 6- Results

### 6-1 Participants

Characteristics of the sampled respondents were as follows: most were in the age group 16-29 (32.3%), married with kids (40.9%), work as housewives (37.7%) and hold an intermediate education (26.2%). Also, most own their mobiles (87.9%), with only 12.1% borrowing it. Furthermore, mostly (54%) use their mobiles on average 5-10 times per day; with call duration between 1-2 hours, and with text numbers of 2-4 texts per day. Lastly, most of the sample has a high level of variation in using their mobiles (49.6%).

### 6-2 Women Empowerment Dimensions

Using principal components analysis and varimax rotation, the women empowerment variable was represented using the five indicators assigned. As shown in table 1, assumptions of factor analysis were met using the Kaiser-Meyer-Olkin measure of sampling adequacy and Bartlett's sphericity test, after deleting 3 items (two statements relating to the overall living standard) and a further 1 item- healthcare dimension), because they failed to load on any of the factors using the

criterion of 0.4 and above and/or with an average variance extracted of 50 percent or more (Sekaran and Bougie, 2016). The five suggested indicators were reduced to three factors, which are named: Access to Services, 4 items combining education and health items (reliability, .908); Autonomy, 4 items combining autonomy items and freedom of movement items (reliability, .883); and Economic opportunities, 3 items (reliability, .986).

**Table 1: Validity and Reliability of the Research Variables**

Variables	KMO	AVE	Bartlett's Test	Cronbach's Alpha	Items	Factor Loading
Access to Services	.822	78.550%	.000	.908	Item1	.470
					Item2	.890
					Item3	.905
					Item4	.877
Autonomy	.748	74.362%	.000	.883	Item1	.800
					Item2	.830
					Item3	.654
					Item4	.690
Economic opportunities	.740	97.343%	.000	.986	Item1	.948
					Item2	.986
					Item3	.986

Table 2 provides descriptive statistics and correlations between the mean responses for each factor. In Table 2, there is some indication that factors are correlated; however, there is no evidence of redundant factors and the factors appear to be independent, as all square roots of AVE values are greater than the correlations between the corresponding construct and other constructs.

**Table 2: Discriminant Validity of the WE Dimensions**

WE Dimensions	Mean	SD	1	2	3
1. Access to Services	3.2294	.98872	(0.886)		
2. Autonomy	3.5819	.98131	.443**	(0.862)	
3. Economic opportunities	3.5368	1.21125	.347**	.470**	(0.987)

**Table 3: Mean Standard Deviation and frequencies of the WE Dimensions**

Variables	N	Mean	Std. Dev.	Frequencies					
				1 Strongly disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly agree	Missing
Access to Services	231	3.2294	.98872	9 (3.9%)	36 (15.5%)	108 (46.6%)	49 (21.1%)	29 (12.5%)	1
Autonomy	232	3.5819	.98131	4 (1.7%)	27 (11.6%)	75 (32.3%)	82 (35.3%)	44 (19%)	0
Economic opp.	231	3.5368	1.21125	7 (3%)	49 (21.1%)	58 (25%)	47 (20.3%)	70 (30.2%)	1

In Table 3, it can be seen that the means of the three WE dimensions are all above the average score and are all close to each other, with only access to service dimension having a slightly lower mean. It could be also generally recognized that most of the sample lies in the categories of "Agree" and "strongly agree" on the role of the mobile in facilitating their empowerment level either in their access to services (with almost 33% in the agree and strongly agree sets), or autonomy (with total of 54% in the agree and strongly agree sets) and/or access and control on economic opportunities (with total of 50% in the agree and strongly agree sets). This result means that respondents see their mobile empower them on all the dimensions relatively equally. Nevertheless, if we look closely to the results, it is could be obvious that respondents highest "strongly agreed" responses (30%) was recorded to the economic dimension, this could flag to the importance of the mobile in facilitating economic empowerment.

### 6-3 Women Empowerment and Mobile Usage

Table 4 shows the relation between Usage and Women Empowerment using chi-square test. It can be observed that there is a significant association between the three usage variables: the number of calls; the number of texts, and Calls Duration with all of the three WE dimensions: Access to Service, Autonomy and Economic opp., as all the corresponding P-values are less than 0.001 and less than 0.01. It can also be observed that there is a significant association between Usage Variation and Access to Services, Autonomy and Economic dimensions, as all the corresponding P-values are less than 0.001.

**Table 4: Association between Usage and Women Empowerment dimensions**

Research Variables	Chi-Square (P-value)	Access to Services	Autonomy	Economic Oppo.
Usage - Number of Calls per day	$\chi^2$ (P-value)	83.938 (0.000)	136.852 (0.000)	101.901 (0.000)
Usage - Call Duration	$\chi^2$ (P-value)	49.241 (0.000)	46.548 (0.001)	69.249 (0.000)
Usage - Number of Texts per day	$\chi^2$ (P-value)	43.719 (0.000)	71.285 (0.001)	37.702 (0.000)
Usage Variation	$\chi^2$ (P-value)	37.856 (0.000)	47.221 (0.001)	14.663 (0.000)

### ***Demographic Variables with Women Empowerment and Usage Factors***

Demographic variables included in this research are age, marital status, Living/job status, education level, mobile ownership. ANOVA and T-tests were run to test if there are any variations in each of the WE and usage factors according to these mentioned demographics.

As per the Age factor: Table 5 shows the ANOVA test results for different age groups. It shows that there is a significant difference for all of the three WE dimensions; access to services, autonomy, and economic opportunities, as all corresponding P-values are less than 0.05. However, it could be noted that the highest mean recorded for all these empowerment dimensions, were reported precisely for the age group 30 to 49 years old compared to all other age groups.

Furthermore, as per the usage factors, only text number, and usage variation were significantly associated with age differences, where the mean for both usage factors (Mean =2.4189) and (Mean = 2.6933) was highest at the age group 16 to 29 years compared to other age groups.

**Table 5: ANOVA Test for Age Groups**

Age	Access to Services	Autonomy	Economic opp.	Usage - Number of Calls	Usage - Calls Duration	Usage - Text Number	Usage Variation
16-29	3.3867	3.6533	3.3600	2.3733	2.3067	2.4189	2.6933
30-49	3.4658	3.7808	3.9589	2.4521	2.2466	1.9385	2.1507
50-60	3.1429	3.3878	3.6531	2.1633	2.7347	1.5581	1.8571
Above 60	2.5000	3.2857	2.8529	2.0571	2.6857	1.4118	1.5714
P-value	.000	.036	.000	.085	.059	.000	.000

Table 6 shows the ANOVA test results for differences according to Marital Status. Results show that all the empowerment dimensions had insignificant results except for the access to services factor that was significant at P-value less than 0.05. As per the usage factors, texts number, and usage variation were both significant at a corresponding P-values less than 0.001.

The mean for access to services for married with children women (Mean = 3.4149) came the highest than any other status, opposite to the mean for usage factors -text number and usage variation, that had their highest mean for single women; Mean= 2.4048; and Mean= 2.5909 respectively.

**Table 6: ANOVA Test for Marital Status**

Marital Status	Access to Services	Autonomy	Economic opp.	Usage - Number of Calls	Usage - Calls Duration	Usage - Text Number	Usage Variation
Single	3.2273	3.6591	3.4545	2.3636	2.2045	2.4048	2.5909
Married	3.1458	3.7708	3.3750	2.3333	2.6667	2.1778	2.3750
Married with children	3.4149	3.4894	3.5638	2.2979	2.5213	1.7640	2.0957
Divorced	2.9259	3.7037	3.7778	2.3704	2.5556	1.6957	2.0000
Widow	2.8750	3.1765	3.5000	1.9412	1.8235	1.4375	1.2941
P-value	.038	.187	.707	.503	.066	.000	.000

Regarding the Living/job status, table 7 shows the ANOVA test for the difference between living/job status groups. It shows that there is a significant difference for all reported variables whether related to empowerment or usage, as all corresponding P-values are less than 0.05. Notably, the mean scores for the small entrepreneur women on all the

empowerment dimensions was the highest mean compared to all other status sets. Similarly, the mean for usage-number of calls ranked for a small entrepreneur (Mean = 2.7561) as the highest status. On the contrary, the mean for usage -text number and for usage variation ranked for students (Mean = 2.2963; Mean = 2.6667) as the highest among any other Status.

**Table 7: ANOVA Test for Living/job status**

Living/job Status	Access to Services	Autonomy	Economic opp.	Usage - Number of Calls	Usage - Calls Duration	Usage - Text Number	Usage Variation
Student	3.0741	3.2963	2.9259	1.9630	1.7778	2.2963	2.6667
House Wife	2.8916	3.1429	2.6386	1.9524	2.4881	1.6790	2.0238
Working	3.4366	3.8732	3.9859	2.3944	2.6761	2.1746	2.3662
Small Entrepreneur	3.4878	3.9268	4.6585	2.7561	2.3659	1.5556	1.6585
P-value	.000	.000	.000	.010	.066	.000	.000

As for the education level, table 8 shows the ANOVA results that confirm a significant difference for only access to services, and autonomy WE dimensions, with p-values less than 0.001. The mean scores for the university educated women had the highest empowerment levels (Mean = 3.6190 for access to services; Mean = 4.0000 for autonomy).

As for usage factors, calls duration, text number, and usage variation were all significant at P-values less than 0.05. The mean scores differ according to the usage factor, where the highest mean score for the usage-number of calls ranked for the second grade (Mean = 2.4828), while the mean for calls duration ranked for intermediate education (Mean = 3.1333) as the highest. Oppositely, the mean scores for the text-number and usage variation (Mean = 2.9 and 2.5) respectively, came highest for those who have a university education.

**Table 8: ANOVA Test for Education Level**

Education	Access to Services	Autonomy	Economic opp.	Usage - Number of Calls	Usage - Calls Duration	Usage - Text Number	Usage Variation
Uneducated, cannot read and write	2.3158	2.5263	3.3684	1.6316	1.5263	1.0000	1.0000
Uneducated but read and write	3.4000	3.5000	4.1429	2.3889	1.5833	1.2333	1.3056
Primary grade	3.0000	3.2500	3.5625	2.0625	1.5625	1.4000	1.5000
Preparatory grade	2.9259	3.1111	3.4815	2.2963	2.3333	1.6296	1.7407
Secondary grade	3.2414	3.7931	3.3103	2.4828	2.3448	2.3793	2.7931
Intermediate education	3.3333	3.8667	3.5333	2.3667	3.1333	2.1207	2.6167
University education	3.6190	4.0000	3.2857	2.4286	3.0714	2.5952	2.9286
P-value	.000	.000	.061	.016	.000	.000	.000

As per the ownership factor: Table 9 shows the T-test of the difference between owning the mobile and not owning it on the level of usage and level of empowerment. It shows that there is a significant difference in all WE dimensions and also on all usage factors, as the corresponding P-values were all less than 0.05. It is also noted that the mean for those who have a mobile are all higher than those who do not have it on all the WE dimensions and usage factors.

**Table 9: T-Test for Ownership**

Ownership/User	Access to Services	Autonomy	Economic Opp.	Usage - Number of Calls	Usage - Calls Duration	Usage - Text Number	Usage Variation
User	2.2222	2.4643	3.0000	1.2857	1.0000	1.1818	1.1786
Ownership	3.3627	3.7353	3.6078	2.4461	2.6324	2.0309	2.3137
P-value	.000	.000	.047	.000	.000	.000	.000

Table 10 shows the ANOVA Test for the difference between Usage Variation and WE. It shows that there is a significant difference for only access to services, and autonomy factors, as corresponding P-values are less than 0.05. However, the mean of access to services for "medium" usage (Mean = 3.4696) is the highest comparing to other usages, also, the mean autonomy rank for "high" variation (Mean = 3.8783) is higher than any other usage variation.

**Table 10: ANOVA Test for Usage Variation**

Usage Variation	Access to Services	Autonomy	Economic opp.
Low	3.2093	3.1081	3.5890
Medium	3.4696	3.6047	3.5349
High	3.2093	3.8783	3.5043
P-value	.000	.000	.897

Table 11 shows a summary of the tests used in this study and the corresponding results.

**Table 11: Summary of tests used and corresponding results**

Type of the test used	Research question examined	Results
Exploratory factor analysis	EFA used to test: if WE is a multidimensional variable	Findings supported a three main dimensions to WE construct namely, Access to services, Autonomy and Economic opportunity.
Chi-Square	To examine if there is an association in WE with different usage factors	Significant association between the three WE dimensions and all usage factors.
ANOVA and T-test	To detect if there is a variation between WE and different demogra- phic categories To detect if there is variations between usage f- actors and demographic categories	Findings supported the existence of variations in WE according to the demographic categories, also there were variations detected in usage factors according to the demographic sets

The results of the ANOVA and T –test are summarized in table 12, next.

**Table 12: Summary of ANOVA and T test results**

Relationships between WE indicators and demographic variables	Results
Age	Significant differences with all the three WE dimensions
Marital status	Significant differences with all WE indicators except for "access to services"
Living/Job status	Significant differences with all the three WE indicators
Education	Significant results detected with only "access to services" and "autonomy" dimensions
Mobile ownership	Significant differences with all the three WE indicators
Relationships between usage factors and demographic variables	Results
Age	Only "text numbers" and "usage variations" were significantly associated with age groups
Marital status	Only "text numbers" and "usage variations" were significantly associated with marital status sets
Living/Job status	All usage factors were significantly associated with living/job status
Education	All usage factors were significantly associated with education
Mobile ownership	All usage factors were significantly associated with mobile ownership

## 7- Discussion

Although this study's main attempt is to examine the relationship between mobile usage and women empowerment, nevertheless, it was thought as an important preliminary step to validate a relatively new quantitative measure for women empowerment and test its multidimensionality in the Egyptian context. The main results for the factor analysis were that the five suggested indicators were reduced to three factors, which are named: Access to Services (combining education and health items); Autonomy (combining a-utonomy items and freedom of movement items); and Economic Opportunities. Generally, this result corroborates with the literature on empowerment which confirms that empowering women is a multidimensional concept (Stromquist, 1995; Malhotra et al, 2002).

Moreover, this result reflected other two important remarks, first; it noted that the economic dimension has been recognized by the

participants as a unique individual factor in empowerment, supporting the fact why most interventions aim at increasing empowerment are focused on the economic dimension (e.g. those of [UNDP, 2016](#)). Also, it was recognized as the most empowerment dimension that is being facilitated by mobile usage as supported by ICT studies (e.g. [Badran, 2014](#)).

However, there is a growing body of literature emphasizing that women's economic empowerment might be a necessary, but not a sufficient condition for realizing overall (or other forms of) empowerment ([Khan, 2013](#); [Denney, 2015](#)).

This brings us to the second remark in this result, which is the recognition of two other forms of empowerment that relate to access to services and autonomy. Although each of these two dimensions had combined other dimensions thought to be treated as separate ones, namely the access to service dimension grouped the education and the health items, while the autonomy dimension grouped the freedom of movement dimension. Education and health items can be recognized under the access to, or control over "resources" domain, or as being used in other studies (e.g. [Malhotra et al., 2002](#)) as one whole factor that reflects control over child-related issues as health and schooling. Autonomy dimension, in general, would also involve decisions involving freedom of movement, as done by Kishor, (1995), who used realized autonomy index to measure the extent to which women perceive that they have power in decision-making and freedom of movement.

Hence, merging two indicators together was witnessed before in the literature of studying women empowerment at the household level. Even the two types of indicators that are used almost universally in previous empirical literature, namely the domestic decision making, and those measuring either access to, or control over resources, were often, merged together since indicators on domestic decision-making tend to focus heavily on financial and resource allocation matters ([Malhotra et al., 2002](#)).

To sum up, the factor analysis results goes favorably with the empowerment literature in terms of the multidimensionality of the empowerment measure and the type of dimensions that are most frequently used as empowerment indicators ([Malhotra et al., 2002](#)).

The results also confirmed the main purpose of this study which is testing the role of mobile on women empowerment. This was expressed first through having most of respondents' answers within the agreement

area, for all WE dimensions; showing that respondents appreciate that their mobile has facilitated their empowerment. Moreover, this result was further confirmed through the chi-squared test results that showed that all forms of mobile usage either in terms of number of calls, duration of calls, number of texts and the variation of use; were significantly associated with respondents' agreement on perceiving mobile as a facilitator to empowerment.

These results go favorably with most of the studies that have examined this relationship in the literature. In terms of access to education, Valk et al, (2010), found that mobile usage increased educational outcomes from use of mobiles that have facilitated its access. Munyua and Mureithi, (2008), indicated in their study that women's perceptions of confidence have been increased by mobile phones, which also helped in increasing women's economic activities. Also, the study conducted by USAID in 2013 results suggested that the wide-scale spread facilitated Afghani's women's access to services such as health and education and improved the quality of their life.

It has been debated in the literature that women can be empowered in one area of life and not in others, which would again imply the importance to treat women's empowerment as a multidimensional concept (e.g. [Strom-quist, 1995](#); [Malhotra et al, 2002](#)). In the current study, this argument was proven in the analysis detecting the association between empowerment dimensions and other demographic variables. Demographics like age, education and marital and work status have been argued in the literature to be crucial determinants for empowerment (e.g [Kishor, 1995](#); [Assaad et al., 2014](#); [Diab and Diab, 2016](#); [Kawaguchi et al., 2014](#)).

This could be seen in the following discussion:

- **Age:** regarding the relationship between age and WE, there was a significant difference detected for empowerment for different age groups. Mainly, women aged 30-49 came highest on all empowerment factors, they got the highest means for access to service, autonomy, and economic opportunities, than any other age group. This means that this young age group sees that their mobiles facilitate their empowerment than any other group. This result supports Schiemer, (2017) results that show young ladies in Egypt perceiving their mobile as an empowerment factor. However, in Kawaguchi et al, (2014) study in Egypt, despite not related to mobile effect, yet the finding flagged that age was associated with women empowerment precisely in terms

of support by family and freedom from domination. However, it was revealed that a relatively high proportion of younger women have only limited access to health services in Egypt. In Diab and Diab, (2016) study, findings show that women's age, explains about 2.3%, of the variance in rural women's overall empowerment in Egypt. Furthermore, the analysis shows that as per the usage factors, only text number, and usage variation, were significantly associated with Age differences. The highest mean was recorded for those between 16 to 29 years co-compared to other age groups. This means that young ladies are inclined more to use texts and net surfing rather than run and receive calls, opposite to those older ladies who have fewer tendencies to text or use the internet. This is supported by Badran, (2014), a study that indicated that older age is associated with lower levels of ICT access, limited modes of use and patterns of connecting. Also, Schiemer, (2017), has noted that mobile phones as a type of ICT have become more attainable by young adults than any others. A combined conclusion that can be drawn from these results is that relatively young ladies are the most empowered group through their usage of their mobiles especially through using texting and net surfing.

- **Marital status:** All results were insignificant denoting no relationship between marital status and WE except for the access to services factor. The m-mean for access to services for married women with children was the highest than any other status. This proves that mainly women with children use their mobiles to care for their children's education and health. This seems to be supported by the results of Kishor study (1995), in Egypt, that confirmed the need of women with a greater number of children for more empowerment especially autonomy in decision making regarding their family-related issues. This specific finding is also favorably corroborated with Diab and Diab, (2016) study that showed that the most significant factor impacting women's overall empowerment is family type followed by the average age of sons. As per mobile usage factors, results revealed no relationship between marital status and usage except for the texting and net usage; where mainly single ladies use the highest texting and highest use variation. This specific result goes favorably with those results pertaining to Age above.
- **Living/job status:** although all WE dimensions were significantly different according to the living/job status, yet the highest empowerment was recorded for those women who have work or who

are entrepreneurs than those who are housewives and/or students. This reflects how important mobile is for empowering those who work. Findings of three studies in Egypt has confirmed that the empowerment for working women is higher compared to other non-working women, for example, Diab and Diab, (2016) showed that women's employment status explains about 1.4%, of the variance in rural women's overall empowerment. Also, Kishor, (1995) study, found out that women's work significantly affects their realized autonomy. And Sadania, (2016), has detected the relationship between different types of working and empowerment for rural and urban women in Egypt and found out that private-outside work has the greatest impact on empowerment, compared to home-based work and public work. Also, private work enhanced joint decision-making for women, while public sector work enhances rural women autonomy on the majority of decisions. As per the mobile as facilitator to empowerment, especially for those working women, in Egypt a study by Schiemer, (2017), has shown that some of the respondents have reported that because of the mobile they were able to satisfy their family's expectations as well as their work commitments and thus feel highly empowered. Results also showed that working women were those who use a high number of calls and also use high call durations than any other group, yet in texting, students came the highest. Also, students were the highest group in their usage variation, meaning that they use text, calls and also internet than any other group of women. Again this result is supporting those findings pertaining to Age and Marital status above.

- **Education:** The highest agreement that mobile facilitates WE, to access services and autonomy, came for those "university educated". Schiemer, (2-017) study showed that university educated young ladies were empowered by the use of their mobiles. Also, in Kishor, (1995), study, it was stated that m-odernization reflected in women's education, has affected women mostly by altering their views about women's role in decision-making and autonomy. However, our results found that there was no significant effect on the economic opportunity, meaning that seeing mobile as a tool for access to economic opportunity is not related to the level of education. This insignificant result conflicted with Khattab and Sakr, (2009) and Abdel Mowla (2009) results that found that women's access to education, is among the major factors that affect economic empowerment of women in Egypt. However, it was still evidenced by

Abdel Mowla (2009) study that raising female education level is not enough to boost women's economic empowerment; improving education quality is crucial as well. This could partly explain the results at hand that show a low effect of education on economic empowerment as compared to other empowerment dimensions. It could be also noted that the questions of empowerment are partly associated with mobiles as a main source of empowerment rather than empowerment in its abstract form. As per the relationship between usage of mobile and education; usage increases by the higher education level, where those who hold secondary, intermediate and university education were the higher in their number of calls, call durations and texting. Also the university educated women got the highest usage variation. Badran, (2014), has confirmed that lower levels of education correspond with divides related to access and use of ICT. Also according to connected women, 2015, field observations suggest that two forms of ID are needed to buy a SIM, however, because women are less likely than men to possess two different forms of identification, owning their mobile is limited by this barrier. Furtherly, this issue is a particular barrier for women from poorer households or who are less educated: 56% of low-educated women perceive this as a barrier compared to 32% of highly educated women and 38% of low-educated men ([connected women, 2015](#)).

- **Ownership:** The results show that there is a significant difference in all WE dimensions and also on all usage factors. It is also noted that the mean for those who have a mobile are all higher than those who do not have it on all the WE dimensions and usage factors. This means that those who own a mobile see that their mobiles give them higher empowerment than those who borrow it. Moreover, it means that they have more usage of it than those who do not own it. Badran, (2014) confirmed the association between mobile ownership and women empowerment.

## 8- Conclusion and Recommendations

This study tried to detect the relationship between mobile usage and empowerment for rural women in Egypt. The analysis was done on different levels, first the study detected the validity of the empowerment measure and its dimensions, where it supported the established literature that calls for the dimensionality of the concept. Secondly, the study flagged to the importance of differentiating these empowerment dimensions and examines them separately. This was proven by the

ANOVA and T-test results that not only showed that women with different demographic variables can have different empowerment levels, but also that the empowerment level could differ according to the dimension of empowerment being assessed. Lastly, the usage variation, also seem to differ according to the different demographic variables.

One key study findings suggest that mainly education and employment are two main channels through which policymakers can improve Egyptian women's situation. This is especially true given that our results suggested that woman who are moderately to highly educated and those who are workers, or self-employed are the most empowered. Consequently, on one hand, the current study urges that governmental policies should work on encouraging female education and enhancing female entrepreneurial skills. On the other hand, Egyptian mobile companies should focus its policies and campaigns on those set of women, and try to customize their services to those that sustain and enhance their empowerment.

Equally important, results showed that specifically young ladies feel more empowered with mobiles than old ones. Combining these findings with the results pertaining to the mobile usage, mobile companies should try to customize their services according to the age groups, where students and young females' empowerment may benefit from lower cost specifically on texting and net surfing.

Also, the findings assured that level of empowerment differs according to the marital status. It was noted that empowerment especially via access to education and health services, was determinant to those women who have children than any other women group.

Finally, ownership of the mobile was an important factor not only for empowering but also in facilitating different forms and levels of usages. Thereby, calling mobile companies to offer compatible prices and employ relevant pricing strategies that could ease the ownership of mobiles.

A general note in the current study is that the empowerment dimension "access to service" was the dimension that mostly differs with demographic factors as it varied with all the demographics assessed. Anatomy dimension followed next, with variations detected for age, living/job status and education variables. Lastly is the economic empowerment that significantly varied with only age and living/job status. This seems to be interesting reading to the analysis at hand and a one that assures the "variable" role of mobile in facilitating

empowerment according to the demographic characteristics of the users. In this study, mobile empowerment via facilitating access to service or autonomy compared to economic opportunities, seem to be highly dependent on the characteristics of the subjects involved.

## 9- Limitations and Future Research

In order to confirm the research findings, and understand it further, future research has to rely on cause and effect examinations rather than analysis of variance testing, and non-parametric tools, which could be considered one of the limitations of the present study. Another limitation could be the way the data was collected and which relied mainly on self-reporting surveys, although this could encounter some bias in the obtained results, however, this is less problematic when using validated scales (Spector, 2006); which are indicated by the validity and reliability tests, conducted. Moreover, it has to be noted that the women empowerment factors identified in this paper as well as the sentences used to measure it, are limited to the mobile and ICT application and not to be taken as a universal measure, however, this limitation could be justified by arguments that calls for treating empowerment as a context-specific variable (Assaad, et al., 2014). Finally, the size of the sample was affected by the nature of the sample settings and its unique culture; hence care should be taken when generalizing the findings. Consequently, future research is encouraged to include a bigger sample size.

Despite its limitations, this study attempts to draw some relevant conclusions that would thereby help practitioners and decision makers within the ICT field in Egypt, to improve their mobile services and customize their efforts in a way that would have positive developmental implications on their users, especially for those disadvantaged. The study also draws attention to the importance of discussing rural women conditions within the academic field, whereby accelerating a new stream of research that would take account of such deprived sample in Egypt.

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