

Empirical Study on Use of Online Social Networking Sites in the Kingdom of Saudi Arabia

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ABSTRACT

Online Social Networking sites (OSNs) provide Internet users with a useful medium for communication, interaction and collaboration. Reported usage of OSN has pervaded all segments of society irrespective of gender, age, nationality, or educational level. This study provides analysis of how demographic factors affect OSN adoption in the Kingdom of Saudi Arabia. The data represent a nationwide face-to-face survey of over 3000 respondents. Data stratification based on the population distribution across the Kingdom was used to select a portion of the samples from the provinces of the Kingdom. Statistical methods, including descriptive statistical analysis, logistic regression, the measure of association, and chi-square tests, were applied to analyze the data (Haight et al., 2014). OSN variables considered include the extent of usage by younger adults, usage by females, the role of education in the use of OSNs, and the dependence on the use of OSNs on the availability of technology such as mobile Internet. Findings show that education level plays a considerable role for OSN usage, teenagers and young adults use OSN more than others, Saudi nationals use OSN more than expatriates in the Kingdom, and OSN usage depends heavily on the availability of the mobile Internet.

Keywords: *Online social networking site, computer-mediated communication, country-specific developments, gender studies, statistical analysis.*

INTRODUCTION

Digital Divide

The term 'digital divide' generally is understood to refer to the gap between those that have access to modern ICT and those that do not, broken down among demographics and regions. The meaning has evolved with the advancement, availability, and utilization of technology by ordinary people.

The term 'modern IT technology' primarily refers to computers, smart phones/devices, and their connection to the Internet and broadband (D. Ruppel & C. P. Ruppel, 2009). As access to modern IT technology is necessary to bridge the digital divide, the level of digital divide may vary because of the different affluence of nations and of different socioeconomic groups within nations. In this context, Sait, Ali, Al-Tawil, & Sanaullah (2003) contend that the digital divide is a major concern because of the ensuing societal split into information-rich and information-poor groups.

The extent and the nature of this divide depends on the category governing access to information being considered. The possession of hardware is considered the governing factor which determines the growing divide among different categories of income, age, employment, etc., and, accordingly, Van Dijk & Hacker (2003) projected a growth of the gap. In another recent study, a different approach recently highlighted the need to change the focus on binary Internet access and suggested that Internet skills and usage be considered to determine the digital divide. Scheerder, van Deursen, & van Dijk (2017) proposed that the

tangible outcomes of the Internet use be highlighted. These conclusions show that the research on the digital divide is largely limited to sociodemographic and socioeconomic factors. Pearce & Rice (2017) concluded that the factors of interest regarding determining the digital divide have shifted beyond access and adoption to skill, usage, and new venues such as OSN etc. They posed the question whether digital divides persist across adoption/non-adoption of OSNs, across different OSNs, and across the different capital-enhancing activities used on those OSNs. Their analysis shows that social ties are more important for resource access, and large gaps exist between elites and non-elites.

Other indicators of the digital divide include Internet access, the level of online activity, and the usage of online social networking (OSN) (Haight, Quan-Haase, & Corbett, 2014). However, all Internet users do not realize the same type of benefits or share the same social values. Searching the web via a browser will yield different social benefits than using Twitter (Wellman, Haase, Witte, & Hampton, 2001). Participating in certain activities on the Internet can help users maintain social capital and create online content (Ellison, Steinfield, & Lampe, 2007). Use of OSN is highly dependent on the use of the Internet. Individuals who use the Internet are more likely to use OSNs and to a greater degree than others (Braun, 2013).

Because of its importance, Haight, Quan-Haase, & Corbett (2014) added OSN usage as a new indicator of the digital divide. In this study, the focus is on this third indicator. The aim of this study is to evaluate the demographic variables shaping the digital divide in Saudi Arabia and to measure their impact on the digital divide by analyzing OSN usage in the Kingdom. Similar to the work by Rahman, Hassan, Osman, & Waheed (2017) and Jaafar, Darmawan, & Ariffin (2018) on Malaysia, this work also investigates the behavior of users in Saudi Arabia.

Technology, Infrastructure, Internet Usage, and Growth

The advancements in telecom, IT, and mobile technologies, especially smartphones, have changed the way people communicate with each other around the globe. Shipments of smartphones globally exceeded those of personal computers for the first time in 2010, only three years from the launch of smartphones (Ackerman & Guizzo, 2011). Smartphones and tablet computers are used for daily chores such as online shopping (IDC, 2014; IMRG, 2015) and for OSN (Roberts, Yaya, & Manolis, 2014).

The use of OSN apps on smartphones allows people to be perpetually connected to friends and family and attend to their needs virtually on a real-time basis. Users can connect to the Internet as and when needed via smart devices through Wi-Fi and advanced mobile Internet technologies such as 3G/4G. According to Adler (2014), the use of OSN is a major Internet activity and more than half of the Internet users access OSN using their smartphones and tablets.

The Saudi Arabian Context: Plans and Services

Despite the slow start of the enrollment and incremental use of the Internet in the Kingdom of Saudi Arabia, Internet usage has increased sharply within a short span of time. Estimates indicate that there were 1 million users of the Internet in the Kingdom in 2001, which was 4.7% of the total population at that time. The number of Internet users increased to 30.5% of the total population by 2007 and has more than doubled to 63.7% by 2014 (CITC, 2014).

Saudi Arabia is among the top adopters of latest technologies, whether they are in telecommunications or IT. For example, 3G service licenses were granted to telecom operators in 2005, and 4G licenses were issued in 2011. Introduction of high speed Internet technologies such as Fiber to the Home (FTTH) and 3G/4G at affordable tariffs (within the Kingdom) have contributed to allowing the public to readily access the Internet. Mobile Internet usage has also grown. In 2010, only 11% of the mobile subscribers used 3G services (CITC, 2010). This has now increased to 81% for 3G/4G services (in the 12 to 65 age group). The rapid growth is both due to the high penetration of smart handheld devices (smartphones and tablets), and affordable tariffs (CITC, 2014).

The high penetration of smart phones, the availability of wireless connectivity at homes, and affordable mobile Internet tariffs have led to increased use of the Internet in Saudi Arabia, irrespective of the nationality, gender, and age of the users. The Internet has become one of the most important utilities in Saudi Arabia, and as a utility may be positioned right behind electricity and water. According to a survey conducted amongst individuals and households in the Kingdom of Saudi Arabia in 2014 (CITC, 2014), 80% of the Internet users (in the 12 and 65 age range) spend over 2 hours a day accessing the Internet.

The authorities foresaw the growing importance of mobile broadband technology and its impact on economic and social development and launched multiple projects to deploy mobile broadband services throughout the Kingdom. These were intended to help reduce the digital divide and to transform the Kingdom into a knowledge-based society (MoPE, 2013). Due to widespread Internet access and a vast number of flexible and secure services such as e-Banking (CITC, 2014), for example, multiple business ventures and entrepreneurship opportunities have become available. These are expected to help reduce unemployment and support the country in its journey towards a knowledge-based society.

Rationale and Objective of the Study

The digital divide remains a concern because it can affect the transition towards a knowledge-based society. In this paper, the usage patterns of social networking with reference to demographic factors such as the gender, residential status, age, education, occupation, and marital status are presented. The main objective is therefore to determine the influence of demographic factors on the use of OSN in the Kingdom of Saudi Arabia. The analysis reveals the demographic variables determining the digital divide. In addition, this study addresses the dependence of OSN usage on the widespread availability of mobile Internet (3G/4G) services across the Kingdom.

The relevant current literature are briefly reviewed in Section 2. In subsequent sections, the methodology, findings, and results are presented.

LITERATURE REVIEW

Currently, OSN is an important dimension of Information and Communication Technology (ICT). The International Data Corporation (IDC) has added OSN to the list of 3rd platform technologies and has predicted that these technologies would bring innovation, growth, and disruption across all industries and businesses (IDC, 2014). Social media including OSN offer its users a route to creating and distributing content or sharing and publicizing information of any kind (Kaplan & Haenlein, 2010). An example is the sharing of family photos using Instagram, which illustrates how OSN has become a boon for connecting with friends and family members around the globe. Boyd & Ellison (2007) defined OSN as:

Web-based services that allow individuals to (1) construct a public or semi-public profile within a bounded system, (2) articulate a list of other users with whom they share a connection, and (3) view and traverse their list of connections and those made by others within the system (Boyd & Ellison, 2007, p.2).

OSN has affected both individuals and businesses in many ways. While individuals tend to socialize through OSN platforms for sharing information about themselves and about nearby locations, businesses communicate through OSN platforms to make announcements, promote opportunities to customers, etc. OSN is becoming a de-facto communication tool among all Internet users.

The people of the Kingdom of Saudi Arabia are well acquainted with OSN technologies (LinkedIn, 2013; Richter, 2013; Statista, 2013b). The use of OSN is rapidly pervading the Saudi society. Both citizens and residents use OSN for sharing information, exchanging messages, and keeping in touch with family and friends. There are more than 1 million users registered from Saudi Arabia on LinkedIn (LinkedIn, 2013). Similarly, 4.1% of the active Twitter users globally are from Saudi Arabia (Richter, 2013). In Saudi Arabia, where over 32% of the population are expatriates from different countries, OSN provides the expatriates a link to communicate with their relatives and friends in their home countries. Similarly, businesses are also moving towards having a social presence on the Internet for both marketing and customer service purposes, and to keep in touch with visitors and customers.

Online Social Networking sites (OSNs) have become more easily accessible due to the advanced features available on smartphones (Sarwar & Soomro, 2013). In addition, the ubiquitous presence of mobile communication infrastructure such as advanced mobile Internet (3G/4G) and Wi-Fi technologies has enabled users to post comments, share videos, and keep abreast of the news anytime and anywhere in the world. A number of published studies enable us to trace the dramatic rise in usage. According to a 2011 report by the media ratings firm Nielsen (Wire, 2011), Internet users were spending a considerable amount of time on OSN sites such as Facebook. The study found that nearly half of the OSN users access the sites using mobile phones. Even individuals over the age of 55 are using OSN through mobile Internet. Estimates indicate that Facebook and Twitter users represented 82% of the Internet users around the world in 2013 (Shen, 2013). By the year 2013, 46% of the users had begun accessing OSN through mobile Internet, which is a significant increase from 16% in the year 2010 (Shen, 2013). In the US alone, the number of smartphone social networking users increased from 55.7 million in 2011 to 97.9 million in 2013, and 131.2 million were predicted using it by 2015 (Statista, 2013a).

Studies have found that OSNs are increasingly popular, especially among young people (Haight, Quan-Haase, & Corbett, 2014; Ramesh, Sam, & Shameem, 2014). The primary reason for the sustainability of OSN providers is because of the users sharing personal information on their platforms voluntarily (Xu, Michael, & Chen, 2013). The other reason for the popularity of social networking among young adults is the communication with other users on real-time basis (Ramesh, Sam, & Shameem, 2014).

Even though OSNs were popular among younger adults by 2013, adoption of OSNs by older adults has not been that rapid (Braun, 2013). The study by Braun (2013) attempted to understand the factors that will encourage older adults to use OSNs. Technology

Acceptance Model (TAM) was used as a framework of the study, and 124 Internet-using older adults aged 60–90 contributed to it.

User behavior on OSN was studied by Chang & Hsiao (2014). They classified the users into groups based on the time they spend on OSNs. This investigation of social behavior revealed that those who spend a considerable amount of time on OSNs were more willing to share personal information.

Older adults are increasingly adopting the use of OSNs. Access patterns also vary with age. The gender divide has reversed in favor of women, perhaps because these individuals are more motivated to use OSNs to complement or compensate for their prevailing social status. There are noteworthy unique challenges and motivations in relation to Internet access and OSN adoption patterns across the later life span of individuals (Yu, Ellison, McCammon, & Langa, 2016).

An opposite observation was made in a younger sample (18-29 years) in Chile (Correa, 2016). Socio-demographic factors and digital skills are shown related to the frequency and types of Facebook use. Males or more educated young people are shown to have higher skills, and digital skills do not determine the frequency of use. Contrary to the findings of other studies on the digital divide, it was shown that young people with a lower education tend to use the Facebook more frequently than more educated people. While more educated and skillful individuals tended to use Facebook for informational and mobilizing purposes, socio-demographic factors and skills did not make a difference in the use of Facebook for socializing purposes. Similar studies have been conducted by Hargattai (2007) and Feng & Xie (2015).

Similar to the findings of Correa (2016) in Chile, van Deursen & van Dijk (2014) via a survey of the Dutch people found that people with a lower level of education and disabled persons use the Internet for more hours a day in their spare time than individuals with a higher education and the employed population. They were able to identify a number of differences in the usage, including those demonstrated by people with a different gender, age, education, and Internet experience.

Blank (2016) has presented empirical results of the digital divide among Twitter users, similar to the work of Correa (2016) on Facebook users. Twitter users and non-users were compared with respect to their characteristic patterns of Internet activity along with key attitudes. The author determined that Twitter data are not suitable for research where representativeness is important, such as forecasting elections or gaining insight into attitudes, sentiments, or activities of large populations. The author claims that Twitter data seem to be more suitable for corporate use (e.g., to reach customers and promote products), than for social science research.

Statistical analysis with chi-square and logistic regression are usually employed to identify the relationship between variables (Haight, Quan-Haase, & Corbett, 2014). To statistically identify whether a significant relationship exists between two variables under observation, chi-square analysis for independence is usually used. This significance is determined by a critical value that is composed of degree of freedom (df) and level of significance (usually 0.05). The degree of freedom (df) is calculated using the standard formula of $df = (\#Row-1) (\#Column-1)$. In a chi-square test, a larger chi-square value means a greater relationship between the two variables. The p-value is a probability that is used to compare the calculated chi-square value against the empirical chi-square value in the chi-square distribution chart (Chi-Square Test, n.d.).

In order to identify the degree of correlation between variables, Spearman or Kendall correlation is usually used. The value of correlation coefficient lies between -1 to 1 where the extreme values reveal the perfect degree of association among variables under consideration (Statistics Solutions, n.d). If correlation coefficient value is equal to zero, then this means that no relationship exists between the variables. A positive (or negative) value indicates a positive (or negative) relationship between the variables.

The level of dependency cannot be identified using chi-square analysis. In order to identify the level of dependence of one variable among other variables, logistic regression is usually used. Logistic regression (Cox, 1958), also known as a logit model, is used to model dichotomous outcome variables. The binary logistic model is employed in (Haight et al., 2014) to predict a binary response based on one or more predictor variables or features (STAT 504, n.d.).

In the following section, the details of the methodology adopted in this study to identify the digital divide among residents of the Kingdom in terms of OSN usage, and how the demographic factors influence the use of OSN are presented.

RESEARCH METHODOLOGY

The method of data collection is similar to that used by Correa (2016). Our survey is based on face-to-face interviews with respondents from the entire Kingdom. The questions pertaining to OSNs used here are part of a larger project conducted by CITC through contracting the research center with which the authors are affiliated (CITC, 2014). The data collection activity commenced in the first quarter of 2014 and concluded in 2014. From the data collected from individuals, 3,000 samples were selected randomly for analysis.

Data stratification based on the population distribution across the Kingdom was used to select a portion of the samples from each of the 13 provinces of the Kingdom of Saudi Arabia to identify respondents. Using this strategy, the respondents were grouped on the basis of the population of regions. The number of respondents from each region is shown in Table 1. The sample size of 3,000 gives a confidence level of 95% with a margin of error of less than 2%. The confidence level is the amount of uncertainty that can be tolerated, whereas the margin of error is the amount of error that is acceptable. The survey only targeted citizens and residents of Saudi Arabia and excluded those who came to Saudi Arabia for a visit or as tourists. The targeted age-group is between 12-65 years.

After identifying the number of samples to be collected from each province, respondents were identified within each province based on the following: nationality (Saudi or Non-Saudi), gender, and age. For example, in the first row of Table 1, of the 767 respondents required from the Riyadh province, 470 males (239 Saudi and 230 expatriates) and 297 females (215 Saudis and 82 expatriates) were selected based on the population distribution. Of the 239 Saudi males, there were 23 from age group 12-14, 37 from the age group 15-19, and so on. Similar distribution was made for male expatriates, and for females. Subsequently, load sheets prepared according to the above requirement were distributed to the surveyors to target only those age ranges, genders, and nationalities that were in the load sheets given to them. Each load sheet prepared had the characteristics required for 20 respondents. A surveyor was given more than one load sheet to be used depending on their capability and desire to collect data.

Table 1: Sample distribution over the entire kingdom.

Province in the Kingdom	Population Between Age-range (12-65 years)	% Over Total Target Population	Approx. Samples Per Region
Al-Riyadh	4,983,932	25.57	767
Makkah Al-Mokarramah	5,004,575	25.67	770
Al-Madinah Al-Monawarah	1,223,458	6.28	188
Al-Qaseem	870,403	4.47	134
Eastern Region	3,055,208	15.67	470
Aseer	1,318,913	6.77	203
Tabouk	527,163	2.70	81
Hail	421,212	2.16	65
Northern Borders	219,050	1.12	34
Jazan	935,603	4.80	144
Najran	341,278	1.75	53
Al-Baha	285,542	1.46	44
Al- Jouf	307,088	1.58	47

Face-to-face surveying was used to interview the respondents and collect the required data. The reason for choosing the face-to-face survey method was because it yields a representative national sample when compared to other survey methods such as telephone surveys and Internet-based surveys (Szolnoki & Hoffmann, 2013). Surveyors reached out to individuals in their dwellings, working in their offices, and present at public places (such as malls, parks, etc.). iPads, smart phones, and other such devices were used to collect the data. An app was used to allow continuous access to the survey and collect data in an offline survey mode. A self-hosted survey tool server was used, and data were uploaded directly to the server whenever Internet connectivity was available. Surveyors were instructed to read each question and its options aloud to the respondents, and were trained on the survey app to record responses directly on the survey app.

The recruitment process of surveyors consisted of two stages. In the first, surveyors with an IT background in the entire Kingdom were identified. Assistance from faculty and students' clubs in the Kingdom's universities was sought. Of the surveyors, 70% were senior students from different universities. Surveyors were given intense training via group sessions held in different cities of the Kingdom. The focus of the group sessions was on emphasizing/highlighting the purpose of conducting the study, clarifying the meaning of questions, and creating awareness of the social and ethical responsibilities during data collection, etc., so that they would not face difficulties while in the field. A hotline for backend support was also available to address any queries of the surveyors.

The required data were identified before preparing the questions. The authors were interested in information regarding the use of OSN related to different demographics, mode of access, and medium from which participants access OSN, e.g., mobile Internet, etc. In addition, authors were also interested in identifying the OSNs popular among the users. The respondents who were using the Internet, were asked whether they had used OSN in the preceding six months. Only those who responded in the affirmative were asked the subsequent follow-up questions about their usage of different platforms and about their activities on OSN sites.

Results based on both simple percentage analysis and statistical analysis with chi-square, measure of association, and logistic regression were obtained. Chi-square test was conducted on OSN usage data against demographic variables to identify whether dependencies exist among them. Logistic regression was chosen because of its wide application in the social sciences. An approach similar to Haight et al. (2014) was employed, and odds ratio and 95% Confidence Interval (C.I.) were obtained using logistic regression analysis. Table 2 shows the percentage sample sizes of respondents for different demographic characteristics.

Table 2: Respondent profiles.

Demographic Variables	Percentage (%)
Gender	
Male	62.86
Female	37.14
Residential Status	
Saudi Nationals	61.22
Expatriates having Residence Permit	38.78
Age	
12-14	4.92
15-19	10.69
20-24	17.36
25-34	32.51
35-44	20.30
45-54	10.50
55-65	3.73
Education	
No Formal Education	2.87
School	43.60
Degree (Diploma)	11.02
Degree (Under Grad)	36.20
Degree (Post Grad)	6.30
Marital Status	
Single	43.83
Married without children	10.66
Married with children	37.85
Divorced	1.78
Widow(er)	0.83
Occupation	
Student	27.94
Homemaker	7.79
Employed	54.44
Others	9.83

RESULTS AND INTERPRETATION

In this section, the results of the survey and the interpretation of the findings are presented.

General Characteristics of the Population

A dichotomous variable was used to determine whether the person being surveyed used OSN in the preceding 6 months. The demographic variables, shown in Table 1, were included in the analysis. These variables include gender, residential status, age, occupation, education, and marital status. The residential status variable reports the status of respondents within Saudi Arabia, in which Saudis are considered nationals while expatriates are considered residents of Saudi Arabia having work or family visas. Age was included as a categorical variable, in which young teens and teenagers were placed in the age range of 12-14 and 15-19 years, respectively.

For the occupation, respondents who indicated that they were students were included in a separate group, while "Others" grouped respondents who are either retired or unemployed. Education variable depicted the level of education the respondent has achieved, whereas the marital status is a self-explanatory variable that showed the current marital status of the respondent. Table 3 shows the cross-tabulated detailed statistics for demographic variables for OSN usage.

Popularity of different OSN platforms in Saudi Arabia

Figure 1 depicts the popularity of different OSN platforms in Saudi Arabia. Photo-sharing website Instagram is also very popular when compared to other well-known OSN sites such as Facebook and Twitter. Keek is a new emerging platform in Saudi Arabia. As seen in Figure 2, OSN users in Saudi Arabia prefer to use mobile and handheld devices over desktop Personal Computers (PCs). Figures 3 and 4 show the popularity of different OSNs among gender and age groups. An interesting finding is that females use Twitter, Instagram, and Keek more than males. On the other hand, Facebook and LinkedIn are more popular among males. Facebook, Twitter, and Instagram are more popular among teenagers and young adults than with others. OSN has proven to be a great medium to keep in touch with friends and families in Saudi Arabia.

Table 3: Detailed statistics for demographic variables for OSN usage.

Demographic Variables	% OSN usage
Gender	
Male	91
Female	90
Residential Status	
Saudi Nationals	92
Expatriates having Residence Permit	89
Age	
12-14	93
15-19	97
20-24	97
25-34	93
35-44	90
45-54	78
55-65	65

Occupation	
Student	97
Homemaker	76
Employed	91
Others	87
Education	
No Formal Education	47
School	89
College/Diploma	93
University (Grad)	95
University (Post Grad)	94
Marital Status	
Single	95
Married without children	91
Married with children	87
Divorced	85
Widow(er)	64
Prefer not to answer	90

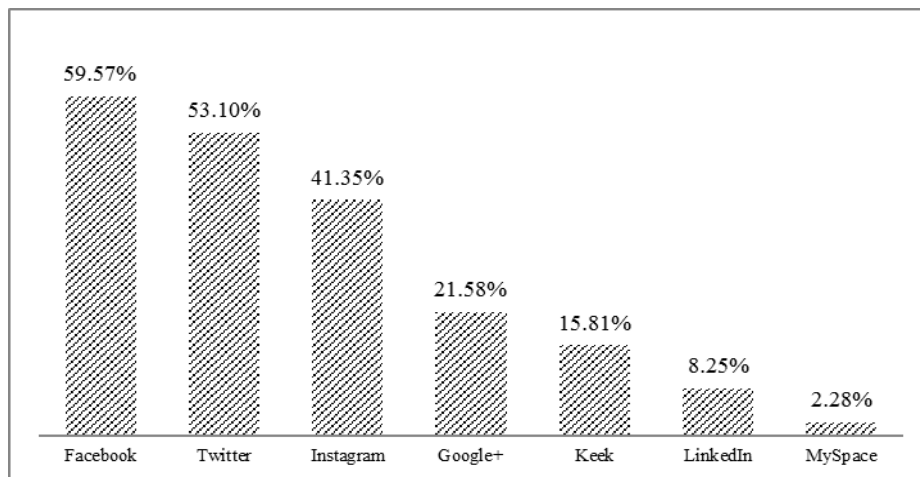


Figure 1: Popularity of different OSN platforms.

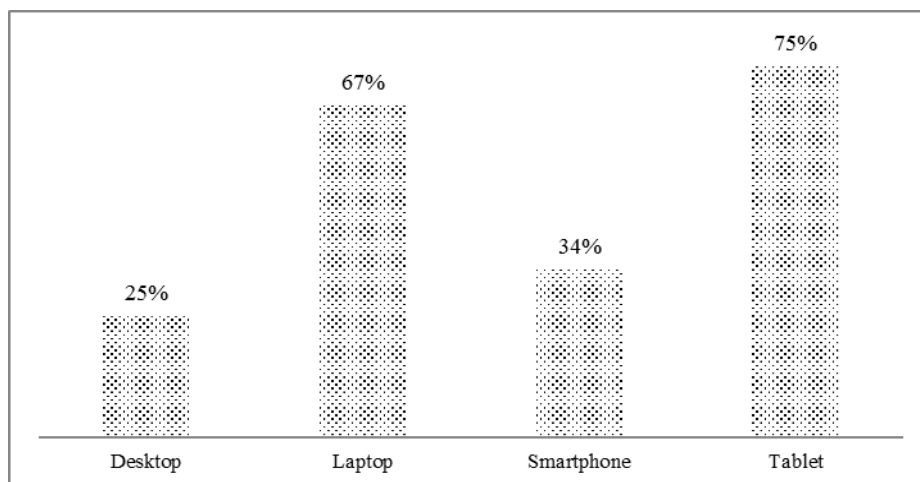


Figure 2: Medium of OSN usage.

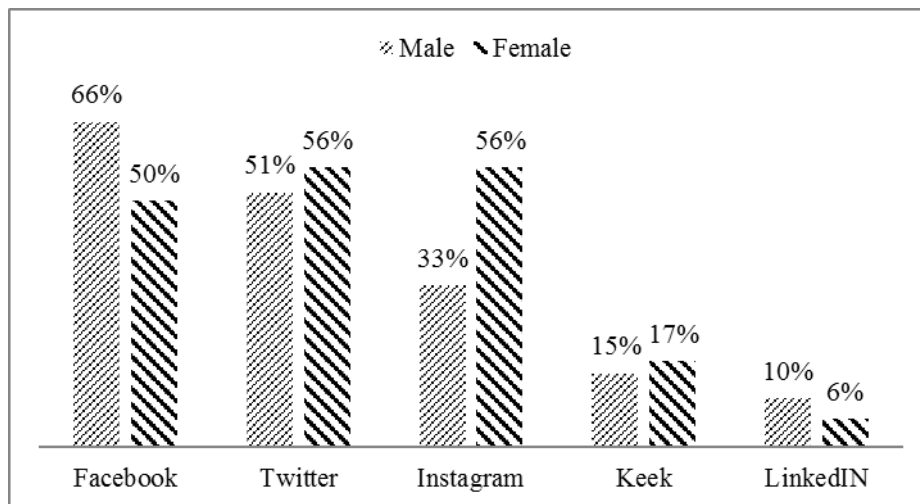


Figure 3: Popularity of well-known OSN sites among genders.

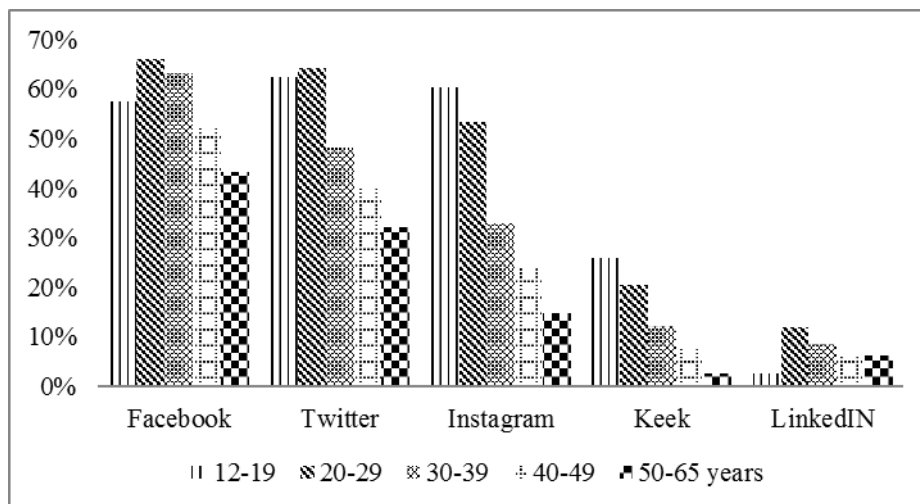


Figure 4: Popularity of well-known OSN sites among different age groups.

Predicting the use of OSNs

Below we discuss the investigation of whether a relationship between OSN usage along different demographic variables exists. To begin with, the hypotheses were tested using chi-square analysis for independence to determine whether the use of the OSN and demographic variables are related. H1 through H6 identify null hypotheses to determine whether the use of OSN as a way of online communication does not depend on demographic variables namely: gender, nationality, age, occupation, education, and marital status respectively. The following hypotheses were tested using chi-square analysis. Table 4 summarizes the results of chi-square analysis.

- H1: Use of OSN as an online communication tool does not depend on the gender.
- H2: Use of OSN as an online communication tool does not depend on the nationality.
- H3: Use of OSN as an online communication tool does not depend on the age.
- H4: Use of OSN as an online communication tool does not depend on the occupation.
- H5: Use of OSN as an online communication tool does not depend on the education.
- H6: Use of OSN as an online communication tool does not depend on the marital status.

Table 4: Chi square results.

Hypothesis	H ₁	H ₂	H ₃	H ₄	H ₅	H ₆
Demographic Variable	Gender	Nationality	Age	Occupation	Education	Marital Status
chi square	1.17	13.08	196.32	100.33	229.70	47.41
Df	1	1	6	3	4	5
P	>0.05	<0.05	<0.05	<0.05	<0.05	<0.05

In Table 4, the degree of freedom (df) is calculated using the standard formula of $df = (\#Row-1) (\#Column-1)$, where a Column designates the variable for OSN usage and a Row is used for the demographic variable. In this study, the significance level or critical value for p is 0.05.

Following conclusions can be drawn from the use of the p-value from the chi-square table chart. Except for hypothesis H1 (for the gender), the other hypotheses can be rejected. The level of OSN use as a way of online communication in Saudi Arabia does depend on the nationality, age, occupation, education, and marital status. Hence, null hypotheses, H2 to H6, are rejected. For H1, the null hypothesis is accepted and can conclude that the use of OSN does not depend on the gender, as both males and females in Saudi Arabia use OSN similarly.

Also, to find measures of association between the variables, Kendall and Spearman Correlation statistics methods were used (Statistics Solutions (n.d)). As indicated earlier, no association exists between gender variable and OSN usage. Some degree of correlation exists among OSN usage and other demographic variables.

In order to identify the level of dependence on the OSN use among different demographics, logistic regression is used. Table 6 provides the differences in OSN usage of different demographic variables obtained using logistic regression. The analysis provides β , from which the Odd Ratio (OR) is calculated as e^{β} . OR is an indication of the dependence of that variable with respect to the reference value.

As shown earlier using hypothesis H1, the usage of OSN is independent of gender, and the odds of men and women using OSN are similar. Regarding the difference among nationalities, for $\beta=0.46$, OR is 1.58 with a small error (StdErr) of 0.13, indicating that Saudi nationals have 58% more likelihood of using OSNs compare to expatriates ($\beta=0.46$; $SE=0.13$; $p<0.01$). Age is a strong predictor of OSN usage, where teenagers and young adults are more likely to use OSN than elderly and senior citizens. Similarly, the level of education is highly associated with the usage of OSN. Respondents with post graduate degrees have 80% higher likelihood of using OSN as compared to respondents with only a school education. Respondents who are currently studying have a higher likelihood of using OSN than those who are no longer students. Individuals who are either retired or unemployed have a higher likelihood of using OSN over homemakers ($\beta=0.73$; $SE=0.23$; $p<0.01$). Interestingly, respondents who are either single or married but do not have children have a higher likelihood of using OSN than the respondents who are married and have children.

Respondents were also asked whether they had accessed OSN using mobile Internet from their smart devices. Table 7 examines the dependence of OSN on mobile Internet for different demographic variables using logistic regression. The odds of individuals using OSN are higher due to the availability of mobile Internet in Saudi Arabia. Saudis are more likely to access OSN sites using mobile Internet when compared to expatriates ($\beta=1.33$; $SE=0.11$; $p<0.01$). Teenagers and young adults have a higher likelihood of using OSN through mobile

Internet than elderly and senior citizens. Females are more likely to use OSN via mobile Internet than males. Respondents with undergraduate degrees have 87% higher likelihood of using OSN via mobile Internet when compared to respondents having only a school education. Individuals who are either studying or employed have a higher likelihood of using OSN via mobile Internet than others in the same category. Interestingly, respondents who are either single or married but do not have children have a higher likelihood of using OSN using mobile Internet than respondents who are married and have children.

Table 5: Listing Symmetric measures for OSN usage for demographic variables.

Demographic Variables	Category	Statistic	Value	Asymp. Std. Error	Approx. T
Gender	Ordinal by Ordinal	Kendall's tau-b	0.02	0.02	1.07
		Kendall's tau-c	0.01	0.01	1.07
		Spearman Correlation	0.02	0.02	1.08
Nationality	Ordinal by Ordinal	Kendall's tau-b	0.07	0.02	3.68
		Kendall's tau-c	0.04	0.01	3.68
		Spearman Correlation	0.07	0.02	3.84
Age	Ordinal by Ordinal	Kendall's tau-b	-0.18	0.02	-9.84
		Kendall's tau-c	-0.13	0.01	-9.84
		Spearman Correlation	-0.2	0.02	-11.3
Occupation	Ordinal by Ordinal	Kendall's tau-b	0.06	0.01	3.94
		Kendall's tau-c	0.04	0.01	3.94
		Spearman Correlation	0.06	0.02	3.38
Education	Ordinal by Ordinal	Kendall's tau-b	0.11	0.02	6.52
		Kendall's tau-c	0.07	0.01	6.52
		Spearman Correlation	0.12	0.02	6.5
Marital Status	Ordinal by Ordinal	Kendall's tau-b	0.1	0.02	5.58
		Kendall's tau-c	0.07	0.01	5.58
		Spearman Correlation	0.11	0.02	5.85

Table 6: Logistic regression investigating OSN usage for demographic variables.

Model with 95% C.I.

Demographic Variables	β (Coefficient)	StdErr (SE)	OR (e^{β})
Gender			
Female (reference)	-	-	-
Male	0.14	0.13	1.15
Residential Status			
Expatriates (reference)	-	-	-
Saudi	0.46**	0.13	1.58
Age			
55-65 (reference)	-	-	-
12-14	1.99**	0.38	7.33
15-19	2.8**	0.38	16.55
20-24	2.8**	0.32	15.78
25-34	1.93**	0.23	6.90
35-44	1.57**	0.24	4.79
45-54	0.61*	0.24	1.83
Education			
School (Reference)	-	-	-
No Formal Education	-2.23**	0.23	0.10
College/Diploma	0.53*	0.24	1.71
University (Under Grad)	0.81**	0.16	2.24
University (Post Grad)	0.59*	0.31	1.80
Occupation			
Homemaker (reference)	-	-	-
Student	2.21**	0.25	9.10
Employed	1.09**	0.17	2.98
Others	0.73**	0.23	2.07
Marital Status			
Married with children (reference)	-	-	-
Single	0.98**	0.15	2.66
Married without children	0.41*	0.21	1.50
Divorced	-0.16	0.39	0.85
Prefer not to answer	-0.05	0.24	0.95

* $p < 0.05$, ** $p < 0.01$

Table 7: Logistic regression investigating OSN usage behavior among Mobile Internet users.
 Model with 95% C.I.

Demographic Variables	β (Coefficient)	StdErr (SE)	OR (e^{β})
Mobile Internet User			
Does not use OSN (reference)	-	-	-
Use OSN	1.95**	0.13	7.07
Users accessing OSN using mobile Internet			
Gender			
Female (reference)	-	-	-
Male	-0.47**	0.12	0.63
Nationality			
Expatriate (reference)	-	-	-
Saudi	1.33**	0.11	3.77
Age			
55-65 (reference)	-	-	-
12-14	0.47	0.38	1.61
15-19	0.32	0.33	1.38
20-24	1.30**	0.34	3.67
25-34	0.63	0.31	1.88
35-44	-0.26	0.31	0.77
45-54	-0.28	0.32	0.76
Education			
School (reference)	-	-	-
No Formal Education	0.47	0.48	1.61
College/Diploma	-0.22	0.16	0.80
University (Under Grad)	0.63**	0.13	1.87
University (Post Grad)	0.32	0.23	1.37
Occupation			
Homemaker (reference)	-	-	-
Student	0.78**	0.22	2.19
Employed	0.47*	0.20	1.60
Others	-0.96**	0.23	0.38
Marital Status			
Married with children (reference)	-	-	-
Single	0.66**	0.13	1.94
Married without children	0.37	0.19	1.44
Divorced	-0.61	0.34	0.54
Prefer not to answer	-1.39**	0.18	0.25

* $p < 0.05$, ** $p < 0.01$

CONCLUSION AND DISCUSSION

This study addresses the extent of the digital divide among residents of the Kingdom of Saudi Arabia in terms of OSN usage, and how the demographic factors influence the use of OSN. Our investigation reveals that the use of OSN is rapidly pervading the Saudi society. Both citizens and residents use OSN for sharing information, exchanging messages, and keeping in touch with family and friends. OSN also provides the expatriates a link to communicate with their relatives and friends in their home countries. OSN utilization is expected to increase in the future.

This was a comprehensive nationwide survey from all provinces of the Kingdom of Saudi Arabia and indicates that citizens use OSN more than expatriates ($\beta=0.46$; $SE=0.13$; $p<0.01$), and teenagers and young adults use OSN more than others. With regard to specific social networking sites, adults over the age of 20 use LinkedIn, a good medium for professional activities such as job hunting, career growth, and staff recruitment. In usage patterns, there is not much difference between users who are employed or unemployed, or those who have retired.

Education divide exists in terms of OSN usage activity. The OSN usage is highly linked with the level of educational level. The higher the education level, the higher chances of people using OSN. This result is in contrast with (Haight, Quan-Haase, & Corbett, 2014) which observed that OSN usage is significantly higher by those with less than a high school education compared to high school graduates.

Our investigation reveals that those respondents who are married but with no kids had 50% higher odds of using OSN than those married and having kids. Another finding from this study is that Saudi citizens use OSN more compared to expatriates. Saudi nationals had 58% higher odds of using OSN as compared to expatriates. Also, these odds became even higher when Saudi nationals use the OSN using mobile Internet.

In the case of young adults who are currently studying, 38% indicated that they spend 8 or more hours a day on OSN, and 25% indicated that they spend 4 to 8 hours a day on OSN. OSN usage depends heavily on the availability of mobile Internet. A large number of OSN users prefer to use the mobile Internet.

Like any other technology, OSN has its uses but it also can be misused. In the future, the current work can be extended to determine how OSN usage may have led to a change in the way people in the Kingdom learn, communicate, spread knowledge, share information, and interact with others. Individuals use OSN very frequently. This overuse is a concern and has disadvantages that may affect the broader social behavior, performance, and, most importantly, the health of individuals. Salehan & Negahban (2013) noted that overuse of social networking may cause social and psychological problems including reduced confidence, lack of interpersonal communication skills, and break-up of personal relationships. OSN has become a significant communication channel at the current time, shaping communication practices, and affecting cultural and social values. Future studies may have to consider such factors to analyze how OSN influences the behavior and traits of individuals, and its impact on social and cultural values of the Kingdom.

Another area to consider is to exploit the benefits of OSN in the education domain. OSN can also be used in the areas of awareness, team building, collaboration, and creativity. Utilization of OSNs in the Kingdom can enable educators to harness its untapped potential to improve the learning experience of today's Internet savvy generation.

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REFERENCES

- Ackerman, E., & Guizzo, E. (2011). 5 technologies that will shape the web. *Spectrum*, 48(6), 40-45. doi: 10.1109/MSPEC.2011.5779788
- Adler, E. (2014). Social media engagement: The surprising facts about how much time people spend on the major social networks. *Business Insider*. Retrieved from <http://www.businessinsider.com/social-media-engagement-statistics-2013-12>
- Blank, G. (2016). The digital divide among Twitter users and its implications for social research. *Social Science Computer Review*. doi:10.1177/0894439316671698
- Boyd, D. M., & Ellison, N. (2007). Social network sites: Definition, history, and scholarship. *Journal of Computer-Mediated Communication*, 13, 210–230. doi: 10.1111/j.1083-6101.2007.00393.x
- Braun, M. T. (2013). Obstacles to social networking website use among older adults. *Computers in Human Behavior*, 29(3), 673-680. doi:10.1016/j.chb.2012.12.004
- Chang, T. S., & Hsiao, W. H. (2014). Time spent on social networking sites: Understanding user behavior and social capital. *Systems Research and Behavioral Science*, 31(1), 102-114. doi: 10.1002/sres.2169
- Chi-Square Test. (n.d.). Retrieved from <http://www2.lv.psu.edu/jxm57/irp/chisquar.html>
- Communication and IT Commission, Riyadh, Saudi Arabia (CITC). (2010). A comprehensive study on the state of ICT market development in Saudi Arabia. Retrieved from <http://www.citc.gov.sa/English/Reportsandstudies/Studies/Pages/TheStateofICTMarketDevelopmentinSaudiArabia.aspx>
- Communication and IT Commission, Riyadh, Saudi Arabia (CITC). (2014). ICT survey results 2014 for individuals report. Retrieved from <http://www.citc.gov.sa/en/Reportsandstudies/Studies/>
- Correa, T. (2016). Digital skills and social media use: How Internet skills are related to different types of Facebook use among 'digital natives'. *Information, Communication & Society*, 19(8), 1095-1107. doi: 10.1080/1369118X.2015.1084023
- Cox, D. R. (1958). The regression analysis of binary sequences. *Journal of the Royal Statistical Society, Series B (Methodological)*, 215-242. Retrieved from <http://www.jstor.org/stable/2983890>
- Ellison, N. B., Steinfield, C., & Lampe, C. (2007). The benefits of Facebook "friends:" Social capital and college students' use of online social network sites. *Journal of Computer-Mediated Communication*, 12(4), 1143-1168. doi: 10.1111/j.1083-6101.2007.00367.x
- Feng, Y., & Xie, W. (2015). Digital divide 2.0: The role of social networking sites in seeking health information online from a longitudinal perspective. *Journal of health communication*, 20(1), 60-68. doi: 10.1080/10810730.2014.906522
- Haight, M., Quan-Haase, A., & Corbett, B. A. (2014). Revisiting the digital divide in Canada: The impact of demographic factors on access to the internet, level of online activity, and social networking site usage. *Information, Communication & Society*, 17(4), 503-519. doi: 10.1080/1369118X.2014.891633
- Hargittai, E. (2007). Whose space? Differences among users and non-users of social network sites. *Journal of Computer-Mediated Communication*, 13(1), 276-297. doi: 10.1111/j.1083-6101.2007.00396.x
- International Data Corporation (IDC). (2014). The smart (phone) shopper, challenges and opportunities for retailers. Retrieved from https://www.idc.com/download/IDC_TheSmart%28Phone%29Shopper_Infographic_Jan2014.pdf

- Interactive Media in Retail Group (IMRG)*. (2015). Mobile accounts for 40% of all online retail sales (2015). Retrieved from <http://www.imrg.org/mobile-accounts-for-40-of-all-online-retail-sales->
- Jaafar, N. I., Darmawan, B., & Ariffin, M. Y. M. (2018). Social networking site technology preference: Similarities and differences in Malaysia and Indonesia. *Jurnal Komunikasi: Malaysian Journal of Communication*, 34(1).
- Kaplan, A. M., & Haenlein, M. (2010). Users of the world, unite! The challenges and opportunities of social media. *Business horizons*, 53(1), 59-68. doi: 10.1016/j.bushor.2009.09.003
- LinkedIn. (2013). One million get LinkedIn in Saudi Arabia. Retrieved from <https://press.linkedin.com/site-resources/news-releases/migrated/2013/09/one-million-get-linkedin-in-saudi-arabia>
- Minister of Economy and Planning (MoPE)*. (2013). National strategy for the transition to a knowledge society. Retrieved from <http://www.mep.gov.sa/inetforms/themes/clasic/article/articleView.jsp?Article.ObjectID=100>
- Pearce, K. E., & Rice, R. E. (2017). Somewhat separate and unequal: Digital divides, social networking sites, and capital-enhancing activities. *Social Media+ Society*, 3(2), 2056305117716272. doi: 10.1177/2056305117716272
- Rahman, N. A. A., Hassan, M. S. H., Osman, M. N., & Waheed, M. (2017). Research on the state of social media studies in Malaysia: 2004-2015. *Jurnal Komunikasi: Malaysian Journal of Communication*, 33(4).
- Ramesh, A., Sam, A., & Shameem, D. A. (2014). Social media networking and its impact on day-to-day activities with special reference to young adults. *International Journal of Logistics & Supply Chain Management Perspectives*, 2(4), 442-447. Retrieved from: <http://pezzottaitejournals.net/index.php/IJLSCMP/article/view/993>
- Richter, F. (2013). *Twitter's top 5 markets account for 50% of active users*. Retrieved from <http://www.statista.com/chart/1642/regional-breakdown-of-twitter-users/>
- Roberts, J., Yaya, L., & Manolis, C. (2014). The invisible addiction: Cell-phone activities and addiction among male and female college students. *Journal of Behavioral Addictions*, 3(4), 254-265. doi: 10.1556/JBA.3.2014.015
- Ruppel, D., & Ruppel, C. P. (2009). A university/community partnership to bridge the digital divide. *Encyclopedia of Information Science and Technology* (2nd ed.), 3880-3889. doi: 10.4018/978-1-60566-026-4.ch618
- Sait, S. M., Ali, S. H., Al-Tawil, K. M., & Sanaullah, S. (2003). *Trends in Internet usage & its social effects in Saudi Arabia*. Retrieved from http://faculty.kfupm.edu.sa/coe/sadiq/richfiles/rich/ppt/Social%20Effects_Malaysia.ppt
- Salehan, M., & Negahban, A. (2013). Social networking on smartphones: When mobile phones become addictive. *Computers in Human Behavior*, 29(6), 2632-2639. doi: 10.1016/j.chb.2013.07.003
- Sarwar, M., & Soomro, T. R. (2013). Impact of smartphone's on society. *European Journal of Scientific Research*, (98). Retrieved from <http://www.researchgate.net/publication/236669025>
- Scheerder, A., van Deursen, A., & van Dijk, J. (2017). Determinants of Internet skills, uses and outcomes. A systematic review of the second-and third-level digital divide. *Telematics and Informatics*. doi: 10.1016/j.tele.2017.07.007

- Shen, X. (2013). Security and privacy in mobile social network [Editor's Note]. *Network*, 27(5), 2-3. doi: 10.1109/MNET.2013.6616107
- STAT 504 (n.d.). Analysis of discrete data: Binary logistic regression with a single categorical predictor. *The Pennsylvania State University*. Retrieved from <https://onlinecourses.science.psu.edu/stat504/node/150>
- Statista. (2013a). Number of smartphone social network users in the United States from 2011 to 2017 (in millions). Retrieved from <http://www.statista.com/statistics/238636/number-of-mobile-social-network-users-in-the-us/>
- Statista. (2013b). *Penetration of leading social networks in Saudi Arabia as of 4th quarter 2014*. Retrieved from <http://www.statista.com/statistics/284451/saudi-arabia-social-network-penetration/>
- Statistics Solutions* (n.d). Correlation (Pearson, Kendall, Spearman). Retrieved from <http://www.statisticssolutions.com/correlation-pearson-kendall-spearman/>
- Szolnoki, G., & Hoffmann, D. (2013). Online, face-to-face and telephone surveys—Comparing different sampling methods in wine consumer research. *Wine Economics and Policy*, 2(2), 57-66.
- Van Deursen, A. J., & Van Dijk, J. A. (2014). The digital divide shifts to differences in usage. *New media & society*, 16(3), 507-526. doi: 10.1177/1461444813487959
- Van Dijk, J., & Hacker, K. (2003). The digital divide as a complex and dynamic phenomenon. *The Information Society*, 19(4), 315-326. doi: 10.1080/01972240309487
- Wellman, B., Haase, A. Q., Witte, J., & Hampton, K. (2001). Does the Internet increase, decrease, or supplement social capital? Social networks, participation, and community commitment. *American Behavioral Scientist*, 45(3), 436-455. doi: 10.1177/00027640121957286
- Wire, N. (2011). *Social media report: Spending time, money, and going mobile*. Retrieved from <http://www.nielsen.com/us/en/insights/news/2011/social-media-report-spending-time-money-and-going-mobile.html>
- Xu, F., Michael, K., & Chen, X. (2013). Factors affecting privacy disclosure on social network sites: an integrated model. *Electronic Commerce Research*, 13(2), 151-168. doi: 10.1007/s10660-013-9111-6
- Yu, R. P., Ellison, N. B., McCammon, R. J., & Langa, K. M. (2016). Mapping the two levels of digital divide: Internet access and social network site adoption among older adults in the USA. *Information Communication & Society*, 19(10), 1445-1464. doi: 10.1080/1369118x.2015.1109695