

# The Impact of “Device” in Social Networking: An Explorative Study with Turkish Social Network Site Users on the Nature of Interactions through Personal Computers and Smartphones<sup>\*</sup>

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**Abstract.** The purpose of this study is to explore the nature of interactions that develops around social networks through two major device categories: PC and smartphones. This study specifically aims to focus on the reasons for the preference of PC and smartphones distinctively and tries to reveal the significant patterns of usage for social networking through both platforms. This quantitative research employs a survey conducted with a sample of 203 Turkish people who are using PCs and smartphones for accessing social networking sites regularly.

**Keywords:** Personal Computer, Smartphone, Social Network Site, Interaction.

## 1 Introduction and Theoretical Background

Social networking sites (SNS) encourage audience participation through computer-mediated discussions with other members of the community, called “friends” or contacts [1]. Boyd and Ellison [2] define SNS as web-based services that allow users to share a public or private profile with common users and explore connections with others within the site. People who engage in social networking on the Internet are both audience members and active participants at once, as users share information and content with each another. New technologies have helped ordinary users learn how to generate and distribute their original content through various channels on the Internet [3]. Through online socializing, users become part of larger publics and social networks, and develop into members of virtual communities [4]. Users create personal profiles that consist of different kinds of biographical information, personal preferences, pictures, music, blogs and comments from friends [5].

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Research on SNS is an area of growing interest in human-computer interaction and social sciences. Social networking sites are popular online communication forms among adolescents and emerging adults. Yet little is known about young people's activities on these sites and how their networks of “friends” relate to their other online and offline networks [6]. Although research on young people's use of social networking sites is emerging (e.g., [2]; [6]; [7]), questions remain regarding exactly what young people do on these sites, with whom they interact and how their social networking site use relates to their other online (such as instant messaging) and offline activities. At this point, the literature reveals that surveys are employed as efficient instruments to investigate social networking thoroughly.

There are surveys conducted on mobile internet and social media use among different user categories. Pew Internet [8] investigated the social media and mobile internet use among teens and young adults. The research revealed that in the last two years, both teen and adult use of SNS has risen significantly, yet there are shifts and some drops in the proportion of teens using several social networking site features. Adults are increasingly fragmenting their social networking experience. As a majority of those who use SNS have two or more different profiles. Facebook is currently the most commonly-used online social network among adults. The specific sites on which young adults maintain their profiles are different from those used by older adults: Young profile owners are much more likely to maintain a profile on MySpace but less likely to have a profile on the professionally-oriented LinkedIn. Wireless internet use rates are especially high among young adults and the laptop has replaced the desktop as the computer of choice among those under thirty (Pew Internet, 2010). Teens are not using Twitter in large numbers. While teens are bigger users of almost all other online applications, Twitter is an exception. However, there is a significant increase in Twitter use and three groups of internet users are mainly responsible for driving the growth of this activity: social network website users, those who connect to the internet via mobile devices, and younger internet users – those under age 44 [9].

The survey of Ericsson Consumer Lab [10] presents findings on the internet and social media use of Turkish users both on desktop and mobile platforms. Data is derived from a field study based on structured interviews with 760 participants and online survey with 763 participants. The findings showed that SNS are the most popular services on the internet for all user categories. 54 % of the participants connect to SNS daily whereas 21 % connects weekly. Contrarily, the participants mostly declared negative attitudes about SNS. 56 % of them declared that users caused the exploitation of their privacy by sharing too much personal information on SNS. 45 % of them thought that SNS have negative impact on the users' communication skills and their abilities to express themselves in Turkish. 48 % of the participants are content of mobile high-bandwidth and use it mostly for personal needs. 16 % use mobile internet for more than 6 hours a day whereas 17 % use it for 3 to 6 hours and 25 % use it 1 to 3 hours a day. Today's smartphone market is mostly dominated by cell phones with 2G connection. The 3G phones have a penetration ratio of 24 % whereas smartphones constitute only 5 % of the overall market. However, future projections point out to the dominance of 3G phones (42 %) and smartphones (17 %). Web surf, access to SNS and status update on SNS are the first three most popular services on mobile phones. Facebook and MSN are the most popular mobile websites followed by Youtube and Google Talk [10].

Besides, some online surveys focus on usability issues in SNS. As a significant example, user experience consultancy, Webccredible [11] carried out a social network usability poll. The research polled more than 1,100 online users between December 2009 and March 2010 on which social networking site they find easiest to use. The study revealed that Facebook and Twitter are considered the easiest to use SNSs but a substantial number of Internet users feel that no social networking sites are easy to use.

The purpose of the present study is to explore the nature of interactions that develops around social networks through two major device categories: PC and smartphones. This study specifically aims to focus on the reasons for the preference of PC and smartphones distinctively and tries to reveal the significant patterns of usage for social networking through both platforms in Turkey. Departing from a user-centered design approach, the study also investigates if the nature of interactions in social networking differs due to the capabilities and constraints specific to each device category. Thereby, our empirical analysis aims at addressing, among others, two research questions of the study that may be summarized as follows: (1) what are the reasons for the preference of PCs and smartphones distinctively for a specific interaction in social networking? and (2) how do capabilities and constraints of different devices affect user experience in SNS? Besides these main research questions, we are interested on the effects of different characteristics of SNS users, such as age and gender. In order to accomplish this task, we perform a battery of statistical and econometric tests based on a survey that we designed specifically for the present study. More precisely, to conduct our research, after constructing the database from the survey, principal component analysis (PCA) is employed to reduce the dimensionality of the data set (having many items for each question), and then different model specifications are considered to assess possible relationships between the variables of interest. In a multivariate framework, the fact that respondents use a given application from SNS (e.g. sharing videos, updating status, commenting on photos or links, etc.) whether on a PC or a smartphone is considered as a dependent variable, while personal characteristics are taken for independent variables together with frequency of visiting SNS and other patterns. From such an analysis, it is possible to detect interactions between SNS user characteristics, choice of devices and usage patterns. Applying the same methodology but in another framework, it is also possible to investigate differences in motivation of different choices made by the SNS users. This allows us to figure out which sites and which applications are preferred to be used on smartphones or on the PC, thus increasing our understanding of the way how social interactions take place on SNS.

The rest of the paper is organized in the following way: first, Section 2 presents the data providing some summary statistics and describes the methods used in the study. Then, the results of the empirical analysis and their interpretation are given in Section 3. Finally, Section 4 concludes the paper.

## **2 Data and Methodological Aspects**

In the first step of our empirical study, we conduct our analysis by means of the statistical techniques of factor and principal component analysis. Since this method provides a very useful and simple approach for multivariate survey data analysis, it

has been used so far in several areas of social science and engineering applications. The main idea of principal component analysis (PCA) is to reduce the dimensionality of a large data set having an important number of interrelated variables. By doing so, this analysis enables us to retain as much as possible the variation present in the data set. Basically, it consists of a linear transformation of the original data set into a smaller number of uncorrelated principal components which are ordered so that the first few give the maximum residual variance, retaining thus most of the variation present in all of the original variables. In other words, PCA provides an alternative set of coordinate axes given by the principal components representing the original data set. Furthermore, these principal components are orthogonal to each other so that their ranking gives the relative amount of information that each one carries<sup>1</sup>. The second step of our analysis consists of using the factor scores obtained during the PCA as dependent variables of the ordinary least square (OLS) regression models in order to show that different variables may have different impacts on each of these factors.

A sample of 203 Turkish SNS users was surveyed on various topics on social networking, such as use of SNS, attitudes about the choice of devices, and the content shared on whether PC or mobile phone. It should be noted that sample sizes vary much by item depending on the number of survey participants who answered the relevant questions. But for each question the number of respondents is at least 80. The data gathering was done anonymously in January 2011 by means of an online questionnaire using *SurveyGizmo* (a survey host for building online forms and collecting data). Some summary statistics giving average scores for each item of different questions and cross-tabulation reports from the survey are given in Table A1 in Appendix A. We use this table and the information it provides in the next section.

Since for a given question there is a number of items, in order to determine subsets of items that fall into different dimensions of the information searched by that question, principal factor analysis produces factors, which can be then easily analytically categorized. Another important advantage of our methodology is that since the inclusion of correlated variables (i.e. items in each question) in the same regression would create a multicollinearity problem, the PCA can transform a set of correlated variables into a set of uncorrelated principal components, which is thus a way to resolve this multicollinearity problem [14]. In consequence, based on the resultant factor analysis, one can calculate factor score variables to be used in the regression models having no severe multicollinearity<sup>2</sup>.

### 3 Results and Discussions

In this section first we report and discuss the results obtained from the PCA, and then we summarize the estimates of the regression analysis<sup>3</sup>.

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<sup>1</sup> To conserve space we do not discuss in detail the methods based on factor and principal component analysis which are well documented in the literature. See for instance [12] and [13].

<sup>2</sup> For further discussion on multicollinearity bias in regression parameter estimates see [15].

<sup>3</sup> Space limitations prevent us from reporting all the results obtained in this paper. All unreported results of this and the following section are available from the authors upon request.

### 3.1 Factor Analysis

As briefly discussed in the previous sections, the aim of conducting factor analysis is twofold: (1) factors reduce number of items in the questionnaire and make it possible the identification of different types of motivations in choosing applications and devices; and (2) these resulting factors may be then used as the predictors of interest in analyzing both user preferences and characteristics (i.e. age and gender).

In this way, we determine subsets of items for each question that represent different dimensions of the concept in question. This method enables us to see whether preferences of PCs and smartphones change for a specific interaction in SNS. To begin, consider the following question (Q1 in Table A1): to which SNS you connect? Our results indicate that items (internet sites) listed above this question cannot be used to construct factors that contain the essential information in the data set. In other words, sharing no common variance, these items cannot be empirically distinguished. However, a descriptive analysis reveals that Turkish SNS users prefer connecting at SNS on their PCs rather than their smartphones. This general rule seems to be valid for all SNS included in the questionnaire. Furthermore, differences in the preferences between PC and smartphone are higher for the case of Youtube, Picasa and Flickr. We should underline at this point that the survey results show that Turkish SNS users do not prefer to use a wide range of SNS. Facebook, Twitter and Youtube are the most widely used SNS among Turkish users.

Consider now the items shared in SNS (Q2 in Table A1). When we apply the same technique, two principle factors emerge, one related to a passive multimedia activity – video, music and link sharing – and another related to a more interactive information sharing activity – posting photos, status updating or writing comments. The behavior of SNS users do not vary whether they use PC or smartphone. The meaning of this finding is simply that, independent of the choice of device, sharing picture, comment or status updating should be considered as actions “different” than sharing video, link or music. We will discuss this conclusion in the light of the regression results. Taking into account the content of activity on SNS (Q3 in Table A1) all items are found to be in the same factor for both PC and smartphones, that is, no preference between these items. However, motivations in connecting to SNS are found to be different with respect to PCs or smartphones. More precisely, in Q4, although for the case of PCs, there is a principal factor that includes all items, for the case of smartphones, the first four items constitute the first factor while the last item constitutes the second. This means that “to meet new people” is a motivation that differs whether using PC or smartphone. This point will be further clarified in the following section. Finally, note that factor analysis gives some other interesting but not that surprising results. To give some examples, consider the content shared in SNS (i.e. Q8) for which, for the case of PC usage, location updating is found to be in the same principal factor as group or event activity (items 10-12), while passing to smartphone usage, the same item appears to move from this factor to another consisting of profile and status updating. On the other, for another question (not reported here) survey participants are asked for the activities that they make with people outside of their friend list. The results indicate that while for the case of PC usage, all items (i.e. viewing his/her profile, reading activities on his/her wall, looking his/her pictures, watching his/her videos and playing game with him/her) build a unique factor, for the case of smartphones, first three items give the first factor and the last two give the second.

### 3.2 Regression Results

In this section, in order to provide further information about the SNS usage we perform some econometric tests. In the first step, we estimate by OLS the following multivariate regression model:

$$Y = bX + \varepsilon \quad (1)$$

where  $Y$  is a vector of observations on the dependent variable,  $X$  is a matrix of explanatory variables that are hypothesized to influence the dependent variable in question,  $b$  is the vector of coefficients to be estimated and  $\varepsilon$  is the error term.

Recall that from the factor analysis we found out that, for the question Q2 (i.e. what to share in SNS), two factors distinguish the items listed below the question. Now we put each of these factors on the left hand side of Eq. (1) as the dependent variable. On the right hand side, we test different combinations of some explanatory variables, namely, age, gender and frequency to connect SNS (which constitute thus the matrix  $X$ ). Some interesting results have been found through the OLS regression. On PCs, taking into account the frequency and regardless of the factor, sharing activity of women is significantly higher than that of men. On the other hand, for the case of smartphones, the frequency has no effect on the factor related to the passive multimedia activity (described above). However, irrespective of gender or age, frequency has a significant positive effect on the second factor representing a dimension of a more interactive sharing in SNS.

Returning back to Q1, which is, connecting to different SNS, we run both OLS and tobit regressions considering the scores for each SNS as dependent variable and the above mentioned covariates as independent variables. Our results indicate clearly that, after controlling for frequency to use and spending time on the SNS, for the case of PC, Facebook is mostly visited by women and young users, Twitter is preferred by again women and Youtube is a site that is mostly visited by young people. On the other hand, for the case of smartphones, the difference in gender disappears and only young people seem to visit mostly Facebook.

We analyzed the activity of SNS users according to their interaction with other users. Two questions help to understand the user preferences on the choice of device. The first question (Q10 in Table A1) asks how often user interact with (i) a friend, (ii) a group of friends, (iii) someone out of the list, and the second question explores by which activity they choose to often interact with other user, (i) viewing the activities on their wall, (ii) viewing their photos, (iii) viewing their videos, (iv) viewing their profiles, (v) gaming. We first analyzed for each device separately which of the preferences to interact with others are interrelated. The multi-equation mixed modeling<sup>4</sup> helps to analyze, by computing the residual covariance structure between interaction preferences, the effects of gender, age and frequency to use SNS on the dependent variable, that is, the frequency of interacting with others. The regression

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<sup>4</sup> We use STATA module `cmp` for multi-equation mixed modeling with OLS. The dependent variable is the frequency to interact with others (3 preferences) and common covariates are age, gender and frequency to use SNS. A residual covariance between 3 equations, significantly different from zero, reveals that preferences are correlated. Further references on STATA module can be found in [16].

results show that while PC users’ preferences with respect to whom they interact are (positively) correlated, smartphone users’ preferences are interrelated except the interaction with someone not on the list. A simple check of this pattern can also be verified with Q4 in the survey. The smartphone users do not prefer to use SNS to meet and interact with new people. This pattern might be related to three major factors: meeting and interacting with someone out of the list is a (1) time consuming and (2) costly activity for smartphones in comparison to PCs (see in Table A1, Q7). Another explanation might be (3) the poor performance of smartphones related to multitasking. If we assume that to be interested with others is not a major activity but an accompanying activity, smartphone users might not use different applications at the same time (multitasking) or cannot open multiple tabs inside one application (e.g. being not able to view others’ profiles or walls on Facebook while watching a video on Youtube). These results bring us to the second question mentioned above. In fact very few people (only 16% of the respondents) interact often with other users on smartphones. Furthermore, in case of preferring to interact, for both PCs and smartphones, viewing profiles and photos found to be the most common way of interaction with other users.

## 4 Concluding Remarks

In this paper, we have provided some descriptive and econometric analyses based on a survey that quantified the preferences of Turkish SNS users. Our results indicate that there exist several differences between the use of PCs and smartphones for a specific interaction in SNS. However, the device choice does not seem to be decisive in most of the cases. For Turkish SNS users, at least for the survey respondents, based on the result that SNS usage is rather limited by Facebook, Twitter and Youtube, the range of activity is not wide and seems to be limited to only power users. It should be noted that there are also some specific constraints in the use of smartphones which do not provide a multiple application environment (multitasking). The connection cost of mobile phones might be another concern for Turkish users. While their usage patterns for a specific application appear to be similar, multiple application usage differs between PCs and smartphones due to these constraints.

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## Appendix A: Statistics of SNS Usage

**Table A1.** Summary Statistics

Q1. To which social networking sites you connect?	Q2. What to share in SNS		Q3. Content of your activity on SNS					
	PC	Mobile	PC	Mobile	PC	Mobile	PC	Mobile
Facebook	6.05	5.38	Photos	4.23	3	Comments on recent events	3.93	3.11
Twitter	3.95	3.55	Comment	4.64	3.84	Personal / emotions/ reactions	3.24	3.25
Friendfeed	1.68	1.31	Status	3.39	3.34	Information about work/school	2.86	2.44
Myspace	1.81	1.11	Information/News	4.1	3.1	Information about your activity	3.18	2.86
Picasa	2.03	1.12	Video	3.54	1.92	Comments on liked events	3.76	3.14
Flickr	2.1	1.19	Music	3.45	1.98	Comments on yours friends activity	4.58	3.57
Youtube	5.15	3.05	Link	4.06	2.58	No. Resp.	84	84
Linkedin	2.25	1.4	No. Resp.	89	89			
No. Resp.	91	91						

  

Q4. What is motivation in connecting to SNS	Q5. Hours spent in SN			Q6. Frequency to connect to SN					
	PC	Mobile		PC	Mobile		PC	Mobile	
To interact with my friend	5.8	5.18	< 1 hour	28.1%	70.5%	1-5 times a day	40%	56.3%	
To read recent comments on current events	4.74	3.97	1-2 hours	31.5%	17.0%	6-10 times a day	26.7%	23%	
To read recent news	5.02	4.27	2-3 hours	21.3%	4.5%	11-20 times a day	16.7%	10.3%	
To enjoy	4.93	4.27	> 3 hours	19.1%	8.0%	>20 times a day	16.7%	10.3%	
To meet new people	2.28	1.78	No. Resp.	89	89	No. Resp.	90	90	
No. Resp.	89	89							

  

Q7. What are the advantages of Smartphone usage	Blackberry	Nokia	Samsung	IPhone	Others	total
Availability to connect any time any where	6.82	6.5	6.42	6.64	6.89	6.63
Keyboard or Touch Screen	5.36	5.3	5.08	5.07	5.44	5.21
Small Screen	3.27	2.2	2	2.5	2.89	2.5
One-handed Usability	5.09	4.1	3.75	4.54	4.33	4.36
Flexible Screen Position	4.09	4.15	3.42	4.93	4.78	4.38
Automatic Location Information	3.64	3.7	3.42	4.75	5.11	4.17
Smart and Simple Page Design	5.36	5.15	5.08	5.68	5.22	5.36
Speed of Connection	5.82	5.5	5.67	5.86	5.67	5.71
Page Design is limited to certain Tasks	3.64	2.45	2.58	2.61	4.67	2.94
Not to Personalise the page according to needs	4.18	2.1	2.92	2.86	4.22	3.01
The Connection Cost	2.09	1	1.42	1.39	2.89	1.56

**Table A1.** (Continued)

Q8. What to share in SNS						
	Blackberry	Nokia	Samsung	iPhone	Others	Total
Photos	3.09	2.9	1.67	3.47	3.2	3
Comment	4.45	3.9	3.67	3.77	3.6	3.84
Status	3.45	3.76	3.17	3.13	3.2	3.34
Information/News	3.27	3.52	3.25	2.83	2.8	3.1
Video	2.09	1.62	2	2.03	1.93	1.92
Music	1.73	1.86	2.25	2.13	1.8	1.98
Link	2.73	2.38	2.58	2.73	2.47	2.58

Q9. Your activity in SN			Q10. With whom your activity on SN is related		
	PC	Mobile			
Recents events on my wall	4.92	4.05	Myself	5.33	4.94
Share photos on my wall	3.36	2.8	One of my friends	3.77	3.24
Creating photo album	3.39	2.02	A group of friends	3.4	2.64
Post videos on my wall	3.46	1.8	Someone out of my list	1.71	1.29
Creating video album	1.63	1.23	No. Resp.	80	80
Post a link to my wall	3.78	2.43			
Update my profile	3.71	2.49			
Update my status	3.57	3.34			
Update my location	1.95	2.22			
Create a new group	1.67	1.18			
Participate to a group	2.47	1.59			
Create a new event	2.13	1.34			
Participate to a new event	3.22	2.35			
Gaming	2.19	1.46			
Use applications	2.61	1.89			
No. Resp.	83	83			

Notes: In questions Q1, Q2, Q3, Q4, Q9 and Q10, 1 stands for "Never" and 7 for "Very Frequently". In questions Q7 and Q8, 1 stands for "Not an advantage" and 7 for "A big advantage".