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Alan Peslak

Patricia Sendall

Merrimack College, [sendallp@merrimack.edu](mailto:sendallp@merrimack.edu)

Wendy Ceccucci

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# Analysis of the Variables that Affect Frequency of Use and Time Spent on Social Networking

Alan Peslak  
arp14@psu.edu  
Information Sciences & Technology  
Penn State University  
Dunmore, PA 18512 USA

Patricia Sendall  
patricia.sendall@merrimack.edu  
Management Information Systems  
Merrimack College  
North Andover, MA 01845 USA

Wendy Ceccucci  
wendy.ceccucci@quinnipiac.edu  
Information Systems Management  
Quinnipiac University  
Hamden, CT 06518 USA

## Abstract

This manuscript provides a comprehensive review of the many potential variables associated with the use of technology and tests their applicability to social networking. Variables were included from a variety of well accepted theories including Theory of Reasoned Action, Diffusion of Innovation, Theory of Planned Behavior, Technology Acceptance Model and End User Computer Satisfaction. Prior studies have explored variables and factors that influence social networking intention and behavior. This study is an extension of prior studies that separately reviewed emotions associated with social networking behavior and intention as well as applying the TRA model and the Diffusion of Innovation theory model to behavioral intention. This study is unique in that it does not review the intention or usage of the technology but rather explores the frequency of use and the amount of time spent using the technology. In addition, it is a comprehensive look at variables from a number of important behavioral theories as well as emotions. As a result, we can explore a comprehensive review of many variables effect on the relative importance of the technology and its time and frequency penetration on the part of users rather than just a generic variable measuring agreement with an intention to use and actual use.

**Keywords:** Social Networking, SMS, Texting, Theory of Reasoned Action, Diffusion of Innovation, Technology Acceptance Model

## 1. INTRODUCTION

Professional networking began as a way for business professionals to make contacts with others in their fields, whether it was to market oneself, market a product, or just share a common interest. With the assistance of Internet technology, it didn't take long for online social networking to catch on (Peslak, Ceccucci, Sendall, 2012). In an attempt to understand social networking behavioral factors associated with the use of technology, this paper explores social networking behavior using variables from five models on human behavior: End User Computer Satisfaction (EUCS); Theory of Reasoned Action (TRA); Theory of Planned Behavior (TPB); Technology Acceptance Model (TAM) and Diffusion of Innovation (DI). The authors explored variables from each of these models for their effect on social networking usage. In addition, the authors included several common emotion factors in the statistical analysis.

## 2. LITERATURE REVIEW

### Social Networking

Social networking is the process by which individuals increase the number of their business and/or social contacts by making connections through other individuals. Social networking is not a new phenomenon; interestingly, the term was coined in 1954 by social scientist J.A. Barnes (TechTarget, 2006). In recent years, social networking has proliferated through the use of software applications and internet technologies. These create interconnected communities using technology that facilitate contacts between people that may have been unlikely to happen without the technology (TechTarget, 2006). Some examples of popular social networking sites are Facebook, LinkedIn, Twitter, YouTube, Google+ and Pinterest. In addition to the desire to increase one's number of business and social contacts, specifically, why do people use social networking? According to Pew Internet, two-thirds of online adults use some form of social media platform. Of that number, approximately two-thirds say that staying in touch with family and friends was the major reason for using social media applications and sites, and half of the online adults reported that they use social networking to connect with old friends with whom they lost touch (Smith, 2011).

For job seekers and recruiters, LinkedIn is still the top social networking site. According to Forbes, of the employment opportunities posted on social networking sites, 77% are on LinkedIn, 54% are on Twitter, and only 25% are posted on Facebook (Adams, 2012). In 2011, there were 4.2 billion professionally oriented searches on the LinkedIn platform and two new members join LinkedIn every second. The USA has 57 million members, Europe has 34 million members. Twitter boasts 465 million accounts, with 175 million tweets per day and 1 million new accounts are added every day (Bullas, 2012).

Facebook remains the number one social media site with 850 million monthly active users; of those, 425 million are mobile users (Bullas, 2012). Nearly 91% of college students use Facebook as their social networking application of choice; however less than 25% use it as a job-searching tool, according to the National Association of Colleges and Employers (2011). Further, nearly 71% of the Class of 2011 expected potential employers to view their Facebook and other social networking profiles. From a business perspective, 80% of U.S. firms report using Facebook and 61% of those companies describe listening to what consumers say about them on social networks. One company reported estimating that one single negative tweet or Facebook post could cost a company approximately thirty customers (Ritchie, 2012). Social networking offers a variety of advantages as an alternative method of communication in business. Row (2009) suggests four key areas where business can be improved through increased use of social networking:

1. Increase the size of your network, increase the number of customers
2. Ability to build a personal relationship with people
3. Establishing an online reputation
4. Low cost marketing

Many individuals get their news from online sources, but only 9% of U.S. adults get their news from Facebook or Twitter. However, according to Pew Research Center (Moire, 2012), Facebook is the number one social media site to drive users to online news sites. About 70% of U.S. adults get news links from friends and family on Facebook.

While 93% of all teens ages 12-17 go online, just 73% are on a social network. The average teen has 201 Facebook friends, however only 8% use Twitter. Teens use social networking sites to post comments on friends' walls (86%), to comment on friends' posted pictures (83%) and to send private messages to them (66%) (Thomas, n.d.)

According to the Nielsen Company (2012), nearly all social media users (97%) access social networking sites from their computers. Access via mobile phone is a distant second with 34.4% of males and 38.5% of females using this device to visit their favorite sites. However, while the computer is the tool of choice across ages, almost 60% of the users between the ages of 18-34 use their mobile devices to visit social networking sites, followed by 36% of users ages 35-64 and almost 13% of users 55 and above. Users are multitasking while visiting social networking sites. Forty-four percent of smart phone and tablet users reported visiting social networking sites while watching TV. The top sites visited while watching TV were Facebook, YouTube, Zynga and Google Search (The Nielsen Company, 2012).

Pinterest and Instagram are relative newcomers to the social networking arena. Instagram is a social photo sharing application for mobile devices that allows users to take a photo, apply a filter to enhance the photo, then share it on Twitter, Facebook or to email. It was launched in November 2010. In September 2011, Instagram had 10 million users and 150 million uploaded photos (Bullas, 2012).

Pinterest allows users to "pin" images and videos on an online pin board. It was established in December 2009 and launched as a closed beta site in March 2010. In December of 2011 Pinterest became one of the top 10 largest social networks with 11 million visits per week. Today, there are over 10 million registered users and nearly 12 million unique monthly visitors (Bullas, 2012).

### **Variables and Mathematical Models**

This work is an extension of a prior study (Ceccucci, Peslak & Sendall, 2010) that reviewed the variables from the five noted models of human behavior and explored their effect on intention to use social networking and actual social networking behavior. Specifically the variables that were reviewed included:

compatibility, complexity, relative advantage and visibility from Diffusion of Innovation (DI); attitude from the Theory of Reasoned Action (TRA); perceived behavioral control from the Theory of Planned Behavior (TPB); ease of use and usefulness from the Technology Acceptance Model (TAM); and timeliness from End User Computer Satisfaction (EUCS). A brief overview of each of these models is given below.

### **Rogers' Diffusion of Innovation Theory**

According to Rogers diffusion is "a process by which an innovation is communicated through certain channels over time among the members of a social system." Diffusion of Innovation theory attempts to explain how, why, and at what rate new ideas and technology are communicated and adopted.

Rogers (1995) identified five factors five major factors affecting the rate of adoption. These factors are:

- relative advantage - the degree to which the adopter perceives the innovation to represent an improvement in the innovation it supersedes.
- complexity - the degree to which the innovation is difficult to understand or apply.
- compatibility- the degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of potential adopters.
- trialability refers to the capacity to experiment with the new technology before adoption.
- observability or visibility refers to the degree to which the results of the innovations are visible to others.

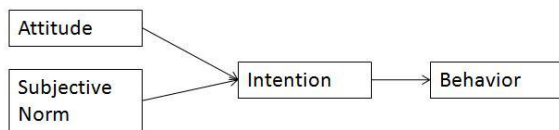
According to Rogers (1995) critical mass occurs when enough individuals have adopted the innovation and its further rate of adoption becomes self-sustaining.

### **Theory of Reasoned Action**

Theory of Reasoned Action (TRA), developed by Ajzen and Fishbein (1980) has continued to be an important model for measuring user behavior (Brewer, Black, Rankin & Douglas, 1999; Pak, 2000; Wooley & Eining, 2009; and Woyke, 2011). The model is shown in Figure 1. TRA suggests that a person's behavioral intention depends on the person's attitude about the behavior and subjective norms. Intention to use

is a common behavioral factor (Bahmanziari, Pearson, & Crosby, 2003; and Lu, Yu, & Liu, 2005). Actual behavior generally follows intention in a variety of models (Bahmanziari, Pearson, & Crosby, 2003; and Wortham, 2011). Definitions of the models factors are as follow:

- Attitude - how we feel about the behavior and is generally measured as a favorable or unfavorable mind-set.
- Subjective norm - is how the behavior is viewed by our social circle or those who influence our decisions.
- Intention -is the propensity or intention to engage in the behavior.
- Behavior - is the actual behavior itself.



**Figure 1:** Theory of Reasoned Action Model

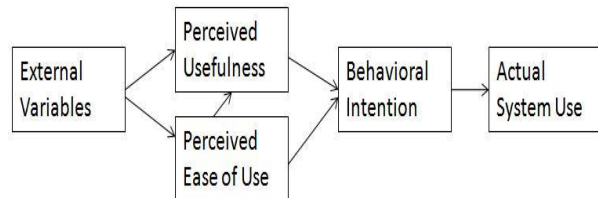
### Theory of Planned Behavior

Ajzen’s Theory of Planned Behavior (TPB) is an extension of Ajzen and Fishbein’s TRA Model (Ajzen, 1985; Ajzen & Fishbein, 1980). TPB includes an additional factor, perceived behavioral control which is a person’s “perceptions of their ability to perform a given behavior” (Ajzen, 1985). In other words, the person’s perceived ease or difficulty of performing the behavior. The greater a person’s perceived behavioral control, the stronger should be their intention to perform the behavior. For example, “if I consider that I have the necessary resources (e.g. time, means of transport) to attend a meeting with a class teacher then I am more likely to form an intention to perform the behavior...of meeting with the class teacher” (Williamson, 2009).

### Technology Acceptance Model

One of the most important models for understanding adoption of information technology is the Technology Acceptance Model (TAM). The model was first proposed by Davis in 1989 and includes two key factors, perceived usefulness and perceived ease of use that are proposed to influence acceptance of a technology. According to Davis (1989) perceived usefulness is defined as “the degree to which a person believes that using a particular system would enhance his or her job performance”. Others have extended this

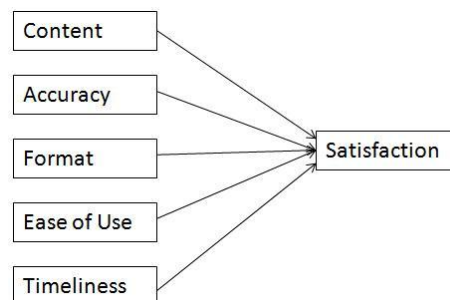
definition to include overall task performance (Simon & Paper, 2007). Again, according to Davis (1989) perceived ease of use is “the degree to which a person believes that using a particular system would be free of effort”. The Technology Acceptance Model is illustrated in Figure 2 (Venkatesh & Morris, 2000).



**Figure 2:** Technology Acceptance Model

### End User Computing Satisfaction

Ease of use and timeliness factors used to evaluate the effect of social networking behavior were taken from the dimensions used in the End User Computing Satisfaction Instrument, shown in Figure 3. The EUCS instrument was developed by Doll and Torkzadeh (1988) and is an extension of the User Information Satisfaction Model (UIS) that was previously developed by Ives, Olson and Baroudi (1983). The EUCS instrument defines five factors that influence user satisfaction: content, accuracy, format, ease of use, and timeliness. Timeliness measured whether the information was supplied in time and if it was up to date.



**Figure 3:** End User Computing Satisfaction Instrument

### Emotions

Many researchers have found that emotions can play a role in performance. Peslak and Stanton (2007) found emotions to have an impact on team performance. Other researchers, Glinow, Shapiro & Brett (2004), and Sy, Cote &

Saavedra (2005) have shown that emotions can play a significant role in project success. To study the impact of emotions on social networking, a small group of four positive emotions was included in the survey. The list was extracted from Shaw (2004) and others.

### 3. RESEARCH APPROACH

A comprehensive survey was developed to explore all aspects of social networking usage. The survey included key questions used in the development of past studies of Theory of Reasoned Action, Technology Acceptance Model, Theory of Planned Behavior, End User Computer Satisfaction, Expectation/Confirmation Theory, and Diffusion of Innovation. Appendix 1 shows the variables, model, and source for questions that were used in this study. One key question was selected for each variable. The study was pre-tested with a small group of students and then administered to students and faculty at two Northeastern universities as well as a limited group of professionals in industry.

The statistical analyses were based on a sample of 196 valid surveys. The demographic mix shows a traditional college student population with 96% of the participants between the ages of 18 and 24. The gender mix was slightly skewed with 64% females.

The questions measured a five point Likert scale with level of agreement from 1 = strongly agree to 5= strongly disagree.

### 4. RESULTS

The variables noted above were analyzed using SPSS 17.0 using multiple regression analysis. As noted, past studies have reviewed these variables relative to behavioral intention and use. Our study explored this further by examining the frequency of usage and time spent with each technology. The goal of this study was to determine the relative importance of the technology through its time and frequency penetration on the part of users rather than just a generic variable measuring agreement with an intention to use and actual use. Figures 4 and 5 below shows the frequency and time spent on Social Networking.

A prior study of the data (Peslak, Ceccucci, & Sendall, 2011) revealed that the factors subjective norm and attitude significantly correlated with intention to use social networking. Another study of Diffusion of Innovation revealed that compatibility,

complexity (reverse), and trialability were significantly correlated with behavioral intention. A separate study found some inverse effect of a few emotions on usage of social networking. But this study revealed somewhat different results. Though these factors may be important in an overall intention to use or in isolation, they do not necessarily map to frequency or time spent when many variables are considered.

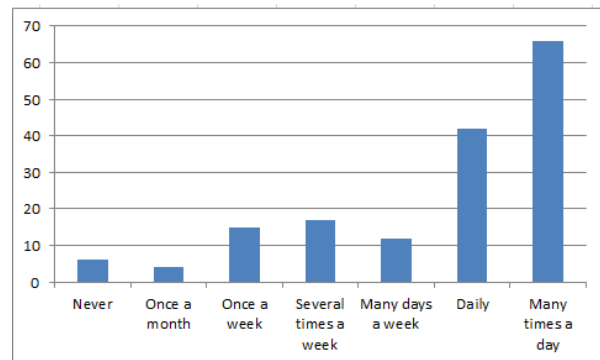


Figure 4: Frequency of Use

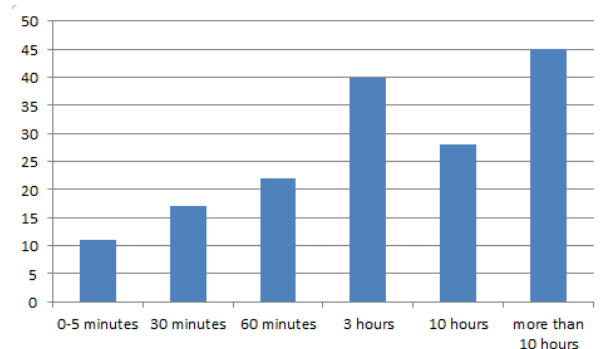
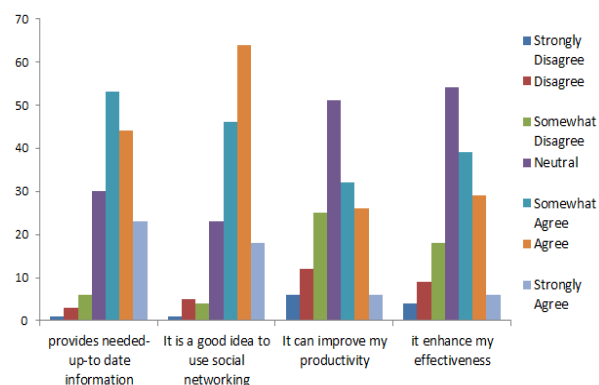


Figure 5: Time Spent on Social Networking

In Appendix 2 we see that only attitude is significantly and positively correlated with frequency of usage from theory of reasoned action. In addition, when other variables are considered, usefulness and ease of use from the technology acceptance model are also found to be significantly, positively correlated to social networking frequency of use. As noted, attitude comes from Theory of Reasoned Action and reflects to the degree to which a technology is perceived as how we feel about a particular technology or in other words our mindset. Ease of Use is self-explanatory. People will use social networking more often if they find it easy to use. Usefulness suggests the degree to which a person believes their performance is enhanced. Figure 6 below shows the results of some of the questions related to the usefulness of social

networking. Frequency of use of social networking is solely and directly related to addressing a communication need. Social networking provides easy and useful non-intrusive asynchronous communications for its users and it will be used most frequently the more this need is recognized and needed. This provides direct variables which can be used to expand usage of social networking across underutilized populations of users. Efforts can be directed to communicating how social networking easily extends users' existing communications methods. In addition, the enhancement of positive mindset needs to be explored and enhanced.



**Figure 6: Usefulness of Social Networking**

Appendix 3 is a regression study that reviews time spent social networking as its dependent variable. Here we see that similar results to those found when studying the frequency dependent variable, with one exception, ease of use. Both attitude and usefulness play a significant role in total time spent on social networking, but ease of use does not. This may be due to the idea that it must be easy to login and begin to use social networking but once connected, the time spent is only related to usefulness and mindset. The ease of use is no longer a factor after login. As noted, attitude is how we feel about the technology. If we feel good about it, we will spend more time on social networking activities. Also, we need to find the activity useful. What usefulness we obtain from social networking was not studied in this analysis but is worthy of further study.

**5. LIMITATIONS AND IMPLICATIONS**

As with any study there are limitations to this study. First, the study examines primarily

traditional students at undergraduate university locations. Though this is a convenience sample, the use of students is a common method in IT research. It can also be suggested that University students and related individuals represent a high penetration population allowing for rich exploration of influencing variables. Results however, ought to be replicated across other locations. Though this group does represent a population of significant users, results may be different with non-students or with other age groups. Another limitation is the sample size. Though sizable, the number of participants can be increased to improve reliability.

A major implication is the one that we set out to determine via our study. We explored specific variables from a wide variety of technology adoption models to determine what actually influences extent of use of social networking. As noted, we found attitude, ease of use, and usefulness as variables influencing frequency and attitude and usefulness influencing frequency. This, as noted, suggests that efforts can be focused in these areas by practitioners to expand the usage of this important asynchronous communications technology.

**6. CONCLUSION**

Overall, this study has provided significant variables that influence and affect social networking frequency of use and time spent using the technology. We see this as the continuation of an exploration of ways to increase and improve penetration of this valuable communications technology. Studies can be developed to confirm these findings with larger and more diverse sample groups, but preliminary findings suggest that social networking frequency of use and time spent social networking are subject to efforts to improve usage through attention to the significant influencing variables of attitude, ease of use, and usefulness.

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**Appendices**

Variable	Actual survey question	Model	Questions adapted from
Attitude	Social networking is good.	Theory of Reasoned Action/TPB	Fitzmaurice (2005)
Compatibility	Social networking is completely compatible with my current situation.	Diffusion of Innovation	Ilie, Van Slyke, Green, & Lou (2005)
Complexity	Social networking is frustrating	Diffusion of Innovation	Ilie, Van Slyke, Green, & Lou (2005)
Critical Mass	Many people use Social networking.	Diffusion of Innovation	Ilie, Van Slyke, Green, & Lou (2005)
Ease of Use	Social networking is easy to do.	Technology Acceptance Model /EUCS	Davis (1989)
Emotions	Pleased Satisfied Contented Delighted	Emotions	Peslak (2005)
Perceived Behavioral Control	Social networking is entirely within my control.	Theory of Planned Behavior	Venkatesh & Morris (2000)
Relative advantage	Social networking improves my productivity.	Diffusion of Innovation	George (2004)
Timeliness	Social networking provides needed information quickly	End User Computer Satisfaction	Fitzmaurice (2005)
Usefulness	I find Social networking useful	Technology Acceptance Model/ECT	Abdinnour-Helm, Chaparro, & Farmer (2005)
Visibility	I have seen many people Social networking.	Diffusion of Innovation	Davis (1989)

**Appendix 1: Factor Models and References**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	.714	1.685		.424	.672
Social networking is good.	.347	.159	.210	2.190	.030
Social networking is compatible with how I communicate.	.170	.105	.128	1.621	.107
Social networking is frustrating.	-.012	.100	-.009	-.120	.905
Many people use social networking.	.043	.144	.022	.298	.766
Social networking is easy to do.	.365	.151	.208	2.414	.017
Pleased	-.359	.300	-.232	-1.196	.234
Satisfied	-.272	.365	-.179	-.743	.459
Contented	.413	.280	.271	1.476	.142
Delighted	.045	.214	.030	.208	.835
Social networking provides needed information quickly.	-.238	.145	-.160	-1.639	.103
Social networking improves my productivity.	-.021	.092	-.018	-.229	.819
Social networking is entirely within my control.	-.024	.085	-.021	-.283	.778
I find social networking useful.	.379	.184	.234	2.059	.041
I have seen many people social networking.	-.064	.123	-.040	-.517	.606

a. Dependent Variable: HowOften

## Appendix 2. Variables Affecting Social networking Frequency of Use

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.499	1.539		.974	.332
	Social networking is good.	.360	.145	.239	2.487	.014
	Social networking is compatible with how I communicate.	.035	.096	.029	.364	.716
	Social networking is frustrating.	-.020	.091	-.017	-.217	.829
	Many people use social networking.	.076	.132	.042	.576	.566
	Social networking is easy to do.	.099	.135	.061	.731	.466
	Pleased	-.278	.275	-.200	-1.011	.314
	Satisfied	-.121	.335	-.089	-.362	.718
	Contented	.126	.256	.091	.491	.624
	Delighted	-.051	.196	-.038	-.263	.793
	Social networking provides needed information quickly.	-.055	.132	-.041	-.415	.679
	Social networking improves my productivity.	-.017	.084	-.016	-.204	.839
	Social networking is entirely within my control.	-.119	.078	-.112	-1.530	.128
	I find social networking useful.	.334	.166	.232	2.007	.047
	I have seen many people social networking.	-.076	.112	-.052	-.675	.501

a. Dependent Variable: Time

**Appendix 3. Variables Affecting Time Spent Social Networking**