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The Impact of Personality on Technology Acceptance: A Study on Smart Phone Users

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Abstract

This study aims to identify the impact of personality traits on technology acceptance of users. A field research is carried out on 401 university students to probe their technology acceptance behavior in the context of smart phones. Relationships between the five factor personality traits, perceived usefulness (PU), perceived ease of use (PEOU) and behavioral intention to use (BITU) the new product are examined. Data analyses revealed that some of the personality traits have significant effects on perceived usefulness and perceived ease of use, while the latter have significant effects on behavioral intention to use the product. Theoretical and managerial implications of the findings are discussed.

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Keywords: Technology acceptance model; Five-factor model personality traits; Smart phone

1. Introduction

Information and communication technologies become a prominent issue of our everyday lives since the past decade. Increasing use of information and communication technologies in the business environment resulted significant changes both in the society and the business life. It is argued that today we are witnessing a revolution based on the information technologies (Çetinkaya and Turan, 2010). Most widely used tools of this revolution of information technology are mobile communication devices such as

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portable computers, tablet Pc's and smart mobile phones. Smart phone sales hit 1.04 billion units in 2013, with a 38.4% increase compared to previous year. Experts say that, because of advanced new applications, ergonomics, and ease of access smart phone market will significantly expand in the following years while the sales of portable computers and tablet Pc's will decrease. Such developments in the mobile telecommunications sector draw the attention of academicians and practitioners to this emerging market.

Several factors influence the buying behavior of individuals. Among others, personality traits pose particularly important effect on individual behavior (Koca and Koç, 2008; Aldemir and Bayraktaroğlu, 2004; Kurtuldu and Keskin, 2005; Erciş and Deniz, 2008). Technology Acceptance Model (TAM) is an important model offering significant theoretical and practical contribution in the field of information technologies (Davis, Bagozzi, and Warshaw, 1989). TAM is used to identify the factors that affect individuals' resistance to use of technology, understand the reasons for technology acceptance, estimate the responses of users to changes and innovations and examine the relationships between the changes in the system and improvements in the practical usage (Davis, 1989; Adams, Nelson, and Todd, 1992). There are numerous studies examining the individual technology adoption behavior with the TAM framework (Davis, Bagozzi, and Warshaw, 1989; Özer, Özcan, and Aktaş, 2010; Akça and Özer, 2012; Çelik and İpçioğlu, 2006; Davis, 1989; Çelik, 2009). Results of the previous studies indicate the importance of simplifying the use of technology and improving the user performance by using the technology.

Research on the technology acceptance mainly concentrates on the technological, social and psychological reasons of accepting the new technology (Turan, 2011). A limited number of studies revealed that personality traits also influence the technology acceptance of the individuals (Parasuraman, 2000; Lam, Chiang, and Parasuraman, 2008; Erdoğmuş and Esen, 2011). However, all of the cited researchers used the technology readiness index (TRI) developed by Parasuraman (2000) which has a four-dimensional personality scale. In order to provide a different approach, authors of the present study used the big five personality traits as a different personality trait scale. Main purpose of this study is examining the effect of personality traits on the technology acceptance of users within the context of smart phones. The study begins with a literature review on personality traits and technology acceptance model, and then will go on to research model and development of hypotheses. Methodology, analyses and results will take place in the next section. Finally, results of the analyses will be discussed and recommendations will be provided for researchers and academicians.

2. Literature Review And Hypotheses

2.1. Personality

Personality is described as the individual's responses to particular situations (Erciş and Deniz, 2008). Personality is that pattern of characteristic thoughts, feelings, and behaviors that distinguishes one person from another and that persists over time and situations (Phares and Chaplin, 1997). Personality is a consistent, stable and conventional relationship of individual with his internal and external environments and is interrelated with all of the personal characteristics (Erkuş and Tabak, 2009). Allport (1961) defined personality as a dynamic organisation within the individual of those psychophysical systems that determine his characteristic behaviour and thoughts'. Personality development is influenced by several

factors including heredity, social environment, family, geographical and physical condition etc. Personality affects the whole life of an individual as a set of characteristics that differentiate him from the others. Hence, it can be argued that personality traits are significant factors which cause different perceptions or responses against the similar instances (Erkuş and Tabak, 2009). In a similar vein, we propose that personality traits may influence the attitudes, intentions and behavior of individuals' technology acceptance and usage.

Psychologists developed several models to measure personality and proposed various dimensions about its structure. Gordon Allport delineated different kinds of traits, which he also called dispositions. Raymond Cattell's research propagated a two-tiered personality structure with 16 primary factors and 5 secondary factors. Hans Eysenck believed just three traits—extraversion, neuroticism and psychoticism—were sufficient to describe human personality. Lewis Goldberg proposed a five-dimension personality model, widely accepted and nicknamed the "Big Five". The Big Five factors are openness, conscientiousness, extraversion, agreeableness, and neuroticism. The first dimension "Openness to Experience" delineates the tendency to be imaginative, independent, and interested in variety vs. practical, conforming, and interested in routine. The second dimension "Conscientiousness" explains the tendency to be organized, careful, and disciplined vs. disorganized, careless, and impulsive. Third dimension is named as "Extraversion", the tendency to be sociable, fun-loving, and affectionate vs. retiring, somber, and reserved. Fourth dimension is named as "Agreeableness", the tendency to be softhearted, trusting, and helpful vs. ruthless, suspicious, and uncooperative. Fifth dimension is named as "Neuroticism", the tendency to be calm, secure, and self-satisfied vs. anxious, insecure, and self-pitying (Matthews, Deary, and Whiteman, 2003).

Since its development, a plethora of researchers utilized the Big Five Model in various fields. This has resulted in criticism and support for the model. In the present study, the Big Five Model is used to identify the impact of personality traits on technology acceptance of users.

2.2. Technology Acceptance Model (TAM)

Researchers used different models to understand individual behavior to accept and use technology. Among others, Fishbein and Ajzen's (1975) "Theory of Reasoned Action-TRA", Hall's (1979) "Concerns Based Adoption Model-CBAM", Rogers's (1983) "Innovation Diffusion Theory –IDT", "Technology Acceptance Model-TAM", Ajzen's (1991) "Theory of Planned Behavior – TPB", "Task Technology Fit-TTF" model and "Unified Theory of Acceptance and Use of Technology" are particularly important theories since they are widely used in various contexts (Bağlıbel, Samancıoğlu, and Summak, 2010). Theories developed to examine the reasons and patterns of individual behavior concerning new technologies are mostly stemmed from the field of psychology (Türker and Türker, 2013). Based on these models, Technology Acceptance Model-TAM come into prominence as a model that is used to explain different dimensions of technology acceptance (Şenel, Gümüştekin, and Şenel, 2013). Grounding on Fishbein and Ajzen's (1975) "Theory of Reasoned Action"-TRA, Davis (1986) developed the TAM in order to explain computer usage behavior of individuals (Davis, Bagozzi, and Warshaw, 1989).

TAM is the most influential and widely used model for technology acceptance. TAM proposes that *Perceived Usefulness – PU* and *Perceived Ease of Use – PEOU determine* the *Behavioral Intention to Use – BITU* of an individual to accept and use a technology. PU is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance". PEOU is

defined as "the degree to which a person believes that using a particular system would be free from effort" (Davis, 1989). Several researchers used these two components of the model (Akça and Özer, 2012; Gümüşsoy and Çalışır, 2009; Erdoğmuş and Esen, 2011). The effectiveness and proficiency of TAM in order to measure the intentions to use a technology is tested and verified in several studies concerning various topics including internet usage, e-mail, distance learning systems, online shopping, internet banking , microprocessors, commercial software, management information systems and intranets (Çelik, 2009). As TAM is increasingly used in various fields, its interaction with other personal characteristics is also probed. Accordingly in this study, we try to identify the impact of personality traits on technology acceptance of users by using the TAM model.

2.3. Development of Hypotheses

Extant literature provides a number of research findings as a justification to the view about how personality might influence TAM relationships. Personality as an exogenous variable is hypothesized to lead to beliefs related to the behavior (Devaraj, Easley, and Crant, 2008). There is some evidence on how personal differences may influence the technology acceptance of individuals (Shih and Fan, 2013). O'Cass and Fenech, (2003) found that personal characteristics is a significant predictor of the ease of use and usefulness dimensions of the TAM. Glassberg (2000) documented that optimum stimulation level, as a personal characteristics, significantly positively influenced both perceived usefulness and perceived ease of use. Agarwal and Prasad (1999) examined, among others, organizational tenure, level of education and prior experiences as individual differences, and found that beliefs mediate the effects of individual differences on attitude toward, and behavioral intentions to use an information technology innovation. As a personality index, TRI, developed by Parasuraman (2000) classifies people into four subgroups according to their prevailing personality traits (i.e. optimism, innovativeness, discomfort and insecurity) reflecting their propensity to embrace and use new technologies for accomplishing goals in home life and at work. This approach is widely used in research related to TAM. It was found that optimism and innovativeness influence both usefulness and ease of use, while discomfort and insecurity have no significant effect on them (Erdoğmuş and Esen, 2011). Another study by Shih and Fan (2013) revealed that only optimism trait has a significant effect on the attitude dimension of TAM.

Apart from the TRI, a limited number of researchers used the five factor model of personality in studies concerning technology acceptance. Some researchers argued that people with a higher degree of extraversion, openness and agreeableness would have a higher degree of technology acceptance (Keeton, 2008). People who are open to change are assumed to be willing to try new and different things. Similarly, extravert individuals are more open to adopt innovation to gain social status. Devaraj, Easley, and Crant (2008) found that agreeableness is positively associated with PU; neuroticism is negatively associated with PU and conscientiousness moderates the relationship between PU and BITU. In another study employing the Five Factor Model, Sevendsen et al. (2013) found that extraversion is positively related to BITU, PU and PEOU. They also found statistical support for the positive relationship between conscientiousness and BITU. Further, they found that openness has a positive effect on PEOU. In another study Landers and Lounsbury, (2006) identified a negative relationship between the internet usage of students and their agreeableness, conscientiousness and extraversion levels. Openness is found to be significantly positively related to personal innovativeness in information systems (Nov and Ye, 2008). Individuals who have low levels of extroversion and high levels of neuroticism had a higher propensity to use social services (chatting, seeking people etc.) on the internet. To sum up, extant literature provides us some evidence on the effect of personality traits on individuals' attitudes and intentions to accept and use new technology. Personality factors may influence users' beliefs and attitudes about the perceived

usefulness of a new technology and to subjective norms. Accordingly, we propose the following hypotheses to be tested in this study.

H1a: Extroversion positively influences PU
H2a: Agreeableness positively influences PU
H3a: Conscientiousness positively influences PU
H4a: Neuroticism negatively influences PU
H5a: Openness positively influences PU

H1b: Extroversion positively influences PEOU
H2b: Agreeableness positively influences PEOU
H3b: Conscientiousness positively influences PEOU
H4b: Neuroticism negatively influences PEOU
H5b: Openness positively influences PEOU

On the other hand, research on the different variables of the TAM revealed significant relationships between PEOU, PU and BITU. Davis (1989) argued that PEOU influences PU. Yet, these two variables jointly influence attitudes and attitudes influence behavioral intentions. However, in a number of studies, attitude toward the behavior is not examined in the model. Instead, it was concluded that PEOU and PU influenced BITU. (Lanseng and Andreassen, 2007; Devaraj, Easley, and Crant, 2008). Yet, in some of the studies on TAM, these internal relationships are not verified. Sousa (2003) found significant relationships between PEOU and PU; PU and PI but no significant relationship detected between PEOU and BITU. Kim (2005) found a positive effect of PEOU on BITU, but no significant relationship detected between PEOU and PU. Again, Kleijnen, Wetzels, and Ruyter, (2004) found a significantly positive effect of PEOU on PU; but did not find any significant effect of PU on BITU. Based on the findings of previous studies, we developed the following hypotheses to test the associations between PEOU, PU and BITU in this study.

H6: PEOU has a positive effect on PU
H7: PEOU has a positive effect on BITU
H8: PU has a positive effect on BITU

3. Methods

3.1. Research Goal

The purpose of this study is examining the effect of personality traits on the technology acceptance of users within the context of smart phones.

3.2. Research model

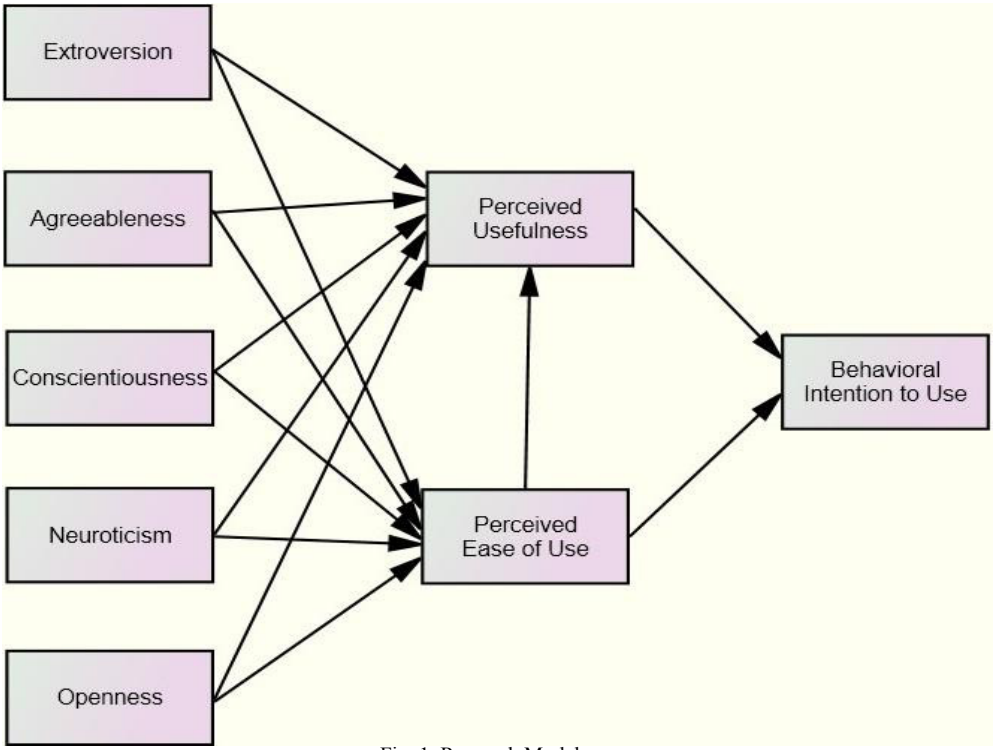

Fig. 1. Research Model

Our research model is shown in Figure 1. We propose that the five factor of the personality have direct effects on PEOU and PU. Further, we propose that PEOU and PU have direct effects on BITU.

3.3. Sample and Data Collection

A self administered questionnaire is used as the data collection tool. Data is collected from a convenient sample of 401 university students studying at Balıkesir University of Turkey. University students are purposely selected as the study sample since they comprise a particular population whose level of new technology acceptance is higher than other groups in terms of age and education level and who they are a significant group of smart phone users. Data analyses were performed by using SPSS and AMOS software.

3.4.Analyses and Results

We used the Turkish version of the IPIP Personality Inventory (Goldberg, 1999) which was adopted and simplified by Sudak and Zehir (2013). After the exploratory factor analysis, 10 out of 30 items are

excluded due to low factor loadings and negative contribution to scale validity. Items of TAM scale (PU, PEOU and BITU) are adapted from Joo and Sang (2013). PU is measured by 3 items, PEOU is measured with 3 items, and BITU is measured by a single item. Factor analysis results, reliability scores, means and standard deviations of the five factor personality scale is provided in Table 1. All of the scale items were in Likert Response Format (Five point: 1=strongly disagree to 5=strongly agree). The Cronbach Alpha reliability of the 3 item Perceived Usefulness (PU) scale is 0,90 whereas it is 0,92 for 3 item Perceived Ease of Use (PEOU) scale.

Table 1. Factor Analysis Results for Five Factor Personality Scale

FIVE FACTOR PERSONALITY SCALE ITEMS	DIMENSION	Factor Load	Cronbach Alpha	Mean	Std. Dev.
E1		,785			
E2	Extroversion (EXT)	,775	,67	3,09	0,95
E3		,737			
A1		,825			
A2		,795			
A3	Agreeableness (AGR)	,743	,79	4,11	0,64
A4		,715			
A5		,537			
C1		,871			
C2	Conscientiousness (CON)	,728	,66	3,58	0,99
C3		,659			
N1		,866			
N2		,840			
N3	Neuroticism (NEU)	,803	,88	3,11	1,04
N4		,798			
N5		,739			
O1		,773			
O2	Openness (OPE)	,742	,73	3,85	0,67
O3		,741			
O4		,653			

Total Explained Variance for Five Factor Personality Scale %61,240

Structural equation modeling is used to test the relationships in the research model. The estimation of the structural model and fit measures are provided in Table 2. Data analyses revealed that Agreeableness has a significant positive effect on PEOU (β=,211; p= ,002), but it does not exert any significant effect on PU (β=,095; p= ,093). This result is consistent with Keaton (2008) but inconsistent with Devaraj, Easley, and Crant (2008). In a similar study, Gümüşsoy and Çalışır (2009) also found significant effects regarding these hypotheses. These findings indicate that depending on the context (i.e. the new technology) results may change. Thus, our findings must be examined in regard to the smart phone technology. It is expected that individuals who easily conform with their environment should adopt the smart phone technologies with relative ease. The negative effect of neuroticism on PU (β=-,083; p= ,014) is also an expected result as similar results were obtained in previous studies (Nov and Ye, 2008; Devaraj, Easley, and Crant, 2008). Since, individuals with a high level of neuroticism are anxious, unconfident, preservationist it is expected that they show a resistance to adopting new technologies. Data analyses also confirmed the relationship between openness and PEOU (β=,359; p= ,001).Individuals who are more open to change and development, perceive the new technologies more easy to use compared to those whose openness level is lower. Keaton (2008) and Svendsen et al. (2013) obtained similar results in their studies. On the other hand, our analyses did not provide enough evidence to show the effect of openness on PU (β=,016; p= ,305). Devaraj, Easley, and Crant (2008) had a similar result upon this relationship. Our data analyses revealed that PEOU has a positive effect on PU (β=,727; p= ,001), PEOU has a positive effect on BITU (β=,280; p= ,001) and PU has a positive effect on BITU (β=,542; p= ,001). These results are also consistent with previous studies (Davis, 1989; Lanseng and Andreassen, 2007; Devaraj, Easley, and Crant, 2008). Table 2 also shows the results of the tested hypotheses. Final model of the study is shown in Figure 2.

Table 2. Estimation Results Structural Model

Relationship			β	t-value	p-value	Conclusion
EXT	→	PU	,051	1,420	,156	H1a not supported
EXT	→	PEOU	-,038	-,873	,383	H1b not supported
AGR	→	PU	,095	1,678	,093	H2a not supported
AGR	→	PEOU	,211	3,096	,002	H2b supported
CON	→	PU	-,019	-,540	,589	H3a not supported
CON	→	PEOU	-,004	-,092	,927	H3b not supported
NEU	→	PU	-,083	-2,458	,014	H4a supported
NEU	→	PEOU	,013	,316	,752	H4b not supported
OPE	→	PU	,016	,305	,760	H5a not supported
OPE	→	PEOU	,359	5,634	,001	H5b supported
PEOU	→	PU	,727	17,783	,001	H6 supported
PEOU	→	BITU	,280	4,839	,001	H7 supported
PU	→	BITU	,542	10,138	,001	H8 supported

CMIN/DF: ,737; RMR: ,012; GFI: ,998; NFI: ,995; RMSEA: ,001

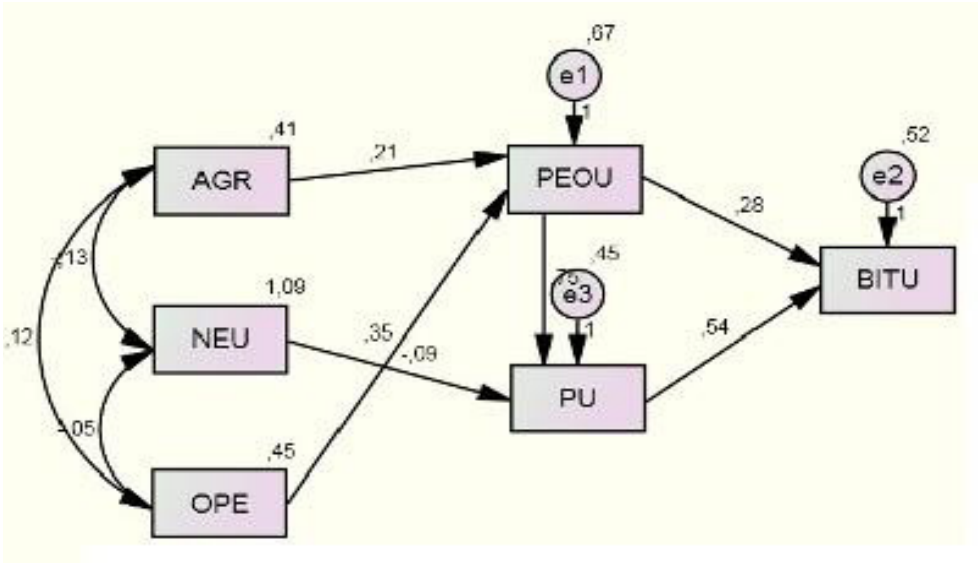

Fig. 2. Final Model

4. Conclusion

This study investigates the relationships between the personality traits and technology acceptance levels of university students who currently owns or plans to have a smart phone. Structural equation model analyses revealed that agreeableness positively influences PU, neuroticism negatively influences PU, openness positively influences PEOU, PEOU positively influences PU, PEOU positively influences BITU, and PU positively influences BITU. These findings are consistent with the previous studies in the literature (Davis, 1989; Lanseng and Andreassen, 2007; Devaraj, Easley, and Crant, 2008; Erdoğmuş and Esen, 2011; Joo and Sang, 2013). However, we could not find enough evidence to support our hypotheses about the effects of extraversion on PU, openness on PU, and agreeableness on PU.

Findings of this study have several implications on the theoretical and practical levels. Our findings highlight that individual differences, in terms of personality traits, may influence technology acceptance of smart phone users. Individuals with a high level of agreeableness (who are assumed to be kind, considerate, likable, helpful, and cooperative) have a higher propensity to perceive smart phone technology as more useful, while those who have a higher level of neuroticism (who are assumed to be anxious, unconfident and preservationist) perceive smart phone technology as less useful. Further, people with a higher level of openness (who are assumed to be willing to try new and different things, actively seek out new and varied experiences, and value change) perceive smart phone technology as more easy to use.

This study has some limitations. One potential limitation may stem from the use of student sample. Though, results can not be generalized to wider populations. However, young university students, as the members of generation z, are the heavy users of the smart phone technologies. They are among the top priority target market of the smart phone manufacturers. The other limitation is concerned with the

selected product category (i.e. smart phones) in this study. Future research may be directed to other respondent groups and product categories to gain a stronger understanding of the relationships examined in this study.

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