THE REPUBLIC OF TURKEY
BAHCESEHIR UNIVERSITY

EXAMINING THE ADOPTION OF INTENTION OF INTERNET OF THINGS IN HEALTHCARE TECHNOLOGY PRODUCTS WITH INNOVATION DIFFUSION THEORY AND TECHNOLOGY ACCEPTANCE MODEL

Master Thesis

MERVE AKSÖZ

İSTANBUL, 2016

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Assoc.Prof.Dr. Nafiz ARICA
Graduate School Director

I certify that this thesis meets all the requirements as a thesis for the degree of Master of Sciences _____.

Prof.Dr. Adem KARAHOCA
Program Coordinator

This is to certify that we have read this thesis and we find it fully adequate in scope, quality and content, as a thesis for the degree of Master of Sciences.

Examining Committee Members Signature	**Signature**
Thesis Supervisor Prof. Dr. Adem KARAHOCA	…….
Member Asst. Prof. Dr. Dilek KARAHOCA	…….
Member Prof. Dr. İbrahim PINAR	…….

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ABSTRACT

EXAMINING THE ADOPTION INTENTION OF INTERNET OF THINGS IN HEALTHCARE TECHNOLOGY PRODUCTS WITH INNOVATION DIFFUSION THEORY AND TECHNOLOGY ACCEPTANCE MODEL

AKSÖZ, MERVE

Information Technologies

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The purpose of the study is to investigate the relationship among critical factors affecting the individuals' intention to adopt internet of things (IoT) products in healthcare. An integrated model was developed based on technology acceptance model (TAM), innovation diffusion theory (IDT), technological innovativeness (TI), protection motivation theory (PMT), and privacy calculus theory (PCT). The model was tested with 426 respondents by using online survey tool. 222 out of 426 respondents were female and 204 out of 426 respondents were male. To analyze and evaluate the research model, structural equational model (SEM) method was employed by using SmartPLS 3.2.3 and XLSTAT 2010. 2 structural models were tested for 1) complete model 2) gender grouped model. Based on the results of complete model; individuals' decision to adopt IoT healthcare technology products is affected by attitude (AT), perceived advantage (PA), image (IM) and perceived ease of use (PEOU). As for the gender grouped model evaluation; the results show that for female group, compatibility and trialability have more impacts on PEOU whereas for male group, perceived advantage has more impacts on PEOU. In explaining adoption intention to using IoT healthcare products, variables of IM, perceived privacy risk, perceived vulnerability have more impacts for male group compared to female group. Compared to female group, for male group, TI has more impact on perceived usefulness (PU) whereas it is insignificant to explain perceived usefulness in the complete model. To explain attitude towards adoption intention, PU has more impact for male group when comparing with female group.

This study is among the first to investigate adoption of future technology "internet of things" products in healthcare from behavioral perspective by developing based on

various theories and models. In very near future, the transition of IPV6 (Internet Protocol Version 6), future of the internet, is going to be in a very fast manner. This means that more or less in 10 years there will be the biggest revolution after invention of the internet, “digital revolution”. Before launching any technology into the market, it should be researched facilitative factors for the people who are going to use in their daily routine.

Keywords: Internet of Things, Healthcare, Adoption intention, Structural equational model, Technology acceptance model, IDT, TI, PMT, PCT

ÖZET

YENİLİK YAYILM TEORİSİ VE TEKNOLOJİ KABUL MODELİ İLE SAĞLIK TEKNOLOJİ ÜRÜNLERİNDE NESNELERİN İNTERNETİNİN KABULÜ NİYETİNİN İNCELENMESİ

AKSÖZ, MERVE

Bilgi Teknolojileri

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Bu çalışmanın amacı, bireylerin nesnelerin interneti destekli sağlık teknoloji ürünlerini kabul niyetini etkileyen kritik faktörler arasındaki ilişkinin incelenmesidir. Bu tez çalışmasında, teknoloji kabul modeli, yeniliklerin yayılma teorisi, teknolojik yenilikçilik, korunma motivasyonu teorisi, kişisel mahremiyet hesaplama teorilerine dayanılarak bütüncül bir model geliştirildi. Bu modelin verisi çevrimiçi bir anket aracı kullanılarak 222'si kadın 201'ü olmak üzere 426 katılımcıdan toplandı. Araştırma modelini analiz etmek ve değerlendirmek için SmartPLS3.2.3 ve XLSTAT 2010 kullanılarak yapısal eşitlik modeli uygulandı. Çalışmada, iki yapısal eşitlik modeli 1) bütüncül model 2) cinsiyete göre gruplanmış model incelendi. Bütüncül modelin sonuçlarına göre; bireyler nesnelerin interneti destekli sağlık teknoloji ürünlerini kabul etmesini etkileyen unsurlar: tutum, algılanan avantaj, imaj, algılanan kullanım kolaylığıdır. Cinsiyete göre gruplanmış modelin değerlendirildiğinde erkeklerde algılanan avantajın algılanan kullanım kolaylığı üzerine daha fazla etkisi vardır. Kadınlar için de denenebilirlik ve uyumluluğun algılanan kullanım kolaylığına daha fazla etkisi vardır. Nesnelerin interneti destekli sağlık teknoloji ürünlerine uyum niyeti açıklanırken; kadınlara kıyasla erkekler için imaj, algılanan kişisel mahremiyet riski, algılanan hassasiyet daha fazla etkiye sahiptir. Bütüncül modelde teknolojik yenilikçilik algılanan kullanım kolaylığını açıklamada anlamlı bir etkiye sahip olmasa da kadınlara kıyasla erkekler için teknolojik yenilik algılanan kullanım kolaylığı üzerine daha fazla etkiye sahiptir. Kadınlara kıyasla erkekler için algılanan kullanılabilirliğin, uyum niyetine yönelik tutumu açıklamak için daha fazla etkisi vardır. Bu çalışma, geleceğin teknolojisi nesnelerin interneti sağlık ürünlerine adaptasyonunu çeşitli teori ve modelleri temel alınıp geliştirilerek davranışsal açıdan inceleyen ilk çalışmalardan biridir. Çok yakın bir zamanda, geleceğin interneti IPV6'ya geçiş çok hızlı bir şekilde olacaktır. Bu gelecek 10 yıl içerisinde internetin icadından sonraki en büyük dijital devrim olacağı anlamına gelmektedir. Pazara herhangi yeni bir teknoloji ürünü

çıkartmadan önce, günlük rutinlerinde bu ürünleri kullanacak insanlar için kolaylaştırıcı faktörlerin neler olduğunu araştırmak faydalı olabilir.

Anahtar Kelimeler: Nesnelerin İnterneti, Sağlık, Adaptasyon niyeti, Yapısal eşitlik modellemesi, Teknoloji kabulü model, IDT, TI, PMT, PCT

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ABBREVIATIONS

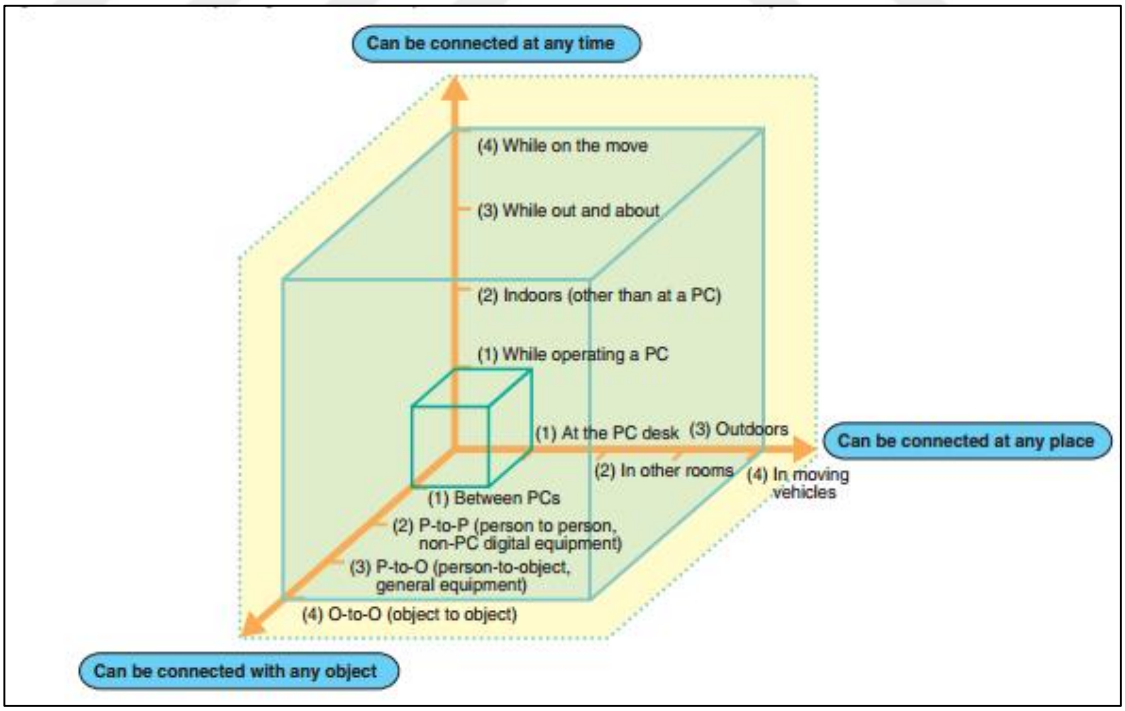
AT	: Attitude
AVE	: Average Variance Extracted
BI	: Behavioral Intention
COM	: Compatibility
GFI	: Goodness of Fit Index
HIT	: Health Information Technology
HTMT	: Heterotrait-Heteromethod Ratio
ICT	: Information and Communication Technologies
IDT	: Innovation Diffusion Theory
IM	: Image
IoT	: Internet of Things
IPV6	: Internet Protocol Version 6
IS	: Information Systems
ITU	: International Telecommunication Union
PA	: Perceived Advantage
PBT	: Planned Behavior Theory
PCT	: Privacy Calculus Theory
PEOU	: Perceived Ease of Use
PLS	: Partial Least Squares
PLS-MGA	: Partial Least Squares-Multi Group Analysis
PLSPM	: Partial Least Squares Path Modeling
PMT	: Protect Motivation Theory
PPR	: Perceived Privacy Risk
PS	: Perceived Severity
PU	: Perceived Usefulness
PV	: Perceived Vulnerability
SCT	: Social Cognitive Theory
TAM	: Technology Acceptance Model
TI	: Technological Innovativeness
TR	: Trialability

TRA	: Theory of Reasoned Action
TRI	: Technology Readiness Index
UTAUT	: The Unified Theory of Acceptance and Use of Technology
WWW	: World Wide Web

1. INTRODUCTION

We all want to take a quality healthcare. It is not limited to quality; also we want it to be cost-effective. Internet of Things (IoT) has the power that can make this realize. More sensor devices mean more patient monitoring for chronic issues, and more patient monitoring means fewer checkups and unnecessary appointments—all resulting in cost reduction. After the invention of internet and World Wide Web (www), IoT is expected to be the pivotal digital revolution. ITU (International Telecommunication Union) is United Nations specialized agency based on public private partnership for information and communication technologies (ICT). In its 2005 IoT report, ITU describes the IoT that network connectivity between people and things from anywhere, anytime by anyone, as it is depicted in Figure 1.1. IoT is the connectivity of everything (even a dust) through wireless technologies by assigning an internet address to anything.

Figure 1.1: Evolutionary stages of the ubiquitous network from the user perspective



Resource: Murakami, T., 2004, Ubiquitous networking: Business opportunities and strategic issues. Nomura Research Institute, https://www.nri.com/global/opinion/papers/2004/pdf/np200479.pdf [accessed 27 April 2016]

In very near future, the transition of IPV6 (Internet Protocol Version 6), future of the internet, is going to be in a very fast manner. This means that more or less within 10 years almost everything will have an internet address. This technology improvement is inevitable. Before any technology getting into the market, it can be useful to research facilitator factors for the people who are going to use it in their daily routine. Investigating and examining the adoption intention or acceptance of a new technology play an important role for the industrial development for that technology. An innovation is produced by a producer and this product would not fit with market needs. Many stunning IoT products have been developed thanks to active involvement of the lead users in both public and private sector (ITU Report 2005). In any innovation diffusion process, the chasm point is stepped over thanks to lead users. Nowadays, user demand performs a prominent role in the process of innovation (Edquist and Hommen 1999). Innovation is not confined to producing special, advanced products. Understanding the user demand and integration of potential adopters are essential in the earlier stages of research and development. The lead users, personified by governments and government-funded institutions such as TÜBİTAK (The Scientific and Technological Research Council of Turkey), Republic of Turkey Ministry of National Defense also plays a major role in technology diffusion.

Individual consumers have an impact on shaping the market of the technology although Gartner researchers predict that IoT revenue will come from more enterprises not from individual consumers by 2020. Readiness of individuals to embrace new services and products are a critical factor in order to make technologies more mature. If users' fears and concerns are not described appropriately, this readiness issue can be a bottleneck for technology diffusion process (ITU Report 2005).

To diminish or avoid these potential bottlenecks, it would be useful to be researched facilitative factors for the people who are going to use in their daily lives. For this purpose, in literature there is vast amount of study examining these technology acceptance concepts.

Technology acceptance and adoption intention of any emerging technology are very prominent fields in Information Systems (IS). The first technology acceptance models were introduced in the 1970ies by Fishbein and Ajzen as relatively the theory reasoned action (TRA) and planned behavior theory (PBT). They tried to understand why people use the technology and why believes drive intentions. In 1986, Fred Davis proposed the technology acceptance model (TAM). There have been various studies/models to study and understand the affecting factors of user acceptance model by using Theory of Reasoned Action (TRA), the Theory of Planned Behavior (TPB), the Technology Acceptance Model (TAM) (Hsiao and Tang 2015). There are some comparative studies like Todd and Taylor's study. They compared TAM and two different theories (TPB and TRA) to evaluate which model best explain which factors were essential and important while understanding usage of information technology and they found out a significant effect in all three model. While they found small differences between models in explanatory power, the results showed that TAM has more explanatory power than others (Taylor and Todd 1995). Although TRA and TPB can explain system utilization by consisting of subjective norms and perceived behavioral controls by means of attitudes towards technology utilization, TAM is more preferable and easy to apply for online works since simplicity. Firstly, TAM is specific for Information Systems (IS) usage by taking into consideration easiness and usefulness (Chen et al. 2011).

When literature is reviewed, it is possible to come across with the studies which TAM and Roger' Innovation Diffusion Theory (IDT) and Technology Readiness Index (TRI) are used together (Sun et al. 2013). TAM and IDT have some similar constructs and they are equivalent of each other to investigate adoption intention in IS field. Researchers points out that the constructs of TAM are basically a subset of perceived innovation characteristics; hence, combining these two theories could produce a more powerful model (Wu and Wang 2005).

There are lots of studies combined the original TAM with IDT. There have been many this kind of studies in IS field, yet very few research has been carried out with healthcare issues. This is valid internationally and nationally. In Turkey, it is not known any research study which examines adoption intention of a very new technology product in healthcare

with various theories including TAM, IDT, protect motivation theory (PMT), and privacy calculus theory (PCT).

The purpose of this research study is to extensively examine and understand individuals' adoption intention of IoT healthcare products so it has been developed and proposed an integrated model that consists of technology acceptance, innovation diffusions, health behavior, and privacy context from multiple perspectives. The adoption towards health information technology (HIT) products should be considered and distinguished from other technological products. It is suggested to researchers to pay attention to health care context when developing a model about healthcare issue (Sun et al. 2013, Holden et al. 2010). Therefore, Protect Motivation Theory (PMT), integrated to the proposed model.

In this study, quantitative research method was used. The questionnaire of the integrated research model was applied on-line to 426 respondents who had at least one smart device as the target subjects because the target group member who could use IoT healthcare products in the close future. Gender breakdown almost dispersed equally; 222 out of 426 were female, 204 out of 426 were male. The integrated research model was tested with a questionnaire consisting of 3 technological factors (key factors from TAM and technological innovativeness from Technology Readiness Index), 5 factors of IDT such as image, trialability, compatibility, attitude, 2 factors related to healthcare severity and vulnerability from PMT, 1 factor related to privacy issue from privacy calculus model, and 1 factor related to cost issue.

To analyze and evaluate the integrated research model, structural equational model (SEM) method was employed by using SmartPLS 3.2.3 and XLSTAT 2010. 2 structural models were tested for 1) complete model 2) gender grouped model. Rest of the thesis is organized as background, research model and hypothesis, data and methodology, discussion, and conclusion sections respectively.

2. BACKGROUND

In this section, the literature review was done by investigating Innovation Diffusion Theory (IDT), Social Cognitive Theory (SCT), Theory of Reasoned Action (TRA), Planned Behavior Theory (PBT), Technology Acceptance Model (TAM), and Protect Motivation Theory (PMT). In the part 2.8, the summary of literature review was given.

2.1 ADOPTION AND DIFFUSION OF INNOVATION

Researches on diffusion theories date back to the beginnings of European social science. The forefather of diffusion theory, has significant contributions in development to this theory, is famous criminologist, statistician, and sociologist Gabriel Tarde. Rogers (2003) explains the approach of Tarde as “the diffusion of innovations was a basic and fundamental explanation of human behavior change”. To Tarde, invention and imitation are the key elements to social change (Katz 1999). For Tarde, the pivotal research question is to examine the adoption or rejection of innovation. At the same time plenty of innovation launches, yet most of them fail and few of them spread out. Why do few of them spread out while the rest of them not? Tarde’s logical law of imitation answers this question with “compatibility” that is, "Logical laws operate whenever an individual prefers a given innovation to others because he thinks it is . . . more in accord with the aims or principles that have already found a place in his mind (through imitation of course)" (Tarde 1903). However, unfortunately logical laws may be rarely effective alone. At this point, non-logical elements such as power usage, habits, and traditions step in (Tarde 1903).

One of the most important contributions of Tarde to diffusion theory is the observation of the rate of adoption of a new idea usually has illustrated with a s-shaped curve in time as displayed in Figure 2.2 (Rogers 2003). Today, it is known that most innovations have S-shaped rate of adoption (Kinnunen 1996, Rogers 2003).

2.1.1 Innovation Diffusion Theory

The most widely known source for innovation diffusion theory (IDT) is Everett M. Rogers' research. Diffusion is the process as a means of an innovation diffuses by means of communication channels over time among the members of a social system (Rogers 2003). Rogers' (2003) IDT definition contains 4 essential elements: innovation, communication channels, time and social system.

1. **Innovation:** It means anything such as idea, practice, or object that is perceived as new by an individual. Newness does not just consist of new knowledge. An individual may have known an innovation for a while, yet he/she has not constructed a negative or positive attitude towards it, nor has adopted or rejected it. Therefore, the newness aspect of an innovation is explained by means of knowledge, persuasion, or a decision to adopt (Rogers 2003, p.11). Every innovation may have a different diffusion and adoption rates in the same social system. The perceptions of individuals affect the adoption rate of innovation. The most important consequences of the innovaiton diffusion theory is adoption/acceptance or rejection of any innovation by individuals (Rogers 2003, p.15). The characteristics of innovation have a direct effect by means of consequence of innovation by individuals. Rogers identifies the characteristics of an innovation as compatibility, relative advantage, trialability, complexity, trialability, and observability.

    a) **Relative Advantage:** It means that an innovation is perceived as better than the idea it substitutes for. Social prestige, convenience, and satisfaction besides economical factors are important components to measure relative advantage. It does not required whether an innovation provides a real objective advantage. The point is whether an individual perceived an innovation as advantageous. If an innovation has more perceived relative advantage, its adoption rate is going to be more rapid.

    b) **Compatibility:** It is the status of an innovation that is perceived as being consistent with the existing values, past experiences, and needs of potential adopters. The adoption of an innovation will become easier when the individuals

or groups, potential adopters, perceives the innovation as advantageous and compatible. Adoption innovation which is compatible with social norms will be adopted faster than non-compatible ones with social norms.

c) **Complexity:** It is the degree of an innovation is perceived as difficult to understand and use. If the invidiuals in a society perceive an innovation as difficult, the adoption rate of this innovation will be more slowly.

d) **Trialability:** It is the degree to which an innovaiton may be experimented with on a limited basis. An innovation that is trialable gives the opportunity to decrease uncertainity to the invidiual who is considering to embrace it by means of learning and discovering the innovation by using it.

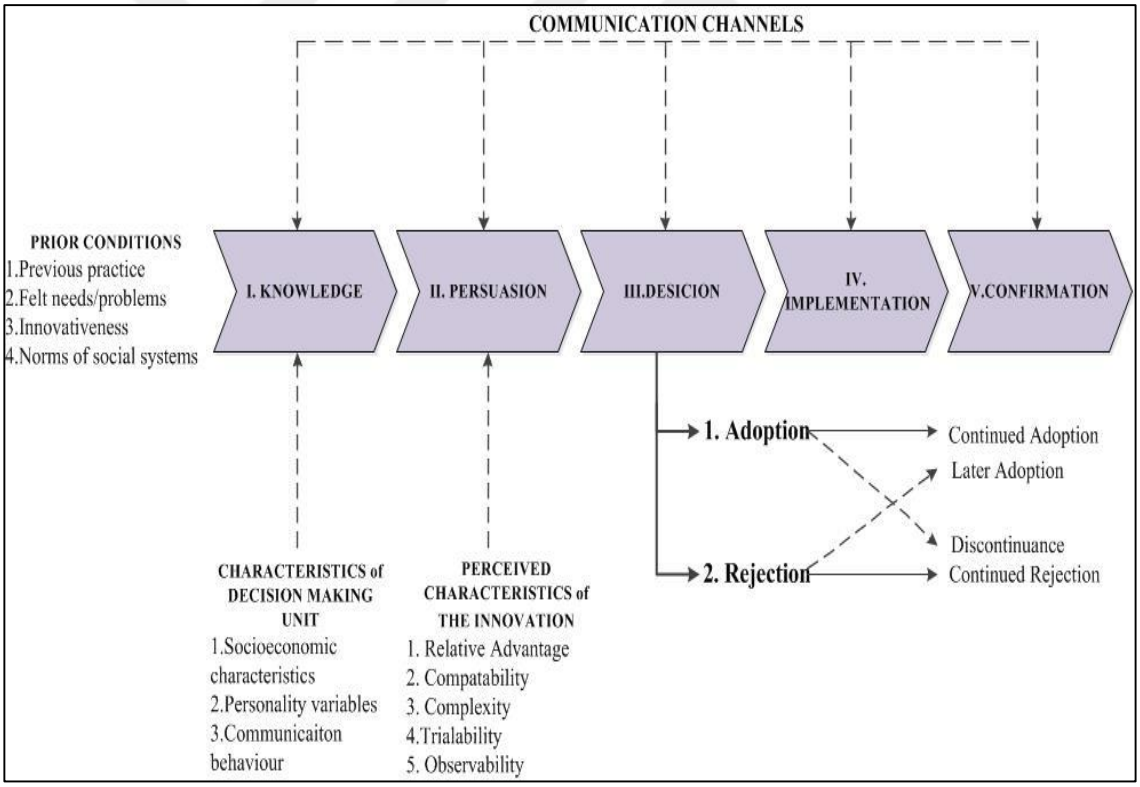
e) **Observability:** It is the degree to which the results an innovation are visible to others. Observability is one of the important effects for the individiuals who have not yet adopted to the innovation. For individuals it is easier to see the results of an innovation at the ones who adopted to the innovation before them. Especially, it is desired to get knowledge about the innovation from peers, neighbours or friends who have previously adopted it (Rogers 2003, p.16).

2. **Communication channels:** Communication is the process that individuals communicate with one another to have a common understanding. Diffusion can be expressed as the exchange of new information among individuals. Communication channels are divided into 2 groups as mass media and interpersonal channels. The faster and more effective channel in persuading an individual to adopt a new idea is interpersonal channels. The results of various diffusion researches show that mostly individuals do not assess an innovation scientifically. Rather than it, many people make subjective evaluation for an innovation that is transferred to them from others who have embraced the innovation before (Rogers 2003, p.18).

3. **Time:** Time is a significant aspect of any communication process. Time is comprised of 3 dimension; innovation decision process, innovativeness, and innovation adoption rate.

   a) **Innovation Decision Process:** An innovation passes from one individual to another (or other unit of adoption) and cease this process with adoption or rejection consequences. At this process, information is sought and processed to lower uncertainty related to innovation. Innovation decision process is measured from first knowledge until the decision to adopt (or reject) (Rogers 2003, p.202). According to Rogers (2003), this process is comprised of five steps as depicted in Figure 2.1.

Figure 2.1: Innovation decision process



Resource: Rogers, E. M., 2003. *Diffusion of innovations*. 3th Edition. New York: The Free Press, p. 164.

i. **Knowledge:** At this stage, the individual wants to get basic information about the innovation is and how it works.

ii. **Persuasion:** At this stage, the individual seeks information in order to evaluate of the consequences of an innovation.

iii. **Decision:** At the end of this stage, the individual decides to adopt or reject of an innovation.

iv. **Implementation:** After decision stage, the individual try his/her decision to see the results if he/she adopts or rejects an innovation.

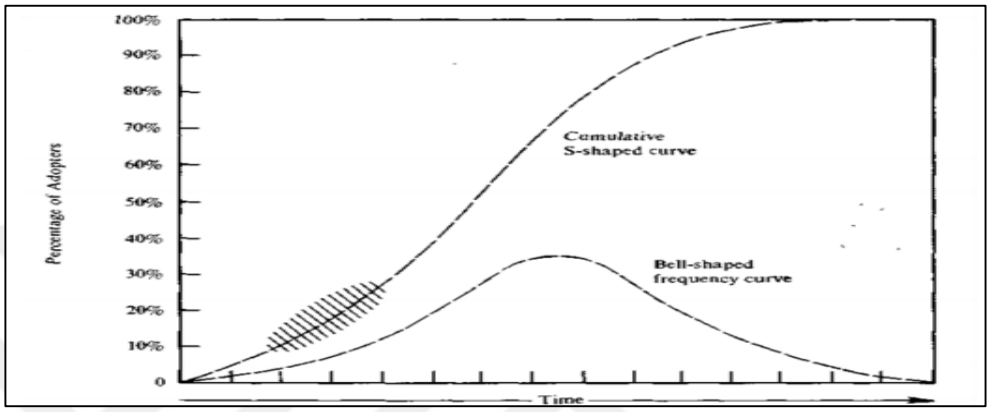
v. **Confirmation:** Confirmation is the stage of seeking reinforcement for an innovation that has already been adopted by the individual, yet he or she may change his or her previous decision if exposed a conflictive message about the innovation.

b) **Innovativeness:** Innovativeness is one dimension of the time that is the fourth dimension of innovation diffusion. According to Rogers (2003), some individuals in the same social system can embrace an innovation relatively earlier than other members of the social system. Innovativeness leads a change on behaviors, the result of an innovation that is adoption or rejection of it, rather than a change on cognitive or attitudinal (Rogers 2003, p.242). In literature, although there are many techniques to measure up innovativeness, two main approaches mostly may be conceptualized; general innovativeness, domain specific innovativeness. General innovativeness articulates openmindness and looking for new experiences by individuals (Joseph and Vyas 1984, Craig and Ginter 1975).

To measure up the innovativeness and the classification of members of a social system regarding to their innovativeness perspective are performed in terms of the individual's time of adoption (Güneş 2010). In literature, the results of many researches on determining effecting factors of innovativeness points out that

personal characteristic of individuals are quite determinant factor. Rogers (2003) makes a categorization for members of the social system regarding to innovativeness, based upon s-shaped curve of adoption such as plotted in Figure 2.2.

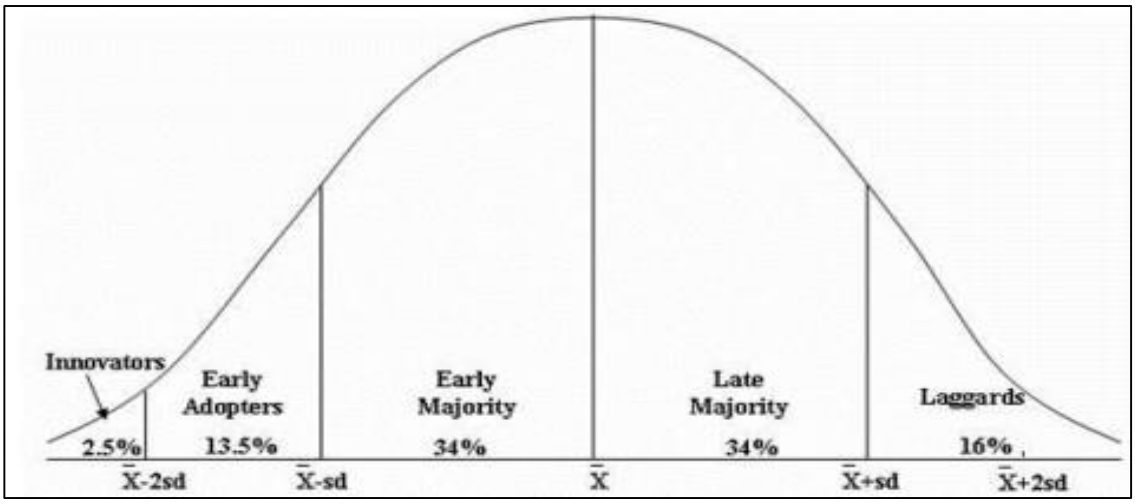
Figure 2.2: The s-shaped curve for adoption diffusion



Resource: Rogers, E. M., 1983. *Diffusion of innovations*. 3th Edition. New York: The Free Press, p. 243.

The s-shaped adopter distribution increases slowly at the beginning. According to Rogers (1983), all individuals can embrace an innovation at different times. As it can be seen in Figure 2.3 there are five main adopter categories, namely, innovators, early adopters, early majority, later majority, and laggards.

Figure 2.3: Categories of innovativeness



Resource: Rogers, E. M., 2003. *Diffusion of innovations*. 3th Edition. New York: The Free Press, p. 247.

i. **Innovator:** These individuals are very passionate to try out new things. In order to take place in this category, innovator, has some prerequisites. An innovator should afford the financial loss owing to an unprofitable innovation. One more point is that the innovator should be able to understand and to use complex technical products/services. The outstanding feature of an innovator is venturesomeness. Even though some members in the social system do not respect to innovators, the innovators are of prime importance in the innovation diffusion process by transporting the innovation from outside in to social system (Rogers 2003, p.248).

ii. **Early Adopter:** Early Adopters are more parallel with the society compared with the innovators. For an innovation diffusion process, they play a significant role compared to other categories. Early adopters give advice and information to potential adopters about the innovation. Due to the fact that early adopters are closer to the average individual of the social system, they are seen as a role model and respected by his/her peers in the social system (Rogers 2003, p.248). Early adopters like to talk about their successes. So the message about the innovation diffuses strongly (Robinson 2009). They decrease the uncertainty about the innovation by adopting it. They make subjective evaluations about the innovation and share these with people surrounding of them by way of interpersonal networks (Rogers 2003, p.248).

iii. **Early Majority:** The most prominent feature of early majorities is that they do not like to take risk, they tend to be deliberate. The decision process of this group takes more time than the other groups'. They do not prefer to be the first person or the last person who tries an innovation (Rogers 2003, p.249). They look for simple, proven, cost-effective, and better ways of doing what they already do. They hate complexity (Robinson 2009).

iv. **Late Majority:** Late Majority approaches to the innovations with a skeptical way. They do not prefer to adopt an innovation until the many others of the

social system have done so. The motivation adoption of this group is the peers' pressure (Rogers 2003, p.250).

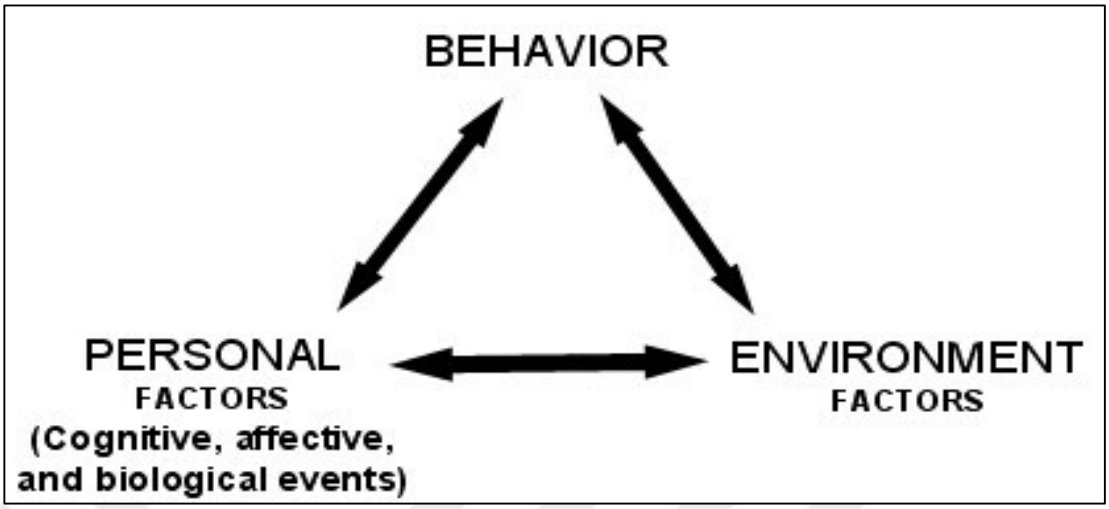
v. **Laggards:** As the name suggests, they are the last people who accept the innovations. Laggards take decisions in their daily routine in terms of the past experiences. They are traditional. Laggards are strictly suspicious about innovations. Their innovation decision process takes the longest time compared to other categories. The time between the knowledge about the innovation and the adoption and usage of the innovation is long. They have reasons not to adopt an innovation in a fast manner. They may not afford an innovation due to scarce financial resources. Before they decide to adopt an innovation, laggards would like to see the people who try it and the results of the innovation (Rogers 2003, p.250).

4. **Social system:** The members or units of a social system may be individuals, informal groups, organizations, and/or subsystems. Behaviors and structures of every individual in a social system are different from each other. Social structure can affect favorable or unfavorable the diffusion of innovation by making easier or impeding the diffusion process (Rogers 2003, p.26).

2.2 SOCIAL COGNITIVE THEORY (SCT)

In 1941, Miller and Dollard proposed social learning theory and this theory was extended with the addition of behavioral and cognitive approaches by Bandura. Bandura (1986) proposed a model that behaviors and feelings can change by taking someone as role model and by making observation. According to this theoretical review, human functioning occurs by the interaction of personal, behavioral, and environmental influences, as it is illustrated in Figure 2.4. For Bandura (1986), a psychology without introspection cannot determine the complexities of human functioning. To predict how the environmental outcomes affect human behaviors, it is crucial to be aware of the individual cognitive processes.

Figure 2.4: Social cognitive theory model

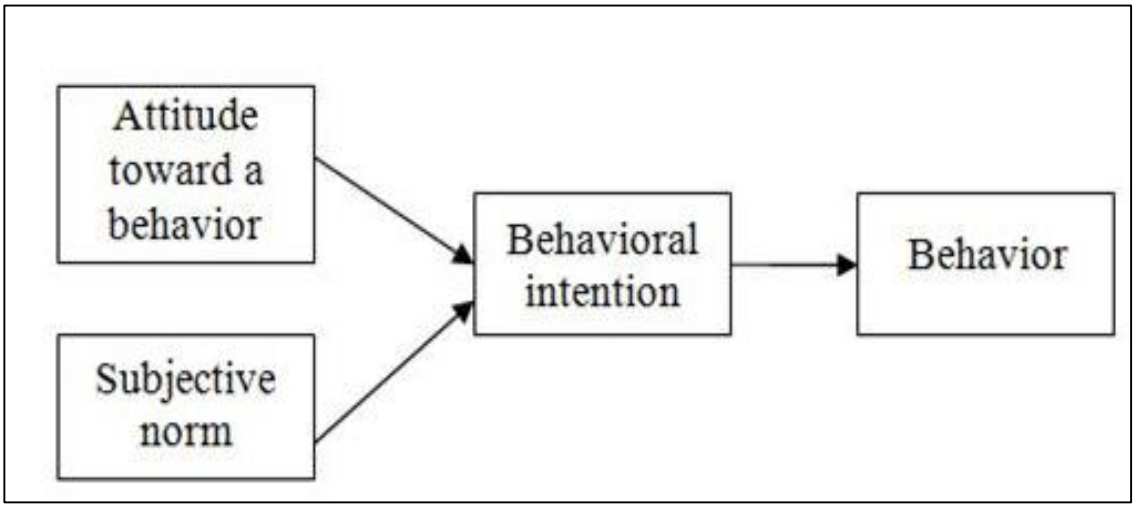


Resource: Pajares, F., 2002. Overview of social cognitive theory and of self-efficacy (Direct url: http://www.emory.edu/EDUCATION/mfp/eff.html, last access date: 15.03.2016)

2.3 THEORY OF REASONED ACTION (TRA)

The theory of reasoned action (TRA) was constructed by Ajzen and Fishbein in 1975. In social psychology, mostly it is used to investigate conscious individual behaviors. Regarding to TRA, attitude of an individual and the subjective norms affect the behavior intention that has an effect on his or her actual behavior such as depicted in Figure 2.5.

Figure 2.5: Theory of reasoned action

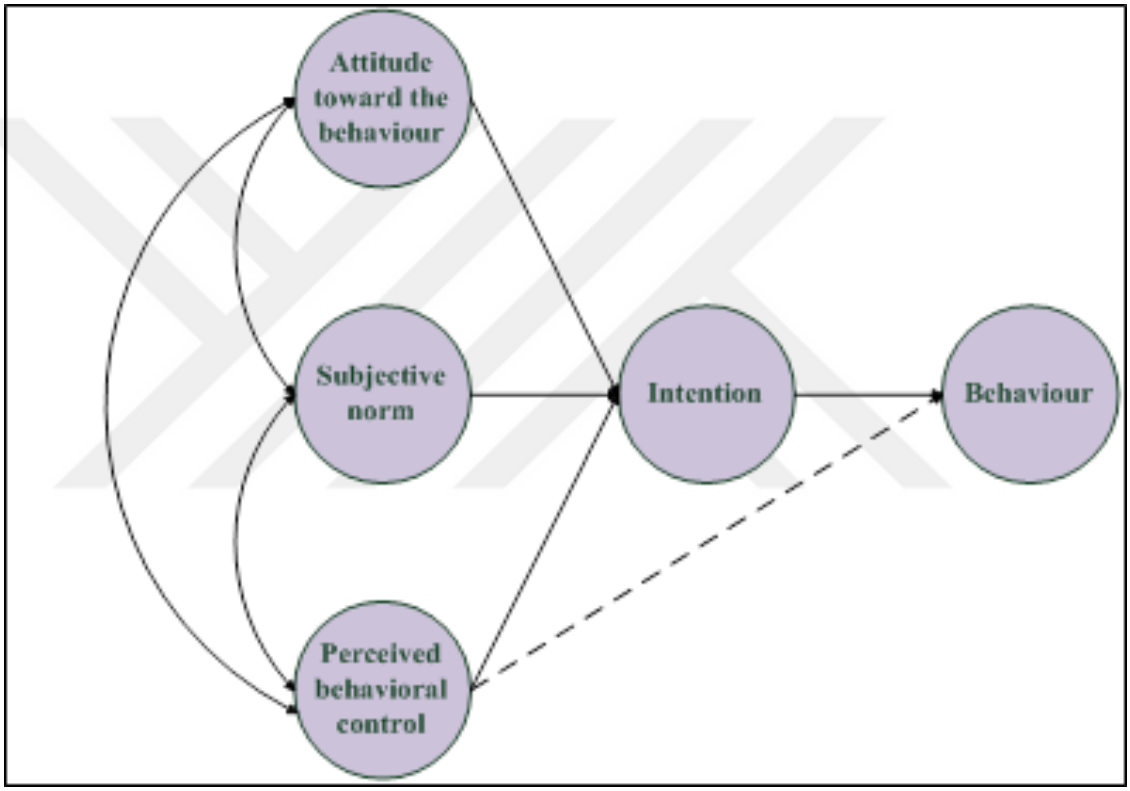


Resource: Ajzen, I., 1991. The theory of planned behavior. *Organizational Behavior and Human Decision Processes*. (**50**), pp.179-211.

2.4 THEORY OF PLANNED BEHAVIOR (TPB)

The theory of planned behavior is the extension of the theory of reasoned action. TPB includes perceived behavioral control in addition to reasoned action theory to understand the behavioral intentions that constitute the actual behavior such as depicted in Figure 2.6 (Ajzen 1991).

Figure 2.6: Theory of planned behavior



Resource: Ajzen, I., 1991. The theory of planned behavior. *Organizational Behavior and Human Decision Processes*. (50), pp.179-211.

2.5 PROTECTION MOTIVATION THEORY (PMT)

The Protection Motivation Theory (PMT) was originally proposed in 1975 by Rogers and used the substantial elements of the Health Belief Model encompasses the cognitive processes mediating attitudinal and behavioral change to understand the fear appeals (Prentice-Dunn and Rogers 1986, Rogers 1975). The proposed theory by Boer and Seydel (1996) have six main feature: severity, vulnerability, response-efficacy, self-efficacy, protection motivation (intention), and protection behavior, as it can be seen in Table 2.1.

The PMT model provides an understanding of why attitudes and behavior can change when an individual encounter with a threat (Floyd et al. 2000, p. 408). In PMT, health behavior is viewed as adaptive coping (beneficial to health) or maladaptive coping (harmful to health). PMT comprises of two evaluation processes: threat and coping. Threat evaluation is determined by perceived severity and perceived vulnerability (Armitage and Conner 2000, p. 175).

Table 2.1: The main components of protection motivation theory

Severity	How severe are the consequences of the disease?
Vulnerability	How probable is it that I will contract the disease?
Response efficacy	How effective is the recommended behavior in avoiding the negative consequences?
Self-efficacy	To what extent am I able to perform the recommended behaviors successfully?
Protect motivation	Am I intending to perform the recommended behavior?
Protective behavior	Performing the recommended behavior?

Resource: Boer, Henk and Seydel, Erwin R., 1996. Protection motivation theory. In: Mark Conner & Paul Norman (Eds.), Predicting health behavior: research and practice with social cognition models. Open University Press, Buckingham, p.99.

The PMT is used widely to examine health behaviors. PMT mostly has frequently been used as a framework to health education attempt to influence and change health behaviors such as reducing alcohol use, enhancing healthy life styles, enhancing diagnostic health behaviors and preventing disease (Boer and Seydel 1996, p.98).

Perceived Severity: Within PMT, perceived severity is explained as the degree of harm from unhealthy behavior (Rogers 1975). The severity of the health threat is described as how seriously the individual considers the health threats. If an individual perceives higher severity towards related issue it is expected that those people tend very likely to adopt the

advised protective behavior (Henson et al. 2010, Boer and Seydel 1996, Prentice-Dunn and Rogers 1986).

Perceived Vulnerability: Perceived vulnerability, one of the threat appraisal processes, assess how an individual personally perceives the given situation as a threat (Milne et al. 2000, p. 108).

2.6 PRIVACY CALCULUS THEORY

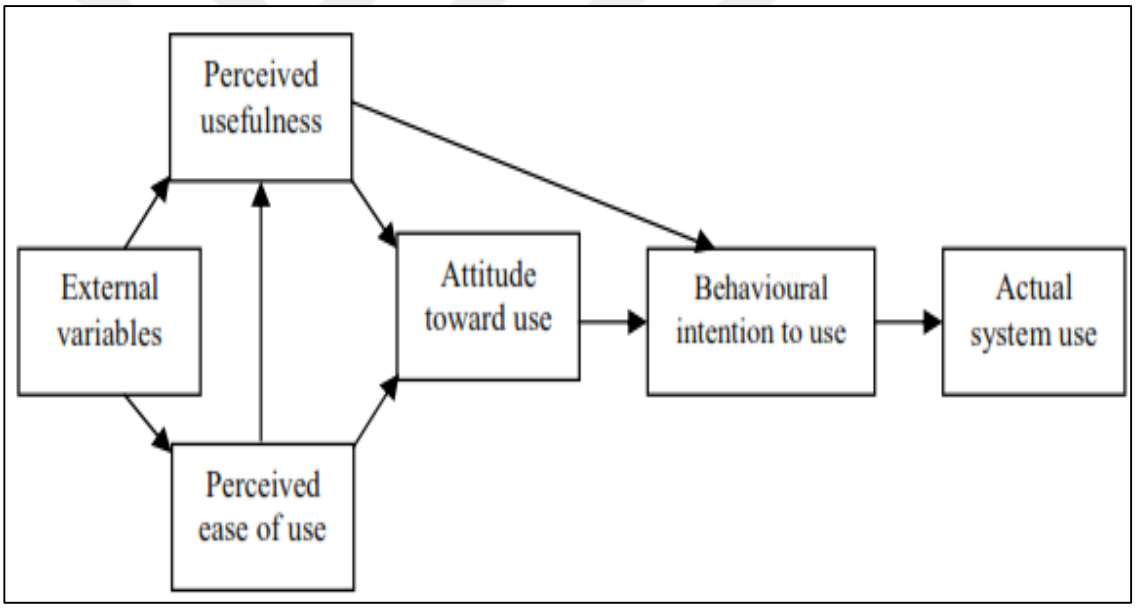
The privacy calculus (PC) perspective proposes that anticipated benefits and perceived risks affect an individual's decision to share information with other parts. Hence, individuals are expected to take into consideration the cost and benefits (Dinev and Hart 2006). In the literature of privacy calculus, perceived risks mostly refer to "potential for loss associated with the release of personal information" (Smith et al. 2011, p. 1001),

2.7 TECHNOLOGY ACCEPTANCE MODEL

There have been various studies/models to study and understand the affecting factors of user acceptance model by using Theory of Reasoned Action (TRA), the Theory of Planned Behavior (TPB), the Technology Acceptance Model (TAM) (Hsiao and Tang 2015). There are some comparative studies like Todd and Taylor's study. They compared TAM, TPB, and TRA to evaluate which model had the best explain power and which factors were essential and important while understanding usage of information technology and they found out a significant effect in all three model. While they found small differences between models in explanatory power, the results showed that TAM has more explanatory power than others (Taylor and Todd 1995). Although TRA and TPB can explain system utilization by consisting of subjective norms and perceived behavioral controls by means of attitudes towards technology utilization, TAM is more preferable and easy to apply for online works since simplicity. Firstly, TAM is specific for Information Systems (IS) usage by taking into consideration easiness and usefulness (Chen et al. 2011).

TAM first developed by Davis (1989) and it was derived from Fishbein and Ajzen's TRA to explain potential user's behavioral intention, as it can be seen in Figure 2.7. In TAM, there are two key factors: perceived ease of use (PEOU) and perceived usefulness (PU). This 2 factors have a direct effect over individual's attitude (AT) and behavioral intention (BI) in IS/IT usage (Hsiao and Tang 2015). According to David (1989), perceived usefulness defines as the perception degree of a person believes that adopting/using a specific system/product can improve his or her job performance. Perceived ease of use is the perception degree of a person believes that adopting/using a specific system/product can be easy to use.

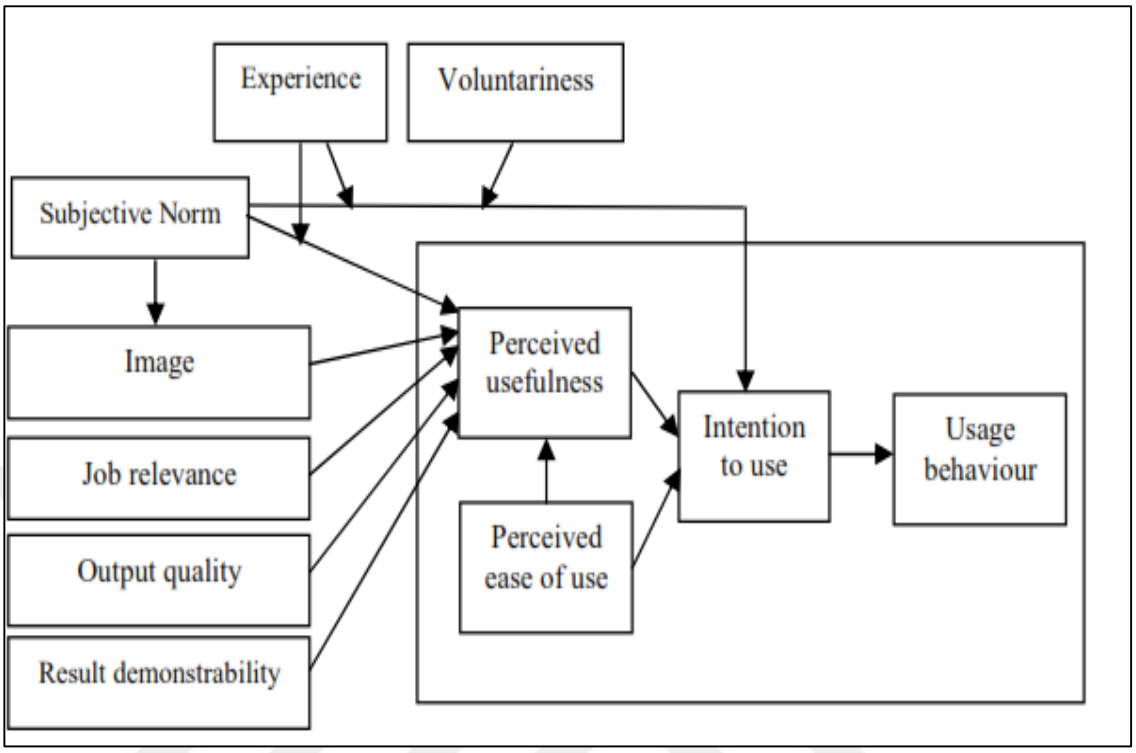
Figure 2.7: Technology acceptance model



Resource: Davis, F.D., 1989. Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*. **13** (3), pp. 319-340.

After David (1989), many studies were conducted and extended in this field. Many studies have suggested extended models by means of revising TAM, due to that TAM is a strong story. Venkatesh and Davis (2000) proposed TAM2 by adding subjective norms, as it can be seen in Figure 2.8.

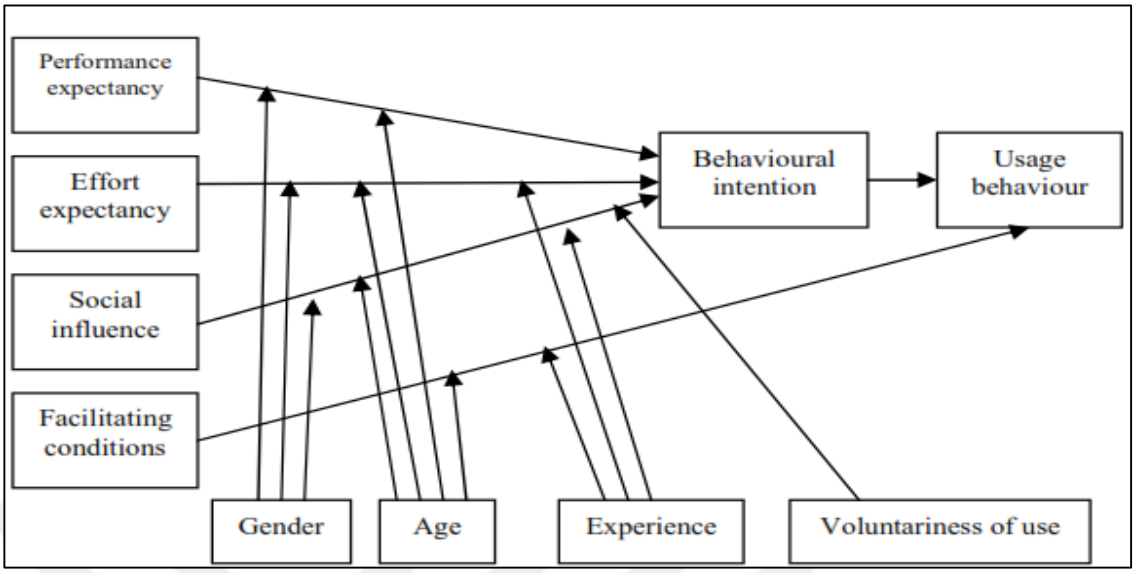
Figure 2.8: Technology acceptance model 2



Resource: Venkatesh, V., and Davis, F.D., 2000. A theoretical extension of the technology acceptance model: four longitudinal field studies. *Management Science*. **46** (2), pp. 186–204.

The Unified Theory of Acceptance and Use of Technology (UTAUT) was developed by Venkatesh, Morris, and Davis (2003) as depicted in Figure 2.9. The purpose of this unified model is to take into consideration some external factors such as gender, age, experience and voluntariness of use over variables such as performance expectancy, effort expectancy, social influence, and facilitating conditions (Venkatesh et al. 2003). According to Venkatesh and friend's research study which they reviewed user acceptance literature and discussed 8 prominent models, UTAUT explains 70 percent of user's acceptance of the technology whereas previous technology acceptance models were able to explain 40 percent of user's acceptance of the technology.

Figure 2.9: Unified theory of acceptance and use of technology



Resource: Venkatesh, V., Morris, M., Davis, G. and Davis, F., 2003. User acceptance of information technology: Toward a unified view. *MIS Quarterly*. **27** (3), pp. 425-478.

2.8 SUMMARY OF LITERATURE REVIEW

As it has mentioned before, in literature there are various models for understanding and exploring the effecting factors in adoption, acceptance and usage of the technology. When literature is reviewed, it is possible to come across research studies that TAM and other theories has been used together to explain technology adaptation including such as IDT and Technology Readiness Index (TRI) (Sun et al. 2013). TAM and IDT have some similar constructs and they are equivalent of each other to investigate adoption intention in IS field. Researchers points out that the constructs of TAM are basically a subset of perceived innovation characteristics; hence, combining these two theories could produce a more powerful model (Wu and Wang 2005). There are lots of studies combined the original TAM with IDT. Table 2.2 shows some studies that used TAM, IDT, and PMT or TAM and IDT together in the literature.

Some related research studies are as following;

Gao et al. (2015) investigated the factors associated with consumer intention to adopt wearable technology for fitness, and to examine the moderating effects of product type on consumer's adoption intention from a behavioral perspective. Gao and friends

developed an integrated technology acceptance model based on UTAUT2, PMT, and PCT. This integrated model was tested with a survey with 462 users. The study found out that consumer's decision in adoption of healthcare wearable technology was significantly affected by factors from technology, health and privacy perspectives. The other finding was that hedonic motivation, social influence, perceived privacy risk, and perceived vulnerability for wearable devices for fitness had more importance than the other factors.

Hsiao et al. (2013) researched what factors had an effect onto the mobile wireless healthcare technology acceptance for elderly people's and also tested whether technology acceptance model could be generalized for mobile wireless healthcare technology among the elderly people by adding other factors referring to individual differences such as health cognition, technology characteristics, and social influences. This extended model was tested with 338 elderly through a survey. This research showed that perceived ubiquity, perceived health knowledge and perceived need were prominent most affecting factors that explain attitude. One interesting finding was that perceived usefulness had no significance influence over attitudes. While perceived usefulness had no effect, perceived ease of use and ubiquity were more relevant and affecting factors in order to construct a reliable model which explained well attitudes towards usage of wireless healthcare technology by elderly people.

Sun et al. (2013) developed a unified model related to of mobile health services by empirically comparing three prominent health and technology acceptance models: TAM, TPB, and PMT. This unified model including factors from 3 health and technology acceptance model outperformed by providing higher R-squares. This study revealed that the prominent factors which explained well the intention adoption was subjective norm, perceived severity and perceived ease of use.

Miltgen et al. (2013) examined the individual acceptance of biometric identification techniques the way voluntarily. Miltgen and friends proposed an integrated model including elements from TAM, IDT, UTAUT, and trust privacy research fields. The study revealed that compatibility, perceived usefulness, facilitating conditions, privacy concern, technology trust, and innovativeness had an influence on biometrics systems acceptance.

The innovativeness construct had significant effect on behavioral intention through compatibility. PEOU and social influence had not a significance effect on behavioral intention. One more finding was that PEOU and PU affected compatibility.

Kim and Park (2012) proposed an integrated model expressing the behavioral intention in the context of healthcare. They tested the integrated technology acceptance model with 728 users of online health portal from the three largest platforms in South Korea. The model included three zones (health, information, technology) to determine behavioral intention of health consumers. Kim and Park (2012) found that perceived threat, perceived usefulness, and perceived ease of use had a significant effect to explain attitude and behavioral intention for health consumers. And also they found strong indirect effect of health status, health belief and concerns, subjective norm, HIT characteristics, and HIT self-efficacy towards attitude and behavioral intention.

Table 2.2: Literature review summary

Literature	User Type	Theory	Key Conclusion
Chen et al. 2002	Consumers	TAM, IDT	**1.** Compatibility, PU, PEOU are the prominent factors to explain the attitude towards using virtual stores **2.** Consumers' intention can be predicted from their attitude towards using virtual stores and this explain consumer acceptance, in result. **3.** Both compatibility and PEOU affect PU
Wu & Wang 2005	B2C (Business to Consumers)	TAM, IDT	**1.** Apart from PEOU, all variables significantly affect users' behavioral intention of user mobile commerce acceptance **2.** Among them, the compatibility has the most significant influence. **3.** Perceived risk has a positive influence on behavioral intention
Lee et al. 2011	Professionals (Business employees)	TAM, IDT	**1.** Compatibility, trialability, complexity, relative advantage, and PEOU are significant determinants of PU. **2.** Complexity, relative advantage, trialability are determinants of PEOU for e-learning system **3.** BI significantly affects compatibility, relative advantage, complexity, trialability, and PU

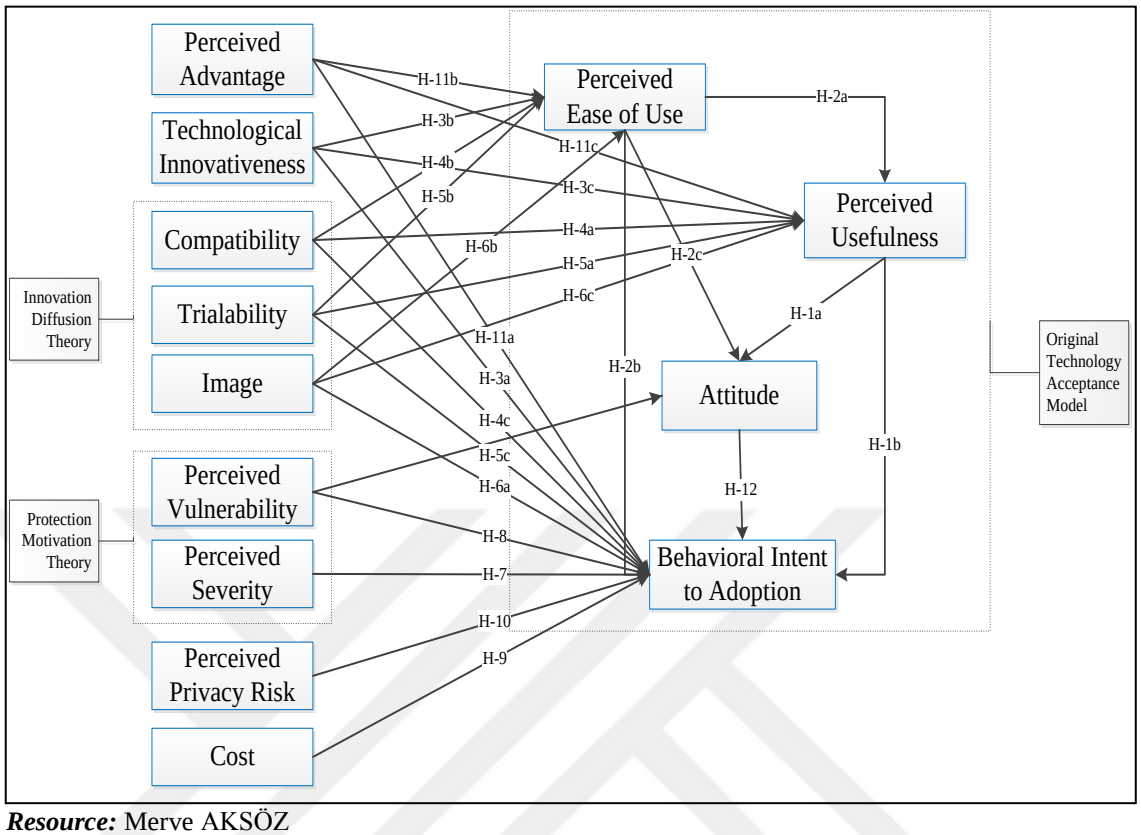
Continued from the previous page			
Literature	**User Type**	**Theory**	**Key Conclusion**
Kim et al. 2012	Online health portal users	TAM, TPB, HBM	**1.** Perceived threat, perceived usefulness, and perceived ease of use are significant determinants of health consumers' attitude and behavioral intention
Chen et al. 2011	Mobile healthcare consumers	TAM, TRA	**1.** TAM is insufficient to explain intention, extended TAM more variance. **2.** Perceived ubiquity, personal health knowledge and perceived need are significant determinants to explain attitude and behavioral intention **3.** This extended proposed model gives an explanation which factors are determinants in elderly persons' adoption of mobile healthcare devices such as RFID healthcare watches or GPS wristwatches.
Sarıkaya 2014	Consumers	TRI	**1.** Model has a low explanatory power when includes of the determinants of innovativeness, optimism, skill deficit, distrust towards consumers' attitude. **2.** By incorporating model with the determinants of facilitative conditions and compatibility, model explanatory power increases.
Miltgen et al. 2013	Biometric system consumers	TAM, IDT, UTAUT	**1.** PU and PEOU have a positive influence on behavioral intention to accept a biometric system. **2.** PEOU are one determinant of PU, has a positive effect on PU **3.** Compatibility is positive correlated with BI, PU, and PEOU. If an individual perceives related emerging product is compatible with past experiences, the related emerging products are accepted more rapidly and also those products are perceived more useful and easy to use by the individual. **4.** Perceived risk has a negative influence on behavioral intention **5.** Consumers who have greater privacy concern perceive usage of a biometric to be riskier. **6.** PU, PEOU, compatibility are more significant in accepting biometric systems for the consumers with higher personal innovativeness
Sun et al. 2013	Mobile healthcare consumers	TAM, TPB, UTAUT, PMT,	**1.** This study reveals the prominent factor to explain mobile health service adoption is response efficacy **2.** Social influence have a positive significant influence on behavioral intention **3.** PEOU and self-efficacy are affecting important factors to explain user behavior **4.** Perceived vulnerability are correlated with adoption intention

3. RESEARCH MODEL

Research model was developed in terms of related literature review. It has been developed an integrated model encompassing technology acceptance, innovation diffusion, health behavior, and privacy context to explain and examine empirically individuals' adoption of IoT products in healthcare from multiple perspectives. The adoption towards health information technology (HIT) products should be considered and distinguished from other technological products. It is suggested to researchers to pay attention to health care context when developing a model about a healthcare issue (Sun et al. 2013, Holden et al. 2010). Therefore, Health Behavior Model (HBM), integrated to the proposed model. Health Behavior Theory provides a systematic way of trying to understanding why people do the things they do and how their environment provides the context for their behavior. The most used models in health behavior researches are the HBM, PMT, self-efficacy theory, TRA, and TPB (Sutton 2002). PMT have better explanation power than other health behavior theories (Sun et al. 2013, Prentice-Dunn et al. 1986). Given that IoT Healthcare Products are a kind of emerging technology healthcare, both technological, healthcare factors and innovative factors are expected to significantly affect individual's adoption decision. And also potential customers can be concerned about privacy issues that IoT healthcare products collect user' healthcare data in real time. Therefore, it has developed and proposed an integrated framework that consists of technology acceptance, innovation diffusions, health behavior, privacy and cost contexts to explain and examine empirically consumer' adoption of IoT products in healthcare from multiple perspectives.

The proposed model, Internet of Things Healthcare Products Technology Acceptance Model, includes 3 technological factors (key factors from TAM and technological innovativeness from Technology Readiness Index), 5 factors of IDT such as image, trialability, compatibility, attitude, 2 factors related to healthcare severity and vulnerability from PMT, 1 factor related to privacy issue from privacy calculus model, and 1 factor related to cost. The following Figure 3.1 describes the research model.

Figure 3.1: Proposed research model



Resource: Merve AKSÖZ

Perceived Usefulness

In TAM, there are two key factors: perceived ease of use (PEOU) and perceived usefulness (PU). This two factors have a direct influence on attitude (AT) and behavioral intention (BI) in IS/IT usage (Hsiao et al. 2013). According to David (1989), perceived usefulness defines as the perception degree of a person believes that adopting/using a specific system/product can improve his or her job performance. Perceived ease of use is the perception degree of a person believes that adopting/using a specific system/product can be easy to use. Many studies confirm the impact of perceived usefulness on behavioral intention to use (Miltgen et al. 2013, Kim et al. 2012, Wu and Wang 2005, Chen et al. 2002). The hypotheses for perceived usefulness in this study are follows:

H-1a: PU has a positive effect on the behavioral intention to adopt using IoT healthcare products

H-1b: PU has a positive effect on the attitude to adopt using IoT healthcare products

Perceived Ease of Use

Perceived ease of use is the perception degree of a person believes that adopting/using a specific system/product can be easy to use. Many studies confirm the impact of perceived usefulness on behavioral intention to use (Miltgen et al. 2013, Kim et al. 2012, Wu and Wang 2005, Chen et al. 2002).

TAM affirms that perceived ease of use is a predictor of perceived usefulness and attitude toward use (Davis 1989). According to Davis and Davis and Venkatesh (2000), the relationship between PEOU and PU are explained in the manner if an individual perceives usage of any technological product/system as easy to use and free of effort, he or she perceives that product/system more useful. The hypotheses for perceived ease of use in this study are as follows:

H-2a: PEOU has a positive effect on the PU of IoT healthcare products
H-2b: PEOU has a positive effect on the behavioral intention to adopt using IoT healthcare products
H-2c: PEOU has a positive effect on the attitude to adopt using IoT healthcare products

Technological Innovativeness

According to IDT, individuals react differently while adopting an innovation because of personal differences such as personal innovativeness. Yi and friends (2006) proved that innovation has a significant role on determining the intention to adopt a technology. Many studies confirm that innovativeness is a significant determinant of technology acceptance (Sarıkaya 2014, Miltgen et al. 2013, Yi et al. 2006, Wu and Wang 2005, Lewis et al. 2003, Agarwal & Karahanna 2000). Beyond TAM, past researches has proposed that the acceptance of mobile healthcare generally involves technological and behavioral aspects for personal use, due to that TAM alone is not sufficient to explain a potential adopter' behavioral intentions (Venkatesh and Davis 2000). Therefore, innovativeness was integrated to research model. The hypothesis for TI in this study are as follows:

H-3a: TI is associated with the behavioral intention to adopt using IoT healthcare products

H-3b: TI is associated with the PEOU to adopt using IoT healthcare products

H-3c: TI is associated with the PU to adopt using IoT healthcare products

Compatibility

Agarwal and Prasad (1999) affirmed that technology acceptance was positive correlated with individual's previous compatible experiences. They found that past experiences with similar technologies have a positive effect on ease of use belief about the emerging information technology. Wu and Wang (2005) had also confirmed the positive correlation between compatibility and both PU and behavioral intention. Chen and friends also confirmed the same finding that was one of the prominent determinants of attitude and both compatibility and PEOU were determinants of PU. In literature, there are many studies that reveal the effect of compatibility in individual technology acceptance (Wu and Wang 2005, Hardgrave et al. 2003, Chau and Hu 2001). According to Sonnenwald et al. (2003) compatibility is defined as "the degree to which an innovation is perceived to be consistent with adopters' existing values, past experiences and needs". The following hypothesis was proposed:

H-4a: Compatibility has a positive effect on PU of IoT healthcare products

H-4b: Compatibility has a positive effect on PEOU of IoT healthcare products

H-4c: Compatibility has a positive effect on the behavioral intention to adopt using IoT healthcare products

Trialability

In literature, there is limited research about the effect of trialability in technological innovation adoption studies. However, a few researches confirm that trialability affects the behavioral intention to use the systems (Lee et al. 2011 and Yang 2007). Accordingly, the following hypotheses were proposed:

H-5a: Trialability has a positive effect on PU of IoT healthcare products
H-5b: Trialability has a positive effect on PEOU of IoT healthcare products
H-5c: Trialability has a positive effect on the behavioral intention to adopt using IoT healthcare products

Image

Moore and Benbasat (1991) proposed to extend innovation diffusion attributes by adding image, visibility, result demonstrability, and voluntariness. At the beginnings, some researchers including Rogers considered the image as an aspect of relative advantage. But Rogers (1983, p.215) also stated that "undoubtedly one of the most important motivations for almost any individual to adopt an innovation is the desire to gain social status". Therefore, image was also included in this research study. Accordingly, the following hypotheses were proposed:

H-6a: Image has a positive effect on the behavioral intention to adopt using IoT healthcare products
H-6b: Image has a positive effect on PEOU to adopt using IoT healthcare products
H-6c: Image has a positive effect on PU to adopt using IoT healthcare products

Perceived Severity

As it has stated in previous sections from the perspective of health behavior PMT has integrated to research model in this study. Rogers (1975) describes perceived severity as "the degree of harm from unhealthy behavior". Accordingly, the following hypotheses were proposed:

H-7: Perceived severity has a positive effect on the behavioral intention to adopt using IoT healthcare products

Perceived Vulnerability

Rogers (1975) describes perceived vulnerability as "the probability that one will experience harm". Accordingly, the following hypotheses were proposed:

H-8: Perceived vulnerability has a positive effect on the behavioral intention to adopt using IoT healthcare products

Cost

Cost is simply defined as the money gone in order to acquire something, and here refers to the money to be paid by consumers for IoT health products. Yahyapour and Nassab found out that cost was important to intent adoption to a new mobile messaging system (Yahyapour and Nassab 2007). Accordingly, the following hypotheses were proposed:

H-9: Cost is associated with the intention to adopt using IoT healthcare products

Perceived Privacy Risk

Privacy issue is an important context in adoption to use or continue to use a technology. Compared with other type of information such as demographic features and general transaction information, personal health information is more sensitive for individuals (Bansal et al., 2010). If potential adopters feel that anyone can reach their healthcare data when using IoT health products, they can reject or give up using it. Accordingly, the following hypotheses were proposed:

H-10: Perceived privacy is negatively associated with the intention to adopt using IoT healthcare products

Perceived Advantage

This construct has added into the research model by researcher. This construct can be considered as relative advantage in IDT. Perceived advantage means that innovation brings greater benefits to potential adopters. In literature, there are studies confirms that relative advantage is a significant parameter in the technological adoption (Lee et al. 2011). Accordingly, the following hypotheses were proposed:

H-11a: PA has a positive effect on the BI to adopt using IoT healthcare products
H-11b: Perceived advantage has a positive effect on PEOU of IoT healthcare products
H-11c: Perceived advantage has a positive effect on PU of IoT healthcare products

Behavioral Intention

Behavioral intention (BI) is defined by Ajzen and Fishbein as a measure of the likelihood that a person will get complete the given behavior (Fishbein and Ajzen 1980). As in the original TRA and TPA, in TAM also the individual intention's is a central factor to perform a given behavior. Motivational factor influences the behavioral intention. It can be generalized as if an individual has a strong intention to perform a behavior, his/her performance would be more likely high (Ajzen 1991).

Attitude

Attitude (AT) is the first determinant of BI and indicates the level of an individual has a favorable or unfavorable evaluation of relevant behavior. Most contemporary social psychologists take a cognitive or information-processing approach to attitude formation. According to this approach, attitudes develop reasonably from beliefs individual have about the object (Ajzen 1991, p. 191). Accordingly, the following hypotheses were proposed:

H-12: Attitude has a positive effect on the BI to adopt using IoT healthcare products

4. DATA AND METHODOLOGY

Research methodology of the thesis study is introduced in this section. Theoretical foundation for technology adoption in healthcare domain and innovation diffusion literature reviews and research model foundation and hypothesis are provided in previous sections. This section provides the research subjects and procedure, materials, data collection, and data analysis for the experiment.

4.1 SUBJECTS AND PROCEDURE

To test the proposed research model and hypotheses, online survey research method was used as quantitative research method. Online questionnaire is reachable any time and users can reach the survey from their computers. Therefore, the survey process becomes very easy for the participants. Online questionnaire used in this research is given in Appendix A. As to subjects, people who had smart devices were selected for the reason that the target group' member who would/could use internet of things (IoT) products in the close future.

4.2 MATERIALS

The survey questionnaire having used for the research study has two main parts. The first part consists of six demographic questions such as age, gender, education, average income, profession field and one filter question: the ownership of any smart device. The second part consists of research related forty factor questions. The questionnaire was translated into Turkish and survey research scope was limited just with Turkish people who lived in Turkey. The Turkish and The English versions of the questionnaire were given in Appendix B: QUESTIONNAIRE (Turkish Version) and Appendix C: QUESTIONNAIRE (English Version). Seven-point Likert scale was used for all items in the second part of the questionnaire: 1=Entirely Disagree, … , 7=Entirely Agree.

The research questions are adopted from previous studies in the literature. Just one scale has not been adopted from previous studies: perceived advantage. Table 4.1 shows item constructs and corresponding resources.

Table 4.1: Constructs, corresponding source and the items

Adopted from	Items	Questions
Behavioral Intention		
Karahanna et al, 2000	BI_1	I intend to adopt personal smart health technology products in my daily life within 6 months
	BI_2	During the next 6 months, I plan to experiment with or regularly use personal smart health technology products in my daily life.
Perceived Advantage		
	PA_1	Using personal smart health technology products would be useful in taking preventive actions related to my health
	PA_2	Using personal smart health technology products would be useful in detecting early intervention states related to my health
	PA_3	Using personal smart health technology products would provide to to be managed digitally and provide to share the information about my health status with healthcare professionals (such as physician, nurse)
Attitude		
Karahanna et al, 2000	AT_1	To begin to use personal smart health technology products in my daily life within the next 6 months, it would be….(Extremely bad-Extremely good)
	AT_2	To begin to use personal smart health technology products in my daily life within the next 6 months, it would be….(Extremely negative- Extremely positive)
	AT_3	To begin to use personal smart health technology products in my daily life within the next 6 months, it would be….(Extremely harmful- Extremely safe)
Perceived Severity		
Sun et al. 2013	PS_1	If I suffered the stated problems, it would be severe
	PS_2	If I suffered the stated problems, it would be serious
	PS_3	If I suffered the stated problems, it would be significant
Perceived Vulnerability		
Sun et al. 2013	PV_1	I am at risk for suffering the stated problems
	PV_2	It is likely that I will suffer the stated problems

	PV_3	It is possible for me to suffer the stated problems
Perceived Usefulness		
Davis 1989	PU_1	Using personal smart health technology products would enable me to take action related to my health more quickly
	PU_2	Using personal smart health technology products would improve my deciding performance related to my health
	PU_3	Using personal smart health technology products would enhance deciding effectiveness related to my health
	PU_4	Using personal smart health technology products would make it easier to take decisions related to my health
Perceived Ease of Use		
Davis 1989	PEOU_1	Learning to use personal smart health technology products would be easy for me
	PEOU_2	It would be easy to use personal smart health technology products
	PEOU_3	Having interaction between personal smart health technology products(smartphone, tablet, watch, etc.) and mobile devices would make my usage (being managable on mobile devices) easier
Technological Innovativeness		
Parasuraman 2000	TI_1	Other people come to me for advice on new technology
	TI_2	In general I am among the first in my circle of friends to acquire new technology when it appears
	TI_3	It seems my friend learning more about newest technologies than I am
	TI_4	I enjoy the challenge of figuring out high tech gadgets
	TI_5	I keep up with the latest technological developments in my areas of interest
Image		
Karahanna et al, 2000	IM_1	If I were to adopt personal smart health technology products, it would give me high status around me
	IM_2	If I were to adopt personal smart health technology products, I would have more prestige around me than who have not yet adopted it
	IM_3	Having personal smart health technology products is a status symbol in the circle of me
Trialability		
Karahanna et al, 2000	TR_1	Before deciding on whether or not to adopt personal smart health technology products, I would like to try (be able to try) it on a trial basis
	TR_2	Before deciding on whether or not to adopt personal smart health technology products, I would like to try (be able to try) it properly on a trial basis

	-TR_3	I would have a chance to try smart health technology products long enough to see what they can do
Compatibility		
Karahanna et al, 2000	COM_1	If I were to adopt personal smart health technology products, it would be compatible with my daily routine
	COM_2	If I were to adopt personal smart health technology products, it would fit with my life style
	COM_3	If I were to adopt personal smart health technology products, it would fit well the way I like to manage my daily routine
Perceived Privacy Risk		
Li et al. 2014	PPR_1	It would be risky to disclose my personal health information to vendors providing personal smart health technology products
	PPR_2	There would be high potential for loss associated with disclosing my personal health information to vendors providing personal smart health technology products
	PPR_3	There would be too much uncertainty associated with giving my personal health information to vendors providing personal smart health technology products
Cost		
Yahyapour 2007	COST_1	The amount of money I pay for personal smart health technology products has a direct effect on my intention to adopt it
	COST_2	I prefer not to use personal health technology products if the money I pay for it costs me a lot, even if it provides me many easiness/facilities in terms of my daily health management

4.3 DATA COLLECTION AND DATA SAMPLING

Online survey tool, surveymonkey, was used to reach up the target group who had any smart device and more than 18 years old. 576 people participated in the survey within 2 weeks (15th February 2016– 29th February 2016). The survey questionnaire was carried out online due to the fact that the online survey can be reachable from anywhere, anytime by anyone. Surveymonkey online survey tool had direct export feature to excel and SPSS so that it is less time consuming. Social networks such as facebook, twitter, social health forums, social IoT and technology facebook groups, and e-mail contacts were used. The response rate was quite enough to make further analysis: 75 percentages.

Purposive criterion sampling method was found more appropriate for data sampling method of this research study. This method involves searching for cases or individuals who meet a certain criterion. For this research study, the criterion was the ownership of any smart device. Because people who own a smart device can be a potential user of any IoT healthcare product in the close future.

Data sampling requirements were provided by taking into account analysis requirements. Although structural equational model method need massive sample sizes for further analysis, in literature there is no any clear information of how massive sample size should be. However, sample sizes less than 100 are considered to be "small" (Kline 2005).
Sample demographics are given in Table 4.2. Larger samples have less sampling error. Sample sizes for estimation methods are given as following;
Small: N < 100
Medium: 100 < N < 200
Large: N > 200
There is no definite standard in literature about the sample size for a confirmatory factor analysis, however, the following recommendation is offered: it is desired that sample size should be 20 times larger than the number of items used in the questionnaire. For a more realistic target, a 10:1 ratio fits better (Kline 2005).

This research model has 40 parameters and 426 respondents after removing uncompleted surveys. According to literature findings, sample size for this research study is considerable enough for SEM and any other estimation methods such as regression.

Sample demographic profiles are given in Table 4.2.

Table 4.2: Demographic profiles of the respondents

Gender					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	222	52,1	52,1	52,1
	Male	204	47,9	47,9	100,0
	Total	426	100,0	100,0	
City					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Istanbul	276	64,8	64,8	64,8
	Ankara	19	4,5	4,5	69,2
	Izmir	16	3,8	3,8	73,0
	Others	115	27,0	27,0	100,0
	Total	426	100,0	100,0	

Continued from the previous page					
Profession Field					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Working	12	2,8	2,8	2,8
	Student	54	12,7	12,7	15,5
	Private Sector	262	61,5	61,5	77,0
	Public Employee	81	19,0	19,0	96,0
	Housewife	5	1,2	1,2	97,2
	Retired	7	1,6	1,6	98,8
	Freelance	5	1,2	1,2	100,0
	Total	426	100,0	100,0	
Income					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0-500 TL	41	9,6	9,6	9,6
	501-1000 TL	18	4,2	4,2	13,8
	1001-1500 TL	47	11,0	11,0	24,9
	1501-2500 TL	87	20,4	20,4	45,3
	2501-3000 TL	71	16,7	16,7	62,0
	3001-5000 TL	108	25,4	25,4	87,3
	5000 TL over	54	12,7	12,7	100,0
	Total	426	100,0	100,0	
Education					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Primary School	1	,2	,2	,2
	Secondary School	2	,5	,5	,7
	High School	39	9,2	9,2	9,9
	two-year vocational high school	44	10,3	10,3	20,2
	four-year license	252	59,2	59,2	79,3
	Masters	72	16,9	16,9	96,2
	PHD	16	3,8	3,8	100,0
	Total	426	100,0	100,0	
Interest in Technological Development					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly not interested	3	,7	,7	,7
	Not interested	6	1,4	1,4	2,1
	Neither not interested nor interested	9	2,1	2,1	4,2
	Somewhat interested	63	14,8	14,8	19,0
	Interested	151	35,4	35,4	54,5
	Strongly interested	194	45,5	45,5	100,0
	Total	426	100,0	100,0	

4.4 DATA ANALYSIS

Structural equational model (SEM) method was employed to analyze research model in this study. SEM is generally used to test models including complex relations and its principal feature is being based on the basis of theory. SEM is a multivariate statistical method based on the basis of defining observed and unobserved variables in a causative and relational model (Meydan and Şeşen, 2011). SEM consists of various statistical methods such as regression, confirmatory factor analysis and path analysis. SEM uses path diagrams to illustrate causative relations about assumed models.

While performing a SEM analysis, it is important to be sure of having chosen the correct method of SEM. SEM model has two main different types: variance based and covariance based ones. In this study, it is performed partial least squares (PLS) approach; variance based SEM method because of that the research data is distributed non-normally.

PLS-SEM is a second generation multivariate statistical method which aims to examine causatively the relationship of latent variables with each other. And also, it aims to maximize the explained variance of the dependent latent constructs (Henseler et al. 2009). PLS-SEM offers a great opportunity for SEM researchers especially in the management information system and marketing disciplines to execute various complex statistical analysis at once. As it can be understood from its name, PLS-SEM is a regression based approach that aims to minimize residual variances of endogenous variables (Hair et al. 2011).

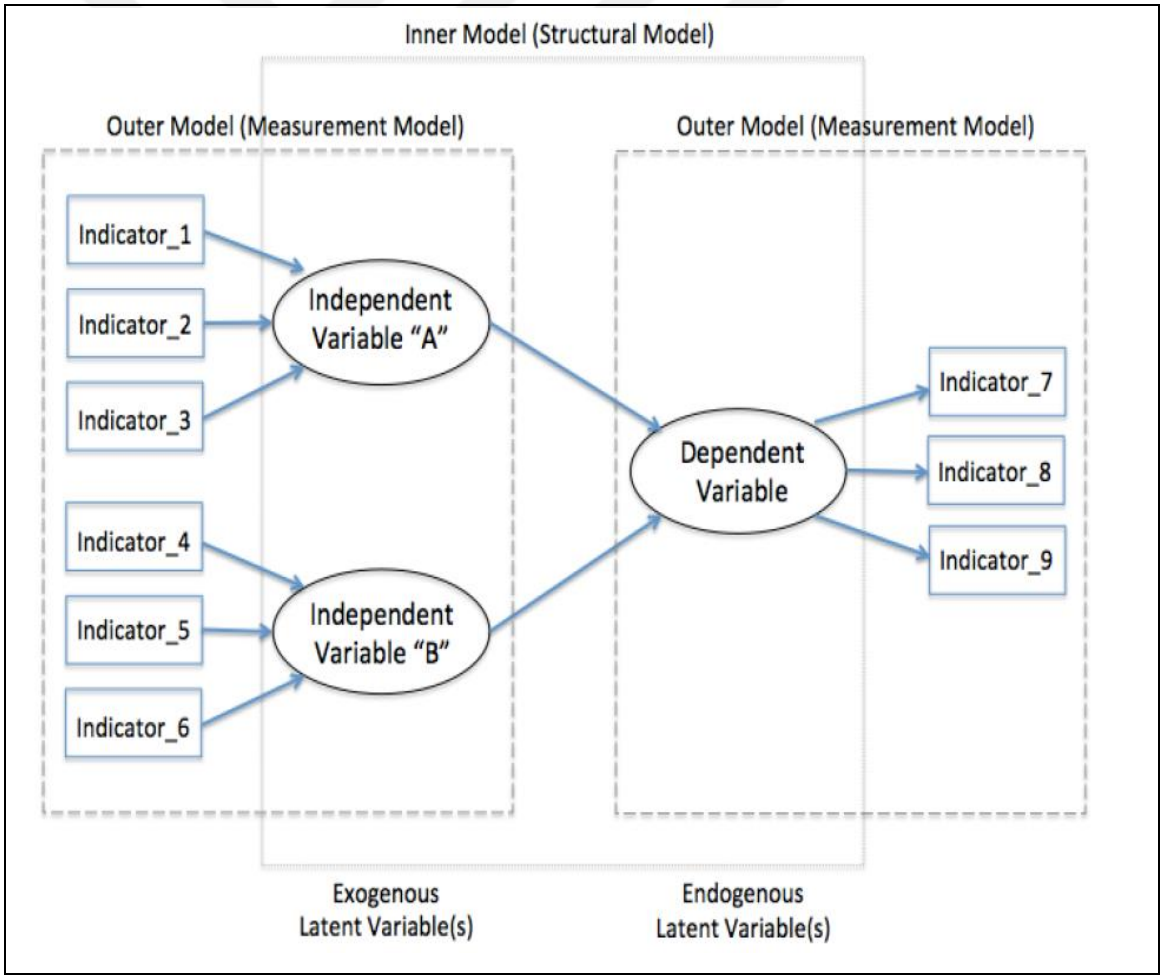
PLS path modeling (PLSPM) is applied to estimate the weights / loadings of a set of non-measurable variables, called latent variables. Latent variables are the linear combination of their measurable sets of variables, called manifest variables (Aparicio 2011). As seen in Figure 4.1, manifest variables are items / indicators in questionnaire and latent variables are constructs in the model.

In literature, SEM is most widely used method whether the research data supports the model or not. SEM comprises of two sub models; i) inner model, ii) outer model. Inner

model represents the relationship between exogenous and endogenous latent variables whereas outer model represents the relationship between latent variable and manifest variables (observed variables, items taken place in the questionnaire) of related latent variables as depicted in Figure 4.1 (Kwong and Wong 2013). In this study, for the evaluation of outer model, PLS-SEM which is one type of confirmatory factor analysis was applied and for inner model evaluation, PLS-Path modelling was applied.

In SEM analyses, a variable is defined as exogenous or endogenous, yet in the same model one variable can be both exogenous or endogenous. An exogenous variable does not have any structural path relationship pointing at it whereas an endogenous variable has at least one path pointing at it.

Figure 4.1: Inner vs. outer model in a SEM diagram



Resource: Kwong, K., and Wong, K., 2013. Partial least squares structural equation modeling (pls-sem) techniques using smartpls. *Marketing Bulletin.* **24**, Technical Note 1.

5. FINDINGS

It was employed a two-step approach to analysis the empirical data collected from online survey. Firstly, the measurement model was examined and secondly the structural model was tested. For two step evaluation of data analysis SmartPLS 3.2.3 and XLSTAT were used. All data analysis steps for both measurement and structural model were illustrated in Figure 5.1 and Figure 5.2.

Figure 5.1 shows which analysis are required to perform for measurement model analysis.

Figure 5.1: **PLS-SEM data analysis process for measurement model**

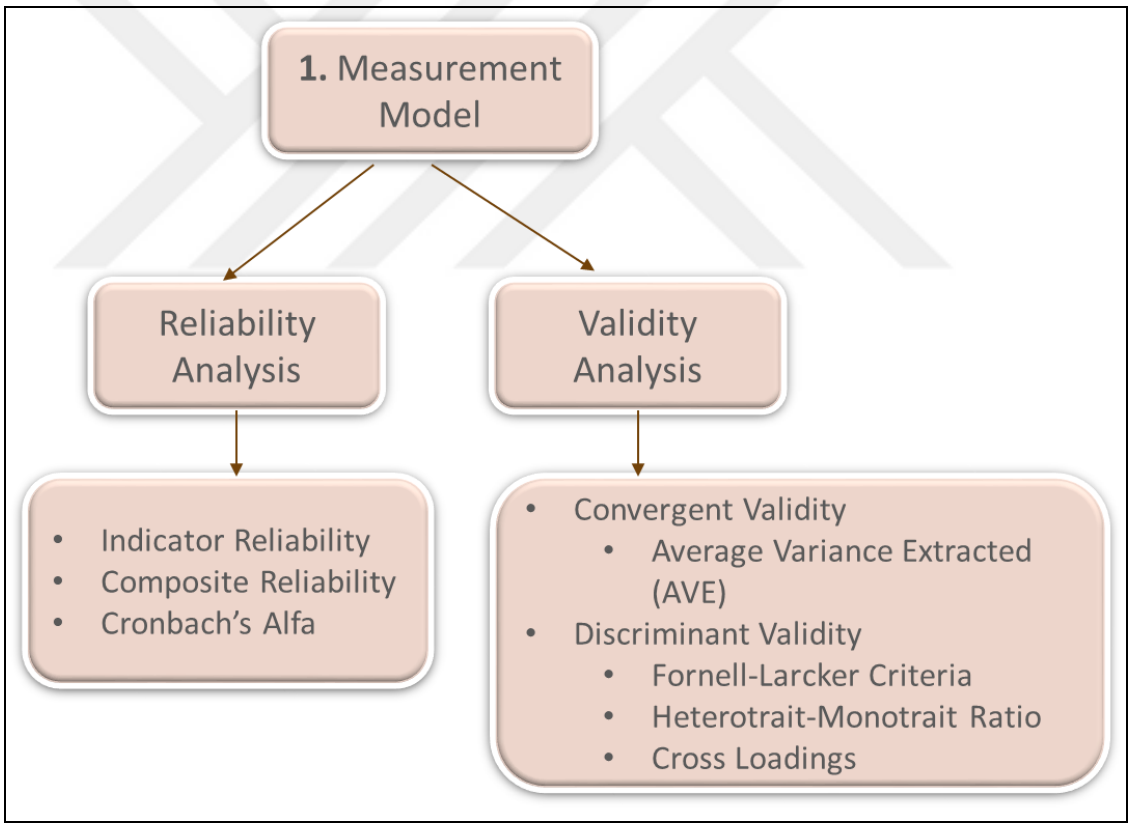
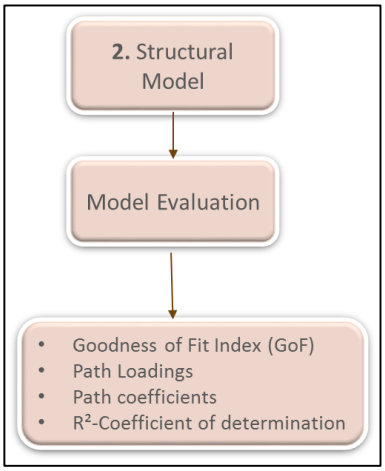


Figure 5.2 shows which analysis are required to perform for structural model analysis.

Figure 5.2: PLS-SEM data analysis process for structural model



5.1 MEASUREMENT MODEL

The measurement model of this study is reflective measurement model. Hair and friends (2013) describes reflective measurement model as the model having highly correlated and interchangeable items. In this case, they suggest evaluating the model in terms of reliability and validity.

5.1.1 Reliability Analysis

The reliability analysis shows if the manifest and latent variables are reliable or not for further analysis. Each respondent might comment the questions differently because of the misunderstanding the questions (items/manifest variables/indicator). Reliability analysis reveals this kind of mistakable questions. For construct reliability assessment, composite reliability and outer loadings are used as respectively an estimate of construct's internal consistency and indicator reliability. Whereas Cronbach's Alpha gives equal importance to all items in the scale, composite reliability does not. Previous literature suggests the use composite reliability as a replacement of Cronbach's alfa (Bagozzi and Yi 1988; Hair et al. 2012). 0, 70 or higher is preferred for indicator reliability, but 0, 40 or higher is acceptable for an explanatory research (Hulland 1999). 0, 70 are preferred for composite reliability, but 0, 60 or higher is acceptable for an explanatory research (Bagozzi and Yi, 1988). Table 5.1 shows result summary of outer model. The indicators of 2 latent variables seem problematic with considerably low loading and low indicator reliability.

Indicator with low loading should be removed from the model to provide reliability constraints.

Table 5.1: First results for summary of outer models

	Latent Variable	Indicator	Loadings	Indicator Reliability (loadings$^{2)}$	Composite Reliability	Cronbach's Alfa	AVE
FIRST EVALUATION	AT	AT_1	0,912	0,832	0,926	0,879	0,807
		AT_2	0,938	0,880			
		AT_3	0,843	0,711			
	BI	BI_1	0,971	0,943	0,971	0,941	0,944
		BI_2	0,972	0,945			
	COM	COM_1	0,884	0,781	0,928	0,884	0,812
		COM_2	0,918	0,843			
		COM_3	0,900	0,810			
	COST	COST_1	0,942	0,887	0,925	0,840	0,861
		COST_2	0,914	0,835			
	IMG	IM_1	0,938	0,880	0,950	0,921	0,864
		IM_2	0,961	0,924			
		IM_3	0,887	0,787			
	PA	PA_1	0,884	0,781	0,929	0,885	0,813
		PA_2	0,921	0,848			
		PA_3	0,899	0,808			
	PEOU	PEOU_1	0,894	0,799	0,904	0,841	0,759
		PEOU_2	0,869	0,755			
		PEOU_3	0,850	0,723			
	PPR	PPR_1	0,508	0,258	0,242	0,930	0,151
		PPR_2	0,438	0,192			
		PPR_3	-0,045	0,002			
	PS	PS_1	0,926	0,857	0,945	0,913	0,853
		PS_2	0,952	0,906			
		PS_3	0,891	0,794			
	PU	PU_1	0,881	0,776	0,942	0,919	0,804
		PU_2	0,922	0,850			
		PU_3	0,901	0,812			
		PU_4	0,881	0,776			
	PV	PV_1	0,857	0,734	0,912	0,854	0,775
		PV_2	0,919	0,845			
		PV_3	0,863	0,745			
	TI	TI_1	0,778	0,605	0,778	0,486	0,595
		TI_2	0,740	0,548			
		TI_3	-0,580	0,336			
		TI_4	0,864	0,746			
		TI_5	0,860	0,740			
	TR	TR_1	0,923	0,852	0,929	0,884	0,813
		TR_2	0,934	0,872			
		TR_3	0,847	0,717			

Reliability analysis was repeated by eliminating low loading indicators. Table 5.2 shows the second evaluation of result summary of outer model. After removing low loading indicators, construct reliability is established. Some indicators which have <0, 70 indicator reliability (AT3_, TI_1 and TI_2) were preferred to keep in the research model because of that outer loadings of them are not so low.

Table 5.2: Second results for summary of outer model (after removed low loading indicators)

	Latent Variable	Indicator	Loadings	Indicator Reliability (loadings$^{2)}$	Composite Reliability	Cronbach's Alfa	AVE
SECOND EVALUATION	AT	AT_1	0,912	0,832	0,926	0,879	0,807
		AT_2	0,938	0,880			
		AT_3	0,843	0,711			
	BI	BI_1	0,971	0,943	0,971	0,941	0,944
		BI_2	0,972	0,945			
	COM	COM_1	0,884	0,781	0,928	0,884	0,812
		COM_2	0,918	0,843			
		COM_3	0,900	0,810			
	COST	COST_1	0,942	0,887	0,925	0,84	0,861
		COST_2	0,914	0,835			
	IM	IM_1	0,938	0,880	0,95	0,921	0,864
		IM_2	0,961	0,924			
		IM_3	0,887	0,787			
	PA	PA_1	0,884	0,781	0,929	0,885	0,813
		PA_2	0,921	0,848			
		PA_3	0,899	0,808			
	PEOU	PEOU_1	0,894	0,799	0,904	0,841	0,759
		PEOU_2	0,870	0,757			
		PEOU_3	0,850	0,723			
	PPR	PPR_1	0,964	0,929	0,955	0,907	0,914
		PPR_2	0,948	0,899			
	PS	PS_1	0,926	0,857	0,945	0,913	0,853
		PS_2	0,952	0,906			
		PS_3	0,891	0,794			
	PU	PU_1	0,881	0,776	0,942	0,919	0,804
		PU_2	0,922	0,850			
		PU_3	0,901	0,812			
		PU_4	0,881	0,776			
	PV	PV_1	0,857	0,734	0,912	0,854	0,775
		PV_2	0,919	0,845			
		PV_3	0,863	0,745			
	TI	TI_1	0,776	0,602	0,887	0,83	0,663
		TI_2	0,738	0,545			
		TI_4	0,870	0,757			
		TI_5	0,864	0,746			
	TR	TR_1	0,923	0,852	0,929	0,884	0,813
		TR_2	0,934	0,872			
		TR_3	0,847	0,717			

5.1.2 Validity Analysis

Assessment of the reflective measurement model is fulfilled through two analyses: i) convergent validity, ii) discriminant validity. Convergent validity is examined to detect whether any unrelated measurement items in the measurement construct (Chan et al. 2015). To examine convergent validity, average variance extracted (AVE) is calculated. 0, 50 and higher for an AVE value is sufficient. This means that a latent variable in question explains more than half of variances of its indicators (Hair et al. 2011). Convergent validity is established that all latent variable AVE value is higher than 0, 50.

Discriminant validity is carried out to check an observed variable is empirically unique and represents best the related latent variable compared with other observed variables in the SEM (Hair et al. 2010). According the results of literature review in this context, for variance based SEM, discriminant validity is evaluated in terms of three approaches: i) Fornell-Larcker criteria, ii) Heterotrait-heteromethod ratio (HTMT) criteria iii) Cross loadings. According to Fornell-Larcker criterion, a latent variable shares more variance with its represented manifest variables than with another latent variable in the structural model. According to cross loading approach, an observed variable's loading with its assigned latent variable should be higher than its loadings with all the remaining variables. The third approach for detecting lack of discriminant validity is heterotrait-heteromethod ratio (HTMT) criteria which has released new in 2015. Henseler et al. (2015) confirmed that Fornell-Larcker criterion and cross loadings approach had an inadmissibly low sensitivity and specifity. From this explanation, it can have considered that they were generally unable to detect a lack of discriminant validity. They have presented a new criteria to detect lack of discriminant validity for variance based SEM: HTMT ratio criteria. This new HTMT criteria examines the comparison of the heterotrait-heteromethod correlations, of which indicators across constructs measuring different phenomena, and the monotrait-heteromethod correlations, of which indicators measuring the same construct. HTMT criteria can detect the discriminant validity with considerably high sensitivity rate. HTMT values close to 1 indicate a lack of discriminant validity. There are different threshold value recommendations: $HTMT_{0,85}$, $HTMT_{0,90}$ and $HTMT_{inference}$. $HTMT_{0,85}$ has higher sensitivity and specificity to detect the lack of

discriminant validity (Henseler et al. 2015). In this research study, discriminant validity is evaluated regarding to 3 criteria: Heterotrait-Monotrait Ratio criteria, Fornell-Larcker criterion and cross loadings. The results of three of them indicate that discriminant validity is well established in this measurement model.

Table 5.3 shows that Heterotrait-Monotrait Ratio result indicates that discriminant validity is well established. As mentioned above HTMT values should be lower than 0, 85, yet the value of 0, 90 might also be acceptable. The reason why it does not well fit with the $HTMT_{0,85}$ that PU and PADV latent variables may have similar indicators (items/manifest variables).

Table 5.3: Heterotrait-monotrait ratio results for discriminant validity

	AT	BI	COM	COST	IM	PA	PEOU	PPR	PS	PU	PV	TI	TR
AT													
BI	0.631												
COM	0.500	0.426											
COST	0.289	0.157	0.283										
IM	0.418	0.423	0.456	0.059									
PA	0.612	0.576	0.479	0.326	0.344								
PEOU	0.500	0.305	0.483	0.345	0.222	0.627							
PPR	0.060	0.031	0.152	0.174	0.026	0.052	0.076						
PS	0.336	0.302	0.471	0.370	0.284	0.403	0.451	0.077					
PU	0.613	0.489	0.528	0.339	0.402	0.868	0.716	0.058	0.443				
PV	0.355	0.286	0.311	0.300	0.239	0.254	0.237	0.121	0.364	0.269			
TI	0.282	0.327	0.474	0.210	0.370	0.377	0.478	0.081	0.344	0.321	0.227		
TR	0.459	0.351	0.617	0.421	0.261	0.527	0.500	0.122	0.504	0.492	0.310	0.417	

According to the results of Fornell-Larcker criterion indicates that discriminant validity is well established, as it can be seen in Table 5.4. Fornell and Larcker (1981) proposes that the square root of AVE in each latent variable can be used to establish discriminant validity with the condition of that this AVE value should be greater than other correlation values among the latent variables.

Table 5.4: Fornell-Larcker criterion results for discriminant validity

	AT	BI	COM	COST	IM	PA	PEOU	PPR	PS	PU	PV	TI	TR
AT	**0.898**												
BI	0.574	**0.972**											
COM	0.442	0.388	**0.901**										
COST	0.250	0.141	0.249	**0.928**									
IM	0.379	0.396	0.415	0.055	**0.929**								
PA	0.540	0.526	0.424	0.284	0.315	**0.901**							
PEOU	0.432	0.273	0.420	0.296	0.201	0.542	**0.871**						
PPR	-0.033	-0.028	0.135	0.155	-0.024	-0.047	0.067	**0.956**					
PS	0.301	0.281	0.423	0.326	0.264	0.362	0.399	0.069	**0.923**				
PU	0.551	0.456	0.476	0.302	0.372	0.785	0.634	0.040	0.405	**0.897**			
PV	0.309	0.257	0.270	0.253	0.211	0.221	0.200	0.105	0.322	0.240	**0.880**		
TI	0.243	0.287	0.407	0.177	0.311	0.335	0.408	0.065	0.307	0.285	0.190	**0.814**	
TR	0.405	0.321	0.545	0.369	0.242	0.466	0.436	0.109	0.452	0.444	0.269	0.366	**0.902**

Cross loadings generally indicate well-established discriminant validity, yet two indicators/manifest variables of perceived advantage (PA_2 and PA_3) have close high loadings with perceived usefulness as depicted in Table 5.5.

Table 5.5: Cross loading results for discriminant validity

	AT	BI	COM	COST	IMG	PA	PEOU	PPR	PS	PU	PV	TI	TR
AT_1	0.912	0.514	0.383	0.223	0.289	0.498	0.395	-0.022	0.243	0.483	0.287	0.209	0.360
AT_2	0.938	0.544	0.441	0.220	0.341	0.509	0.416	0.026	0.281	0.516	0.320	0.232	0.386
AT_3	0.843	0.486	0.364	0.233	0.394	0.446	0.350	-0.098	0.288	0.483	0.221	0.213	0.346
BI_1	0.567	0.971	0.365	0.138	0.371	0.502	0.255	-0.050	0.274	0.436	0.248	0.248	0.305
BI_2	0.548	0.972	0.390	0.136	0.398	0.520	0.274	-0.005	0.271	0.449	0.251	0.310	0.319
COM_1	0.408	0.353	0.884	0.259	0.346	0.355	0.354	0.105	0.407	0.409	0.270	0.340	0.496
COM_2	0.407	0.352	0.918	0.233	0.406	0.400	0.393	0.163	0.375	0.459	0.228	0.357	0.496
COM_3	0.380	0.345	0.900	0.183	0.368	0.390	0.386	0.095	0.362	0.417	0.233	0.403	0.481
COST_1	0.253	0.142	0.280	0.942	0.066	0.293	0.311	0.169	0.323	0.322	0.226	0.153	0.396
COST_2	0.207	0.117	0.173	0.914	0.033	0.229	0.232	0.115	0.280	0.231	0.246	0.179	0.278
IM_1	0.369	0.384	0.408	0.065	0.938	0.325	0.183	-0.024	0.251	0.363	0.168	0.308	0.264
IM_2	0.389	0.384	0.419	0.057	0.961	0.325	0.231	-0.017	0.272	0.378	0.199	0.303	0.255
IM_3	0.288	0.331	0.321	0.028	0.887	0.215	0.136	-0.027	0.206	0.287	0.230	0.251	0.140
PA_1	0.496	0.509	0.371	0.222	0.292	0.884	0.504	-0.046	0.302	0.673	0.208	0.307	0.433
PA_2	0.490	0.475	0.390	0.267	0.273	0.921	0.482	-0.049	0.307	0.729	0.197	0.293	0.414
PA_3	0.473	0.438	0.386	0.280	0.287	0.899	0.481	-0.031	0.371	0.721	0.193	0.305	0.413
PEOU_1	0.391	0.263	0.359	0.235	0.184	0.491	0.894	0.079	0.318	0.578	0.180	0.350	0.356
PEOU_2	0.355	0.219	0.325	0.233	0.148	0.440	0.870	0.060	0.283	0.481	0.188	0.357	0.314
PEOU_3	0.379	0.228	0.407	0.300	0.188	0.482	0.850	0.036	0.431	0.587	0.156	0.359	0.460
PPR_1	-0.033	-0.029	0.112	0.158	-0.029	-0.048	0.074	0.964	0.074	0.039	0.090	0.048	0.098
PPR_2	-0.029	-0.024	0.150	0.137	-0.016	-0.041	0.052	0.948	0.057	0.038	0.113	0.079	0.111
PS_1	0.306	0.263	0.392	0.310	0.253	0.364	0.355	0.043	0.926	0.371	0.288	0.284	0.429
PS_2	0.272	0.271	0.408	0.298	0.258	0.335	0.366	0.050	0.952	0.374	0.312	0.299	0.399
PS_3	0.256	0.242	0.369	0.296	0.218	0.304	0.386	0.102	0.891	0.380	0.291	0.266	0.427
PU_1	0.486	0.444	0.398	0.262	0.299	0.809	0.553	-0.020	0.370	0.881	0.219	0.256	0.432
PU_2	0.508	0.405	0.453	0.259	0.360	0.680	0.553	0.069	0.377	0.922	0.224	0.227	0.393
PU_3	0.478	0.399	0.420	0.313	0.351	0.666	0.569	0.076	0.404	0.901	0.227	0.299	0.391
PU_4	0.501	0.383	0.437	0.252	0.326	0.651	0.598	0.024	0.302	0.881	0.188	0.240	0.374
PV_1	0.245	0.219	0.202	0.199	0.152	0.138	0.121	0.113	0.260	0.159	0.857	0.166	0.209
PV_2	0.279	0.244	0.257	0.222	0.238	0.222	0.174	0.086	0.304	0.245	0.919	0.186	0.245
PV_3	0.292	0.216	0.251	0.248	0.162	0.222	0.234	0.080	0.284	0.225	0.863	0.150	0.257
TI_1	0.188	0.183	0.344	0.125	0.272	0.216	0.318	0.071	0.228	0.227	0.190	0.776	0.233
TI_2	0.189	0.285	0.299	0.105	0.415	0.167	0.220	0.075	0.161	0.180	0.136	0.738	0.229
TI_4	0.235	0.251	0.368	0.178	0.202	0.379	0.416	0.027	0.313	0.292	0.152	0.870	0.387
TI_5	0.173	0.222	0.309	0.158	0.169	0.289	0.345	0.051	0.273	0.211	0.146	0.864	0.314
TR_1	0.378	0.294	0.505	0.332	0.230	0.448	0.423	0.088	0.419	0.420	0.230	0.329	0.923
TR_2	0.386	0.319	0.496	0.362	0.236	0.411	0.397	0.119	0.418	0.389	0.278	0.353	0.934
TR_3	0.331	0.254	0.473	0.303	0.187	0.400	0.358	0.087	0.385	0.393	0.220	0.308	0.847

5.2 STRUCTURAL MODEL

At this second step structural model is evaluated and hypotheses are tested. The essential evaluation criteria for the structural model is R^2 value, coefficient determinant, path coefficients' level, and significance of the path coefficients. R^2 values of endogenous latent variables should be high since PLS-SEM aims to explain important latent constructs' variance. The evaluation of R^2 value varies in terms of particular research discipline. R^2 value of 0, 20 is accepted high in social sciences whereas a R^2 value of 0, 75 would be perceived high in more numerical studies. Chin (1998) describes R^2 values of 0, 67, 0, 33, and 0, 19 in PLS path models as substantial, moderate, and weak, respectively. Another measure to evaluate structural model is Goodness of Fit Index (GFI) which is based on the relative amount of variance and covariance in the sample covariance matrix. As it is stated by Schermelleh-Engel et al. (2003) the GFI should be between 0 and 1, with values close to 1 of good fit otherwise the data probably do not fit the model.

T-statistics is used to test the significance of both inner and outer model by generating a procedure called bootstrapping. In this procedure, a great number of subsamples (e.g., 5000) are taken from the original sample data set with the replacement by giving a bootstrap standard error, that hence gives approximate T-values for significance testing of the structural path (Kwong and Wong 2013).

Firstly, the entire total model was evaluated. Then the data was grouped regarding gender and the grouped data was tested if there was any significant difference between female and male potential adopters.

5.2.1 Complete Model Evaluation

To calculate GFI, XLSTAT-PLS-PM was used. The results are illustrated in Table 5.6.

Table 5.6: Goodness of fit indexes of the complete model

Goodness of Fit Index			
Models	**GoF**	**GoF (Bootstrap)**	**Standard error**
Absolute	0,598	0,618	0,030
Relative	0,942	0,938	0,026
Outer model	0,975	0,993	0,024
Inner model	0,966	0,945	0,009
Mean R^2	0,471		

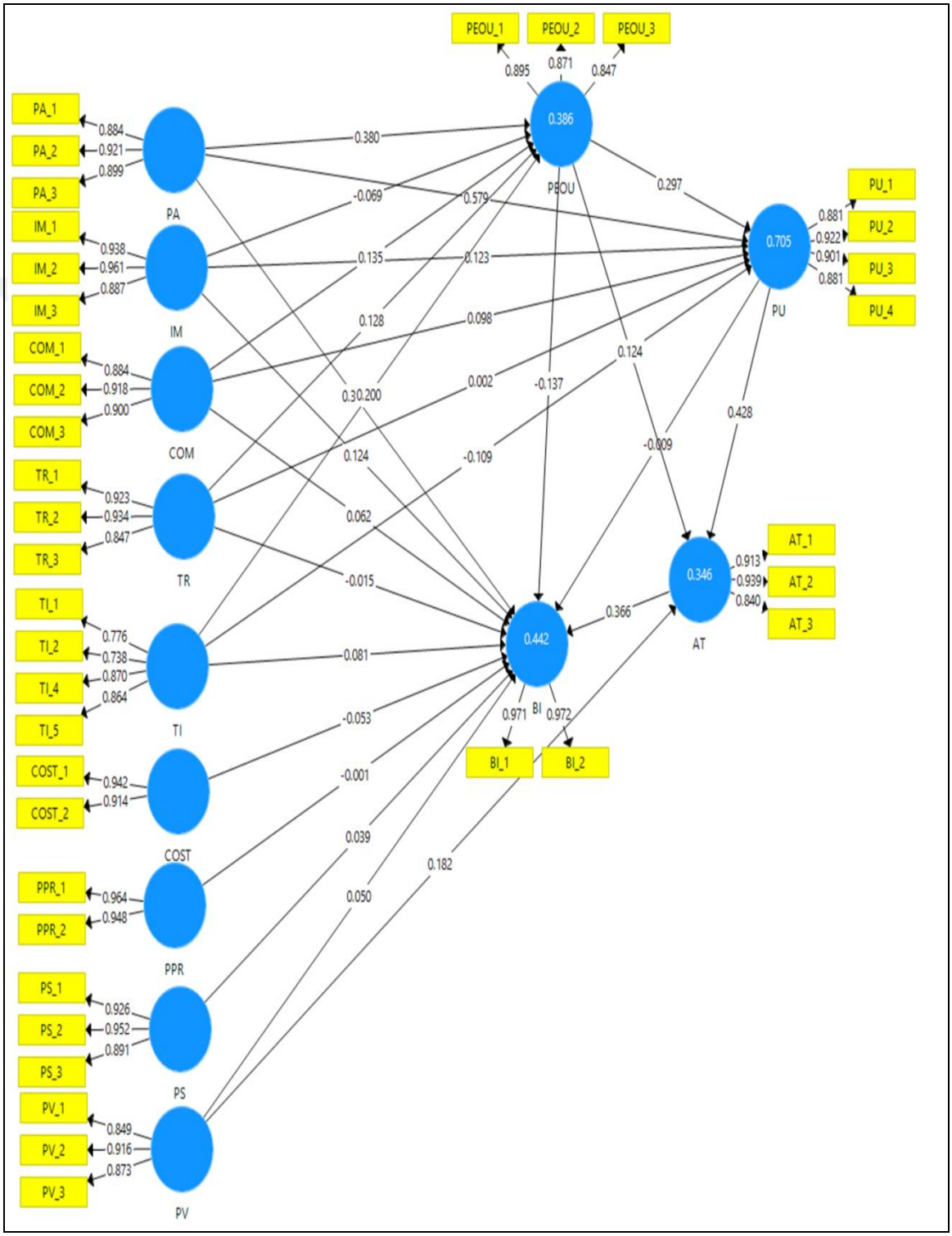
As it can be seen in Table 5.6, GoF is in an acceptable range. The R^2 values of important constructs are 0,442 (Behavioral Intention), 0,314 (Attitude), 0,705 (Perceived Usefulness), and 0,386 (Perceived Ease of Use), as it is illustrated in Table 5.7.

Table 5.7: Model assessment of the complete model

Latent variable	Type	R^2	Adjusted R^2	Mean Communalities (AVE)	D.G. rho
PA	Exogenous			0,813	0,929
IM	Exogenous			0,864	0,950
TR	Exogenous			0,813	0,929
COM	Exogenous			0,812	0,928
PPR	Exogenous			0,356	
COST	Exogenous			0,861	0,925
TI	Exogenous			0,595	
PS	Exogenous			0,853	0,945
PV	Exogenous			0,775	0,911
PEOU	Endogenous	0,386	0,380	0,759	0,904
PU	Endogenous	0,703	0,699	0,804	0,943
AT	Endogenous	0,354	0,346	0,807	0,926
BI	Endogenous	0,442	0,427	0,944	0,971
Mean		**0,471**		**0,759**	

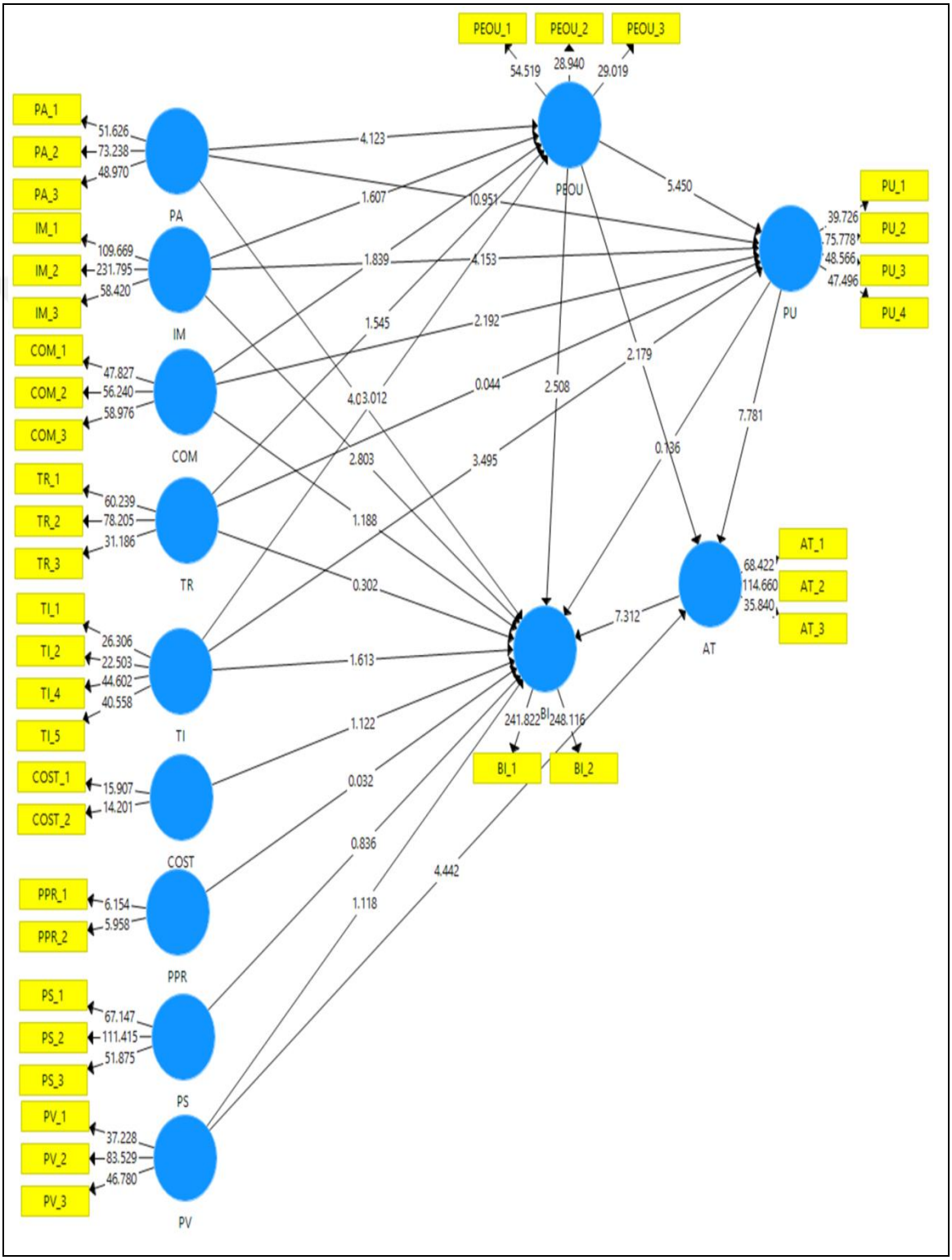
Path loadings and R^2 values was calculated by using PLS algorithm in SmartPLS 3.2.3. The entire model path loadings and R^2 values can be seen in Figure 5.3.

Figure 5.3: Path loadings and R^2 values of the complete model



In order to test the relations between the factors the bootstrapping results are depicted in Figure 5.4 and Table 5.8.

Figure 5.4: Path coefficients of the complete research model



In the table 5.8, there are two important columns as to determine the significance of the path coefficients: t statistics and p value. The significant paths are given as Attitude -> Behavioral Intention (p<0, 01), Compatibility -> Perceived Ease of Use (p<0, 10), Compatibility -> Perceived Usefulness (p<0, 05), Image -> Behavioral Intention (p<0, 01), Image -> Perceived Usefulness (p<0, 01), Perceived Advantage -> Behavioral Intention (p<0, 01), Perceived Advantage -> Perceived Ease of Use (p<0, 01), Perceived Advantage -> Perceived Usefulness (p<0, 01), Perceived Ease of Use -> Attitude (p<0, 05), Perceived Ease of Use -> Behavioral Intention (p<0, 05), Perceived Ease of Use -> Perceived Usefulness (p<0, 01), Perceived Usefulness -> Attitude (p<0, 01), Technological Innovativeness -> Perceived Ease of Use (p<0, 01), Technological Innovativeness -> Perceived Usefulness (p<0, 01)..

Table 5.8: Bootstrapping results of the complete model

Paths	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Significance
AT -> BI	0,366	0,367	0,050	7260,000	<0,0005	Significance***
COM -> BI	0,062	0,065	0,052	1191,000	0,234	**Not Significance**
COM -> PEOU	0,135	0,134	0,074	1825,000	0,068	Significance*
COM -> PU	0,098	0,097	0,045	2177,000	0,030	Significance**
COST -> BI	-0,053	-0,049	0,047	1119,000	0,263	**Not Significance**
IM -> BI	0,123	0,124	0,045	2736,000	0,006	Significance***
IM -> PEOU	-0,069	-0,071	0,044	1559,000	0,119	**Not Significance**
IM -> PU	0,123	0,122	0,029	4197,000	<0,0005	Significance***
PA -> BI	0,314	0,307	0,079	3990,000	<0,0005	Significance***
PA -> PEOU	0,380	0,381	0,092	4120,000	<0,0005	Significance***
PA -> PU	0,579	0,581	0,054	10792,000	<0,0005	Significance***
PEOU -> AT	0,139	0,138	0,058	2387,000	0,017	Significance**
PEOU -> BI	-0,137	-0,136	0,056	2454,000	0,014	Significance**
PEOU -> PU	0,297	0,294	0,056	5339,000	<0,0005	Significance***
PPR -> BI	-0,001	-0,001	0,041	0,028	0,977	**Not Significance**
PS -> BI	0,039	0,041	0,046	0,834	0,404	**Not Significance**
PU -> AT	0,463	0,464	0,054	8600,000	<0,0005	Significance***
PU -> BI	-0,010	-0,007	0,068	0,143	0,887	**Not Significance**
PV -> AT	0.182	0.183	0.041	4442,000	<0,0005	Significance***
PV -> BI	0,051	0,052	0,045	1144,000	0,253	**Not Significance**
TI -> BI	0,081	0,079	0,051	1590,000	0,112	**Not Significance**
TI -> PEOU	0,200	0,207	0,066	3045,000	0,002	Significance***
TI -> PU	-0,109	-0,106	0,031	3511,000	<0,0005	Significance***
TR -> BI	-0,015	-0,015	0,049	0,303	0,762	**Not Significance**
TR -> PEOU	0,128	0,126	0,083	1548,000	0,122	**Not Significance**
TR -> PU	0,002	0,002	0,037	0,043	0,966	**Not Significance**

P<0, 01= Significance***, P<0, 05= Significance**, P<0, 10= Significance*

Based on bootstrapping results depicted in Table 5.8, hypotheses testing results are illustrated in Table 5.9

Table 5.9: Hypotheses results

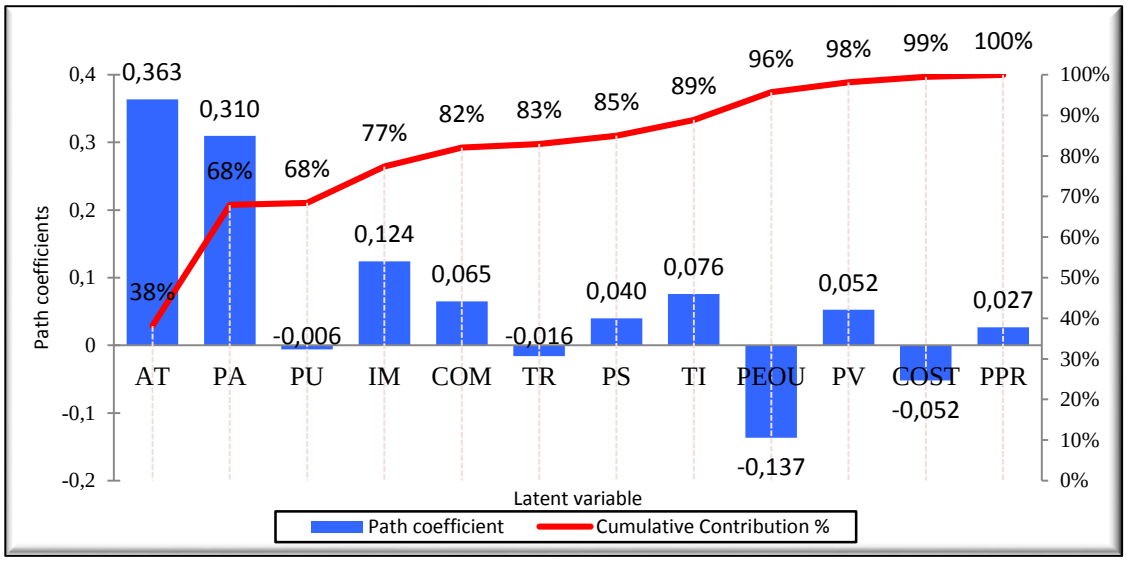
Paths	Hypotheses	Results
PU -> BI	**H-1a:** PU has a positive effect on the behavioral intention to adopt using IoT healthcare products	Not Supported
PU -> AT	**H-1b:** PU has a positive effect on the attitude to adopt using IoT healthcare products	**Supported**
PEOU -> PU	**H-2a:** PEOU has a positive effect on the PU of IoT healthcare products	**Supported**
PEOU -> BI	**H-2b:** PEOU has a positive effect on the behavioral intention to adopt using IoT healthcare products	**Supported**
PEOU -> AT	**H-2c:** PEOU has a positive effect on the attitude to adopt using IoT healthcare products	**Supported**
TI -> BI	**H-3a:** TI is associated with the behavioral intention to adopt using IoT healthcare products	Not Supported
TI -> PEOU	**H-3b:** TI is associated with the PEOU to adopt using IoT healthcare products	**Supported**
TI -> PU	**H-3c:** TI is associated with the PU to adopt using IoT healthcare products	Supported
COM -> PU	**H-4a:** Compatibility has a positive effect on PU of IoT healthcare products	**Supported**
COM -> PEOU	**H-4b:** Compatibility has a positive effect on PEOU of IoT healthcare products	**Supported**
COM -> BI	**H-4c:** Compatibility has a positive effect on the behavioral intention to adopt using IoT healthcare products	Not Supported
TR -> PU	**H-5a:** Trialability has a positive effect on PU of IoT healthcare products	Not Supported
TR -> PEOU	**H-5b:** Trialability has a positive effect on PEOU of IoT healthcare products	Not Supported
TR -> BI	**H-5c:** Trialability has a positive effect on the behavioral intention to adopt using IoT healthcare products	Not Supported
IM -> BI	**H-6a:** Image has a positive effect on the behavioral intention to adopt using IoT healthcare products	**Supported**
IM -> PEOU	**H-6b:** Image has a positive effect on PEOU to adopt using IoT healthcare products	Not Supported
IM -> PU	**H-6c:** Image has a positive effect on PU to adopt using IoT healthcare products	**Supported**
PS -> BI	**H-7:** Perceived severity has a positive effect on the behavioral intention to adopt using IoT healthcare products	Not Supported
PV -> BI	**H-8:** Perceived vulnerability has a positive effect on the behavioral intention to adopt using IoT healthcare products	Not Supported
COST -> BI	**H-9:** Cost is associated with the intention to adopt using IoT healthcare products	Not Supported
PPR -> BI	**H-10:** Perceived privacy negatively is associated with the intention to adopt using IoT healthcare products	Not Supported
PA -> BI	**H-11a:** Perceived advantage has a positive effect on the behavioral intention to adopt using IoT healthcare products	**Supported**
PA -> PEOU	**H-11b:** Perceived advantage has a positive effect on PEOU of IoT healthcare products	**Supported**
PA -> PU	**H-11c:** Perceived advantage has a positive effect on PU of IoT healthcare products	**Supported**
AT -> BI	**H-12:** Attitude has a positive effect on the behavioral intention to adopt using IoT healthcare products	**Supported**

To explain behavioral intention to adopt using IoT healthcare products the most contribution comes from attitude (38 percent) and perceived advantage (30 percent). Other parameters contribution is less low respectively Image (9 percent), perceived ease of use (-7 percent). Table 5.10 and Figure 5.5 show the values of correlations, path coefficients, contribution to R^2 for BI construct. The model equation for BI construct is **BI**= 0, 36***AT** + 0, 31***PA** + 0, 12***IM** – 0, 14***PEOU**. This equation includes just the values which have significant path coefficients.

Table 5.10: Impact and contribution of the variables to BI

Constructs	Correlation	Path coefficient	Correlation * path coefficient	Contribution to R^2 (%)	Cumulative %
Total Explanation of BI (R^2) : %44,2					
AT	0,573	0,363	0,208	38%	38%
PA	0,526	0,310	0,163	30%	68%
IM	0,396	0,124	0,049	9%	77%
PEOU	0,273	-0,137	-0,037	**7%**	84%
COM	0,388	0,065	0,025	5%	88%
TI	0,277	0,076	0,021	4%	92%
PV	0,257	0,052	0,013	2%	95%
PS	0,281	0,040	0,011	2%	97%
COST	0,141	-0,052	-0,007	**1%**	98%
TR	0,321	-0,016	-0,005	**1%**	99%
PPR	0,107	0,027	0,003	1%	99%
PU	0,455	-0,006	-0,003	**1%**	100%

Figure 5.5: Impact and contribution of the variables to BI

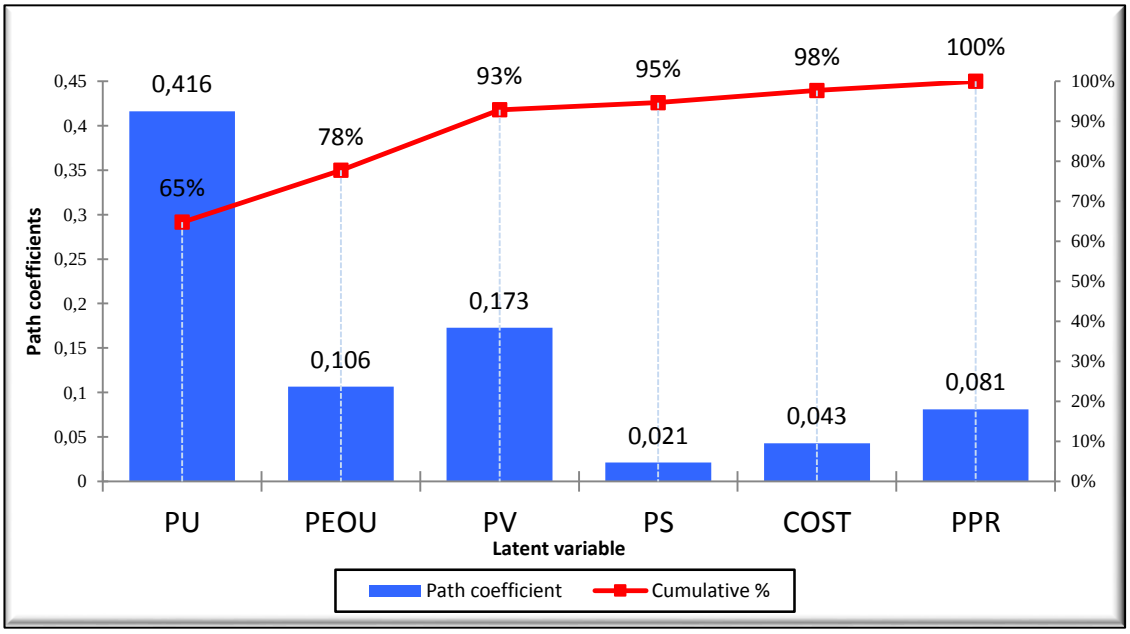


Perceived usefulness has the greatest effect to explain attitude to adopt using IoT healthcare products. It' contribution to R^2 of AT is 65 percent. The other parameters' contributions are relatively perceived vulnerability (15 percent), perceived ease of use (13 percent) as it is illustrated in Table 5.11 and Figure 5.6. The model equation for AT is **AT** = 0,42***PU** + 0,17***PV** + 0,11***PEOU**. This equation includes just the values which have significant path coefficients.

Table 5.11: Impact and contribution of the variables to AT

Constructs	Correlation	Path coefficient	Correlation * path coefficient	Contribution to R^2 (%)	Cumulative %
Total Explanation of AT (R^2) : %35,4					
PU	0,550	0,416	0,229	65%	65%
PV	0,310	0,173	0,053	15%	80%
PEOU	0,432	0,106	0,046	13%	93%
COST	0,250	0,043	0,011	3%	96%
PPR	0,100	0,081	0,008	2%	98%
PS	0,302	0,021	0,006	2%	100%

Figure 5.6: Impact and contribution of the variables to AT

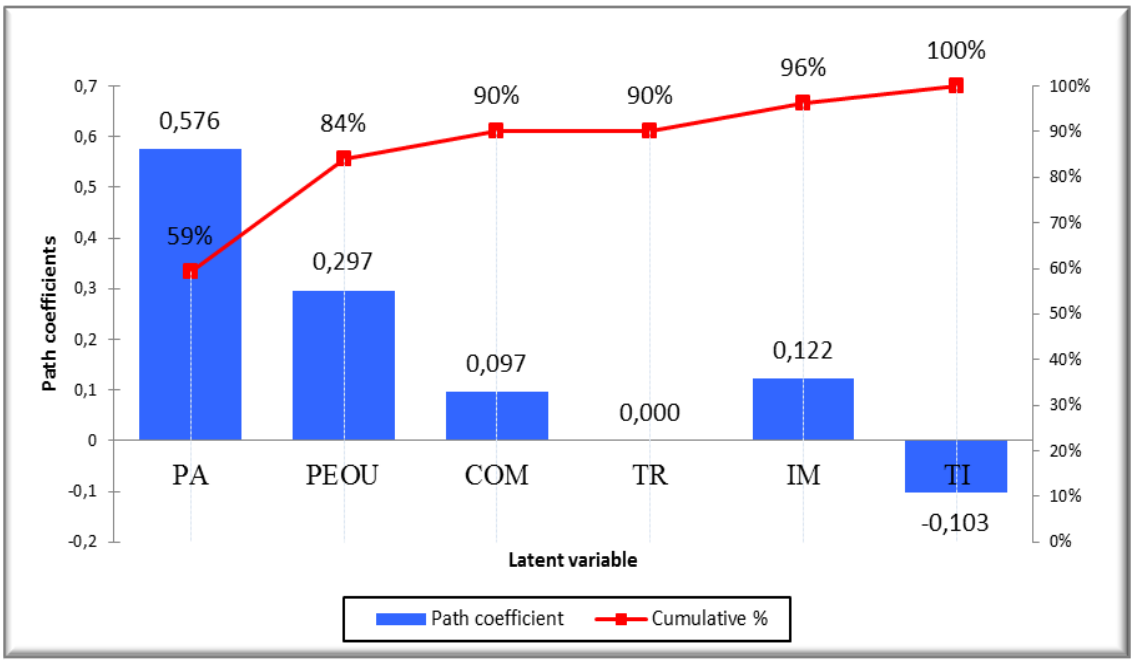


Perceived advantage has the greatest effect to explain perceived usefulness to adopt using IoT healthcare products. Perceived ease of use, compatibility, image follow perceived advantage with the values relatively 25 percent, 6 percent, 6 percent, as it is illustrated in Table 6.12 and Figure 5.7. The impact of technological innovativeness and trialability are insignificant. The model equation is for PU is **PU**= 0,58***PA** + 0,30***PEOU** + 0,10***COM** + 0,12***IM**.

Table 5.12: Impact and contribution of the variables to PU

Constructs	Correlation	Path coefficient	Correlation * path coefficient	Contribution to R^2 (%)	Cumulative %
Total Explanation of PU (R^2) : %70,2					
PA	0,783	0,576	0,451	59%	59%
PEOU	0,634	0,297	0,188	25%	84%
COM	0,476	0,097	0,046	6%	90%
IM	0,373	0,122	0,046	6%	96%
TI	0,278	-0,103	-0,029	4%	100%
TR	0,444	0,000	0,000	0%	100%

Figure 5.7: Impact and contribution of the variables to PU

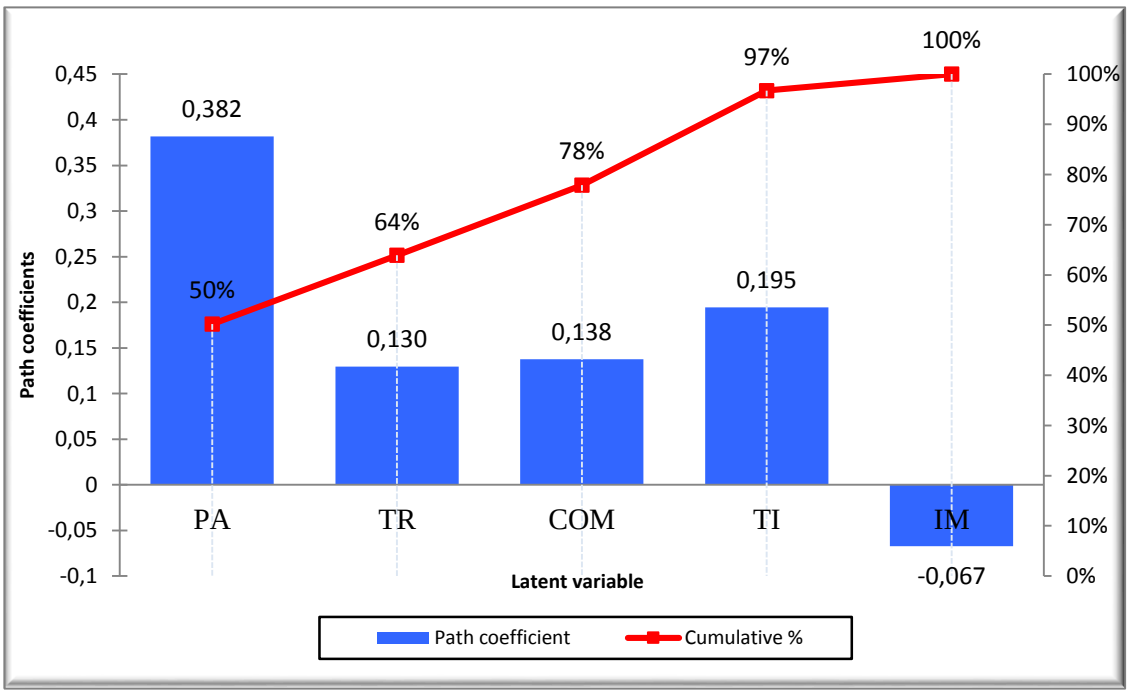


Perceived advantage has the greatest impact to explain perceived ease of use to adopt using IoT healthcare products. The other parameters which have impact on PEOU are relatively technological innovativeness (19 percent), compatibility (14 percent). The impact of trialability and image are insignificant, as it can be seen in Table 5.13 and Figure 5.8. The equation of the model for PEOU is **PEOU**= 0,38***PA** + 0,20***TI** + 0,14***COM**.

Table 5.13: Impact and contribution of the variables to PEOU

Constructs	Correlation	Path coefficient	Correlation * path coefficient	Contribution to R^2 (%)	Cumulative %
Total Explanation of PEOU (R^2) : %38,6					
PA	0,542	0,382	0,207	50%	50%
TI	0,399	0,195	0,078	19%	69%
COM	0,420	0,138	0,058	14%	83%
TR	0,436	0,130	0,057	14%	97%
IM	0,201	-0,067	-0,014	3%	100%

Figure 5.8: Impact and contribution of the variables to PEOU



5.2.2 Gender Grouped Model Evaluation

After the evaluation of the complete model, the model was tested if there were any significant differences in their group-specific parameter estimates regarding gender parameter. Complete data was splitted into 2 groups: 1: female, 2: male. For this purpose, multi-group analysis was conducted in SmartPLS 3.2.3. SmartPLS provides outcomes regarding three different approaches that are based on bootstrapping results from every group. Sarstedt et al. (2011) describe the multi-group analysis methods are in detail:

a. Confidence Intervals (Bias Corrected)

b. Partial Least Squares Multi-Group Analysis (PLS-MGA): This method is a non-parametric significance test. P-value is examined to determine the significance of difference of group-specific path coefficients. A p value smaller than 0, 50 or larger than 0, 95 is accepted as significant.

c. Parametric Test: This method is used to test significance of parametric datasets. Group specific PLS-SEM is based on equal variances of groups.

d. Welch-Satterthwait Test: This method is used to test significance of parametric datasets. Group specific PLS-SEM is based on unequal variances of groups.

For this research study PLS-MGA was used for evaluation of the significance difference between gender groups because of non-normal data distribution.

Goodness of fit indexes for each gender type is in acceptable ranges. It seems that male group GoF, GoF (Bootstrap) and standard error are substantially high compared to female group.

The R^2 values of important constructs for gender groups are illustrated in Table 5.14 and Table 5.15.

Table 5.14: Goodness of fit indexes of gender splitted model

Models	Female			Male		
	GoF	**GoF (Bootstrap)**	**Standard error**	**GoF**	**GoF (Bootstrap)**	**Standard error**
Absolute	**0,596**	**0,608**	**0,043**	**0,664**	**0,673**	**0,043**
Relative	0,944	0,898	0,039	0,949	0,918	0,038
Outer model	0,997	0,991	0,033	0,997	0,991	0,034
Inner model	0,947	0,906	0,017	0,952	0,926	0,014
Mean R^2	0,450			0,549		

The results show that R^2 values of endogenous latent variables for male group are substantially higher than the values of female group.

Table 5.15: Model assessment of gender grouped model

Latent Variable	Type	Female				Male			
		R^2	**Adjusted R^2**	**AVE**	**D.G. rho**	**R^2**	**Adjusted R^2**	**AVE**	**D.G. rho**
PA	Exogenous			0,783	0,915			0,837	0,939
IM	Exogenous			0,849	0,944			0,880	0,956
TR	Exogenous			0,778	0,913			0,849	0,944
COM	Exogenous			0,795	0,921			0,825	0,934
PPR	Exogenous			0,868	0,952			0,871	0,953
COST	Exogenous			0,866	0,928			0,855	0,922
TI	Exogenous			0,629				0,543	
PS	Exogenous			0,847	0,943			0,859	0,948
PV	Exogenous			0,781	0,915			0,766	0,907
PEOU	Endogenous	0,356	0,344	0,736	0,893	0,493	0,482	0,780	0,914
PU	Endogenous	0,688	0,681	0,776	0,933	0,735	0,728	0,833	0,952
AT	Endogenous	0,303	0,286	0,803	0,924	0,448	0,434	0,811	0,928
BI	Endogenous	0,453	0,424	0,939	0,968	0,521	0,493	0,948	0,973
Mean		**0,450**		**0,789**		**0,549**		**0,802**	

The path coefficient results for female group are depicted in Table 5.16. The significant paths are **AT-> BI** (p<0, 01), **COM-> BI** (p<0, 01), **COM->PU** (p<0, 10), **IM->PU** (p<0, 01), **PA->BI** (p<0, 01), **PA->PEOU** (p<0, 05), **PA->PU** (p<0, 01), **PEOU->PU** (p<0, 01), **PU->AT** (p<0, 01), **PV->AT** (p<0, 01), **TI->BI** (p<0, 01), **TI->PEOU** (p<0, 10), **TI->PU** (p<0, 01), **TR->PEOU** (p<0, 10).

Table 5.16: Bootstrapping results of the model of female group

Paths	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Significance
AT -> BI	0,373	0,379	0,069	5447,000	<0,0005	Significance***
COM -> BI	0,081	0,083	0,070	1171,000	0,242	**Not Significance**
COM -> PEOU	0,284	0,270	0,109	2613,000	0,009	Significance***
COM -> PU	0,116	0,111	0,069	1672,000	0,094	Significance*
COST -> BI	-0,034	-0,033	0,073	0,461	0,645	**Not Significance**
IM -> BI	0,029	0,031	0,059	0,489	0,625	**Not Significance**
IM -> PEOU	-0,060	-0,061	0,058	1031,000	0,302	**Not Significance**
IM -> PU	0,136	0,134	0,046	2921,000	0,004	Significance***
PA -> BI	0,352	0,338	0,100	3525,000	<0,0005	Significance***
PA -> PEOU	0,231	0,248	0,094	2453,000	0,014	Significance**
PA -> PU	0,557	0,557	0,077	7219,000	<0,0005	Significance***
PEOU -> AT	0,135	0,136	0,087	1553,000	0,120	**Not Significance**
PEOU -> BI	-0,068	-0,065	0,077	0,879	0,379	**Not Significance**
PEOU -> PU	0,369	0,364	0,080	4601,000	<0,0005	Significance***
PPR -> BI	-0,064	-0,061	0,052	1234,000	0,217	**Not Significance**
PS -> BI	0,049	0,059	0,054	0,916	0,360	**Not Significance**
PU -> AT	0,331	0,328	0,083	3972,000	<0,0005	Significance***
PU -> BI	-0,089	-0,082	0,093	0,959	0,338	**Not Significance**
PV -> AT	0,211	0,213	0,053	3959,000	<0,0005	Significance***
PV -> BI	-0,079	-0,076	0,057	1378,000	0,168	**Not Significance**
TI -> BI	0,192	0,188	0,064	2996,000	0,003	Significance***
TI -> PEOU	0,142	0,147	0,079	1788,000	0,074	Significance*
TI -> PU	-0,179	-0,170	0,040	4454,000	<0,0005	Significance***
TR -> BI	0,011	0,013	0,064	0,177	0,860	**Not Significance**
TR -> PEOU	0,209	0,201	0,110	1896,000	0,058	Significance*
TR -> PU	-0,050	-0,052	0,051	0,974	0,330	**Not Significance**

P<0, 01= Significance***, P<0, 05= Significance**, P<0, 10= Significance*

The path coefficient results for male group are depicted in Table 5.17. The significant paths are AT-> BI (p<0, 01), IM->BI (p<0, 01), IM->PU (p<0, 01), PA->BI (p<0, 01), PA->PEOU (p<0, 01), PA->PU (p<0, 01), PEOU->PU (p<0, 01), PEOU->BI (p<0, 01), PU->AT (p<0, 01), PPR->BI (p<0, 05), PU->AT (p<0, 01), PV->AT (p<0, 05), PV->BI (p<0, 01), TI->PEOU (p<0, 10).

Table 5.17: Bootstrapping results of the model of male group

Paths	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Significance
AT -> BI	0,301	0,304	0,077	3933,000	<0,0005	Significance***
COM -> BI	0,005	0,008	0,080	0,061	0,951	**Not Significance**
COM -> PEOU	0,000	0,010	0,082	0,002	0,998	**Not Significance**
COM -> PU	0,061	0,066	0,055	1110,000	0,267	**Not Significance**
COST -> BI	-0,053	-0,042	0,063	0,829	0,407	**Not Significance**
IM -> BI	0,214	0,215	0,065	3291,000	0,001	Significance***
IM -> PEOU	-0,080	-0,083	0,057	1415,000	0,157	**Not Significance**
IM -> PU	0,116	0,113	0,038	3030,000	0,002	Significance***
PA -> BI	0,282	0,283	0,099	2860,000	0,004	Significance***
PA -> PEOU	0,547	0,532	0,127	4310,000	<0,0005	Significance***
PA -> PU	0,621	0,618	0,069	9013,000	<0,0005	Significance***
PEOU -> AT	0,111	0,113	0,076	1454,000	0,146	**Not Significance**
PEOU -> BI	-0,198	-0,200	0,074	2676,000	0,007	Significance***
PEOU -> PU	0,218	0,211	0,074	2943,000	0,003	Significance***
PPR -> BI	0,115	0,116	0,058	2002,000	0,045	Significance**
PS -> BI	-0,005	-0,009	0,078	0,064	0,949	**Not Significance**
PU -> AT	0,519	0,516	0,073	7077,000	<0,0005	Significance***
PU -> BI	0,108	0,100	0,108	0,996	0,319	**Not Significance**
PV -> AT	0,154	0,157	0,063	2463,000	0,014	Significance**
PV -> BI	0,189	0,192	0,063	3007,000	0,003	Significance***
TI -> BI	-0,018	-0,017	0,071	0,254	0,799	**Not Significance**
TI -> PEOU	0,322	0,327	0,111	2886,000	0,004	Significance***
TI -> PU	-0,036	-0,032	0,064	0,557	0,578	**Not Significance**
TR -> BI	0,007	0,002	0,080	0,086	0,932	**Not Significance**
TR -> PEOU	-0,041	-0,032	0,104	0,399	0,690	**Not Significance**
TR -> PU	0,037	0,040	0,056	0,661	0,508	**Not Significance**

P<0, 01= Significance***, P<0, 05= Significance**, P<0, 10= Significance*

Evaluation of the significance test of path coefficients between female and male was carried out through PLS-MGA and the results were illustrated in Table 5.18. According to these results, the paths that has the statistically significant difference between female and male are COM->PEOU (p<0, 05), IM->BI (p>0, 95), PA-> PEOU (p>0, 95), PPR->BI (0, 95), PU->AT (p>0, 95), PV-> BI (p>0, 95), TI-> PU (p> 0, 95), TR->PEOU (p<0, 05).

Table 5.18: The results of PLS-MGA

Paths	**Path Coefficients diff** (| GROUP_Gender(1,0) - GROUP_Gender(2,0) |)	**p-Value** (GROUP_Gender(1,0) vs GROUP_Gender(2,0))	**Significance**
AT -> BI	0,072	0,241	Not Significance
COM -> BI	0,077	0,230	Not Significance
COM -> PEOU	0,284	0,022	**Significance***
COM -> PU	0,055	0,264	Not Significance
COST -> BI	0,019	0,425	Not Significance
IM -> BI	0,185	0,982	**Significance****
IM -> PEOU	0,020	0,405	Not Significance
IM -> PU	0,020	0,368	Not Significance
PA -> BI	0,070	0,309	Not Significance
PA -> PEOU	0,316	0,969	**Significance****
PA -> PU	0,064	0,732	Not Significance
PEOU -> AT	0,024	0,418	Not Significance
PEOU -> BI	0,130	0,109	Not Significance
PEOU -> PU	0,150	0,083	Not Significance
PPR -> BI	0,179	0,987	**Significance****
PS -> BI	0,054	0,283	Not Significance
PU -> AT	0,189	0,957	**Significance****
PU -> BI	0,197	0,916	Not Significance
PV -> AT	0,057	0,240	Not Significance
PV -> BI	0,268	0,999	**Significance****
TI -> BI	0,210	0,017	Not Significance
TI -> PEOU	0,180	0,904	Not Significance
TI -> PU	0,143	0,970	**Significance****
TR -> BI	0,004	0,479	Not Significance
TR -> PEOU	0,250	0,049	**Significance***
TR -> PU	0,086	0,876	Not Significance

P<0, 01= Significance***, P<0, 05= Significance**, P<0, 10= Significance*

6. DISCUSSION

6.1 THEORETICAL IMPLICATIONS

This study examines general important factors related to adoption of an emerging technology by individuals. This research study is among the first to empirically examine individual's adoption intention of "internet of things" technology products in healthcare. Potential benefits of the use of IoT related products in healthcare can provide various advantages from reducing healthcare costs to improving healthcare efficiency and quality. The issue is not confined to inventing an advanced technological product/service; the point of discussion is how to attract individuals to adopt these favorable fantastic technologies in their daily lives. For IS field, this is crucial to research. Various studies about user's technology adoption just conceptually state some critical factors or empirically examine a limited number of prominent factors from just technology perspectives. This research study extensively investigates factors that affect individual's adoption intention of IoT healthcare technology products from behavioral perspectives including technology, healthcare, innovativeness, and privacy perspectives.

In this study, an integrated model has been developed to examine adoption intention of IoT healthcare technology products by individuals. After reviewing a large number of literatures about health information technology adoption, it is merged four models to show how individual's adoption intention toward IoT healthcare technology products is affected: TAM, IDT, PMT, and PCT. Compared with other health information technology adoption studies (Hung et al. 2014, Johnson et al. 2014, Sun et al. 2013), this integrated model provides a more comprehensive understanding of individual's decision to adopt an emerging healthcare technology products (such as internet of things healthcare products).

Furthermore, it is highlighted the differences between gender groups of individual's adoption of IoT healthcare technology products in this study. Different from other studies (Li et al. 2014, Johnson et al. 2014, and Sun et al. 2013); it does not focus on single type of product or consumer segmentation. This study is a great example for future behavioral

studies to investigate the adoption intention from behavioral perspective through an integrated model. This study also may help both business managers and social planners to regulate better policies and strategies to promote IoT technology diffusion in healthcare.

6.2 PRACTICAL IMPLICATIONS

Furthermore, this research study also expresses several practical implications. To examine and test the proposed integrated model, SEM-PLS, XLSTAT-PLSPM and SEM-PLS-MGA as estimation methods have carried out. The proposed methodologies have been applied to a sample of 426 respondents through online survey. The integrated model encompasses 40 manifest variables and 13 latent variables to explain adoption intention of IoT healthcare technology products.

Two model evaluations have carried out. i) Complete model, ii) Gender grouped model. For the complete model, privacy and healthcare perspectives have insignificant direct effect whereas healthcare perspective affects the adoption intention through attitude factor. From the technological perspective, whereas perceived ease of use and perceived advantage have a direct effect, perceived usefulness has indirect effect through attitude factor. From the diffusion of innovation perspective, perceived advantage and image have a direct effect while compatibility has indirect effect to adoption intention. Attitudes have the greatest effect to decide to adopt any IoT healthcare product. Besides, beneficialness is a salient factor to explain adoption intention. From this point, it can be expressed that individuals desire to believe that start to adopt any IoT healthcare product should provide favorable effects onto their daily lives. Technological innovativeness has an indirect effect through perceived ease of use whereas compatibility has an indirect effect through perceived usefulness. One important result is the significance correlation between perceived ease of use and perceived usefulness. As the original constructor of TAM proposes that perceived ease of use directly affects the perceived usefulness. According TAM, if usage of a system is perceived as easy by an individual, the system is perceived more useful by the individual.

When the model is examined in terms of gender, health and privacy perspectives are found significant effect on adoption intention. It is observed that males concern more about privacy and healthcare vulnerability issues than females when deciding to adopt any IoT healthcare product. When males decide to adopt any IoT healthcare product, image, perceived privacy risk, perceived vulnerability affects them more compared to females. It is found out that males believe that using any technological product can provide them more prestige in their social life and this can lead them to adopt more easily any emerging technological product than females. When explaining the impact of technological innovativeness on intention adoption whereas there is significant direct effect for females, there is no significant direct effect for males. It is observed that for males technological innovativeness is more significant factor to explain perceived usefulness compared with females. Compatibility and trialability have more significant effect on perceived ease of use for females compared with males. This result proves that compatibility and trialability have positive effect for the diffusion of any innovation. Females prefer to use any new emerging IoT healthcare technology products if they are compatible with their experiences, routines, and social norms. This result also proves Tarde's logical law of imitation: "Why do few of innovations spread out while the rest of them not?". Compatibility and trialability factors are facilitator to adopt IoT healthcare technology products.

It is observably seen that the relationship between cost and behavioral intention is not significant. This result may be because of the target products category is about healthcare.

7. CONCLUSION

This research study proposed an integrated model that examines the outstanding factors of adoption intention toward IoT healthcare technology products from 4 different and complementary (of each other) theories: technology acceptance model, innovation diffusion theory, protect motivation theory, and privacy calculus theory. How these factors differently affect individual's intention to adopt in terms of gender is also provided. The proposed research model is empirically tested through an online survey. The majority of hypothesized relationships are supported by the data. This study is among the first to comprehensively investigate IoT healthcare technology issue from behavioral perspective. This research also helps to understand individuals' adoption intention of any emerging IoT technology product in healthcare.

Results of the study are separately given for the complete model and gender grouped model. Results show that mostly the factors related to technology acceptance and innovation diffusion would significantly affect individuals' decision to adopt IoT technology products in healthcare. When all hypotheses are tested whether there is any difference between genders groups, it is observably seen that males give a lot of importance to *image, privacy and health vulnerability* issues compared with females. Thus, it should be paid more attention to these factors when design a specific IoT healthcare technology product for male consumers. Also, this information might be useful for marketing/sales people or academicians who study on these subjects. Findings also suggest that all individuals regardless of gender pay more attention to attitude, perceived advantage, and perceived ease of use in their adoption of IoT technology products in healthcare. From this finding, it can be expressed that Turkish people's perception drives their behaviors, not logical reasons. Maybe this is valid for all people not just for Turkish people. The world is what people see and understand of it, not the reality. Mostly, any innovation diffuses thanks to lead users who are innovators and early adopters according to the law of innovation diffusion. Early majority do not start to adopt any innovation into their daily lives before they see the people around them use that new product. Early majority wants to get feedbacks about the new emerging product that it is used by others.

The law of innovation diffusion tells us that if it is desired to reach mass market success or mass market acceptance of an idea, you cannot have it, until it is achieved crossing the chasm point which means between 15 and 18 percent market penetration. Theses lead users buy or use any new emerging technology products just because they want and just because they believe that it is good to own that product. For the diffusion of IoT healthcare technology products this law is valid. IoT production (in any sector) is still in infancy for now these years. If marketing strategy is focused on "why people should adopt and accept IoT healthcare technology products" rather than on "what features they have", IoT healthcare technology product would diffuse more easily and faster.

APPENDICES

APPENDIX A: Online Questionnaire

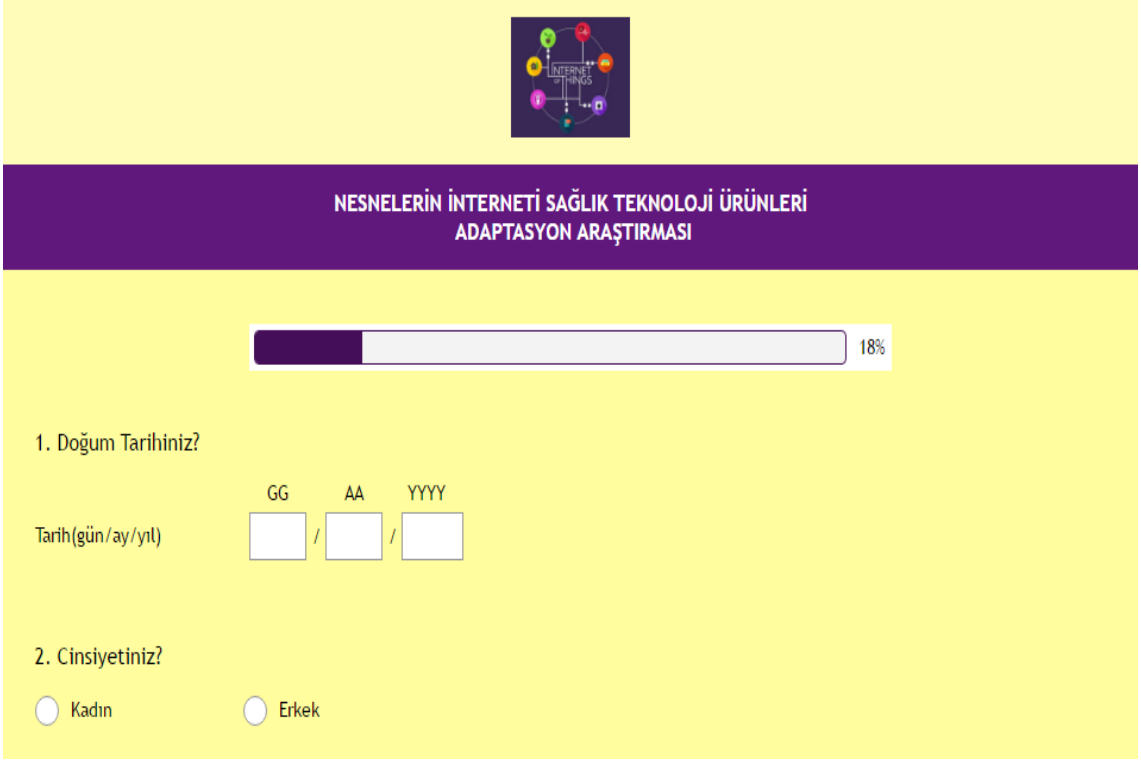
NESNELERİN İNTERNETİ SAĞLIK TEKNOLOJİ ÜRÜNLERİ
ADAPTASYON ARAŞTIRMASI

9%

Nesnelerin İnterneti Sağlık Teknoloji Ürünleri Adaptasyon Araştırması Anketime Hoş Geldiniz.

Değerli Katılımcı,

Aşağıda yer alan anket Bahçeşehir Üniversitesinde yürütülen ve "Nesnelerin İnterneti " konulu yüksek lisans tez araştırması kapsamında uygulanmaktadır. Vereceğiniz hiç bir cevap doğru ya da yanlış olarak değerlendirilmeyecektir. Önemli olan vereceğiniz cevabın sizin duygu, düşünce ve davranışlarınızı yansıtmasıdır. Ayrıca, cevaplarınız sadece her soruyu eksiksiz tamamladığınızda değerli olacağından lütfen tüm soruları cevaplayınız. Cevaplarınız sadece bilimsel amaçlı kullanılacağından, gizlilikleri araştırmacı tarafından korunacaktır. Sonuçlar bireysel olarak değil, toplu olarak değerlendirilecektir.
Saygılarımla,



NESNELERİN İNTERNETİ SAĞLIK TEKNOLOJİ ÜRÜNLERİ
ADAPTASYON ARAŞTIRMASI

18%

1. Doğum Tarihiniz?

Tarih(gün/ay/yıl) GG / AA / YYYY

2. Cinsiyetiniz?

Kadın Erkek

3. Hangi İlde yaşıyorsunuz?

- İstanbul
- Ankara
- İzmir
- Diğer (lütfen belirtiniz)

4. Ne iş yapıyorsunuz?

- Freelance
- Özel Sektör
- Devlet Memuru
- İşsiz
- Emekli
- Diğer (lütfen belirtin)

5. Aylık ortalama geliriniz ile ilişkili olarak aşağıda verilen seçeneklerden size en uygun olanını işaretleyiniz

- 0-500 tl
- 501-1000 tl
- 1001-1500 tl
- 1501-2500 tl
- 2501-3000tl
- 3001- 5000tl
- 5000tl ve üstü

6. Eğitim durumunuz hangisidir? (Mevcut Durumunuz)

- İlkokul
- Ortaöğretim
- Lise
- İki Yıllık Yüksek Okul (Ön Lisans)
- Dört yıllık Fakülte(Lisans)
- Yüksek Lisans (Masters)
- Doktora

NESNELERİN İNTERNETİ SAĞLIK TEKNOLOJİ ÜRÜNLERİ ADAPTASYON ARAŞTIRMASI

27%

7. Teknolojik gelişmeler ilginizi çekiyor mu?

- Oldukça ilgimi çekiyor
- İlgimi Çekiyor
- Biraz İlgimi çekiyor
- İlgimi Ne Çekiyor Ne Çekmiyor
- İlgimi çekmiyor
- Hiç ilgimi çekmiyor

8. Akıllı cihazınız (telefon, tablet, saat, diğer giyilebilir teknolojik ürünler, vb.) var mı?

- Evet
- Hayır

NESNELERİN İNTERNETİ SAĞLIK TEKNOLOJİ ÜRÜNLERİ ADAPTASYON ARAŞTIRMASI

36%

Nesnelerin İnterneti (IoT) Ürünleri Nedir?

• Gündelik yaşamda kullanılan aletlere, nesnelere internet adresi verilerek kablosuz akıllı ağ teknolojileriyle internet adresi olan her şeyin birbirine bağlanabilmesini ifade ediyor. Bu teknoloji akıllı nesneleri internete bağlar.

• **Nesnelerin interneti** sağlık ürünleriyle diyabet, tansiyon gibi kronik hastalıklar için akıllı sindirilebilir/sürülebilir/giyilebilir sensörler yardımıyla erken müdahale ve doğru tedavi zamanına daha kolay karar verilebilir. Örn: Bir diyabet hastası yutacağı sindirilebilir bir hap yardımıyla kanındaki insülin miktarı kritik değere yaklaştığında kişinin akıllı cihazına (telefon, tablet, saat, vb.) bir uyarı gönderilerek insülin iğnesi yapması gereken zamanı haber verebilir ya da vücuduna alması gereken besinin içeriği hakkında bilgi verebilir. Erken uyarı/müdahale imkanı sağlanmasının yanı sıra kişi sağlığıyla ilgili günlük takibini akıllı cihazı üzerinden izleyebilip, bilgilerini sağlık profesyonelleri ile paylaşarak doğru zamanda doğru bilgiyle doğru müdahale/tedavi sağlanmış olur.

Bu aşamadan sonraki soruların yukarıdaki tanım ve açıklamalara göre cevaplanılması beklenmektedir.

Yukarıda yapılan tanım ve açıklamalardan edinilen bilgilere göre lütfen aşağıdaki ifadelere katılım derecenizi belirtiniz.

9. Gelecek 6 ay içerisinde günlük yaşantımda kişisel akıllı sağlık teknoloji ürünlerini kullanma niyetim var

- ◯ Hiç Katılmıyorum
- ◯ Katılmıyorum
- ◯ Biraz Katılmıyorum
- ◯ Ne Katılıyorum Ne Katılmıyorum
- ◯ Biraz Katılıyorum
- ◯ Katılıyorum
- ◯ Tamamen Katılıyorum

10. Gelecek 6 ay içerisinde günlük yaşantımda kişisel akıllı sağlık teknoloji ürünlerini deneyimlemeyi ya da düzenli kullanmayı planlıyorum

- Hiç Katılmıyorum
- Katılmıyorum
- Biraz Katılmıyorum
- Ne Katılıyorum Ne Katılmıyorum
- Biraz Katılıyorum
- Katılıyorum
- Tamamen Katılıyorum

11. Kişisel akıllı sağlık teknoloji ürünlerini kullanmam sağlığımla ilgili koruyucu önlemler almada faydalı olacaktır/faydalıdır

- Hiç Katılmıyorum
- Katılmıyorum
- Biraz Katılmıyorum
- Ne Katılıyorum Ne Katılmıyorum
- Biraz Katılıyorum
- Katılıyorum
- Tamamen Katılıyorum

12. Kişisel akıllı sağlık teknoloji ürünlerini kullanmam sağlığımla ilgili erken müdahale durumlarının tespitinde faydalı olacaktır/faydalıdır

- Hiç Katılmıyorum
- Katılmıyorum
- Biraz Katılmıyorum
- Ne Katılıyorum Ne Katılmıyorum
- Biraz Katılıyorum
- Katılıyorum
- Tamamen Katılıyorum

13. Kişisel akıllı sağlık teknoloji ürünlerini kullanmam sağlık durumumla ilgili bilgilerimin dijital olarak takip edilebilir ve sağlık profesyonelleriyle(hekim, hemşire gibi) paylaşılabilir olmasını sağlayacaktır/sağlar

- Hiç Katılmıyorum
- Katılmıyorum
- Biraz Katılmıyorum
- Ne Katılıyorum Ne Katılmıyorum
- Biraz Katılıyorum
- Katılıyorum
- Tamamen Katılıyorum

Geri İleri

45%

14. Gelecek 6 ay içerisinde günlük sağlık işlemlerim için akıllı sağlık teknoloji ürünlerini kullanmaya başlamak.....

- 1=Oldukça Kötü
- 2=Kötü
- 3=Biraz Kötü
- 4=Ne İyi Ne Kötü
- 5=Biraz İyi
- 6=İyi
- 7=Oldukça İyi

15. Gelecek 6 ay içerisinde günlük sağlık işlemlerim için akıllı sağlık teknoloji ürünlerini kullanmaya başlamak.....

- 1=Oldukça Olumsuz
- 2=Olumsuz
- 3=Biraz Olumsuz
- 4=Ne Olumlu Ne Olumsuz
- 5=Biraz Olumlu
- 6=Olumlu
- 7=Oldukça Olumlu

16. Gelecek 6 ay içerisinde günlük sağlık işlemlerim için akıllı sağlık teknoloji ürünlerini kullanmaya başlamak.....

- 1=Oldukça Güvensiz
- 2=Güvensiz
- 3=Biraz Güvensiz
- 4=Ne Güvenli Ne Güvensiz
- 5=Biraz Güvenli
- 6=Güvenli
- 7=Oldukça Güvenli

Geri İleri

55%

Lütfen bu sayfadaki 6 soruyu aşağıdaki belirtilen 3 sorunu düşünerek cevaplayınız.

Sorun 1: Sağlık durumunuzla ilgili çok az bilgi sahibi olma

Sorun 2: Gün içinde sağlık durumunuzu izleme ihtiyacınızın olması

Sorun 3: Tıbbi bir rahatsızlığınızın olması (tansiyon, diyabet, kalple ilgili rahatsızlık, vb.)

17. Eğer bu tarz sorunlardan dolayı sıkıntı yaşasaydım sonucu kesinlikle çok ciddi olurdu

- Hiç Katılmıyorum
- Katılmıyorum
- Biraz Katılmıyorum
- Ne Katılıyorum Ne Katılmıyorum
- Biraz Katılıyorum
- Katılıyorum
- Tamamen Katılıyorum

18. Eğer bu tarz sorunlardan dolayı sıkıntı yaşasaydım sonucu çok ciddi olurdu

- Hiç Katılmıyorum
- Katılmıyorum
- Biraz Katılmıyorum
- Ne Katılıyorum Ne Katılmıyorum
- Biraz Katılıyorum
- Katılıyorum
- Tamamen Katılıyorum

19. Eğer bu tarz sorunlardan/problemlerden dolayı sıkıntı yaşasaydım dikkate değer bir sorun olurdu

- Hiç Katılmıyorum
- Katılmıyorum
- Biraz Katılmıyorum
- Ne Katılıyorum Ne Katılmıyorum
- Biraz Katılıyorum
- Katılıyorum
- Tamamen Katılıyorum

20. Belirtilen sorunlarla ilgili sıkıntı yaşama konusunda risk altındayım

- Hiç Katılmıyorum
- Katılmıyorum
- Biraz Katılmıyorum
- Ne Katılıyorum Ne Katılmıyorum
- Biraz Katılıyorum
- Katılıyorum
- Tamamen Katılıyorum

21. Büyük ihtimalle belirtilen sorunlarla ilgili sıkıntı yaşayacağım

- Hiç Katılmıyorum
- Katılmıyorum
- Biraz Katılmıyorum
- Ne Katılıyorum Ne Katılmıyorum
- Biraz Katılıyorum
- Katılıyorum
- Tamamen Katılıyorum

22. Belirtilen sorunlarla ilgili sıkıntı yaşamam olasıdır

- Hiç Katılmıyorum
- Katılmıyorum
- Biraz Katılmıyorum
- Ne Katılıyorum Ne Katılmıyorum
- Biraz Katılıyorum
- Katılıyorum
- Tamamen Katılıyorum

Geri İleri

23. Kişisel akıllı sağlık teknoloji ürünlerini kullanmam sağlığımla ilgili daha hızlı aksiyon alabilmemi sağlayacaktır/sağlar

- Hiç Katılmıyorum
- Katılmıyorum
- Biraz Katılmıyorum
- Ne Katılıyorum Ne Katılmıyorum
- Biraz Katılıyorum
- Katılıyorum
- Tamamen Katılıyorum

24. Kişisel akıllı sağlık teknoloji ürünlerini kullanmam sağlığımla ilgili karar verme **yetimi** artıracaktır/artırır

- Hiç Katılmıyorum
- Katılmıyorum
- Biraz Katılmıyorum
- Ne Katılıyorum Ne Katılmıyorum
- Biraz Katılıyorum
- Katılıyorum
- Tamamen Katılıyorum

25. Kişisel akıllı sağlık teknoloji ürünlerini kullanmam sağlığımla ilgili karar verme **etkinliğimi** artıracaktır/artırır

- Hiç Katılmıyorum
- Katılmıyorum
- Biraz Katılmıyorum
- Ne Katılıyorum Ne Katılmıyorum
- Biraz Katılıyorum
- Katılıyorum
- Tamamen Katılıyorum

26. Kişisel akıllı sağlık teknoloji ürünlerini kullanmam sağlığımla ilgili kararlar almamı kolaylaştıracaktır/kolaylaştırır

- Hiç Katılmıyorum
- Katılmıyorum
- Biraz Katılmıyorum
- Ne Katılıyorum Ne Katılmıyorum
- Biraz Katılıyorum
- Katılıyorum
- Tamamen Katılıyorum

27. Kişisel akıllı sağlık teknoloji ürünlerini kullanmayı öğrenmek benim için kolay olacaktır/kolaydır

- Hiç Katılmıyorum
- Katılmıyorum
- Biraz Katılmıyorum
- Ne Katılıyorum Ne Katılmıyorum
- Biraz Katılıyorum
- Katılıyorum
- Tamamen Katılıyorum

Geri İleri

28. Kişisel akıllı sağlık teknoloji ürünlerini kullanmak benim için kolay olacaktır/kolaydır

- Hiç Katılmıyorum
- Katılmıyorum
- Biraz Katılmıyorum
- Ne Katılıyorum Ne Katılmıyorum
- Biraz Katılıyorum
- Katılıyorum
- Tamamen Katılıyorum

29. Kişisel akıllı sağlık teknoloji ürünlerinin mobil cihazlarla (cep telefonu, tablet, saat vb. ürünlerle) etkileşim içinde olması kullanımımı kolaylaştıracaktır/kolaylaştırır (mobil cihazlar üzerinden yönetiminin yapılabilir olması)

- Hiç Katılmıyorum
- Katılmıyorum
- Biraz Katılmıyorum
- Ne Katılıyorum Ne Katılmıyorum
- Biraz Katılıyorum
- Katılıyorum
- Tamamen Katılıyorum

30. Diğer insanlar bana yeni teknolojiler hakkında danışmaya gelirler

- ( ) Hiç Katılmıyorum
- ( ) Katılmıyorum
- ( ) Biraz Katılmıyorum
- ( ) Ne Katılıyorum Ne Katılmıyorum
- ( ) Biraz Katılıyorum
- ( ) Katılıyorum
- ( ) Tamamen Katılıyorum

31. Genellikle arkadaş çevremde yeni çıkan teknolojilere ilk ben sahip olurum

- ( ) Hiç Katılmıyorum
- ( ) Katılmıyorum
- ( ) Biraz Katılmıyorum
- ( ) Ne Katılıyorum Ne Katılmıyorum
- ( ) Biraz Katılıyorum
- ( ) Katılıyorum
- ( ) Tamamen Katılıyorum

32. Arkadaşlarım yeni teknolojiler hakkında benden daha fazla bilgiye sahiptir

- ( ) Hiç Katılmıyorum
- ( ) Katılmıyorum
- ( ) Biraz Katılmıyorum
- ( ) Ne Katılıyorum Ne Katılmıyorum
- ( ) Biraz Katılıyorum
- ( ) Katılıyorum
- ( ) Tamamen Katılıyorum

Geri İleri

33. İleri teknolojiye sahip ürünleri kullanmayı öğrenmekten zevk alırım

- Hiç Katılmıyorum
- Katılmıyorum
- Biraz Katılmıyorum
- Ne Katılıyorum Ne Katılmıyorum
- Biraz Katılıyorum
- Katılıyorum
- Tamamen Katılıyorum

34. İlgi alanıma giren en son teknolojik yenilikleri takip ederim

- Hiç Katılmıyorum
- Katılmıyorum
- Biraz Katılmıyorum
- Ne Katılıyorum Ne Katılmıyorum
- Biraz Katılıyorum
- Katılıyorum
- Tamamen Katılıyorum

35. Kişisel akıllı sağlık teknoloji ürünlerini kullanacak olsam bu bana çevremde yüksek statü verirdi

- Hiç Katılmıyorum
- Katılmıyorum
- Biraz Katılmıyorum
- Ne Katılıyorum Ne Katılmıyorum
- Biraz Katılıyorum
- Katılıyorum
- Tamamen Katılıyorum

36. Kişisel akıllı sağlık teknoloji ürünleri kullanacak olsam çevremdeki kullanmayanlardan daha prestijli olurdum

- Hiç Katılmıyorum
- Katılmıyorum
- Biraz Katılmıyorum
- Ne Katılıyorum Ne Katılmıyorum
- Biraz Katılıyorum
- Katılıyorum
- Tamamen Katılıyorum

37. Kişisel akıllı sağlık teknoloji ürünlerine sahip olmak çevremde bir mevki göstergesidir

- Hiç Katılmıyorum
- Katılmıyorum
- Biraz Katılmıyorum
- Ne Katılıyorum Ne Katılmıyorum
- Biraz Katılıyorum
- Katılıyorum
- Tamamen Katılıyorum

Geri İleri

91%

38. Kişisel akıllı sağlık teknoloji ürünlerini kullanıp kullanmamaya karar vermeden önce deneyebilmek isterdim/deneyebildim

- Hiç Katılmıyorum
- Katılmıyorum
- Biraz Katılmıyorum
- Ne Katılıyorum Ne Katılmıyorum
- Biraz Katılıyorum
- Katılıyorum
- Tamamen Katılıyorum

39. Kişisel akıllı sağlık teknoloji ürünlerini kullanıp kullanmamaya karar vermeden önce uygun bir şekilde deneyebilmek isterdim/deneyebildim

- Hiç Katılmıyorum
- Katılmıyorum
- Biraz Katılmıyorum
- Ne Katılıyorum Ne Katılmıyorum
- Biraz Katılıyorum
- Katılıyorum
- Tamamen Katılıyorum

40. Kişisel akıllı sağlık teknoloji ürünlerinin neler yapabileceğini görecek kadar deneyebilme fırsatım olmasını isterdim/fırsatım oldu

- Hiç Katılmıyorum
- Katılmıyorum
- Biraz Katılmıyorum
- Ne Katılıyorum Ne Katılmıyorum
- Biraz Katılıyorum
- Katılıyorum
- Tamamen Katılıyorum

41. Kişisel akıllı sağlık teknoloji ürünlerini kullanacak olsam günlük işlerimle uyumlu olurdu

- Hiç Katılmıyorum
- Katılmıyorum
- Biraz Katılmıyorum
- Ne Katılıyorum Ne Katılmıyorum
- Biraz Katılıyorum
- Katılıyorum
- Tamamen Katılıyorum

43. Kişisel akıllı sağlık teknoloji ürünlerini kullanacak olsam günlük işlerimi halletmeyi sevdiğim yöntemle uyumlu olurdu

- Hiç Katılmıyorum
- Katılmıyorum
- Biraz Katılmıyorum
- Ne Katılıyorum Ne Katılmıyorum
- Biraz Katılıyorum
- Katılıyorum
- Tamamen Katılıyorum

Geri İleri

100%

44. Kişisel akıllı sağlık teknoloji ürünlerini sağlayan firmalarla sağlık bilgilerimi paylaşmak riskli olabilir

- Hiç Katılmıyorum
- Katılmıyorum
- Biraz Katılmıyorum
- Ne Katılıyorum Ne Katılmıyorum
- Biraz Katılıyorum
- Katılıyorum
- Tamamen Katılıyorum

45. Büyük ihtimalle sağlık teknoloji ürünlerini sağlayan firmalarla sağlık bilgilerimi paylaşmakla ilişkili hasar/kayıp/zarar oluşabilir

- Hiç Katılmıyorum
- Katılmıyorum
- Biraz Katılmıyorum
- Ne Katılıyorum Ne Katılmıyorum
- Biraz Katılıyorum
- Katılıyorum
- Tamamen Katılıyorum

46. Kişisel akıllı sağlık teknoloji ürünlerini sağlayan firmalarla sağlık bilgilerimi paylaşmayla ilgili çok fazla belirsizlik olabilir

- Hiç Katılmıyorum
- Katılmıyorum
- Biraz Katılmıyorum
- Ne Katılıyorum Ne Katılmıyorum
- Biraz Katılıyorum
- Katılıyorum
- Tamamen Katılıyorum

47. Kişisel akıllı sağlık teknoloji ürünlerini kullanmak için ödeyeceğim para miktarı bu ürünleri kullanmaya başlama (ya da kullanma) niyetime direk etkisi vardır

- Hiç Katılmıyorum
- Katılmıyorum
- Biraz Katılmıyorum
- Ne Katılıyorum Ne Katılmıyorum
- Biraz Katılıyorum
- Katılıyorum
- Tamamen Katılıyorum

48. Kişisel akıllı sağlık teknoloji ürünleri için ödeyeceğim para miktarı bana çok gelirse günlük sağlık takibim/yönetimimle ilgili birçok kolaylık sağlamasına rağmen kullanmamayı tercih ederim

- Hiç Katılmıyorum
- Katılmıyorum
- Biraz Katılmıyorum
- Ne Katılıyorum Ne Katılmıyorum
- Biraz Katılıyorum
- Katılıyorum
- Tamamen Katılıyorum

Geri Bitti

APPENDIX B: QUESTIONNAIRE (Turkish Version)

Faktörler	Sorular
Demografi	Cinsiyetiniz?
	Yaşınız?
	Hangi İlde yaşıyorsunuz?
	Ne iş yapıyorsunuz?
	Aylık ortalama geliriniz ile ilişkili olarak aşağıda verilen seçeneklerden size en uygun olanını işaretleyiniz:
	Eğitim durumunuz hangisidir?
	Teknolojik gelişmeler ilginizi çekiyor mu?
Filtre Soru	Akıllı cihazınız (telefon, tablet, saat, diğer giyilebilir teknolojik ürünler, vb.) var mı?
Davranışsal Niyet	Gelecek 6 ay içerisinde günlük yaşantımda kişisel akıllı sağlık teknoloji ürünlerini kullanma niyetim var
	Gelecek 6 ay içerisinde günlük yaşantımda kişisel akıllı sağlık teknoloji ürünlerini deneyimlemeyi ya da düzenli kullanmayı planlıyorum
Algılanan Avantaj	Kişisel akıllı sağlık teknoloji ürünlerini kullanmam sağlığımla ilgili koruyucu önlemler almada faydalı olacaktır/faydalıdır
	Kişisel akıllı sağlık teknoloji ürünlerini kullanmam sağlığımla ilgili erken müdahale durumlarının tespitinde faydalı olacaktır/faydalıdır
	Kişisel akıllı sağlık teknoloji ürünlerini kullanmam sağlık durumumla ilgili bilgilerimin dijital olarak takip edilebilir ve sağlık profesyonelleriyle(hekim, hemşire gibi) paylaşılabilir olmasını sağlayacaktır/sağlar
Tutum	Gelecek 6 ay içerisinde günlük sağlık işlemlerim için akıllı sağlık teknoloji ürünlerini kullanmaya başlamak…..(Kötü-İyi)
	Gelecek 6 ay içerisinde günlük sağlık işlemlerim için akıllı sağlık teknoloji ürünlerini kullanmaya başlamak…..(Olumsuz-Olumlu)
	Gelecek 6 ay içerisinde günlük sağlık işlemlerim için akıllı sağlık teknoloji ürünlerini kullanmaya başlamak…..(Güvensiz-Güvenli)
Algılanan Önem/Şiddet	Eğer bu tarz sorunlardan dolayı sıkıntı yaşasaydım sonucu kesinlikle çok ciddi olurdu
	Eğer bu tarz sorunlardan dolayı sıkıntı yaşasaydım sonucu çok ciddi olurdu
	Eğer bu tarz sorunlardan/problemlerden dolayı sıkıntı yaşasaydım dikkate değer bir sorun olurdu
Algılanan Hassasiyet	Belirtilen sorunlarla ilgili sıkıntı yaşama konusunda risk altındayım
	Büyük ihtimalle belirtilen sorunlarla ilgili sıkıntı yaşayacağım
	Belirtilen sorunlarla ilgili sıkıntı yaşamam olasıdır
Algılanan Kullanışlılık	Kişisel akıllı sağlık teknoloji ürünlerini kullanmam sağlığımla ilgili daha hızlı aksiyon alabilmemi sağlayacaktır/sağlar
	Kişisel akıllı sağlık teknoloji ürünlerini kullanmam sağlığımla ilgili karar verme yetimi artıracaktır/artırır
	Kişisel akıllı sağlık teknoloji ürünlerini kullanmam sağlığımla ilgili karar verme etkinliğimi artıracaktır/artırır
	Kişisel akıllı sağlık teknoloji ürünlerini kullanmam sağlığımla ilgili kararlar almamı kolaylaştıracaktır/kolaylaştırır

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Algılanan Kullanım Kolaylığı	Kişisel akıllı sağlık teknoloji ürünlerini kullanmayı öğrenmek benim için kolay olacaktır/kolaydır
	Kişisel akıllı sağlık teknoloji ürünlerini kullanmak benim için kolay olacaktır/kolaydır
	Kişisel akıllı sağlık teknoloji ürünlerinin mobil cihazlarla (cep telefonu, tablet, saat vb. ürünlerle) etkileşim içinde olması kullanımımı kolaylaştıracaktır/kolaylaştırır (mobil cihazlar üzerinden yönetiminin yapılabilir olması)
Teknolojik Yenilikçilik	Diğer insanlar bana yeni teknolojiler hakkında danışmaya gelirler
	Genellikle arkadaş çevremde yeni çıkan teknolojilere ilk ben sahip olurum
	Arkadaşlarım yeni teknolojiler hakkında benden daha fazla bilgiye sahiptir
	İleri teknolojiye sahip ürünleri kullanmayı öğrenmekten zevk alırım
	İlgi alanıma giren en son teknolojik yenilikleri takip ederim
İmaj	Kişisel akıllı sağlık teknoloji ürünlerini kullanacak olsam bu bana çevremde yüksek statü verirdi
	Kişisel akıllı sağlık teknoloji ürünleri kullanacak olsam çevremdeki kullanmayanlardan daha prestijli olurdum
	Kişisel akıllı sağlık teknoloji ürünlerine sahip olmak çevremde bir mevki göstergesidir
Denenebilirlik	Kişisel akıllı sağlık teknoloji ürünlerini kullanıp kullanmamaya karar vermeden önce deneyebilmek isterdim/deneyebildim
	Kişisel akıllı sağlık teknoloji ürünlerini kullanıp kullanmamaya karar vermeden önce uygun bir şekilde deneyebilmek isterdim/deneyebildim
	Kişisel akıllı sağlık teknoloji ürünlerinin neler yapabileceğini görecek kadar deneyebilme fırsatım olmasını isterdim/fırsatım oldu
Uyumluluk	Kişisel akıllı sağlık teknoloji ürünlerini kullanacak olsam günlük işlerimle uyumlu olurdu
	Kişisel akıllı sağlık teknoloji ürünlerini kullanacak olsam yaşam stilime uygun olurdu
	Kişisel akıllı sağlık teknoloji ürünlerini kullanacak olsam günlük işlerimi halletmeyi sevdiğim yöntemle uyumlu olurdu
Algılanan Kişisel Mahremiyet Riski	Kişisel akıllı sağlık teknoloji ürünlerini sağlayan firmalarla sağlık bilgilerimi paylaşmak riskli olabilir
	Büyük ihtimalle sağlık teknoloji ürünlerini sağlayan firmalarla sağlık bilgilerimi paylaşmakla ilişkili hasar/kayıp/zarar oluşabilir
	Kişisel akıllı sağlık teknoloji ürünlerini sağlayan firmalarla sağlık bilgilerimi paylaşmayla ilgili çok fazla belirsizlik olabilir
Maliyet	Kişisel akıllı sağlık teknoloji ürünlerini kullanmak için ödeyeceğim para miktarı bu ürünleri kullanmaya başlama (ya da kullanma) niyetime direk etkisi vardır
	Kişisel akıllı sağlık teknoloji ürünleri için ödeyeceğim para miktarı bana çok gelirse günlük sağlık takibim/yönetimimle ilgili birçok kolaylık sağlamasına rağmen kullanmamayı tercih ederim

APPENDIX C: QUESTIONNAIRE (English Version)

Measurement Factors	Items
Demographics	Gender
	Age
	City
	Profession Field
	Average Monthly Income
	Education Status
	Are you interested in technological developments?
Filter Question	Do you have smart devices(cellphone, tablet, watch and wearable technological products, etc.)?
Behavioral Intention	I intend to adopt personal smart health technology products in my daily life within 6 months.
	During the next 6 months, I plan to experiment with or regularly use personal smart health technology products in my daily life.
Perceived Advantage	Using personal smart health technology products would be useful in taking preventive actions related to my health
	Using personal smart health technology products would be useful in detecting early intervention states related to my health
	Using personal smart health technology products would provide to be managed digitally and provide to share the information about my health status with healthcare professionals (such as physician, nurse)
Attitude	To begin to use personal smart health technology products in my daily life within the next 6 months, it would be….(Extremely bad-Extremely good)
	To begin to use personal smart health technology products in my daily life within the next 6 months, it would be….(Extremely negative-Extremely positive)
	To begin to use personal smart health technology products in my daily life within the next 6 months, it would be….(Extremely harmful-Extremely safe)
Perceived Severity	If I suffered the stated problems, it would be severe
	If I suffered the stated problems, it would be serious
	If I suffered the stated problems, it would be significant
Perceived Vulnerability	I am at risk for suffering the stated problems
	It is likely that I will suffer the stated problems
	It is possible for me to suffer the stated problems

Continued from the previous page	
Perceived Usefulness	Using personal smart health technology products would enable me to take action related to my health more quickly
	Using personal smart health technology products would improve my deciding performance related to my health
	Using personal smart health technology products would enhance deciding effectiveness related to my health
	Using personal smart health technology products would make it easier to take decisions related to my health
Perceived Ease of Use	Learning to use personal smart health technology products would be easy for me
	It would be easy to use personal smart health technology products
	Having interaction between personal smart health technology products(smartphone, tablet, watch, etc.) and mobile devices would make my usage (being managable on mobile devices) easier
Technological Innovativeness	Other people come to me for advice on new technology
	In general I am among the first in my circle of friends to acquire new technology when it appears
	It seems my friend learning more about newest technologies than I am
	I enjoy the challenge of figuring out high tech gadgets
	I keep up with the latest technological developments in my areas of interest
Image	If I were to adopt personal smart health technology products, it would give me high status around me
	If I were to adopt personal smart health technology products, I would have more prestige around me than who have not yet adopted it
	Having personal smart health technology products is a status symbol in the circle of me
Trialability	Before deciding on whether or not to adopt personal smart health technology products, I would like to try (be able to try) it on a trial basis
	Before deciding on whether or not to adopt personal smart health technology products, I would like to try (be able to try) it properly on a trial basis
	I would have a chance to try smart health technology products long enough to see what they can do

Continued from the previous page	
Compatibility	If I were to adopt personal smart health technology products, it would be compatible with my daily routine
	If I were to adopt personal smart health technology products, it would fit with my life style
	If I were to adopt personal smart health technology products, it would fit well the way I like to manage my daily routine
Perceived Privacy Risk	It would be risky to disclose my personal health information to vendors providing personal smart health technology products
	There would be high potential for loss associated with disclosing my personal health information to vendors providing personal smart health technology products
	There would be too much uncertainty associated with giving my personal health information to vendors providing personal smart health technology products
Cost	The amount of money I pay for personal smart health technology products has a direct effect on my intention to adopt it
	I prefer not to use personal health technology products If the money I pay for it costs me a lot, even if it provides me many easiness/facilities in terms of my daily health management

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