Journal of
Social and Administrative Sciences
www.kspjournals.org
Volume 6 March 2019 Issue 1

# User acceptance of cloud based hospital information system

*By* Abdulkadir ÖZDEMİR [a†]
& Ahmet Kamil KABAKUŞ [b]

**Abstract.** In this study, it is aimed to determine the factors that affect system use of the IT specialists. Accordingly, it is aimed to analyze,through web-based survey and Technology Acceptance Model, the factors that influence the cloudbasedsystem usage of the 150 IT specialists, who work for state hospitals, The results related to the structural model developed fromTechnology Acceptance Modelhave been analyzed with AMOS - Analyis of Moment Structures programme and the accordance of the statistical results have been analyzed by using Structural Equation Modelling method on model.According to analysis results, the effects of the factors related to the IT specialists' perceived usefulness and perceived ease of use on the applicability of this technology with their advantages and disadvantages havealso been discussed, thanks to the data gathered from the users. The Structural model has been confirmed with the statistical results and confirmed hypotheses have been evaluated separately. Suggestions have been offered to the researchers about making prevalent of the cloud based Hospital Information System as a software service, required substructure, its components and applicability. Standards and legal status has also been examined.

**Keywords.** Cloud computing, Technology acceptance model, Cloud basedhospital information system, Structural equation model.
**JEL.** J24, O15, M12, M51, M55.

## 1. Introduction

In the last quarter of the last century and early 2000s, the tremendous development in the fields of electronics and software engineering had effect on information technologies as it did on all areas. This situation created an opportunity for the effective business operations of the enterprises, but also caused great difficulties in the establishment, operation and maintenance of information infrastructures (Lumsden & Anabel, 2013). The companies, which are under the influence of globalization and rapid developments in technology, need to have speed,

[a†] Atatürk University Faculty of Economics and Administrative Sciences, Department of Management Information Systems, Erzurum, Turkey.
☎. (0442) 231 11 11 ✉. abdulkadir@atauni.edu.tr
[b] Atatürk University Faculty of Economics and Administrative Sciences, Department of Management Information Systems, Erzurum, Turkey.
☎. (0442) 231 11 11 ✉. kamilkabakus@gmail.com

flexibility and cost advantage in order to survive in a competitive environment (Tengilimoğlu, Işık, & Akbolat, 2012).

Server virtualization, which is one of the technological developments, is the logical isolation of the physical layer for the efficient use of hardware parts. To explain the concept of server virtualization a little more; it is a software solution that enables the efficient allocation, use and management of physical resources. The purpose of virtualization is to provide a high level of performance, scalability, reliability, usability, accessibility and agility in a layer of security and management. The purpose of virtualization is to provide a high level of performance, scalability, reliability, usability, accessibility and agility in a layer where security and management co-exist (Kusnetzky, 2011).

Virtualization technology is a structure that reduces labor loss and cost, as well as provides high efficiency and flexibility, divides a physical structure into logical sub-components and optimizes server efficiency (Çelik, 2009). Virtualization technologies, which means resource usage and sharing, form the basis of cloud computing. The purpose of virtualization technologies is to create much more logical units with a small number of physical resources and to use these units independently from each other in various services. The purpose of virtualization technologies is to create much more logical units with a small number of physical resources and to use these units independently from each other in various services.

The cloud refers to a separate information technology environment which was designed to provide scalable and computable ICT (Information and Communication Technologies) resources remotely. This concept usually means cluster or stack. The cloud, which previously appeared in various network topologies as the symbol of the Internet, is now used to represent the sources of computing with the remote provisioning environment and to represent the boundary of the cloud environment. It provides open and measured access to web-based computing resources. Cloud environments are defined for access to content-based computing resources published over the Internet.

Cloud Computing is a software solution, where the opportunities provided by regular and scalable information technologies are distributed and consumed as a service using real-time internet technologies. Since cloud computing includes more than one integrated technology rather than a specific technology, a wide range of definitions are made in the literature. A few of these definitions are as follows.

Cloud computing is a new internet-based distribution and support model for information technology services. It is a product of the technology needed for easy access to remote devices and server services over the internet. A typical cloud computing provides access to data and software on the server through the web service (Knorr, 2008).

The basis of cloud computing is the use of all programs by accessing it on the internet without the need for installation. Expanding the capabilities of computers, cloud information technology is the community name of IT

resources that provide users with access to a range of software and services over the Internet (Rayport & Heyward, 2009).

Cloud computing is a special form of distributed information resources that introduce usage models for remotely scalable and computable resources (Erl, Puttini, & Mahmood, 2013). Briefly, cloud computing is a kind of information technology in which scalable and flexible information technology capacity is offered to customers by using internet technologies.

The aim of this study is to determine the factors affecting the applicability of Hospital Information Systems (HIS) via cloud computing technologies and to measure the severity of the perception of the end users about this technology in their future behavior. For this purpose, the relationship between a structural model and subjective norm, job relevance, social image, output quality, result demonstrability, perceived usefulness, perceived ease of use, behavioral intention and system use factors will be tested by utilizing technology acceptance models (TAM).

In the study, the results of the statistically tested model are aimed to be tested on the cloud based HIS which is established within the Public Hospitals Association. The study will contribute to the literature in terms of testing the model on acloud based hospital information system.

## 2. Theory and literature

The acceptance situation of cloud computing services in the scope of the Technology Acceptance Model was studied within the framework of perceived usefulness and perceived ease of use in state institutions, higher education institutions and SMEs (Small and Medium Business) and the factors of availability, access, security and reliability were examined (Gupta, Seetharaman, & Raj, 2013; Shin, 2013, 2015; Stantchev, Colomo-Palacios, Soto-Acosta, & Misra, 2014).

Shin (2013) used value-sensitivity approach in the potential user adoption evaluation. Gupta *et al.*, (2013) added a cost reduction factor to the factors of availability, access, security and reliability, and their reliability factor was rejected in their study.

Joo & Sang (2013) evaluated the use and adoption of Korean smartphones with the Technology Acceptance Model as well as the U & G (Use and Satisfaction) approach, Kim & Oh (2011), evaluated the adoption of mobile data systems, using the Structural Equation Model, as did Chen & Tseng (2012), who evaluated the acceptance of in-service training in web-based learning.

Rodríguez & Trujillo (2014) evaluated the adoption of low-priced carriers in the aerial transportation according to the Unified Theory of Technology Use and Adoption within the scope of the Technology Acceptance Model, Agudo-Peregrina, Hernández-García, & Pascual-Miguel (2014) used the Technology Acceptance Model 3 approach, which is the previous Technology Acceptance Model before the Unified Theory of Technology Use and Adoption, Tamor, Gearhart, & Soto (2013) used a statistical approach in the estimation of user adoption. The adoption of

application tools such as Youtube and Google in procedural learning and collaborative learning was researched within the framework of the Extended Technological Acceptance Model and positive results were obtained (Cheung & Vogel, 2013; Lee & Lehto, 2013).

In addition to the solutions brought about by information systems, the studies evaluating the status of the society's adoption of information systems have an important place in the literature. In the case of Enterprise Resource Planning (ERP) software manufacturing systems, generally the adoption by users and stakeholders is studied. The Structural Equation Model was proposed when the adoption of ERP systems, its contribution to the competitive position, and the Critical Success Factors were considered (Ram, Corkindale, & Wu, 2013; Ram, Wu, & Tagg, 2014).

Nwankpa & Roumani (2014) evaluated the contribution of ERP software with the perspective of Organizational Learning Capacity. A method of analysis that we frequently encounter in the studies on the Technology Acceptance Model axis is the Partial Least Squares method (Ram *et al.*, 2014; Sternad & Bobek, 2013). There are also numerous Technology Acceptance Model recommendations to predict perceived ease of use and perceived usefulness in these systems (Akça & Özer, 2012; Erdem, 2011).

Another area where the Technology Acceptance Model is used is HIS. While Pai & Huang (2011) made an evaluation on the Information Systems Success Model in terms of service, system and information quality, Aggelidis & Chatzoglou (2009) proposed a modified Technology Acceptance Model and used the Structural Equation Model as a method. In his study of the adoption of HIS, Ward (2013) used the Unified Theory of Technology Use and Adoption as a Technology Acceptance Model and the Propagation of Innovations models altogether. Jackson, Mun, & Park (2013) highlighted the concept of personal innovation in HIS within the frame of Technology Acceptance Model. Moores (2012) used the Partial Least Squares Method in its analysis by suggesting an integrated model for HIS, Chow, *et al.*, (2012) have expanded the Technology Acceptance Model for adopting technological education in health systems.

The security risks of cloud computing technologies were particularly examined by the researchers (Ali, Khan, & Vasilakos, 2015; Ryan, 2013; Shahzad, 2014). Ryan (2013) compared 4 different models for the confidentiality and security of data on software as a service (SaaS) by cloud service providers and made a research on models and their applicability. Key-transfer over the web browser provides the strongest secure structure, while hardware-assisted encryption is commonly used for applicability. Shahzad (2014) aimed to provide a better understanding of cloud computing security issues and to identify approaches and solutions adopted by the cloud service industry. Amazon studied cloud services and focused on data security and data privacy. Ali *et al.*, (2015) analyzed and compared security risks that may arise from hardware and software components in data centers due to the nature of virtualization and technologies that enable cloud computing.

## 3. Data set and method

### 3.1. Model and hypotheses

It is found out that the technology acceptance model that Venkatesh & Bala (2008) put forward made up a theoretical framework appropriate for the purpose of the study. This model, known as Technology Acceptance Model (TAM) 3, is used to evaluate the variables that can be applied on the information system. The effects of factors such as Subjective Norm (SN), Job Revelance (REL), Social Image (SIMG), Output Quality (OUT), Result Demonstrability (RES), Computer Self-Efficacy (CSE), Perceptions of External Controls (PEC) and Computer Anxiety (CA) which have an effect onPerceived Usefullnes (PU) and Computer Self-Efficancy (CSE), Perceptions of External Control (PEC) which have an effect on Perceived Ease of Use (PEOU) that were to have an effect on users' acceptance or rejection of a new system, were observed in the first stage. In the second stage, it was tried to measure how the Perceived Usefullnes and the Perceived Ease of Use that users affected the behavioral intention. In the third stage, in what way and severity these had an effect on the user's system use were studied. As a result, the model aims to test the cause and effect relationships between the variables. 13 hypotheses and models to be tested in the research are given below.

**$H_1$**:Thesubjective norm of use of cloud based HISpositively affects the user's behavioral intention to adopt this technology.

**$H_2$**:The subjective norm of use of cloud based HIS positively affects the user's perceived usefulness to adopt this technology.

**$H_3$**:The subjective norm of use of cloud based HIS positively affects the user's job relevance with the business to use this technology.

**$H_4$**: The job relevance of the use of cloud based HIS with the business has a positive effect on the user's perceived usefulness in adopting this technology.

**$H_5$**: The social image of cloud based HIS has a positive effect on the user's perceived usefulness in adopting this technology.

**$H_6$**: The output quality of cloud based HIS has a positive effect on the user's perceived usefulness in adopting this technology.

**$H_7$**: The result demonstrability of cloud based HIS has a positive effect on the user's perceived usefulness in adopting this technology.

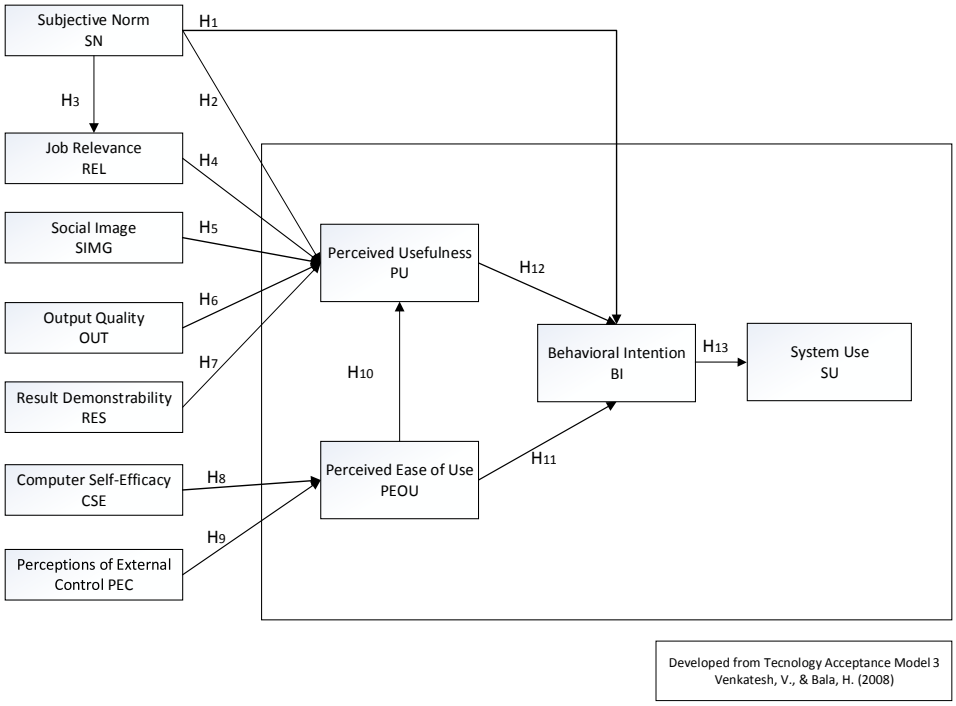
**$H_8$**: The computer self-efficacyof cloud based HIS has a positive effect on the user's perceived ease of use in adopting this technology.

**$H_9$**: The perceptions of external controlof cloud based HIS has a positive effect on the user's perceived ease of use in adopting this technology.

**$H_{10}$**: The perceived ease of use for the use of cloud basedHIS has a positive effect on the user's perceived usefulness in adopting this technology.

**$H_{11}$**: The perceived ease of use for the use of cloud basedHIS has a positive effect on their behavioral intention in using this technology.

**H12**: The perceived usefulness in of cloud based HIS being used has a positive effect on their behavioral intention in using this technology.




**Graph 1.** *Theoretical models and hypotheses*

**H13**: The behavioral intention of cloud basedHIS has a positive effect on their system use.

## 3.2. Measures

Scales used in the survey are provided in the following Table 1. Perceived usefulness, perceived ease of the use and system use was developed from Davis (1989), Venkatesh & Bala (2008) and added more questions these scales. Questionereare indicated in Table 1.

**Table 1.** *Instruments Table*

| Constructs | | Item | Sources |
|---|---|---|---|
| Perceived Usefulness (PU) | PU1 | Using the system improves my performance in my job | (Davis, 1989) |
| | PU2 | Using the system in my job increases my productivity. | |
| | PU3 | Using the system enhances my effectiveness in my job. | |
| | PU4 | I find the system to be useful in my job. | |
| Perceived Ease of Use (PEOU) | PEOU1 | My interaction with the system is clear and understandable. | |
| | PEOU2 | Interacting with the system does not require a lot of my mental effort. | |
| | PEOU3 | I find the system to be easy to use. | |
| | PEOU4 | I find it easy to get the system to do what I want it to do. | |
| Computer Self-Efficacy (CSE) | | I could complete the job using a software package ... | Compeau & Higgins (1995) |

| | | | |
|---|---|---|---|
| | CSE1 | ... if there was no one around to tell me what to do as I go. | |
| | CSE2 | ... if I had just the built-in help facility for assistance | |
| | CSE3 | ... if someone showed me how to do it first. | |
| | CSE4 | ... if I had used similar packages before this one to do the same. | |
| Perceptions of ExternalControl (PEC) | PEC1 | I have control over using the system. | Venkatesh & Bala (2008) |
| | PEC2 | I have the resources necessary to use the system. | |
| | PEC3 | Given the resources, opportunities and knowledge it takes to use the system, it would be easy for me to use the system. | |
| | PEC4 | The system is not compatible with other systems I use. | |
| Subjective Norm (SN) | SN1 | People who influence my behavior think that I should use the system. | Taylor & Todd (1995) |
| | SN2 | People who are important to me think that I should use the system. | |
| | SN3 | The senior management of this business has been helpful in the use of the system. | |
| | SN4 | In general, the organization has supported the use of the system. | |
| Social Image (SIMG) | SIMG1 | People in my organization who use the system have more prestige than those who do not. | Moore & Benbasat (1991) |
| | SIMG2 | People in my organization who use the system have a high profile. | |
| | SIMG3 | Having the system is a status symbol in my organization. | |
| Job Relevance (REL) | REL1 | In my job, usage of the system is important. | Davis, Bagozzi, & Warshaw (1992). |
| | REL2 | In my job, usage of the system is relevant. | |
| | REL3 | The use of the system is pertinent to my various job-related tasks. | |
| Output Quality (OUT) | OU1 | The quality of the output I get from the system is high. | |
| | OUT2 | I have no problem with the quality of the system's output. | |
| | OUT3 | I rate the results from the system to be excellent. | |
| Result Demonstrability (RES) | RES1 | I have no difficulty telling others about the results of using the system. | Moore & Benbasat (1991). |
| | RES2 | I believe I could communicate to others the consequences of using the system. | |
| | RES3 | The results of using the system are apparent to me. | |
| | RES4 | I would have difficulty explaining why using the system may or may not be beneficial. | |
| Behavioral Intention (BI) | BI1 | Assuming I had access to the system, I intend to use it. | Davis (1989) |
| | BI2 | Given that I had access to the system, I predict that I would use it. | |
| | BI3 | I plan to use the system in the next months. | |
| System Use (SU) | SU1 | On average, how much time do you spend on the system each day? | Venkatesh & Bala (2008) |

The factors in the survey were analyzed to see the reliability and the validity. Confirmatory factor analysis and Cronbah's Alpa analysis are implemented for each factor. The factor scores and Cronbach alpa scores are indicated in Table 2.

**Table 2.** *Construct Reliability and Validity Analysis*

| | Cronbach's Alpha | rho_A | Composite Reliability | Average Variance Extracted (AVE) |
|---|---|---|---|---|
| BI | 0.856 | 0.856 | 0.913 | 0.778 |
| CSE | 0.917 | 0.922 | 0.941 | 0.800 |
| OUT | 0.936 | 0.938 | 0.959 | 0.886 |
| PEC | 0.846 | 0.860 | 0.907 | 0.765 |
| PEOU | 0.940 | 0.944 | 0.954 | 0.807 |
| PU | 0.954 | 0.955 | 0.961 | 0.757 |
| REL | 0.952 | 0.953 | 0.977 | 0.955 |
| RES | 0.885 | 0.886 | 0.929 | 0.814 |
| SIMG | 0.925 | 0.940 | 0.952 | 0.868 |
| SN | 0.792 | 0.819 | 0.876 | 0.703 |
| SU | 0.912 | 0.912 | 0.958 | 0.919 |

According to result of the analysis, factor scores of the $PU_7$, $PEC_4$, $RES_4$, $SN_2$, $SU_1$ is not high enough to consider in the analysis, therefore these items are extracted from the analysis.

**Table 3.** *Factor Outer Loadings Matrix*

| RES | | SN | | BI | |
|---|---|---|---|---|---|
| RES1 | 0.893 | SN1 | 0.877 | BI1 | 0.902 |
| RES2 | 0.906 | SN2 | 0.486 | BI2 | 0.909 |
| RES3 | 0.876 | SN3 | 0.840 | BI3 | 0.832 |
| RES4 | 0.510 | SN4 | 0.767 | CSE | |
| SU | | PU | | CSE1 | 0.878 |
| SU1 | 0.631 | PU1 | 0.872 | CSE2 | 0.924 |
| SU2 | 0.914 | PU2 | 0.886 | CSE3 | 0.871 |
| SU3 | 0.945 | PU3 | 0.899 | CSE4 | 0.903 |
| PEC | | PU4 | 0.891 | OUT | |
| PEC1 | 0.897 | PU5 | 0.868 | OUT1 | 0.934 |
| PEC2 | 0.902 | PU6 | 0.817 | OUT2 | 0.953 |
| PEC3 | 0.810 | PU7 | 0.605 | OUT3 | 0.937 |
| PEC4 | 0.329 | PU8 | 0.847 | PEOU | |
| SIMG | | PU9 | 0.857 | PEOU1 | 0.905 |
| SIMG1 | 0.934 | REL | | PEOU2 | 0.861 |
| SIMG2 | 0.915 | REL1 | 0.922 | PEOU3 | 0.891 |
| SIMG3 | 0.946 | REL2 | 0.959 | PEOU4 | 0.928 |
| | | REL3 | 0.959 | PEOU5 | 0.905 |

### 3.3. Sampling and method

Our research universe is composed of IT specialists working in state hospitals of Turkish Ministry of Health, Public Hospitals Institution. At the end of the researches, it has been determined that at least 1 IT specialist is employed in each hospital. The number of hospitals affiliated to the Public Hospitals Institution is 854 (Health, 2013). With this classification, the

number of public hospitals making up the main universe consists of 667 public hospitals. The number of questionnaires that are sent to the IT specialists of 667 hospitals and thus filled up was 175. Some of the 175 questionnaires were found to be incorrect and incomplete. The incorrect and incomplete questionnaires were extracted and 150 questionnaires were taken into consideration in the study.

Structural Equation Modeling (SEM) was used to determine the factors affecting the applicability of hospital information management systems over cloud computing technologies and to test the linear and nonlinear relationships between the variables formed in the research model. The SEM is a comprehensive statistical approach used to test models where causal and interrelationships are combined between observed variables and latent variables. The SEM, which is used in many fields of science, provides a comprehensive method for the testing and measurement of meaningful theories. It is widely used in measuring relationships between variables and developing and testing enterprise models (Çelik & Yılmaz, 2013).

The basic aim in structural equality research is to test the propositions of the theoretical model with the data at hand and to determine how they correspond to each other (Şimşek, 2007). Before starting the study, SEM tests how the theoretical model is verified with the data collected and analyzed. SEM can be seen as an extension of the general regression analysis that performs multiple regression analyzes together. Basically, it is a combination of factor analysis and regression analysis. It combines the causal relationship between the variables in the regression model and the structural factor modeling in the single factor analysis. In order to determine the relationships between variables, it is a multivariate analysis method that combines factors such as factor analysis, variance, covariance analysis and multiple regression (Çelik & Yılmaz, 2013). It is the general name of multiple statistical methods rather than a single statistical technique. Other terms such as covariance structure analysis, covariance structure modeling or analysis of covariance structures are also used in the literature for SEM (Kline, 2011).

## 4. Findings

### 4.1. Demographic findings

The results of the evaluation of IT specialists in terms of demographic variables is summarized in Table 4. 12.7% of the participants are female and 87.3% are male IT specialists. When the age distribution variable is examined, it is seen that the participants are concentrated in the 24-41 age group (79.4%). It is seen that the participants are 3.3% in the 18-23 age range and 5.3% in the 48 and older age group.

**Table 4.** *Demographic Characteristics of Participants*

| | Variable | Frequency | Percent (%) |
|---|---|---|---|
| Sex | Women | 19 | 12,7 |
| | Men | 131 | 87,3 |
| Age | 18-23 | 5 | 3,3 |
| | 24-29 | 36 | 24 |
| | 30-35 | 55 | 36,7 |
| | 36-41 | 28 | 18,7 |
| | 42-47 | 18 | 12 |
| | 48 and over | 8 | 5,3 |
| Education | High School | 13 | 8,7 |
| | College (2 years) | 29 | 19,3 |
| | Graduate (4years) | 76 | 50,7 |
| | Masters | 27 | 18,0 |
| | PhD | 5 | 3,3 |
| Title | Head of IT | 66 | 44,0 |
| | IT Manager | 49 | 32,7 |
| | Hospital Manager | 12 | 8,0 |
| | Head of Administrative Services | 2 | 1,3 |
| | Adm.FinancialManager/Deputy | 21 | 14,0 |

It has been evaluated whether IT specialists are familiar with the latest events regarding information leakage about cloud computing technology and whether they use the Health Drive Desktop application or not. The results are seen on Table 5. It was understood that 62.7% of the participants had information about this incident regarding the leakage of the sound record by the US National Security Agency (NSA), which infringed the international reliability of American-based technology companies, and 37.3% of them did not have any information about this event.

**Table 5.** *Confidence and Practices of Participants in the Concept of Cloud Computing*

| | Variable | Frequency | Percent (%) |
|---|---|---|---|
| Do you know about the US National Security Agency (NSA) scandal? | Yes | 94 | 62,7 |
| | No | 56 | 37,3 |
| Did you lose your trust in the concept of Cloud Computing after learning about the NSA scandal? | Yes | 47 | 31,3 |
| | No | 103 | 68,7 |
| Do you use the Health Drive app? | Yes | 56 | 37,3 |
| | No | 94 | 62,7 |
| Which of the Cloud Computing Service Models is appropriate for the infrastructure in your organization? | Infrastructure as a Service (IaaS) | 53 | 35,3 |
| | Platform as a Service (PaaS) | 13 | 8,7 |
| | Software as a Service (SaaS) | 84 | 56,0 |

4.2. The evaluation of structural model

In the field of social sciences, normality tests can sometimes give misleading results. Therefore, looking at the skewness and kurtosis coefficients of the variables give more reliable results. For example according to George (2011) if the skewness and kurtosis coefficients are between -2.0 and +2.0, the Normality Test shows a normal distribution, however, according to a later study carried out by Tabachnick & Fidell (2007) if the skewness and the kurtosis coefficients are between -1.5 to +1.5 then the data shows a normal distribution. In this respect, it is seen that the data shows a normal distribution in the test results.

**Table 6.** *Normality Test*

| | Mean Value | Standart Deviation | Skewness | Kurtosis |
|---|---|---|---|---|
| PU | 3,7340 | ,09566 | -1,079 | ,402 |
| PEOU | 3,6299 | ,10104 | -,892 | ,057 |
| PEC | 3,2539 | ,08983 | -,715 | ,182 |
| SN | 3,0807 | ,09017 | -,424 | -,385 |
| OUT | 3,4961 | ,10088 | -,671 | -,120 |
| RES | 3,2756 | ,08722 | -,512 | ,165 |
| BI | 3,7533 | ,10022 | -,897 | ,080 |
| CSE | 3,8504 | ,09926 | -1,090 | ,520 |
| SIMG | 3,4646 | ,11541 | -,588 | -,724 |
| SU | 3,4593 | ,10645 | -,531 | -,507 |
| REL | 3,7297 | ,10799 | -,946 | -,023 |

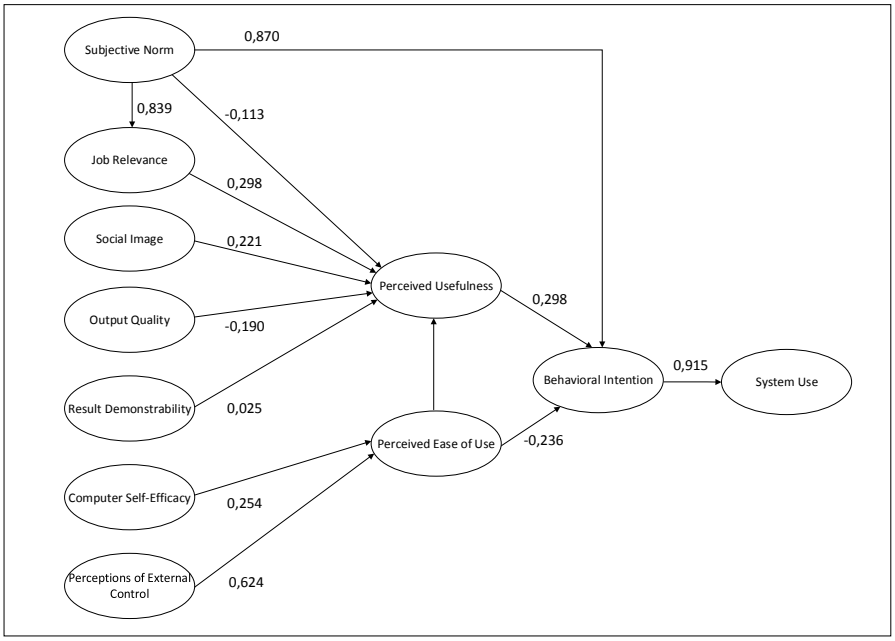
The evaluation of the research model was started with the chi-square statistic which is considered as the initial fit index in a sense commonly used in the SEM studies. In the following stage, the measure of the goodness of fit was examined in order to see how well the predetermined model explained the data obtained in the structural equation model. Goodness of fit measures are the stage in which the decision was made regarding whether to accept or reject the structural model. In Table 7, compliance indices for model are given and they are examined.

**Table 7.** *Goodness Measures of the Research Model*

| Goodness Measure | Ideal Goodness Values | Acceptable Goodness Values | Goodness Values of the Factor |
|---|---|---|---|
| $\chi^2$ | (P>0,05) desired. | | 1193,786 |
| $\chi^2$ /df | $\chi^2$ /df≤ 2 | $\chi^2$ /df≤ 5 | 2 |
| RMSEA | 0.00<RMSEA<0.05 | 0.05<RMSEA<0.10 | 0,079 |
| GFI | 0.95<GFI<1.00 | 0.90<GFI<0.95 | 0,918 |
| AGFI | 0.90<AGFI<1.00 | 0.80<AGFI<0.90 | 0,849 |
| CFI | 0.95<CFI<1.00 | 0.90<CFI<0.95 | 0,895 |
| NFI | 0.95<NFI<1.00 | 0.90≤NFI<0.95 | 0,926 |
| TLI | 0.95<TLI<1.00 | 0.90≤TLI<0.95 | 0,899 |
| RFI | 0.90<RFI<1.00 | 0.85< RFI<0.90 | 0,789 |

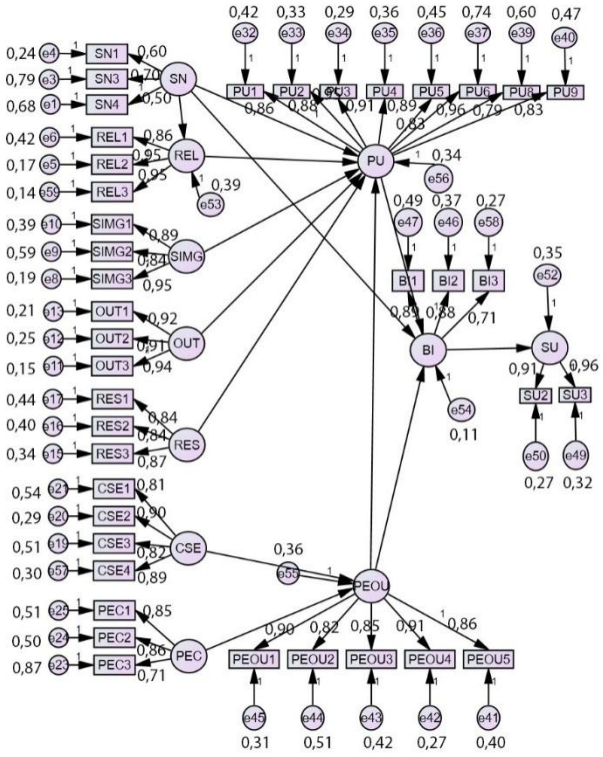
The chi-square test result is the test of the fit between the data and the model. According to Anglim (2007), this test gives information about

different parts of the model with the consideration of the sign of regression coefficients and the level of significance.




**Graph 2.** *Regression Aspects and Standard Regression Loads*

The difference between the expected covariance matrix and the observed covariance matrix $\chi^2$ was found to be significant (p = 0,000). According to Jöreskog & Sörbom (1993), the $\chi^2$ / df ratio was used because the chi-square value would not be used as a formal test in assessing the compatibility of the model. According to the model $\chi 2$ and degree of freedom ($\chi 2$ / df = 1193,786/597 = 2), it can be stated that the fit is very good according to the result obtained( $\chi^2$ / df ≤ 2). It is desired that the $\chi 2$ / df ratio is close to zero or is at least less than five. (Yoo, Donthu, & Lee, 2000). This ratio was obtained as 2 and it was statistically decided that the compatibility of the data with the model was acceptable. The degree of freedom (df = 597) is an important criterion in the chi-square test, but if this value is bigger, $\chi^2$/df ratio is used to evaluate the compatibility of the model instead of $\chi^2$ is signigicant alone (Meydan & Şeşen, 2011).




**Graph 3.** *Road coefficients and error coefficients AMOS output*

**Table 8.** *Evaluation of Hypothesis of Research Model*

| Structural Relationsin the Model | Standard Loads | Standard Error | Critical Ratio tValue | P Values | Result of Hypothesis |
|---|---|---|---|---|---|
| Variables Affecting Perceived Usefulness Factor ($R^2$=0,71) | | | | | |
| H2: PU – SN | -0.165 | 0.276 | -0.599 | 0.549 | REJECT |
| $H_4$: PU – REL | 0.270 | 0.090 | 2.987 | 0.003 | ACCEPT |
| $H_5$: PU – SIMG | 0.195 | 0.069 | 2.824 | 0.005 | ACCEPT |
| $H_6$: PU – OUT | -0.190 | 0.148 | -1.287 | 0.198 | REJECT |
| $H_7$: PU – RES | 0.026 | 0.216 | 0.121 | 0.904 | REJECT |
| $H_{10}$: PU – PEOU | 0.770 | 0.114 | 6.769 | 0,000 | ACCEPT |
| Variables Affecting Perceived Ease of Use Factor ($R^2$=0,65) | | | | | |
| $H_8$: PEOU – CSE | 0.249 | 0.094 | 2.639 | 0.008 | ACCEPT |
| $H_9$: PEOU – PEC | 0.552 | 0.097 | 5.677 | 0,000 | ACCEPT |
| Variables Affecting Behavioral Intention Factor ($R^2$=0,84) | | | | | |
| $H_1$: BI – SN | 1.241 | 0.195 | 6.371 | 0,000 | ACCEPT |
| $H_{11}$: BI – PEOU | -0.251 | 0.098 | -2.550 | 0.011 | ACCEPT |
| $H_{12}$: BI – PU | 0.290 | 0.087 | 3.321 | 0,000 | ACCEPT |
| Variables Affecting Job Relevance Factor ($R^2$=0,70) | | | | | |
| $H_3$: REL - SN | 1.355 | .189 | 7.183 | 0,000 | ACCEPT |
| Variables Affecting System Use Factor ($R^2$=0,69) | | | | | |
| $H_{13}$: SU – BI | 1.005 | .089 | 11.319 | 0,000 | ACCEPT |

When the p and t values given in Table-8 are evaluated, the relationships "Perceived Usefulness - Subjective Norm" expressed as $H_2$, "Perceived Usefulness - Output Quality" expressed as $H_6$, "Perceived Usefulness - Result Demonstrability", expressed as $H_7$ and "Behavioral Intention - Perceived Ease of Use" expressed as $H_9$ were found to be

insignificant at p <0.05 level. Therefore, the hypotheses $H_2$, $H_6$, and $H_7$ were rejected as they are not statistically supported the way it is expressed in the model. The relations other than $H_2$, $H_6$, and $H_7$ hypothesis were significant at p <0.05 significance level.This means that the hypotheses $H_1$, $H_3$, $H_4$, $H_5$, $H_8$, $H_9$, $H_{10}$, $H_{11}$, $H_{12}$ and $H_{13}$ were accepted.The directions of the hypotheses included in the model were evaluated separately.While the hypotheses H3 and H4 in the model are negative hypotheses, other hypotheses are positive hypotheses.As seen in Table 8, the direction of all hypotheses was as expected.For this reason, as the direction of the accepted hypothesis above is as expected, it is meaningful to accept them.

## 5. Conclusion

The concepts of knowledge and information are now integrated into the concept of technology and started to collect all sectors around. Keeping pace with this rapidly evolving and changing structure has become a must rather than necessity. Organizations desiring to survive in the world competition market increase their power by combining these structures to themselves, while organizations moving in the opposite direction have to shrink in direct proportion to their resistance to change. When we look at the world market in general, the service industry is growing rapidly. In Turkey, which is a developing country, the importance of the service sector is increasing. And the Health Industry, which is one of the most important components of this service sector, is an area in which organizations that improve themselves the most take place. Cloud computing is the leading technology in this development. Cloud based HIS is a sub-element of this technology which can be applied by this technology. Leaving the traditional IT investments and priorities aside, a process of change has started in which the required services are provided on the Internet, corporate costs are minimized, and IT is redefined in business processes rather than technology management. Cloud computing, as this process of change is called, has attracted the attention of many public institutions and enterprises, including health enterprises. The decision makers who wanted to see the advantages of cloud computing in their organizations started to adapt their existing information systems and software to the cloud. The formation of the cloud structures and the transition process are predicted to accelerate in the next few years.

The biggest obstacle to the implementation of this technology in hospitals is the safety of the data. Special clouds and cloud based HIS created for hospitals are successfully implemented. In this structure, where the internet traffic is taken to a point, units connected to the internet via SSL-VPNand they connect to the application via web services. In order that we can refer the applications served over web as software service, it must bear the features of cloud technologies. This reveals that not every web application is a cloud service. In addition, the acquisition of cloud information technologies standards to our country initiated by TSE (Turkish Standards Instititution) determines the duties and responsibilities

for the general cloud users and service providers. These standards will be ensured by the relevant laws and regulations on the legal basis and will enable the users to use these services without worry and will enable the spread of cloud service models. Public institutions, especially hospitals, aim using a single cloud based HIS in order to ensure integrity throughout the country, leaving aside the use of outsourcing in the information systems and imaging softwares. Cloud Based HIS needs in our country are provided by certain software companies and data confidentiality agreements are made with these companies. Multi-use in cloud technologies allows a single application to be used seperately from other hospitals. These data privacy protocols are also provided by signing mutual agreements with the service provider. The application as a software service and applicability of a single cloud based HIS used in provincial basis was supported to be used on a regional and national basis by this study. The systematic skills of the IT specialists facilitate their adaptation to the new technology. Today, widely used and tested virtualization technologies have been experienced by 55.3% of the participants. As a general opinion and the result of the previous technologies, IT specialists adopted the principle of "Don't interfere to the running system". However, today technology is rapidly renewed. The substructures that are closed to the renewal remain behind and they cannot reach the desired performance. In the evaluation of IT specialist taking their private cloud structures into account, current events do not affect the trust in cloud technologies. Although 62% of participants were aware of the leakage of the information occured in US NSA, the effect of this event on their behavior remained at 31.3%. This is the result of participants desiring to use cloud services, although they are aware of the dangers that may be present. However, the transformation of their future intentions into using these cloud services does not have the same effect. The Health Drive Desktop app is used by 37.3% of the participants.IT specialists found that software services from cloud service models for state hospitals are appropriate and applicable at 56%.

Hospitals have stated that there is a need for some more time to implement this technology in order to provide uninterrupted service to patients in terms of the problems and interruptions patients can face. In our study, instead of actual usage data, the compliance of the models with the survey data that are requested to be filled from the users voluntarily was investigated. For further studies, the results of this study or any similar studies can be tested and compared with the actual use data.

Considering the magnitude of the imaging data, the fact that data centers in different geographical locations of the country for the Ministry of Health community cloud based HIS will be established and the data will be backed up at these points will create a further phase of the study. Thanks to the data centers established in the provincial centers, thefiber infrastructure for fast communication and the scalable storage products, the storage centers will enable other computing centers to use the unused storage

resources when needed thus increasing the efficiency. Considering current legislation and standard studies, cloud based HIS will be able to provide uninterrupted service by using the resources effectively in hospitals catching up with the cutting edge technology closely. The IT infrastructure Turkey is also being improved at the service provider level. Thanks to an uninterrupted and fast communication network, today's technology enables this communication between cities even across the country by private leased lines with delays in milliseconds.

## References


Aggelidis, V.P., & Chatzoglou, P.D. (2009). Using a modified technology acceptance model in hospitals. *International Journal of Medical Informatics,* 78(2), 115-126. 10.1016/j.ijmedinf.2008.06.006

Agudo-Peregrina, Á.F., Hernández-García, Á., & Pascual-Miguel, F.J. (2014). Behavioral intention, use behavior and the acceptance of electronic learning systems: Differences between higher education and lifelong learning. *Computers in Human Behavior*, 34, 301-314. 10.1016/j.chb.2013.10.035

Akça, Y., & Özer, G. (2012). Teknoloji kabul modeli'nin kurumsal kaynak planlaması uygulamalarında kullanılması (The Use of Technology Acceptance Model in Enterprise Resource Planning Implementations). *Business and Economics Research Journal,* 3(2), 79-96.

Ali, M., Khan, S.U., & Vasilakos, A.V. (2015). Security in cloud computing: Opportunities and challenges. *Information Sciences,* 305, 357-383. doi. 10.1016/j.ins.2015.01.025

Anglim, J. (2007). *Structural Equation Modelling*. [Retrieved from].

Chen, H.-R., & Tseng, H.-F. (2012). Factors that influence acceptance of web-based e-learning systems for the in-service education of junior high school teachers in Taiwan. *Evaluation and Program Planning,* 35(3), 398-406. 10.1016/j.evalprogplan.2011.11.007

Cheung, R., & Vogel, D. (2013). Predicting user acceptance of collaborative technologies: An extension of the technology acceptance model for e-learning. *Computers & Education,* 63(1), 160-175. 10.1016/j.compedu.2012.12.003

Chow, M., Herold, D. K., Choo, T.-M., & Chan, K. (2012). Extending the technology acceptance model to explore the intention to use second life for enhancing healthcare education. *Computers & Education,* 59(4), 1136-1144. 10.1016/j.compedu.2012.05.011

Compeau, D.R., & Higgins, C. A. (1995). Application of social cognitive theory to training for computer skills. *Information Systems Research,* 6(2), 118-143. 10.1287/isre.6.2.118

Çelik, E., & Yılmaz, V. (2013). *LİSREL 9.1 ile Yapısal Eşitlik Modellemesi: Temel Kavramlar, Uygulamalar, Programlama*. Ankara: Anı Yayıncılık.

Çelik, M. (2009). Neden Sanallaştırma? [Retrieved from].

Davis, F.D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS quarterly*, 13(3), 319-340. 10.2307/249008

Davis, F.D., Bagozzi, R.P., & Warshaw, P.R. (1992). Extrinsic and intrinsic motivation to use computers in the workplace1. *Journal of Applied Social Psychology,* 22(14), 1111-1132. 10.1111/j.1559-1816.1992.tb00945.x

Erdem, H.K. (2011). *Kurumsal kaynak planlama sistemlerinin kullanımında etkili olan faktörlerin genişletilmiş teknoloji kabul modeli ile incelenmesi.* [Retrieved from].

Erl, T., Puttini, R., & Mahmood, Z. (2013). *Cloud Computing: Concepts, Technology & Architecture*: Pearson Education.

George, D. (2011). *SPSS for Windows Step by Step: A Simple Study Guide and Reference, 17.0 Update, 10/e*: Pearson Education India.

Gupta, P., Seetharaman, A., & Raj, J.R. (2013). The usage and adoption of cloud computing by small and medium businesses. *International Journal of Information Management,* 33(5), 861-874. 10.1016/j.ijinfomgt.2013.07.001

Health, M. (2013). *General Directorate of Health Research*. Health Statistics Yearbook.

Jackson, J.D., Mun, Y.Y., & Park, J.S. (2013). An empirical test of three mediation models for the relationship between personal innovativeness and user acceptance of technology. *Information & Management,* 50(4), 154-161. 10.1016/j.im.2013.02.006

Joo, J., & Sang, Y. (2013). Exploring Koreans' smartphone usage: An integrated model of the technology acceptance model and uses and gratifications theory. *Computers in Human Behavior,* 29(6), 2512-2518. 10.1016/j.chb.2013.06.002

Jöreskog, K. G., & Sörbom, D. (1993). *LISREL 8 User's Reference Guide; PRELIS 2 User's Reference Guide*. Chicago: Scientific Software Intenational.

Kim, B., & Oh, J. (2011). The difference of determinants of acceptance and continuance of mobile data services: A value perspective. *Expert Systems with Applications,* 38(3), 1798-1804. 10.1016/j.eswa.2010.07.107

Kline, R. B. (2011). *Principles and Practice of Structural Equation Modeling*: Guilford press.

Knorr, E. (2008). What Cloud Computing Really Means. [Retrieved from].

Kusnetzky, D. (2011). *Virtualization: A Manager's Guide*: O'Reilly Media, Inc.
Lee, D. Y., & Lehto, M. R. (2013). User acceptance of YouTube for procedural learning: An extension of the Technology Acceptance Model. *Computers & Education,* 61, 193-208. 10.1016/j.compedu.2012.10.001
Lumsden, J.R.I., & Anabel, G. (2013). Understanding The Determinants of Cloud Computing Adoption Within The UK.
Meydan, C.H., & Şeşen, H. (2011). *Yapısal Eşitlik Modellemesi AMOS uygulamaları*. Ankara: Detay Yayıncılık.
Moore, G.C., & Benbasat, I. (1991). Development of an instrument to measure the perceptions of adopting an information technology innovation. *Information System Research,* 2(3), 192-222. 10.1287/isre.2.3.192
Moores, T.T. (2012). Towards an integrated model of IT acceptance in healthcare. *Decision Support Systems,* 53(3), 507-516. 10.1016/j.dss.2012.04.014
Nwankpa, J., & Roumani, Y. (2014). Understanding the link between organizational learning capability and ERP system usage: An empirical examination. *Computers in Human Behavior,* 33, 224-234. 10.1016/j.chb.2014.01.030
Pai, F.-Y., & Huang, K.-I. (2011). Applying the technology acceptance model to the introduction of healthcare information systems. *Technological Forecasting and Social Change,* 78(4), 650-660. doi. 10.1016/j.techfore.2010.11.007
Ram, J., Corkindale, D., & Wu, M.-L. (2013). Implementation critical success factors (CSFs) for ERP: Do they contribute to implementation success and post-implementation performance? *International Journal of Production Economics,* 144(1), 157-174. 10.1016/j.ijpe.2013.01.032
Ram, J., Wu, M.-L., & Tagg, R. (2014). Competitive advantage from ERP projects: Examining the role of key implementation drivers. *International Journal of Project Management,* 32(4), 663-675. 10.1016/j.ijproman.2013.08.004
Rayport, J. F., & Heyward, A. (2009). *Envisioning the Cloud: The Next Computing Paradigm*. [Retrieved from].
Rodríguez, T. E., & Trujillo, E. C. (2014). Online purchasing tickets for low cost carriers: An application of the unified theory of acceptance and use of technology (UTAUT) model. *Tourism Management,* 43, 70-88. 10.1016/j.tourman.2014.01.017
Ryan, M. D. (2013). Cloud computing security: The scientific challenge, and a survey of solutions. *Journal of Systems and Software,* 86(9), 2263-2268. doi. 10.1016/j.jss.2012.12.025
Shahzad, F. (2014). State-of-the-art Survey on Cloud Computing Security Challenges, Approaches and Solutions. *Procedia Computer Science,* 37, 357-362. doi. 10.1016/j.procs.2014.08.053
Shin, D. (2013). User centric cloud service model in public sectors: Policy implications of cloud services. *Government Information Quarterly,* 30(2), 194-203. 10.1016/j.giq.2012.06.012
Shin, D. (2015). Beyond user experience of cloud service: Implication for value sensitive approach. *Telematics and Informatics,* 32(1), 33-44. 10.1016/j.tele.2014.02.002
Stantchev, V., Colomo-Palacios, R., Soto-Acosta, P., & Misra, S. (2014). Learning management systems and cloud file hosting services: A study on students' acceptance. *Computers in Human Behavior,* 31, 612-619. 10.1016/j.chb.2013.07.002
Sternad, S., & Bobek, S. (2013). Impacts of TAM-based External Factors on ERP Acceptance. *Procedia Technology,* 9, 33-42. 10.1016/j.protcy.2013.12.004
Şimşek, Ö.F. (2007). *Yapısal Eşitlik Modellemesine Giriş: Temel İlkeler ve LISREL Uygulamaları*. Ankara: Ekinoks Yayıncılık.
Tabachnick, B.G., & Fidell, L.S. (2007). *Using multivariate statistics*: Allyn & Bacon/Pearson Education.
Tamor, M.A., Gearhart, C., & Soto, C. (2013). A statistical approach to estimating acceptance of electric vehicles and electrification of personal transportation. *Transportation Research Part C: Emerging Technologies,* 26, 125-134. 10.1016/j.trc.2012.07.007
Taylor, S., & Todd, P.A. (1995). Understanding information technology usage: A test of competing models. *Decision Sciences,* 6(2), 144-176. 10.1287/isre.6.2.144
Tengilimoğlu, D., Işık, O., & Akbolat, M. (2012). *Sağlık işletmeleri yönetimi*: Nobel Akademik Yayıncılık.

Venkatesh, V., & Bala, H. (2008). Technology acceptance model 3 and a research agenda on interventions. *Decision sciences*, 39(2), 273-315. 10.1111/j.1540-5915.2008.00192.x

Venkatesh, V., & Bala, H. (2008). Technology acceptance model 3 and a research agenda on interventions. 39(2), 273-315. 10.1111/j.1540-5915.2008.00192.x

Ward, R. (2013). The application of technology acceptance and diffusion of innovation models in healthcare informatics. *Health Policy and Technology*, 2(4), 222-228. 10.1016/j.hlpt.2013.07.002

Yoo, B., Donthu, N., & Lee, S. (2000). An examination of selected marketing mix elements and brand equity. *Journal of the Academy of Marketing Science*, 28(2), 195-211. 10.1177/0092070300282002