

Structural Model of Effecting Psycho-Socio Factor on Usage ICT (Faculty Members of Private University in Iran)

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ABSTRACT

In the age of ICT, all human activities proceed towards electronic process based on the World Wide Web and the Internet. Also, as one of the valuable solutions to the ever-increasing educational needs, has received global acceptance. The main aim of this survey is to identify and determine the effective factors on acceptance and use of ICT by designing structural model between faculty members of zone 8 branches in Tehran from IAU. Given that the present survey has a descriptive-field plan and questionnaire is measurement tool that reliability and validity of this tool was confirmed. Finding of study was showed that private universities in Tehran given to the importance of studying application level of ICT in universities. Finding show that nine (9) variables affect the application of IC T. These variables clarify 84 percent of the dependent variable's variance totally and there are still unrecognized variables. Computer competence, computer self-efficacy, management support and perceived ease of use of computer were recognized as strong predictors of ICT application.

KEY WORDS: Usage ICT, Psycho- socio, structural model, private university.

INTRODUCTION

Ever-increasing growth of information and communications technology (ICT) today affects all aspects of human life; hence it has been exposed to change and transition. These changes have been considerable particularly in the social, cultural, economic, political, and educational fields as well as many other domains and have provided the ground for rapid and irreversible transitions across the world. (1). Also, today, we are living in an age that is called the age of information and this is marked by rapid changes in the second half of the twentieth century in the field of science and technology leading to the formation of a modern society called information society (2). Information and communications are modern age technology that has been resulted in reduced calculation time, accuracy in data processing, easy exchange of information and decreasing data costs (3). Iran as a developing country, faces many problems in the field of ICT such as lack of cultural foundation for ICT adoption, lack of skilled human resource, unfamiliarity with foreign languages, lack of motivation and investigation spirits, lack of inclination to work, effort and operation and in one word, decreasing capability of life skill are the outcomes of inability of the traditional higher educational system in responding to the changing social needs. Our higher education is still book-oriented and students, despite their prominent capabilities and talents, are bound to pass lessons primarily by memorizing the subjects of some old books. Further, research and investigation as well as strengthening of searching spirit are at the lowest ebb in the educational system. Also, teaching is still teacher-and book-oriented and students have little roles in the learning process. Furthermore, Researchers generally believe that ICT enhances individual and group productivity and total efficiency, stimulates creativity and provides opportunities for organizations to compete in an increasingly globalized world(4).

ICTs and educational system:

The world's educational systems have been affected severely with the advancement of scientific, technical and technological domains and hence these have provided necessary grounds for comprehensive reforms and changes in the world's educational system (5). As such, over the last three decades ICT has been proposed as one of the most important sources and a significant element in the educational system; it has been applied at various educational levels especially higher education in countries in order to achieve developmental targets. Presently, ICT, as one of the valuable solutions to the ever-increasing educational needs, has received global acceptance (6). According to Chang (7), the ever-increasing popularity of ICT means that computers are being employed more at all educational levels. In the education industry, institutions have gradually adapted to the potential impact of ICT while applying it in classes to improve the learning process (8). Meanwhile, universities are considered as the most important developmental tools of each country and their key and effective roles are gradually becoming obvious in socio-economic, cultural and scientific realms (9). In fact, higher education of each country is the main route to

development because literacy is one of the important social indexes for a stable development. In other words, literacy not only enhances general education rather its increasing level affects the manner and amount of political, economic, cultural and educational participation of its people. Naisbitt (10) also believes that an up-to-date knowledge is significant for many jobs and professions.

Universities, as one of the scientific-research centers of the country, have researchers that through modern technologies perform investigations simultaneously with the tasks of teaching and learning and as components of the higher education system; they traverse the unknown borders of knowledge and through their services accelerate the rhythm of development and advancement of the country. Production of scientific information is considered to be the outcomes of academics' performance that is represented in the form of information resources such as books, articles, reports, research plans and so forth (11). Thus, it can be concluded that the use of ICT in the field of education as well as in the research processes is an undeniable fact. Currently, universities worldwide are trying to find out how to adapt with such changes so that they overcome the challenges arising from implementation of ICT (12). With due attention to the above-mentioned issues as well as considering the fact that technology use is no longer limited to computer experts, it is essential now for all students and faculty members to have first-hand knowledge of computer technology and apply it for success in their future jobs (13). At the same time, educational authorities, simultaneously with such changes must support learners in their attempts to satisfy educational needs of the 21st century. Yang (14) believes that the impact of technology on higher education, work environment and life underscore the importance of technology's acceptance and application process; success depends on acceptance and adaptation of modern technologies extensively and with higher speed.

However, Iran has lacked fruitful and effective exploitation of information and communications technology (ICT) in the field of higher education due to different challenges and problems encountered by academics and researchers at universities and research centers especially Islamic Azad University largely because of lack of suitable financial support from the government.

Although, extensive activities have been performed in the field of IT and ICT in Iran over the past few years and plan of development on IT use (TAKFA)¹ is a sample plan of such actions which has defined the actual framework at national level by considering special role and task for each sector and simultaneously, different plans are being executed in the higher education sector and considerable resistance still remains at relatively high level against change at universities and educational institutions (9).

Since acceptance and use of the ICT by individuals is vital for the success of a system (15) studying the nature and effective factors on use of the ICT has assumed much importance (6). Consequently, perceiving a factor that reinforces the efficiency of information systems' application is still a significant issue for researchers and the people attached to this educational domain (16) because merging of ICT in university classes require important transition that must be confirmed and accepted by the most significant factors and agents, namely students and faculty members (17).

According to Roblyer and Edwards (18) the logic of using technology in education consists of the following: 1) motivation of learners 2) unique educational capabilities including linking the learners to information resources and tools of learning, helping learners for better imagination of problems and their solutions, 3) supporting modern educational approaches like participatory learning, common intelligence and problem-solving ability, 4) increased productivity of teachers, 5) required skills of the age of technology such as technology literacy, information literacy, visual literacy and helping students to be constantly in the learner position.

Moreover, Hawkrigde et al (19) have explained four types of logic that are used to support technology synthesis in schools: (a) social: learners must be prepared to perceive computers and their role in the society, (b) professional: in order to find job opportunities for those having computer proficiencies, (c) educational: taking into account the positive impacts of technology in teaching and learning, and (d) convincing: technology is leading to change, improvement and reformation.

In spite of abundant investments and considerable practical actions in Iran, less infrastructure affairs have still been performed. We are at an early stage in the field of theoretical studies, representing of models and conceptual frameworks. First, several experiences in this regard are studied here and then the related researches will be examined. However, as the Basic Policies and Orientations of IAU Research along with Programs, Expectations and Conclusions in 2010, Islamic Azad University follows the following policies for ICT development:

1. Enhancement of the university's share in production of advanced science and technology,
2. Enhancement of qualitative level of faculty members,
3. Establishment and reinforcement of scientific parks and research and entrepreneurship centers,
4. Implementation of modern knowledge and proficiencies in educational and research activities, and

¹ Development of use of IT= Toseeh Karborde Fannavari Ettelaat

5. Improvement of research performance through planning and executing of programs and planning for their accomplishment.

ICT Office Programs in IAU

ICT office in Iran's IAU compiles and follows programs in order to enhance ICT usage in universities and higher education institutes; the most important of them are:

- A) Mechanization qualitative and quantitative development program in the University.
- B) Qualitative and quantitative development program of ICT usage for mechanization.
- C) Qualitative and quantitative development program of digital library plan and establish digital library.
- D) Qualitative and quantitative development program to establish book electronic shops and other scientific productions.

In Iran, the following expectations were drawn for ICT application in IAU:

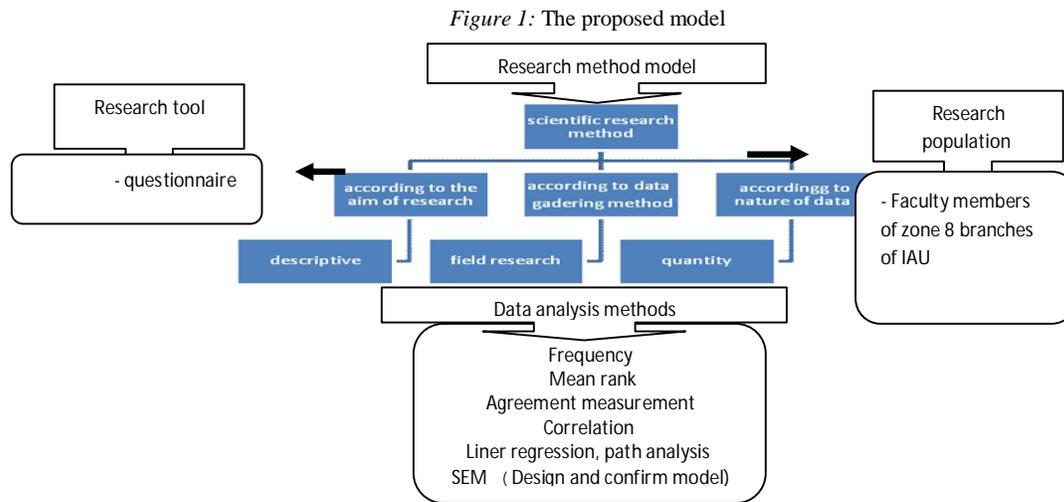
1. Recognizing of the current situation in ICT scope in university branches.
2. ICT usage to offer electronic services to students, researchers, professors, faculty members through standards optimization approach such as speed, accuracy, confidentiality, security and quality.
3. Reinforcement of communicative bases in ICT area in order to establish integrated network of IAU.
4. Research and development in ICT scope to create new organizational strategies and identify potential opportunities in order to respond to needs of students, faculty members and improve university process effectiveness and efficiency by means of ICT.
5. Supplying and applying of appropriate substructures to offer electronic services through ICT.
 6. Establish scientific, research and executive relation and participation in ICT scope with other university centers, organizations and the related corporations in order to improve ICT knowledge of the university.
 7. Up-to-date information banks and sending them to the central organization.
 8. Determining of shortages of the university equipment and branches.
 9. Adopting of educational policies for the personnel in order to train proficient and specialized forces with the aim of improving technical knowledge of the personnel.
 10. Updating of information bases of university equipment and branches.

The accomplished researches and studies in Iran show that despite the vital role information could play in the qualitative development of universities, an insignificant number of studies have been done in this field; hence more comprehensive works are needed to focus on different dimensions and viewpoints. So far, most of the surveys on ICT use in Iran have highlighted the role of ICT in employment or just the impact of the Internet on educational and research activities at student level. As such, effective factors in exploiting ICT at universities especially by faculty members as trainers of the specialized force as well as how these technologies have been used in education have not been touched upon. Faculty members are the principal elements of private and public universities who, through the acceptance and use of ICT, can help higher education develop considerably. Personal, social and psychical factors are effective in using ICT but no comprehensive research has yet been done in this regard. The current research is an attempt to bridge the gap in the existing literature by investigating which elements and factors are effective in facilitating the use of ICT by faculty members of the IAU at zone 8 branches of Tehran metropolis.

MATERIALS AND METHODS

The study was conducted in three phases; the first phase dealt with the construction of the research instrument, the second phase involved the pilot study to assess the reliability and validity of the instrument and the final phase was explanation of the analysis method to obtain accurate result from study. Reliability of the following scales was established in order to obtain meaningful results. According to these phases, it was designed by using a survey research methodology in order to examine the causal-effect of the faculty members' social - psychical perceptions on perceived usefulness and perceived ease of ICT use and their attitudes and intentions toward use of technology between faculty members of IAU. This study was specifically designed to guide and obtain empirical evidence for the conceptual framework.

The statistical population of this study was all full-time faculty members who were working in a private university in Iran in Tehran province semester 1 of the 2009-2010 academic year. The population was 3898 that three-hundred and sixteen (316) professors of Zone 8 Azad Universities were selected by simple random sampling method. (316) was sent questionnaires, two-hundred ninety one (291) of them were returned and respondents' viewpoints and opinions about effective factors on ICT usage among faculty members were studied.



RESULTS

Individual characteristic:

In order to respond to the first question related to personal and professional characteristics (or demographic characteristics) of the studied population, they have been studied in the form of variables such as participant’s age, gender, educational level, professional rank, field of study, level of language proficiency, and working experience with ICTs. The results could be observed in the following table.

Table 1. *Personal characteristics of respondent*

| Variables | Scale | the highest Measure |
|------------------------------|---------------------|---------------------|
| Age | 36 to 40 years | 53.6% |
| Gender | Female | 51.8% |
| Field of Study | Basic Sciences | 22.3% |
| Education Level | PhD | 55.7% |
| Professional Rank | Associate professor | 29.9% |
| English Language Proficiency | Moderate | 57.0% |
| Working Experience with ICTs | 4 to 6 years | 26.8% |

In order to respond to the second question related to effective psycho-social factors on usage of ICT among the studied population, they have been studied in the form of variables such as participant’s computer self-efficacy, computer anxiety, computer attitude, intention to use, perceived ease of use, perceived usefulness, cultural perception, attitude toward ICT and management support. The results of their priority could be observed in the following table.

Table 2. *priority of psycho-socio factor*

| Dependent variable | Mean | SD | CV (%) | Rank |
|-----------------------------|--------|--------|--------|------|
| Computer Self-efficacy | 65.05 | 15.899 | 24.4 | 5 |
| Computer Anxiety | 51.28 | 20.234 | 39.4 | 9 |
| Computer competences | 100.69 | 28.965 | 0.9 | 1 |
| Management support | 57.04 | 15.049 | 27.1 | 6 |
| Attitude toward ICT | 92.27 | 20.131 | 21.8 | 3 |
| Perceived usefulness | 76.64 | 22.704 | 29.6 | 7 |
| Behavioral Intention to use | 34.44 | 11.063 | 32.1 | 8 |
| Perceived ease of use | 34.82 | 8.164 | 23.4 | 4 |
| Cultural perception | 80.90 | 15.938 | 19.7 | 2 |

Correlation test is used to respond to relationships between psycho-social factors of the respondents with the ICT usage by faculty members given the fact that it is intended to determine relations among all psycho-social variables with each other and actual use of ICT. The results are illustrated in Table 3.

Prediction of Actual use of ICT through all variables of proposed Model

As observed in Table 4 computer competence with $R^2 = .644$ was recognized as the strongest predictor for use of ICT among effective variables on the dependent variable. Then computer self-efficacy with $R^2 = .409$ and management support with $R^2 = .400$ were recognized as the second and third strongest predictors for usage of ICT respectively. But in terms of effect on the dependent variable of ICT usage, variables of attitude toward ICT, behavioral intention and computer competence were the most important and the most effective variables with regard to use of ICT.

Multiple regression results indicate that 84 percent of the variance in the dependent variable was explained by the linear combination of the predicting variables. This shows high predicting power of variables of the recommended model.

Table 4 Amount of R, R² and Effects of Independent Variable on Actual Use of ICT

| Dependent variable | Independent variables | R | R ² | Direct effects | Indirect effects | Total effects |
|--------------------------------|------------------------------|------|----------------|----------------|------------------|---------------|
| (AU) (R ² = .84) | Behavioral Intention | .430 | .184 | .87 | | .87 |
| | Attitude toward ICT (AT) | .401 | .161 | - | .85 | .85 |
| | Perceived usefulness (PU) | .251 | .063 | - | .17 | .17 |
| | Perceived ease of use (PE) | .540 | .292 | - | .62 | .62 |
| | Age (AGEFACTOR) | .078 | .006 | - | .06 | .06 |
| | Computer Self-efficacy (CSE) | .639 | .409 | - | .13 | .13 |
| | Computer Anxiety (CA) | .263 | .069 | - | .09 | .09 |
| | Computer Competence (CC) | .803 | .644 | - | .69 | .69 |
| | Management Support (MS) | .633 | .400 | - | .03 | .03 |
| | Cultural Perception (CP) | .234 | .055 | - | .51 | .51 |
| | Work Experience (EXPERIENCE) | .006 | .000 | - | .23 | .23 |

Structural model of effective factors' model on ICT usage

As pointed second application of the structural equation model in this research is regarded as a strong technique for analyzing of simultaneous regression equations that has been used in the form of path analysis to study the causal relation among variables of effective factors' model on ICT usage. Structural equation map is illustrated in Figure 3 that has been extended based on results obtained from confirmatory factor analysis. According to obtained results of Tables 5 and Figure 2,3 which shows testing of the model map we can conclude that this structure is fit. Now we can test hypotheses through studying of the structural model with a suitable measurement model.

Figure 2 shows standardized path coefficients and their significance level in the structural model for each of the latent variables. Standardized the path coefficients demonstrate strength of relations among independent and dependent variables. Coefficients of determination (R²) show the explained variance amounts by independent variables about the dependent variable are calculated too.

In Figure 3 all variables with "t" parameters higher than 2 have been confirmed. Based on obtained results of path coefficients, attitude (AT), behavioral intention (BI) and computer competences (CC) variables have the highest effect on the dependent variable of actual utilization (AU). Management support (MS) variables have the lowest effect.

Table 3 Correlation Matrix between Psycho-social Variables with Each Other and Actual Use of ICT

| | | CSE | CA | MS | CP | PU | PEOU | AT | BI | AU |
|------|---------------------|----------|-----------|-----------|---------|---------|---------|---------|---------|---------|
| CSE | Pearson Correlation | 1 | -.145* | .577** | .181** | .229** | .459** | .546** | .462** | .639** |
| | Sig. (2-tailed) | . | .013 | .000 | .002 | .000 | .000 | .000 | .000 | .000 |
| | N | 291 | 291 | 291 | 291 | 291 | 291 | 291 | 291 | 291 |
| CA | Pearson Correlation | -.145(*) | 1 | -.165(**) | -.461** | -.497** | -.400** | -.347** | -.266** | -.263** |
| | Sig. (2-tailed) | .013 | . | .005 | .000 | .000 | .000 | .000 | .000 | .000 |
| | N | 291 | 291 | 291 | 291 | 291 | 291 | 291 | 291 | 291 |
| MS | Pearson Correlation | .577(**) | -.165(**) | 1 | .160** | .317** | .432** | .442** | .305** | .633** |
| | Sig. (2-tailed) | .000 | .005 | . | .006 | .000 | .000 | .000 | .000 | .000 |
| | N | 291 | 291 | 291 | 291 | 291 | 291 | 291 | 291 | 291 |
| CP | Pearson Correlation | .181(**) | -.461(**) | .160(**) | 1 | .595** | .521** | .408** | .562** | .234** |
| | Sig. (2-tailed) | .002 | .000 | .006 | . | .000 | .000 | .000 | .000 | .000 |
| | N | 291 | 291 | 291 | 291 | 291 | 291 | 291 | 291 | 291 |
| PU | Pearson Correlation | .229** | -.497** | .317** | .595** | 1 | .452** | .221** | .539** | .251** |
| | Sig. (2-tailed) | .000 | .000 | .000 | .000 | . | .000 | .000 | .000 | .000 |
| | N | 291 | 291 | 291 | 291 | 291 | 291 | 291 | 291 | 291 |
| PEOU | Pearson Correlation | .459** | -.400** | .432** | .521** | .452** | 1 | .507** | .685** | .540** |
| | Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 | . | .000 | .000 | .000 |
| | N | 291 | 291 | 291 | 291 | 291 | 291 | 291 | 291 | 291 |
| AT | Pearson Correlation | .546** | -.347** | .442** | .408** | .221** | .507** | 1 | .552** | .401** |
| | Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 | .000 | . | .000 | .000 |
| | N | 291 | 291 | 291 | 291 | 291 | 291 | 291 | 291 | 291 |
| BI | Pearson Correlation | .462** | -.266** | .305** | .562** | .539** | .685** | .552** | 1 | .430** |
| | Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 | .000 | .000 | . | .000 |
| | N | 291 | 291 | 291 | 291 | 291 | 291 | 291 | 291 | 291 |
| AU | Pearson Correlation | .639** | -.263** | .633** | .234** | .251** | .540** | .401** | .430** | 1 |
| | Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | . |
| | N | 291 | 291 | 291 | 291 | 291 | 291 | 291 | 291 | 291 |

** Correlation is significant at the .01 level (2-tailed).

* Correlation is significant at the .05 level (2-tailed).

Table 5 Causal Relations among the Existent Independent and Dependent Variables in Effective Factors' Model on ICT Application

| dependent variable | independent variable | Direct effects | Indirect effects | Total effects | Standard deviation | t- value |
|--|------------------------------|----------------|------------------|---------------|--------------------|----------|
| Perceived usefulness (PU) (R ² = 0.93) | Computer Self-efficacy (CSE) | .31 | - | .31 | .04 | 7.71* |
| | Computer Anxiety (CA) | .28 | - | .28 | .01 | 7.02* |
| | Computer competence (CC) | .48 | - | .48 | .09 | 12.50* |
| | Management support (MS) | .18 | - | .18 | .05 | 4.06* |
| | Cultural perception (CP) | -.10 | - | -.10 | .10 | -2.87* |
| Perceived ease of use (PE) (R ² = 0.29) | Computer Self-efficacy (CSE) | .08 | - | .08 | .01 | 3.21* |
| | Computer Anxiety (CA) | .09 | - | .09 | .03 | 3.66* |
| | Computer competence (CC) | .30 | - | .30 | .10 | 7.96* |
| | Management support (MS) | -.07 | - | -.07 | .01 | -2.36* |
| | Cultural perception (CP) | .96 | - | .96 | .10 | 17.04* |
| Attitude toward ICT (AT) (R ² = 0.43) | Perceived usefulness (PU) | .54 | - | .54 | .06 | 11.07* |
| | Perceived ease of use (PE) | .46 | - | .46 | .11 | 10.00* |
| | Computer Self-efficacy (CSE) | - | .08 | .08 | - | - |
| | Computer Anxiety (CA) | - | .09 | .09 | - | - |
| | Computer competence (CC) | - | .30 | .30 | - | - |
| | Management support (MS) | - | -.07 | -.07 | - | - |
| | Cultural perception (CP) | - | .95 | .95 | - | - |
| Behavioral Intention (BI) (R ² = 0.98) | Attitude toward ICT (AT) | .99 | - | .99 | .11 | 21.81* |
| | Perceived usefulness (PU) | - | .53 | .53 | - | - |
| | Perceived ease of use (PE) | - | .45 | .45 | - | - |
| | Computer Self-efficacy (CSE) | - | .08 | .08 | - | - |
| | Computer Anxiety (CA) | - | .09 | .09 | - | - |
| | Computer competence (CC) | - | .30 | .30 | - | - |
| | Management support (MS) | - | -.07 | -.07 | - | - |
| | Cultural perception (CP) | - | .95 | .95 | - | - |
| Actual Use (AU) (R ² = 0.84) | Behavioral Intention | 1.02 | - | .13 | .13 | 24.07* |
| | Attitude toward ICT (AT) | - | .99 | .99 | - | - |
| | Perceived usefulness (PU) | - | .55 | .55 | - | - |
| | Perceived ease of use (PE) | - | .47 | .47 | - | - |
| | Computer Self-efficacy (CSE) | - | .08 | .08 | - | - |
| | Computer Anxiety (CA) | - | .09 | .09 | - | - |
| | Computer competence (CC) | - | .30 | .30 | - | - |
| | Management support (MS) | - | -.07 | -.07 | - | - |
| | Cultural perception (CP) | - | .96 | .96 | - | - |

* Significant at the .01 level

ns: not significant

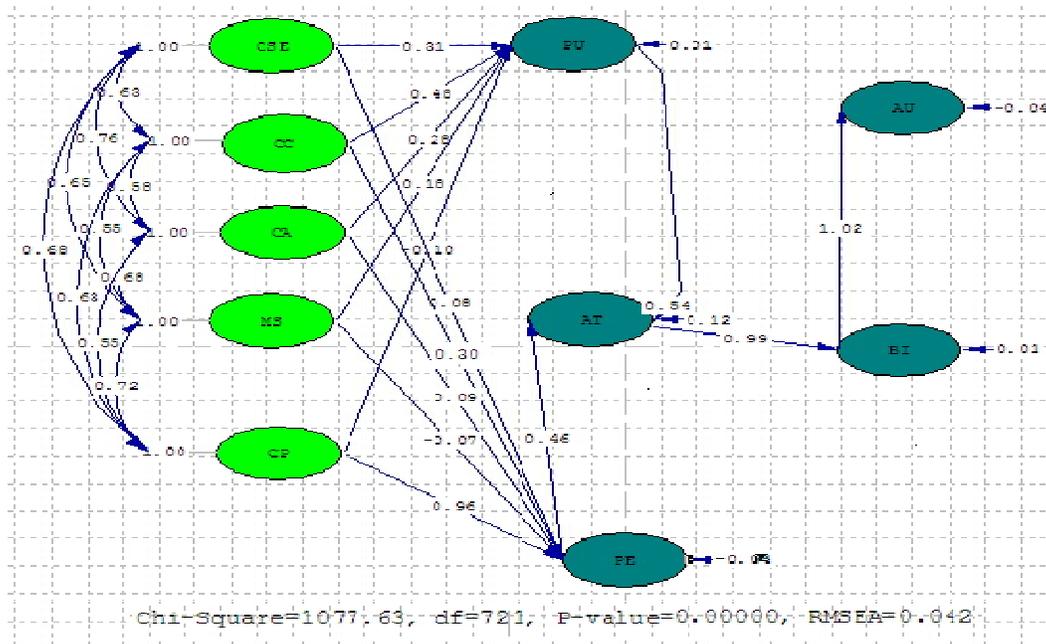


Figure 2 Structural equations model with path (Standardized) coefficients.

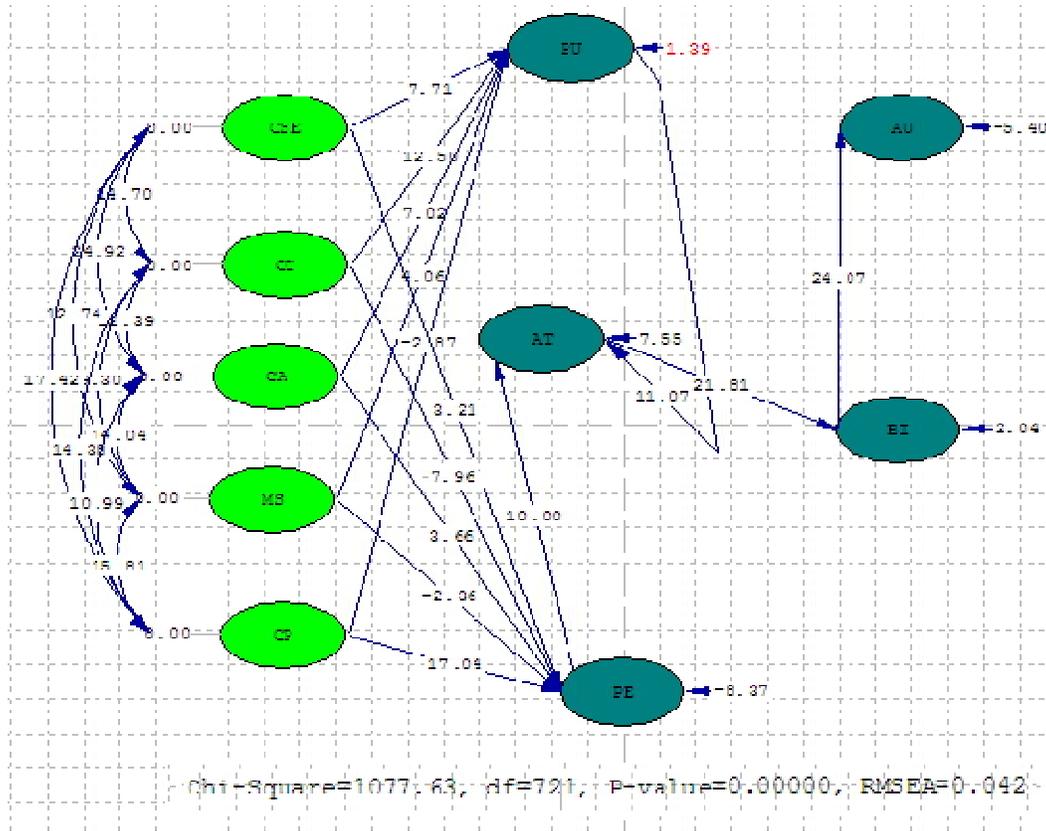


Figure 3 Structural equations model with amounts of *t-value*.

DISCUSSION AND CONCLUSION

Today, ICT is developed with considerable speed in the world and millions of people are interacting with each other by advancement of information technology. Also, productivity of many activities has been increased much following advances in information technology, computer growth and development of the Internet. Many countries such as Iran are trying to develop human resources by educating people in using modern technologies. One of the significant places in this regard is universities, because international relations across the universities are very high and thus equipping of universities with information software and hardware and capability of using such technologies by faculty members and students are very important.

Using ICT seems necessary in universities because of some reasons. First, ICT is very essential for better teaching by professors and more learning by students like representation through PowerPoint. Second, faculty members and students have an urgent need for ICT system especially Internet in order to exchange their scientific ideas and receive or send their scientific articles. Third, saving and keeping records of faculty members, students and easy access to such records enhance the necessity of ICT usage.

This survey has been performed in IAU branches in Tehran given to the importance of studying use of ICT in universities. The final result of this survey was access to an ICT usage model in IAU. It will be possible to use this model in other universities, institutions and countries by more studies and testing of the above model in other situations.

According to the obtained model, affects the use of ICT in IAU in Iran. These variables clarify 84 percent of the dependent variable's variance totally and there are still unrecognized variables. Computer competence, computer self-efficacy, management support and perceived ease of use of computer were recognized as strong predictors of ICT usage among the above variables. Hence more attention must be focused on these four components in order to enhance the use of ICT in universities. Necessary education with regard to using modern information and communication technologies must be represented for faculty members and students in order to increase computer competence and computer self-efficacy. Management support is necessary to hold such terms and increase accessibility to hardware and software in the university; therefore managers play a significant role in universities in order to encourage ICT usage.

Finally, according to the TAM and findings, could be seemed that finding of study adapted to upgrade theory, knowledge and application domains of it.

Theory aspect:

If the ICT usage was considered as an innovation in the educational field, the research result showed that behavioral intention about ICT had the most impact on it this means that had behavioral intention about ICT could be added in the theoretical aspect.

Knowledge aspect:

In the other hand, according to the study, results could be improved knowing about what factors assessment to ICT usage indirectly such as computer competence, computer self-efficacy and management support. This study could be gave options of this factors that increase knowledge about it in the educational field.

Application aspect:

Furthermore, usage of these option and elimination or decrease the obstacle front of actual use would be reinforced the application aspect.

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