Recognition of Factors Affecting Students Trust in Virtual Universities Using Delphi Method

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ABSTRACT
At the present time in Islamic republic of Iran the virtual universities are operating beside the Non-virtual universities. The problem that virtual universities now confront is low level of students trust to these universities. The current research tries to recognition factors affecting students trust in Virtual Universities using Delphi Method. This qualitative study examined the opinions of a diverse group of participating experts in the area of information technology and virtual universities. Data were collected through a Delphi methodology during which four rounds of Delphi were administered to determine the Factors affecting students Trust in Virtual Universities.

Keywords: Virtual Universities, Information and Communication Technologies, Trust, Trust Key Factors, Delphi Method, Delphi Rounds.

INTRODUCTION
The emergence of information and communication technologies (ICTs) and their use in training of people has resulted in formation of virtual universities. Most countries with more or less similar goals have acted to establish such universities. Islamic republic of Iran too, as a developing country in Asia has taken such steps. The result of this effort up to time of writing this essay has been designing of ten virtual universities in order to satisfy the educational needs of the great number of people requesting to benefit from higher education in Iran (Sarlak and abedi jafari, 2006). At the present time virtual universities are operating beside the Non-virtual universities. The problem that virtual universities confront is low level of student trust to these universities. The current research tries to recognition factors affecting students trust in Virtual Universities using Delphi Method.

DELPHI METHOD
Delphi method (Delphi Technique) is a group decision-making process that involves circulating questionnaires on a specific problem among group members, sharing the questionnaires results with them, and then continuing to recirculate and refine individual responds until a consensus regarding the problem is reached. The formal steps followed in the Delphi method are:

Step 1 - A problem is identified.
Step 2 – Group members are asked to offer solutions to the problem by providing anonymous responses to a carefully designed questionnaire.
Step 3 – Responses of all group members compiled and sent out to all group members.
Step 4 – Individual group members are asked to generate a new individual solution to the problem after they have studied the individual responses of all other group members compiled in step 3.
Step 5 – Steps 3 and 4 are repeated until a consensus problem solution is reached.

The advantages of Delphi method is that ideas can be gathered from group members who are too geographically separated or busy to meet face to face. Its disadvantages are that members are unable to ask questions of one another (Daft, 2006).

The following key characteristics of the Delphi method help the participants to focus on the issues at hand and separate Delphi from other methodologies (www.wikipedia.com):
1. Structuring of information flow
2. Regular feedback
3. Anonymity of the participants

Structuring of Information Flow
The initial contributions from the experts are collected in the form of answers to questionnaires and their comments to these answers. The panel director controls the interactions among the participants by processing the information and filtering out irrelevant content. This avoids the negative effects of face-to-face panel discussions and solves the usual problems of group dynamics.

Regular Feedback
Participants comment on their own forecasts, the responses of others and on the progress of the panel as a whole. At any moment they can revise their earlier statements. While in regular group meetings participants tend to stick to previously stated opinions and often conform too much to group leader, the Delphi method prevents it.

Table 1. Interpretation of Kendall’s coefficient amounts

| Kendall’s Coefficient Amount | interpretation | Assuredness of Arrangement Factors |
|------------------------------|----------------|-----------------------------------|
| 0.1                          | Very weak consensus | Not existing                        |
| 0.3                          | Weak consensus    | Minimal                            |
| 0.5                          | Medium consensus  | Average                            |
| 0.7                          | Strong consensus  | High                               |
| 0.9                          | Very strong consensus | Very high                        |
Anonymity of the Participants
Usually all participants maintain anonymity. Their identity is not revealed even after the completion of the final report. This stops them from dominating others in the process using their authority or personality, frees them to some extent from their personal biases, minimizes the “bandwagon effect” or “halo effect” allows them to freely express their opinions, encourages open critique and admitting errors by revising earlier judgments.

CONSENSUS CRITERION IN DELPHI METHOD
In this research, Kendall’s Coefficient of Concordance was applied to indicate the level of consensus amongst the panel members. Table 1 explains different amounts of this coefficient (Schmidt, 1997).

RESEARCH METHODOLOGY
The present research methodology is shown in figure 1.

Research Problem
The main problem that Iran’s virtual universities now confront is low level of student trust to these universities. The study sought to answer the question:

What are the effecting factors on students trust towards virtual universities?

Delphi Panel Members Selection
Delphi method uses a panel of carefully selected experts who answer a series of questionnaires. The notion is that well-informed individuals, calling on their insights and experience, are better equipped to predict the future than theoretical approaches or extrapolation of trends. In current Research 25 Experts in area of information technology and virtual universities were selected as Delphi panel members.

First Round Results
In round one, the questions were structured as fixed-alternative options. However, the panelists were provided the opportunity to introduce 6 new factors that not mentioned in previous studies. In other words, in first round, the ideas of panelist about importance of trust old factors as well as trust new factors that not mentioned in previous studies were collected. It must be noted that in the first round of Delphi method, 24 experts from 25 members of panel did participate. A Likert-type scale of 1 to 5 which includes “minimal effect: 1”, “little effect: 2”, “average effect: 3”, “higher effect: 4” and “far higher effect: 5” made it possible to score the final list of specific first round rankings. A total score for each response ranking emerged from the statistical analysis performed.

In table 3, the panelist ideas regarding importance of trust factors mentioned in 11 previous studies is shown. Table 4 includes aspects such as number of answers for each question, average of answers, their benchmark deviation, arrangement and importance of each answer according to the average base answer, and the

Figure 1. Research methodology

| Delphi Panel Members Selection: |
|--------------------------------|
| - Determining the required skills |
| - Recognition of the eligible candidates |
| - Referring to the candidates of membership in panel |
| - Choosing the final candidates of membership in panel |

| Research Literature Review: |
|----------------------------|
| - Recognition of the last researches in this case study |
| - Extracting the Effecting Trust factors in the last researches |

| Research problem |
|------------------|
| Delphi Panel Members Selection: |
| Research Literature Review: |
| First round of Delphi Method |
| Second round of Delphi Method |
| Third round of Delphi Method |
| Fourth round of Delphi Method |
| Achieving the ideas accepted by all members (Factors Effecting Students Trust) |

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### Table 2. The results of literature review

| Researcher                  | Context                                                        | Sample Size                     | Theoretical Framework                  | Methodology                                                                 | Analytic Techniques                                                                 | Trust key Factors                      |
|-----------------------------|-----------------------------------------------------------------|----------------------------------|----------------------------------------|------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| Jarvenpaa et al. (1999, 2000) | Exploring initial trust in an Internet store and cross-cultural investigation, using online bookstores and travel sites | 184 students (Australia), 198 students (Israel), 115 subjects of an offline panel (Finland) | Exchange theory, balance theory, theories of reasoned action and planned behavior | Experiential survey approach, participants performed four shopping activities at on-line bookstores and on-line travel sites; offline panel survey; cross-cultural validation of the study | Factor analyses (structural Equation modeling) and regression analyses | Perceived Size, Perceived reputation |
| Gefen (2000)                | Exploring trust in an e-commerce vendor, using an on-line book-store | 217 students (USA)              | —                                      | Experiential survey approach, participants performed product search at an on-line bookstore | Confirmatory analysis (structural equation modeling) with LISREL8                    | Disposition to trust                  |
| Gefen and Straub (2000)     | Exploring trust in an e-commerce vendor, using an on-line travel agency | 161 students (USA)              | Technology acceptance model, theory of reasoned action | Experiential survey (free simulation experiment), participants performed search for round trip at an on-line travel agency | Confirmatory analysis with PLS, post-hoc analysis with PLS | Social presence, Perceived ease of use, trust in e-service provider |
| De Ruyter et al. (2001)     | Exploring the antecedents of trust, relative advantage and perceived risk in the adoption of e-services | 202 participants (Netherlands) | Adoption process theory, signaling theory | Experimental study, participants were presented with offline role-playing scenarios | ANOVAs (analyses of variance) and MANOVA                                             | Organizational reputation, perceived risk, Trust in e-services |
| Lee and Turban (2001)       | Exploring the antecedents of consumer trust in Internet shopping | 405 students (China)            | —                                      | Survey                                                                        | Multiple linear regression                                                           | Trustworthiness Of internet shopping and internet merchant, contextual factors |
| Pavlou and Chellappa (2001) | Exploring the antecedents of trust in electronic commerce transactions | 276 students (three studies) (USA) | —                                      | Field study with on-line questionnaire, regular survey, experimental study using manipulated Web-sites | Least-squares multiple regression analysis                                            | Perceived privacy, perceived security, satisfaction with past outcomes |
| Bhattacherjee (2002)        | Developing a new scale for measuring trust and testing it for the antecedents of willingness to transact with an e-commerce company, using a bookstore | 147 students, 122 online banking users (USA) | —                                      | Experiential survey after a tour at an online bookstore, on-line survey          | Confirmatory factor analyses (structural equation Modeling)                           | Familiarity with firm                  |
| Kim and Prabhakar (2002)    | Exploring initial trust in the adoption of on-line banking      | 266 Internet users (196 used on-line banking) (USA) | Social network theory                 | On-line survey                                                                 | Multiple logistic regression analysis                                                | structural assurances                 |
| Koufaris and Hampton-Sosa (2002) | Exploring the antecedents of initial trust in an online company, using sevveral-vendors | 111 students (USA)              | Technology acceptance model, theory of planned behavior | Experiential survey with on-line questionnaire, participants visited an unfamiliar Web-site and performed a product search | Confirmatory factor analyses (structural equation modeling)                            | , Enjoyment, perceived usefulness     |
| Pavlou (2003)               | Exploring the effect of trust in e-commerce on several factors including consumers’ intention to transact | 102 students, 155 Internet users (USA) | Theory of planned behavior, theory of reasoned action, technology acceptance model | Three exploratory surveys (first on predefined on-line book store, second on self-selected familiar on-line vendor, third on on-line companies in general) | Partial least squares regression analysis                                             | Trust in e - retailer                 |
The second part of the questionnaire of Delphi method in first round was assigned to trust influential factors, which didn’t exist in the first list. But from the point of view of those who answered, this was an important key factor. In this part, it was requested from each those who were answering to give six successful factors along with brief explanation. In the Table 4, panelist’s new ideas regarding the Factors affecting Students Trust in Virtual universities are shown.

Second Round Results
In round two, the questions were structured as fixed-alternative options. It must be noted that in the second round of Delphi method, 23 experts from 25 members of panel did participate. All those who answered in this round did participate in the previous round. A Likert-type scale of 1 to 5 which includes “minimal effect: 1”, “little effect: 2”, “average effect: 3”, “higher effect: 4” and “far higher effect: 5” made it possible to score the final list of specific first round rankings.

In second rounds questionnaires, a new list was introduced in which participants in the first round mentioned the influential factors of students’ trust towards virtual universities in Iran. In this section, the respondent had to declare his/her opinion on the level of influence of each of them and the students’ trust towards the virtual universities in Iran, with choosing from the existing selection. These selections are in the form of LIKRET Scale and contain “ very little influence 1”, “ little influence 2”, “ average influence 3”, “ great influence 4”, “ greater influence 5”. In the Table 5 results of the second round of Delphi method contains aspects such as number of answer for each question, average response, deviation of their benchmark, importance of each factor according to the average response and percentage of member who indicated, issued and arranged each factor like a continuous group is shown.

Third Round Results
In round three, the questions were structured as fixed-alternative options. It must be noted that in the third round of Delphi method, 22 experts from 25 members of panel did participate. All those who answered in this round did participate in the previous round. A Likert-type scale of 1 to 5 which includes “minimal effect: 1”, “little effect: 2”, “average effect: 3”, “higher effect: 4” and “far higher effect: 5” made it possible to score the final list of specific first round rankings.

In the first part of the questionnaire of the third round of Delphi method, ensemble of factors were introduced which participants in the first and the second rounds did recognize those as a key and influential factor of students’ trust upon the virtual universities in Iran. Only those responses receiving a median score of 4 or higher remained for the third round (Linstone & Turoff, 1975). In table 6 the results of third round is shown.

| No. | Title                        | Number of iteration |
|-----|------------------------------|---------------------|
| 1   | Honesty                      | 1                   |
| 2   | Sense of accepting critics   | 1                   |
| 3   | Virtue of intention          | 1                   |
| 4   | Eligibility                  | 1                   |
| 5   | Stability                    | 1                   |
| 6   | Loyalty                      | 1                   |
| 7   | Administrative efficacy      | 7                   |
| 8   | openness                     | 1                   |
| 9   | Confidentiality              | 1                   |
| 10  | Accomplishing commitments    | 1                   |
| 11  | Economical nature of studies | 6                   |
| 12  | Predictability               | 1                   |
| 13  | Suitable environmental conditions for activities of virtual universities | 5                  |
| 14  | Fairness & Justice           | 1                   |
| 15  | Flexibility                  | 1                   |

Kendal’s Coefficient of Concordance is 0.711.
Fourth Round Results

In round four, the questions were structured as fixed-alternative options. It must be noted that in the fourth round of Delphi method, only 20 experts from 25 members of panel did participate. All those who answered in this round did participate in the previous round. A Likert-type scale of 1 to 5 which includes “minimal effect: 1”, “little effect: 2”, “average effect: 3”, “higher effect: 4” and “far higher effect: 5” made it possible to score the final list of specific first round rankings.

In fourth round questionnaire, a number of factors were introduced which the participants in the first and second rounds did recognize as an influential key factor on student’ trust towards virtual universities. The median scores of this factors was 4 or higher (“a lot” and “a lot more”). In this round, the respondent must again give his/her opinion by choosing one of the existing items about the influential level of each factor, which influence on students trust towards virtual universities. In table 7 the results of fourth round is shown. The brief results of Delphi fourth round are shown in Table 8.

In fourth round, Kendal’s Coefficient of Concordance is 0.734, compared to the third round coefficient (0.711) was increased up to 2.3 percent.

CONCLUSION

The results of four rounds of Delphi shows that according to the following reasons, consensus amongst the panel members was obtained and can terminate the repetition of rounds.

### Table 5. Second round results

| Description | Number of answers | Average of answers | Standard deviation of answers | Order of importance | Percentage of members who have determined the arrangement of factors like the arrangement of group |
|-------------|-------------------|--------------------|-------------------------------|--------------------|--------------------------------------------------|
| Universities Administrative efficacy | 23 | 3.43 | 0.73 | 1 | 60.8 |
| Economical nature of studies | 22 | 4.23 | 0.92 | 3 | 50 |
| Suitable environmental conditions for activities of virtual universities | 23 | 4.17 | 0.65 | 5 | 43.4 |
| Accomplishing commitment | 23 | 3.96 | 0.71 | 10 | 43.4 |
| Fairness & Justice | 23 | 3.91 | 1.20 | 11 | 65.2 |
| Flexibility | 23 | 3.87 | 0.92 | 12 | 47.8 |
| Predictability | 23 | 3.87 | 0.97 | 13 | 52.1 |
| openness | 23 | 3.74 | 0.81 | 14 | 39.1 |
| Confidentiality | 22 | 3.73 | 0.88 | 15 | 31.8 |
| Honesty | 22 | 3.64 | 0.95 | 16 | 40.9 |
| Sense of accepting critics | 23 | 3.52 | 0.95 | 17 | 47.8 |
| Virtue of intention | 21 | 3.48 | 1.03 | 18 | 57.1 |
| Eligibility | 22 | 3.32 | 0.78 | 19 | 63.6 |
| Stability | 23 | 2.96 | 0.77 | 20 | 78.2 |
| Loyalty | 21 | 2.90 | 1.04 | 21 | 100 |

### Table 6. Third round results

| Description | Number of answers | Average of answers | Standard deviation of answers | Order of importance | Percentage of members who have determined the arrangement of factors like the arrangement of group |
|-------------|-------------------|--------------------|-------------------------------|--------------------|--------------------------------------------------|
| Academic perceived Reputation | 22 | 4.86 | 0.35 | 1 | 86.3 |
| Administrative efficacy | 22 | 4.69 | 0.48 | 2 | 68.1 |
| University Perceived Size | 21 | 4.50 | 0.91 | 3 | 69.4 |
| Suitable environmental conditions for activities of virtual universities | 22 | 4.23 | 0.69 | 4 | 52.3 |
| Economical nature of studies | 22 | 4.18 | 0.66 | 5 | 63.6 |
### Table 7. Fourth round results

| Description                                           | Number of answers | Average of answers | Standard deviation of answers | Order of importance | Percentage of members who have determined the arrangement of factors like the arrangement of group |
|-------------------------------------------------------|-------------------|--------------------|-------------------------------|---------------------|-------------------------------------------------------------------------------------------------|
| Academic perceived Reputation                         | 20                | 4.88               | 0.32                          | 1                   | 85.00                                                                                           |
| Administrative efficacy                                | 20                | 4.65               | 0.50                          | 2                   | 65.00                                                                                           |
| University perceived Size                             | 19                | 4.62               | 0.84                          | 3                   | 70.00                                                                                           |
| Economical nature of studies                          | 20                | 4.26               | 0.73                          | 4                   | 63.10                                                                                           |
| Suitable environmental conditions for activities of virtual universities | 20                | 4.20               | 0.60                          | 5                   | 70.00                                                                                           |

### Table 8. The brief results of Delphi fourth round

| Description                                           | Arrangement of factors importance based on the fourth round answers |
|-------------------------------------------------------|---------------------------------------------------------------------|
| Academic perceived Reputation                         | 1                                                                   |
| Administrative efficacy                                | 2                                                                   |
| University perceived Size                             | 3                                                                   |
| Economical nature of studies                          | 4                                                                   |
| Suitable environmental conditions for activities of virtual universities | 5                                                                   |

### Table 9. The standard deviation of panelist answers

| Description                                           | First and second rounds k1=24, k2=23 | Third round k3=22 | Forth round k4=20 |
|-------------------------------------------------------|--------------------------------------|-------------------|-------------------|
|                                                       | Average | Standard Deviation | Average | Standard Deviation | Average | Standard Deviation |
| Academic perceived Reputation                         | 4.88    | 0.33               | 4.86    | 0.35               | 4.88    | 0.32               |
| Administrative efficacy                                | 4.58    | 0.70               | 4.50    | 0.91               | 4.52    | 0.84               |
| University perceived Size                             | 4.43    | 0.73               | 4.69    | 0.48               | 4.65    | 0.50               |
| Economical nature of studies                          | 4.23    | 0.92               | 4.18    | 0.66               | 4.26    | 0.73               |
| Suitable environmental conditions for activities of virtual universities | 4.17    | 0.65               | 4.23    | 0.69               | 4.20    | 0.60               |
| Average of Standard Deviations                        | 0.666   | 0.618              | 0.598   |                    |
1. According to Table 7, more than 50\% of members have determined the arrangement of factors like the arrangement of group.

2. According to the Table 9, the standard deviation of panelist answers regarding the importance of trust factors has decreased from 0.666 in the first and second round to 0.596 in the fourth round.

3. The Kendall’s Coefficient of Concordance for the panelist answers regarding the arrangement and importance of student trust factors in the fourth round is 0.734. With attention to the number of panelist, which is more than 10 people, this level of Kendall’s Coefficient is significantly meaningful (Schmitt 1997). The Kendall’s Coefficient of Concordance for the arrangement of success factors in the fourth round (0.734) in comparison to the third round (0.711) is just increased up to 0.023. This coefficient or the level of unanimity amongst the panel members did not grow much between two continuous rounds (Schmitt 1997).

**STUDY IMPLICATIONS**

The study findings indicate that factors effecting students’ trust in virtual universities are Academic perceived Reputation, Administrative efficacy of virtual university, virtual University perceived Size, Economical nature of Study in virtual university and Suitable environmental conditions for activities of virtual universities.

The implication for virtual and on-line universities is that the trust building to these universities requires recognition factors effecting student trust.

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