

## 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 which applying to these universities. The current research tries to recognize 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.

**Key words:** Virtual Universities, trust, Delphi method

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### 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<sup>[1]</sup>. 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 recognize 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 advantage 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<sup>[2]</sup>. 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):

**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

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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

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.

**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<sup>[3]</sup>.

### RESEARCH METHODOLOGY

The present research methodology is shown in Fig. 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 affecting 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.

**Literature review:** The following section provides an overview of the results of 11 empirical studies on trust

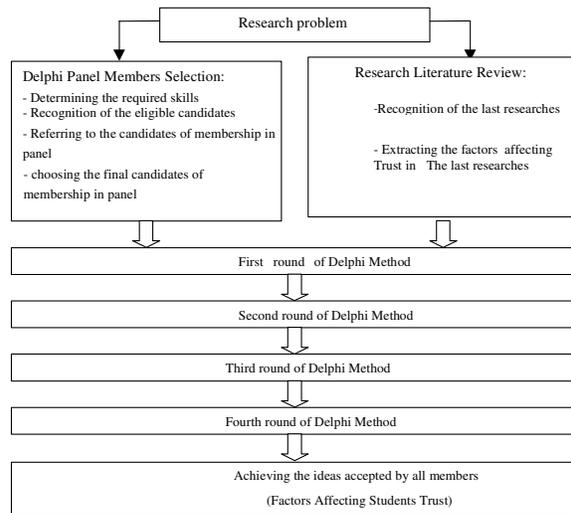


Fig. 1: Research methodology

in the electronic and virtual entities ranging from the year 1999 to the year 2003<sup>[4]</sup>. In Table 2, a brief result of eleven stated studies is shown.

According to the studies mentioned above and after classifying same cases, factors such as Perceived Size, Perceived reputation, Disposition to trust, Social presence, Perceived ease of use, trust in e-service provider, Organizational reputation, perceived risk, Trust in e- services, Trustworthiness Of internet shopping and internet merchant, contextual factors, Perceived privacy, perceived security, satisfaction with past outcomes, Familiarity with firm, structural assurances, Enjoyment, perceived usefulness, Trust in e- retailer, are the factors effecting people trust to electronic and virtual institutions.

### DELPHI METHOD IMPLEMENTATION

After panel member's selection, four rounds of Delphi method were performed.

**The 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 pervious 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

Table 2: The results of literature review

Researcher	Context	Sample size	Theoretical framework	Methodology	Analytic techniques	Trust key factors
Jarvenpaa <i>et al.</i> <sup>[15,6]</sup>	Exploring initial trust in an Internet store and cross-cultural investigation, using online book stores 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	Experimental survey approach	Factor Analysis (structural Equation modeling) and regression analyses	Size perceived reputation
Gefen <sup>[7]</sup>	Exploring trust in an ecommerce 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 <sup>[8]</sup>	Exploring trust in an ecommerce 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 <i>et al.</i> <sup>[9]</sup>	Exploring the antecedents of trust, relative perceived risk in the adoption of e-services	202 participants (Netherlands)	Adoption process theory, signaling theory	Experimental study, participants were advantage and presented with scenarios	ANOVAs (analyses of variance) and MANOVA offline role-playing	Organizational reputation, perceived risk, Trust in e-services
Lee and Turban <sup>[10]</sup>	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 <sup>[11]</sup>	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 outcome
Bhattacharjee <sup>[12]</sup>	Developing a new scale for measuring trust and testing it for the antecedents of willingness to transact with an ecommerce 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 <sup>[13]</sup>	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 <sup>[14]</sup>	Exploring the antecedents of initial trust in an online company, using severable-vendors	111 students (USA)	Technology acceptance model, theory of planned behavior	Experiential survey with on-line Questionnaire	Confirmatory factor analyses (structural equation modeling)	,Enjoyment, perceived usefulness
Pavlou <sup>[15]</sup>	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

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 pervious 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 percentage of members which arranged each factor like arrangement of group have been indicated and shown.

Table 3: First round results: panelist ideas regarding importance of trust factors

Description	No. of answers	Average of answers	S.D of answers	Order of importance	Percentage of members who have determined the arrangement of factors like the arrangement of group
Perceived Reputation	24	4.88	0.33	1	87.5
Perceived Size	24	4.58	0.7	2	66.7
Previous familiarity with firm	23	3.91	0.83	3	43.4
Reliability of e- services	24	3.88	1.01	4	50
Structural assurance	23	3.83	0.87	5	39.1
Social and cyberspace presence	23	3.78	0.98	6	56.5
Satisfaction with past outcomes	23	3.78	1.1	7	47.8
Perceived risk	22	3.77	0.95	8	36.3
Easy to use	23	3.74	1.07	9	52.1
Perceived quality	24	3.21	1.12	10	70.8
Perceived security	21	2.52	1.05	11	76.1
Perceived privacy	21	2.43	0.9	12	71.4

Table4: Panelist’s new ideas regarding the factors affecting students trust to virtual universities

Title	No. of iteration
Honesty	1
Sense of accepting critics	1
Virtue of intention	1
Eligibility	1
Stability	1
Loyalty	1
Administrative efficacy	7
openness	1
Confidentiality	1
Accomplishing commitments	1
Economical nature of studies	6
Predictability	1
Suitable environmental conditions for activities of virtual universities	5
Fairness and Justice	1
Flexibility	1

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 Table4, panelist's new ideas regarding the factors affecting students trust in Virtual universities are shown.

**The 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 the second round questionnaire, 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 likert 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.

**The 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 and Turoff, 1975). In Table 6 the results of third round is shown.

In this round, Kendal's Coefficient of Concordance is 0.711.

**The 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

Table 5: second round results

Description	No. of answers	Average of answers	SD 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 and 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

Table6: third round results

Description	No. of answers	Average of answers	SD 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	No. of answers	Average of answers	SD 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

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.

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

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%.

### The fourth round as final round

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

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	S.D	Average	S.D	Average	S.D.
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

- According to Table7, More than 50 Percentage of members have determined the arrangement of factors like the arrangement of group
- 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 0.598 in the fourth round
- The Kendal’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 Kendal’s Coefficient is significantly meaningful. The Kendal’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<sup>[3]</sup>

**Designing Research conceptual model:** Now, we can design the research conceptual model based-on Delphi results and literature review. In fig. 2 the research conceptual model is shown.

**DISCUSSION**

The focus of this model is the antecedents of students trust in a virtual university. In present conceptual model 5 factors as antecedents of students trust in virtual university were emphasized.

**Virtual University perceived Size:** The panelist suggests that a virtual university’s perceived size (i.e., number of students a virtual university) assists applicants in forming their impressions regarding the virtual university’s trustworthiness. Thus, in this study, we are interested in the applicant’s perception of the virtual university’s size, and how this perception affects their trust in the virtual university. In traditional universities, a applicant (i.e., trustor) uses size as a

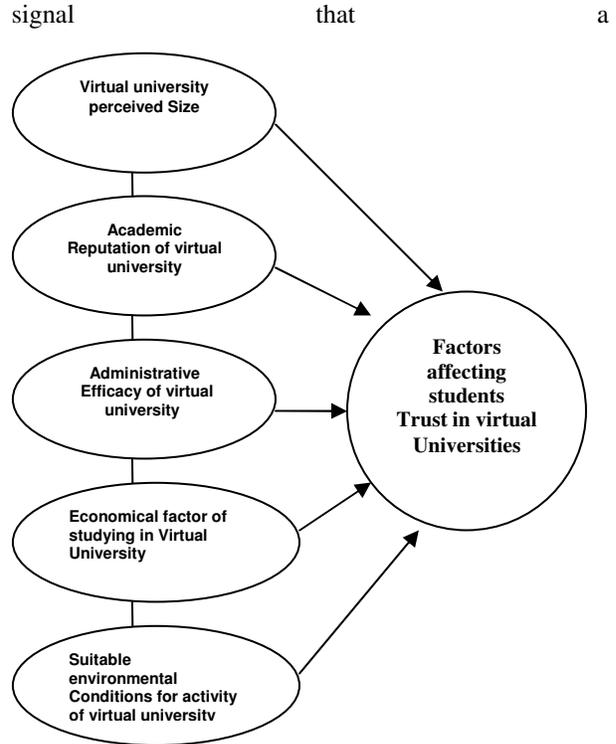


Fig. 2: Research conceptual model

university (i.e., trustee) can be trusted . The perception of large organizational size implies that other applicants trust the organization and interaction successfully with it. This experience of others is taken as a reason to trust that an organization will deliver on its promises.

**Academic Reputation of Virtual university:**

Reputation, like size, is conceptualized as the applicant’s perception of a virtual university’s reputation, where reputation is defined as the extent to which trustor believe a trustee organization is honest and concerned about its students. Universities with a good reputation are perceived to be reluctant to jeopardize their reputational assets by acting opportunistically..

**Administrative Efficacy of Virtual university:**

Administrative Efficacy is the ability of a virtual university to offer a better student services such as simplification of admission process, high quality multi media education, easy access of students to virtual library, E- enrollment of students, establishment of different graduate and undergraduate academic disciplines, suitable relations with industry, collaboration with national and international universities, attainment to the better university's rank. the administrative efficacy can increase students trust in virtual universities.

**Economical factor of studying in Virtual Universities:**

The relation between price of educational services in virtual universities and students trust in these universities is a complex relationship. Very cheap and very expensive educational services of virtual universities can impede student's education in these universities.

**Suitable environmental Conditions for activity of virtual universities:**

The role of suitable environmental conditions (such as: mass media attitudes toward virtual universities, families attitudes to virtual universities, and sufficient IT infrastructures in country) for activity of Virtual Universities in creating trust in applying students is undeniable.

**STUDY IMPLICATIONS**

The study findings indicate that factors affecting 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 affecting student trust.

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