The Relationship between the National Culture and the Implementation of the e-Voting System

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***Abstract*—Electronic voting as a subset of e-government, not only for election's cost but also for its vastness, has been concerned by governments. Although, governments have tried to implement e-voting services through their countries, but such developing countries; like Iran, have to mention not only copying technological solutions and paying huge amount of money for buying equipment and infrastructure, but also social and cultural challenges that their country will face with them. In this paper, the social and cultural challenges of implementing e-voting services in Iran have been survived by dimensions of GLOBE national culture. The social and cultural challenges are: lack of transparency, Trust and finally weakness of Change management in which these challenges are illustrated that implementing e-voting services in Iran would face with important difficulties.**

***Index Terms*—E-Voting, GLOBE project, national culture.**

I. Introduction

During the recent decade, it has been seen that many countries such as England, USA and France have sought to establish the e-voting system via founding long-term plans. In so doing, not only the developed countries are included, but also a wide range of developing countries have gained considerable results in the e-voting system, namely, Estonia and Brazil.

On the other hand, since early 2000 and upon proposing the plan of Iran development and use of information and communication Technology, it was intended to establish the e-voting system by Iran government, but no practical action has been taken in the field of e-voting yet after 10 years.

In order to implement e-voting systems, different components involve which are cultural, political, social, technical, and organizational components [10]. In case of any failure to address these components, there will be some gaps in establishing e-voting systems. Since the above-mentioned components are extensive, and we can't mention all of them herewith, we will study the challenges in implementing the e-voting system in Iran with regard to different aspects of Iranian national culture and investigating their relationship with implementing e-voting systems.

First, we will study Iranian national culture, with regard to the statistics from the Globe project and upon introducing national culture and addressing dimensions, it will be explained the e-voting system in brief.

II. National Culture

Some researchers believe there is no definite explanation and interpretation for culture, since researchers make comments on cultures with different insights (sociological and psychological). But according to Hofstede's national culture, it can be defined as follow: *every person has mental, behavioral and emotional pattern which he has learned throughout his life. All the mental, behavioral and emotional patterns of a person are together called the cognitive plan. The most general cognitive plan of a society, district, region or a country is called "national culture"* [3].

Manuscript received August 20, 2012; revised October 31, 2012.

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III. GLOBE Project

GLOBE project is a large-scale project which initiated all over the world with 160 researchers participating. The most important objective in conducting this project is to increase the knowledge of the cross cultural interactions and relations. This project was conducted among 1700 managers from 951 organizations and thereby the national culture factors of 62 countries have been estimated [21].

GLOBE project has studied cultural aspects in two forms, "*As is"* and "*Should be*" which indicates respectively behavioral factors and value factors. Values indicate the desirable and ideal cognitive status of the society and behavioral factors illustrate the real status of the society

IV. Iranian National Culture Based on GLOBE Achievements

Globe project has been conducted among 350 middle managers who came from 3 fields (communication and telecommunication, food industry and bank) and the results have been presented in Table I. [2]

According to the results from GLOBE project, which are represented in Table I, Iran has the highest rate of IC among the other countries participated in this project, i.e. Iranians have high dependence on group and communities. On the other hand SC rate in Iran very low compared to other countries attending GLOBE, indicating the individual spirit of Iranians in performing tasks and, from another perspective, Iranian low interest in collective tasks [4], [10].

Also, *PD* rate in Iran indicate high distance between the inferiors and authorities and regarding the resulted rate in *should be* section, it's figured out that, like all participating countries, Iranians are willing to fill this gap.

The derived *UA* has a low rate like most of the Middle East and African countries indicating high risk the instability of the society. On the other hand, taking into consideration the *should be* factor, one can get to the fact that people of this society are after reducing the *UA* rate in the future.

As, *Ho* and *Fo* dimensions also have a relatively average rate among Iranians.

DOI: 10.7763/IJIMT.2012.V3.344

TABLE II: IRANIAN NATIONAL CULTURE. GLOBE PROJECT

Dimensions	As is	Should be
Power distance (PD)	5.43	2.8
Gender egalitarianism (GE)	2.99	3.75
Social collectivism (SC)	3.88	5.54
In group collectivism (IC)	6.03	5.86
Human orientation (HO)	4.23	5.61
Uncertainty avoidance (UA)	3.67	5.36
Performance orientation (PO)	4.58	6.08
Future orientation (FO)	3.7	5.84
Assertiveness(AS)	4.04	4.99

V. E-VOTING

In the recent decade, some services of information technology and communication (e-democracy, digital democracy) have emerged in politics and these changes have caused a new attitude in e-voting system [12]. E-voting system is one of the subsets of e-government which has been used since 1960, in different voting and elections. The question posed is why we have turned to e-voting systems and what the advantages of this system are. From among the advantages of this system, the following can be mentioned. [12], [29], [13])

1) increasing the precision of vote counting which is done completely automatically
2) Increasing the speed of vote counting and real-time results or in some cases the results are announced with little delay (in accordance with the architecture of the system).
3) being able to vote for the respective candidate from everywhere in the precinct
4) Reducing the administrative costs of the election in long run (operating and early implementation of the e-voting system is costly. But in the long run the cost will highly be reduced).
5) Increasing participation on the part of the voters

E-Voting is a process through which people can vote for their respective candidate from places in which there is access to communication system as internet [12].Now, not any system with such a definition is taken into account as an e-voting system and the following conditions and constraints must be included, in order for a system to be labeled as a safe e-voting system [12].

1) Only qualified people are entitled to vote and all qualified people can only vote once in the system
2) the vote of every person should be preserved at any stage during voting and after voting
3) Identity of voters should be keep anonymous during and after the election.
4) Anyone can verify election's authenticity and counting.

It is to be worthy of mentioning that in the current research by e-voting we don't mean organizational election and survey. The objective is to mention the e-voting at a national level. It is clear that the importance and sensitivity of such an election are so high that it can influence the destiny of nation. On the other hand, one of the most important specifications that e-voting systems have is, many people from different social status should participate at a certain time and following that we must see high efficiency in this system. Two of the four limitations (number three and four) of the e-voting system seem contradictory including:

- Identity of voters should be keep anonymous during and after the election
- Anyone can verify election's authenticity and counting

Regarding the third limitation, the e-voting system needs to have high security and keep the personal information of the voters as confidential. In contrary, the fourth limitation causes an increase in the transparency of the aforementioned system.

Although by transparency one can create trust between government and system, and also people and system, we need to note that the transparency or openness of information will increase possibility of destroying or hacking people's confidential and personal information. To solve this problem one need to adopt a policy with which to keep a balance between statistical transparency and the resulting risk. Ignoring each of the mentioned cases –transparency and confidentiality- and also failing to keep an appropriate balance between these two factors, the aforementioned system will fail.

VI. USA PRESIDENTIAL ELECTION IN 2000

However France, Sweden, Finland, Austria, Australia, USA and Spain have had long-term activities and plans in implementing the e-voting system, some of which have faced considerable success and some have faced many problems in spite of long term activities in this field.

USA experienced a difficult presidential election in 2000. In this election, the major part was held electronically, many conflicts and tension took place over the obtained results.

It is estimated, on the basis of Census organization statistics, that 3 million people enrolled in USA presidential election, were not able to vote thanks to the problems of the system [30] .According to statistics, two million ballots have been destroyed or received ambiguously in this presidential election [30].

In the USA election in 2000, between half a million and 1.2 million votes have been destroyed due to the problems in voting precinct or the voters have not been able to vote because they have faced some problems such as communication lines [30] page 11. Based on the voting technology project report, the average number of invalid votes of punch cards system and DRE, has been more than paper votes between 1988 and 2000, while more than 30 million people have voted for their favorite candidates through punch cards in the 2000 election. Obviously the invalid votes have not been taken into account or have been altered either intentionally or unintentionally. It follows in this report that, in the USA presidential election in 2000, with the cost of over1 billion US dollars, between 4 and 6 million votes have not been taken into account in counting the candidate's votes for different reasons.

VII. IRELAND E-VOTING SYSTEM

Of other e-voting projects which faced problems and finally led to loss of 10 million US dollars, we can mention Ireland e-voting project. This project started in 2002 and sought to implement DRE or voting machine as well as

Televoting. After some years the Irish government obviated and neglected. Of the consequences of this failed project, we can mention about 55 million euros and also 400.000 to 700.000 euros annual cost of maintaining purchased equipment, let alone operational costs; together with 7000 unused DRE machines. (Minister of Ireland government, 2009)

Irish government held a committee on e-voting (CEV) in 2004 which was dissolved in September 2006. The objective of holding this committee was to ensure hardware and software security and reliability. In the 7th part of the last report issued by this committee, there are considerable points out of which we can mention (committee on e-voting secondary part: 2006). All voting systems, as well as hardware components have high quality and these systems have suitable designs for voting. The related committee (CEV) announces afore said systems and the related components to be suitable for holding election in Ireland. The utilized software in this system has relatively high quality, yet, for increasing efficiency and reliability it needs to undergo some practical changes.

The problems and suggestions mentioned by this committee about the software and hardware utilized in this system are not so complex and time consuming. It seems that there were problems more than hardware and software problems in Ireland e-voting project.

On the other hand, different political and social groups in this country ask to install and use VVAT system in order to implement the e-voting system. By using VVAT, voters are given the opportunity to be given a printed vote for each vote they cast through voting machine in order to have a tangible vote or document to cast and to use it when needed such as recounting and breaking down of the systems [29]. Although the committee (CEV) had proposed a suggestion similar to that of VVAT in a way that received votes will be saved in a database independent of the e-voting system to increase the authenticity of the system, finally, the country's minister in April 2009 announces that e-voting project will not continue.

VIII. Comparing Iranian National Culture with Some Countries Who Have Established E-Voting Successfully

As mentioned earlier, many countries tried to implement e-voting system. Comparing different cultural aspects of these countries with those of Iran can get noteworthy results. National cultural aspects of 7 countries including Australia, Japan, the USA, Sweden, Finland, Austria and France; all of which have had positive plans and results from e-voting systems have been drawn in the following chart with Iran.

On the basis of the presented diagram, among these 8 countries, Iran has the highest PD value. The gap between Iran and the second country (France) whit highest PD value is 0.15. As you can see, Iran has the lowest UA factor, and after Iran, Japan has the lowest UA factor, and the gap between Iran and this country is 0.4. Regarding HO factor, it can be mentioned that Australia, Japan, Iran and Us are the most tolerant facing human mistakes. As mentioned earlier, Iran has the highest IC factor in this diagram and the difference between Iran and the second country is 1.23. In addition, Iran has an average position in assertiveness and FO factor of globe project. The next is "Gender Egalitarianism" that Iran has the least GE factor, which is topped by Austria in this chart; the difference between these two countries is 0.1.

Furthermore, Iran has the highest level of PO factor among the 7 countries. After Iran; the USA in this comparison is the second country which has the highest PO, with the difference of 0.09 from Iran. Obviously, Iran has a desirable position in comparison to the 7 countries regarding PO factor. But the factors of PD, UA, ID and IC in this country cause some problems which are to be dealt with later.

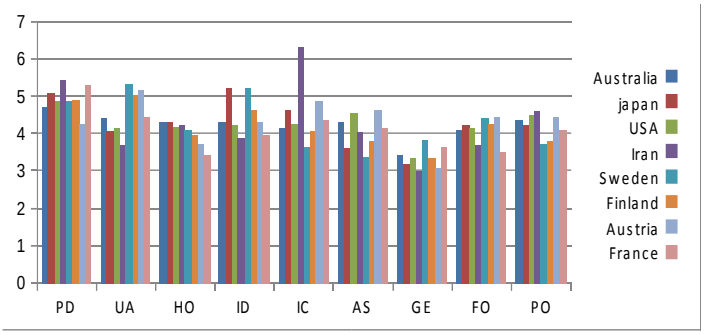

Fig. 1. Comparative chart of national culture with 7 pioneer countries in the field of e-voting and Iran

IX. National Culture and Implementation of E-Voting System

During recent decades, a great deal has been done in national culture. Most of these efforts have been made to make electronic systems and services compatible with the culture of the societies using such systems [10]. Political and government based electronic services were not excluded and even one can acknowledge the relationship between national culture and electronic services has been closer in this field. Earlier, electronic service providers didn't have any worries more than technological problems. But for the time being, many hardware barriers have been removed and they are seeking a way to make services acceptable and usable. It is not possible to realize this important notion without taking into consideration the ethical, mental and value issues of the users because each society has its own problems and needs, so a proper answer must be given in accordance with the needs of the society. It has to mention that in this research just four dimensions of GLOBE project has been surveyed, which are In-Group Collectivism, Power Distance, Social Collectivism and Uncertainty Avoidance.

X. Challenges to Face in Implementing the E-Voting System in Iran

A. Transparency

Ideally, either on paper or electronic, 3 to 5 percent of the votes is destroyed [9], but one of the results of implementing the e-voting system in different societies is the Transparency of the problems associated to the elections which occur either intentionally or unintentionally. It is mentionable that some societies can't adopt transparency among people. The reason is that in such countries like Iran there are different groups, races, regions and languages with high IC [6]. Such multicultural societies are called separated societies [15]. People in these societies are attached to their groups and families, on the other hand, the personality and the nature of the person depends on the group, group member and the

beliefs of the groups. Now, if the person in a separated society intends to complain or criticize the aforementioned society, this leads to many problems and finally his seclusion from the society. So, people in this situation behave and comment in the definite framework the society determines. Therefore, people face ambiguity and doubt which reduces transparency in the society [4]. On the other hand, among the countries participated GLOB project, Iran has very high PD which indicates the social distance between the head and subordinate and among different classes of the society as well causes the people not to have access to resources or a major part of them, that leads to a lack of transparency and openness of information among people of the society, and consequently, the informational and statistical transparency of the society reduce [3], [16].

B. Trust

One of the important factors in implementing electronic services is people's trust in electronic systems. During recent years, since 2004 later on specially, companies have observed a descending trend in using electronic services. What is regarded as the milestone for this reduction is the recorded information safety and security of people in virtual sites and place of the companies [16], [18]. According to many researches in this field, *security*, and as a result, *trust* in security has been regarded as significant point for this reduction.

There have always been to completely different and contradictory point of views regarding confidence building in user and the degree of transparency in the system.

The first point of view indicates that voting anonymously increases people's trust [9]. Being anonymous on the part of voters is one of the most important requirements of the voting system [12], [13], because casting anonymously is regarded as voter's rights which leads to reduction in the transparency of the system.

The second point of view is that trust is achieved when the user has access to all operating stages and system information, i.e., openness and high transparency of the system. This transparency causes to remove all ambiguities during e-voting process. Herewith, one can identify the problems and errors of the system and announce the results by taking into account system error factor, but the high quality of the system causes to reduce the its security which is regarded as a weak point. In contrary, it should be mentioned that the intention of authorities is to increase user's trust and increase the efficiency of the e-voting system. They need to be able to keep a balance between security resulting from anonymity and the risk from transparency. The balance is measured and tested on the basis of electronic services provided. For example, the relation of these two points of view differs in electronic projects as e-voting, e-banking and e-tourism. On the other hand, according to the research conducted in this field, it can be concluded that Iranian society is not trust oriented, because the results of GLOBE project show that countries with high IC and PD have lower trust in their relation and since Iran peaks in the two factors, Iranian's trust can be describe as low [8], [9], [16].

One of the factors contributing significantly to people's trust in electronic services is the technological and electronic literacy of that society since it is the most important basis for trust.

C. Technological Literacy

Using internet services such as carrying out daily work virtually, using social networks, internet shopping and having experiences in internet cause to increase trust [23]. For the time being, people's digital literacy relates directly to internet services because it paves the way for internet services. According to recently issued statics (2009) by university of Tehran, fewer than 10 percent of Iranians have electronic literacy, most of who are young and teenagers. This reason can be sought in different digital generation.

Authorities in this field have divided different generations into four categories based on technological literacy [19]:

1) Mature generation (born before 1946)
2) Population explosion (1946 – 1964)
3) X generation 1965-1980
4) Y generation [1981-1994]

The mature population and population explosion generation are not familiar with technology and have no technological literacy. People of X generation are also known as immigrant to digital world and finally Y generation are the dwellers of the technology world. Therefore many voters have no appropriate technological literacy to use the e-voting systems. This is one of the problems in most of the countries all over the world in implementing electronic services. Iran is not excluded from these countries in this regarded.

According to the latest national statics of Iran 17.6% of the Iranian who are 15 years old or more are illiterate, so there are more than 9.331.000 illiterates in the society (Statistical center of Iran, 2009: 609). On the other hand, Internet penetration coefficient in Iran is only 11% and only 0.49% of Iranians have accessed to ADSL [11]. Also according to 2010 standing of the countries in the world, Iran is ranked 102 among 160 countries all over the world in providing e-government services. (United nation, 2010) existing evidences illustrate that a vast range of Iranians are not familiar with electronic and internet services, which in turn, causes them not to turn to electronic services and this is a large barrier in confidence build, for the e-voting system in Iran.

D. Change Management

All electronic services have been formed by changing the procedure of presenting or providing services. Although the change doesn't relate to the nature of the process, it relates to the way in which the process operates. For example, there has been no change in the nature of election in e-voting since voters vote electrically rather than on paper or the counting is done by machines rather than manually. But users face new environment and conditions which inspires the concept of change either technically, theoretically or officially, people of the society are those who will administrate the change or stop its administration [22].

So one of the most influential factors in change process is national culture which directs the changes through it positive and negative effects and finally it causes the administration of the change or stopping its administration. People's readiness to accept change and supporting it is among the positive effects of national culture on change procedure. On the other hand national culture can effect changes negatively. One of the negative effects of which is people's resistance against implementation of changes [14]. One of the most important factors in accepting changes is to implement a relationship between authorities who makes changes and users. Users

present their feedbacks to authorities and, on the other hand, authorities in so doing create a pathway for the users to enter change procedure. If this trend is done continuously, it will cause users involve in the e-voting process. For example, authorities and the designer of this system can gather all required information and seek help from specialist in their plans by announcing their long-term and short-term plans and their performing methods to involve them in their programs and interact with them. In this way they can increase specialist's participation by accepting and using their criticism and suggestion in next stages. On the other hand, they increase public participation in the project by giving necessary training, from another prospective, to the voters on how to use systems and by announcing the advantages and disadvantages of the e-voting system. Since PD is high in Iran, there is a weak link between authorities and subordinate, therefore, criticism and real feed backs of the people are not completely and correctly presented to authorities on the other hand, we can mention that accepting criticism and suggestion is suffering in Iran.

So, implementation procedure will face problems and sometimes authorities are forced to resist those resisting change, either directly or indirectly [22]. On the other hand, Iran is among countries with very high IC as mentioned earlier such countries have no united and integrated structures, In contrast to countries with high SC which are united and integrated [15]. It can be mentioned, therefore, people in such societies don't have feeling of attachment to national projects and as a result they don't regard national interests as part of their own interests and don't pay attention to completing national projects and their effectiveness. From another perspective in looking at Iranian national culture, we get to UA. UA is 3.67 in Iran which is among countries with low UA that indicates the instability and lack continuity in Iran society. However according to the "should be" factor (5.36) we notice that Iranian are after stability and continuity which indicates that Iranian have no ability to tolerate more risk and change in the society and try to face minimal changes.

XI. Conclusion

In this paper, it is tried to discover the influences of Iranian national culture on implementing of electronic voting in Iran. So, the most important challenges in which Iran government and people face with in implementing electronic voting are concluded by surveying the four dimensions of GLOBE national culture that are In-group collectivism, Power distance, Social collectivism and Uncertainty avoidance .

These challenges are lack of transparency and trust (also technological illiteracy) and finally weakness of change management.

As a result, such countries like Iran with high IC and high PD leads to the low rate of transparency. Also, such countries like Iran with high IC and high PD leads to the low rate of trust. And finally, Iran with low SC, high PD and low UA leads to the weakness of change management.

All these issues illustrate that Iran situation could be not ready for implementing electronic voting in this period.

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