Public Administration Presence on the Web: a Cultural Explanation

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Abstract: UN reports (2002-2005) reveal several differences in worldwide adoption of e-Government by public administration (PA). This research conducts an analysis of the impact of the national culture on e-Government adoption by PA to attempt to explain these differences. The impact of culture, as defined by Hofstede, is tested at the level of Web Measure Index and at the different stages of e-Government evolution. The regression analysis and Pearson's coefficients show the importance of Individualism and Uncertainty Avoidance. Power Distance has lower impact on e-Government adoption. The level of education attainment moderates these relationships.

Keywords: e-Government, stages of e-Government evolution, Web Measure Index, national culture.

1. Introduction

e-Government programs remain at the top of most countries policy agendas (UN, 2002). The emphasis on the e-Government may be due to the potential of information and communication technologies (ICT) to transform public administration (PA) to an efficient system, enhance public services quality, establish trust between PA and citizens and realize economic objectives (OECD, 2003; UN, 2004). In fact, e-Government aims at providing an efficient government management, better service delivery, and empowerment of citizens through access to information and participation in public policy decision making (UN, 2005). For these benefits, the PA in most countries develops Web sites, portals and electronic services delivery (UN, 2002; 2003; 2004; 2005). However, differences in worldwide adoption of e-Government are considerable. The e-Government readiness index estimated for each of UN countries varies between 0, 9062 in the United States of America and 0, 0011 in Liberia (UN, 2005). The Web Measure Index varies between 0 (no presence for countries like Haiti, Zambia, Liberia, etc.) and 1 in the United States of America.

Certainly, the diffusion of the Web in PA leans on a political will that mobilizes the necessary human, material and financial resources. But, this diffusion depends also on social and economic variables (UN, 2002). UN (2005) affirm that e-Government readiness is a function of a country's situation of technological and telecommunication infrastructure and of the level of its human resource development. Nevertheless, *"the number of variables - social, legal and institutional as well as economic and technological - which might retard the diffusion process is virtually limitless"* (Rosenberg, 1972, cited by Erumban and de Jong, 2006, p.303). Recently, several researchers show the importance of culture in IT adoption and justify the divergences between countries in the adoption of ICT, in general (Erumban and de Jong, 2006) and of specific technologies, such as Internet, PC, fax machines, cellular phone, telephone and pagers (Bagchi and al., 2004; Gong and al., 2007) on the base of the cultural variables. According to Zghal (2001), cultures include both favourable factors to ICT exploitation and unfavourable ones that may hinder an efficient implementation of these technologies. So, this research tries to answer this question: what is the impact of the national culture on the adoption of the e-Government by the PA? The analysis starts with the definition of e-Government and the presentation of its stages of evolution. Then, an explanation of the differences between the countries use of the e-Government is advanced on the base of a cultural perspective and the hypotheses are formulated. After the precision of the methodology, the results and their interpretations are presented. We end by a conclusion where the contributions and limits of this study are discussed.

2. e-Government: Definition, dimensions and stages of evolution

2.1 Definition and dimensions of e-Government

UN (2005, p.14) define e-Government as "the use of ICT and its application by the government for the provision of information and public services to the people". Broadly defined, e-Government includes all ICT platforms and applications in use by the public sector. The objectives are a continuous optimization of public services delivery and information dissemination, citizens' participation in political processes, while transforming the internal and external relationships and processes by the technology, the Internet and the new medias (Moon, 2002; UN, 2002). Narrowly defined, e-Government is the use of ICT between PA

agencies, enterprises, and citizens to simplify and improve information diffusion, communication and public services delivery (Moon, 2002; UN, 2002).

According to El Jamali and al. (2004), a complete definition of e-Government must consider all partners of PA. e-Government includes interactions between the administration and the citizens "Government to Citizens" (G2C), the administration and the business "Government to Business" (G2B), and the PA agencies "Government to Government" (G2G). These interactions concern the information diffusion, communication and / or the realization of online transactions. The G2C/C2G allows citizens to consult information, to communicate and to make transactions instantaneously and easily. Several interactions such as services delivery, social assistance, legal authorization, etc., can be developed. The G2B/B2G refers to the use of ICT in relationships between PA agencies and private and public business for information diffusion, communication and realization of administrative formalities. Finally, the G2G refers to the use of ICT between PA agencies at national, regional and local levels. PA is composed of several agencies that can intervene, each according to its domain of expertise, in the realization of the same transaction. ICT (Internet, Intranet, Web servers, etc.) allow them to share their data and to put in common their knowledge and resources. Moreover, they allow the development of technological and organizational platforms that integrate operational, decisional and management processes (El Jamali and al., 2004).

2.2 Stages of e-Government evolution

According to Layne and Lee (2001), e-Government implementation follows an evolutionary process starting with the phase of information, then the phases of interaction, transaction, and horizontal and vertical integration (Moon, 2002; El Jamali and al., 2004). However, it is not obligatory for a PA to follow a linear progression in the implementation of e-Government. The possibility to evolve to stages of integration before exploiting the full potential of information or interaction phases is not excluded. UN (2005) presents a model of e-Government evolution composed of five stages. These five stages will be used in the statistical analysis. For this reason, the model of e-Government evolution and its components' definitions are adopted (UN, 2005):

Table 1: Stages of e-Government evolution, (UN, 2005, p.16)

Emerging Presence is stage 1 representing information, which is limited and basic. The e-Government online presence comprises a web page and /or an official website; links to ministries/departments of education, health, social welfare, labour and finance may/may not exist; links to regional/local government may/may not exist; some archived information such as the head of states' message or a document such as the constitution may be available on line, most information remains static with the fewest options for citizens.
Enhanced presence is stage 2 in which the government provides greater public policy and governance sources of current and archived information, such as policies, laws and regulation, reports, newsletters, and downloadable databases. The user can search for a document and there is a help feature and a site map provided. A larger selection of public policy documents such as an e-Government strategy, policy briefs on specific education or health issues. Though more sophisticated, the interaction is still primarily unidirectional with information flowing essentially from government to the citizen.
Interactive presence is stage 3 in which the online services of the government enter the interactive mode with services to enhance convenience of the consumer such as downloadable forms for tax payment, application for license renewal. Audio and video capability is provided for relevant public information. The government officials can be contacted via email, fax, telephone and post. The site is updated with greater regularity to keep the information current and up to date for the public.
Transactional presence is stage 4 that allows two-way interaction between the citizen and his/her government. It includes options for paying taxes; applying for ID cards, birth certificates/passports, license renewals and other similar C2G interactions by allowing him/her to submit these online 24/7. The citizens are able to pay for relevant public services, such as motor vehicle violation, taxes, fees for postal services through their credit, bank or debit card. Providers of goods and services are able to bid online for public contacts via secure links.
Networked presence is stage 5 which represents the most sophisticated level in the online e-Government initiatives. It can be characterized by an integration of G2G, G2C and C2G (and reverse) interactions. The government encourages participatory deliberative decision-making and is willing and able to involve the society in a two way open dialogue. Through interactive features such as the web comment form, and innovative online consultation mechanisms, the government actively solicits citizens' views on public policy, law making, and democratic participatory decision making. Implicit in this stage of the model is the integration of the public sector agencies with full cooperation and understanding of the concept of collective decision-making, participatory democracy and citizen empowerment as a democratic right.

3. e-Government adoption by PA: A cultural explanation

The Web Measure Index (WMI) (UN, 2002-2005) assesses the websites of the governments to determine if they are employing e-Government to the fullest. This index provides an evaluation of Internet and World Wide Web utilization by the PA for the diffusion of information and the public services delivery.

UN results (2005, p.57) reveal that PA in 179 countries are online in 2005. However, disparities between countries are considerable: the WMI varies between 0 (no presence for countries like Haiti, Zambia, Liberia, etc.) and 1 in the United States of America. These disparities concern countries with different levels of economic, social and technological development, but even for industrialized countries, having similar features, differences in the WMI exist. In addition, 22 developing countries are among the 50 first countries. Among these 22 countries, 11 are better classified than some industrialized and high income per capita countries such as France, Iceland and Switzerland (appendix 1).

Several researchers (Bagchi and al., 2004; Erumban and de Jong, 2006; Gong and al., 2007) justify the worldwide divergences in the adoption of ICT, in general, or of specific technologies such as Internet, PC, fax machines, telephone, cellular phone and pagers by the cultural differences between countries. In fact, different cultures react differently to new products and technological innovations (Gong and al., 2007) and deciding to adopt such technologies may be influenced by the social and cultural features and the perceived values of the individuals within a society (Erumban and de Jong, 2006). Therefore, culture can be considered as a factor that differentiates between countries in the adoption of ICT.

Zghal (2001, p.5) defines culture as an internal logic, a sort of habits and a tacit understanding terrain that members in a society share and to which each adjust his/her behaviours. So, individuals share a collective national character that shapes their values, believes, attitudes, and determine their behaviours in a society. It is a system of values collectively shared (Hofstede) or culture that differentiates between the countries. Gong and al. (2007) and Erumban and de Jong (2006) recognize two theoretical approaches of the national culture: the approach of Hall (1976) and the approach of Hofstede. According to Gong and al. (2007), In Hall's approach, culture is seen as a unidimensional construct in which countries are grouped into either high/low or high/medium/low context categories. This distinction is based on the way messages are communicated within a society. In high context cultures (e.g. Japan, China), contextual significations are important in the interpretation of a message, while in low-context cultures (e.g. USA, Canada), most of the information is explicitly expressed in the words (Gong and al., 2007). Gong and al. (2007) highlight that the studies that have used the Hall's approach to explore the influence of culture on the diffusion have shown mixed results because of an empirical measurement problem when using this approach. In addition, according to Erumban and de Jong (2006), this approach doesn't describe the cultural differences between countries in a detailed manner. So, more sensitive measures of national culture are needed.

Based on data from an empirical survey carried on between 1967 and 1973 with about 116 000 employees of IBM in 50 countries and 3 regions, Hofstede observes that the national cultures can be distinguished on four cultural dimensions: Power Distance, Uncertainty Avoidance, Individualism/ Collectivism and Masculinity/ Femininity. A fifth dimension was added later (Long-Term Orientation). Hofstede's approach of culture and in particular these dimensions are the most studied when considering ICT adoption at a national level (Bagchi and al., 2004; Kovacic, 2005; Erumban and de Jong, 2006; Gong and al., 2007). Despite the criticism of its methodology and its limited context (Baskerville, 2003; 2005), this approach offers the most robust measures of national cultures and its five dimensions are considered as the most discriminating factors between countries (Gong and al., 2007). Bagchi and al. (2004) stress their relevance to assess culture's influence on adoption of ICT. Besides, all these authors conclude that differences in adoption of ICT between countries can be attributed to the national culture as it is described in Hofstede's approach. Thus, these dimensions provide better criteria for assessing culture's influence on ICT adoption, and will be used to analyze differences observed in the case of e-Government. Nevertheless, cultures include both favourable factors to ICT exploitation and unfavourable ones that may hinder an efficient implementation of these technologies (Zghal, 2001). So, if culture has a certain duality on behaviours, the question is: what are among these dimensions those that may have an impact on e-Government adoption by PA? Each dimension of culture and its expected relationship with ICT adoption are discussed below.

4. Culture's dimensions and e-Government adoption by PA: an analytical framework

4.1 Power distance (PD)

Power distance is the extent to which a society accepts differences and inequalities in power distribution among individuals, organizations and institutions. In large (high-scoring) PD countries, individuals are more ready to accept power differences and a large hierarchical order than individuals in small PD countries. These later countries are characterized by decentralized and participative decision making structures (Bagchi and al., 2004).

Since ICT can contribute to the decentralization of decision making by allowing more suitable information diffusion and sharing, they will be more accepted in small PD countries. In these countries, Kovacic (2005) remarks that citizen involvement to political decision processes is solicited, and requires ICT implementation. Hence, this author suggests that the large PD countries may have negative attitudes toward the adoption of ICT.

But, ICT are, also, a symbol of power and authority; this can encourage their adoption in large PD countries (Bagchi and al., 2004). This adoption risks to be a sign of social status and limited to the elite of the society (Gong and al., 2007). In large PD countries, organizations are characterized by centralized structures, authority and application of formal rules (Erumban and de Jong, 2006). Thus, individuals called to respect authority and differences and to follow instructions may be less ready to challenge status quo and less motivated to adopt ICT (Gong and al., 2007).

Results from earlier studies show that when the PD is low, the adoption of PC and cellular phones increases (Bagchi and al., 2004). It is also the case in Internet use and access (Gong and al., 2007) and in ICT adoption independently of their types (Erumban and de Jong, 2006). Kovacic (2005) confirms the hypothesis that the government of a large PD country has negative attitude toward the increase of the e-Government readiness. So, we expect that e-Government adoption increases in small PD countries (H1).

4.2 Individualism/ Collectivism (ID)

Individualism describes the relationship between the group and the individual in a society. In individualistic cultures (low collectivism) individuals are more concerned with themselves and their direct families' members. The personal freedom and the individual decision-making are valued (Erumban and de Jong, 2006; Gong and al., 2007). In contrast, members from low individualistic cultures (high collectivism) show more attachment to their group of adherence (extended family, community, association, etc.). They are integrated into strong, cohesive groups in which individuals expect their relatives and others in their group to look after them in exchange for unquestioning loyalty. Obligations and group harmony come before individual objectives (Gong and al., 2007).

Authors (Bagchi and al., 2004; Kovacic, 2005; Erumban and de Jong, 2006; Gong and al., 2007) agree that ICT adoption increases in individualistic cultures. On one hand, individuals in individualistic cultures have more freedom to express their opinions and try new ideas than individuals in collectivistic cultures (Erumban and de Jong, 2006; Gong and al., 2007). Therefore, they are more innovative and more open to the adoption of ICT. On another side, ICT reduces time and space constraints. They assure more independence in work or personal life in the sense that they have the option to maintain greater physical distance and allow individuals to schedule their activities to meet the needs of several groups to which they belong (Bagchi and al., 2004). Because of the same features, ICT promotes continuous contact between groups' members in collectivistic cultures (Bagchi and al., 2004). However, in such cultures, the importance of face-to-face interactions reduces the role of ICT in maintaining relationships (Bagchi and al., 2004). Moreover, individuals do not adopt ICT if they prove to be in contradiction with their groups norms (Erumban and de Jong, 2006).
Significant relationships between individualism and the adoption of PC, Internet, telephone, pagers (Bagchi and al., 2004) and ICT in general (Erumban and de Jong, 2006) are showed by these authors. In the case of e-Government, Kovacic (2005) finds that the government of an individualistic culture shows positive attitudes toward the improvement of the e-Government readiness. In contrast, Gong and al. (2007) invalidate the hypothesized positive effect of individualism on Internet adoption. But, they find a marginally significant relationship and in the expected direction for narrow band penetration ($t = 1, 56$; $p < 0, 1$). So, we expect that e-Government adoption by PA increases in individualistic cultures (H2).

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4.3 Masculinity/ Femininity (MA)

This dimension of culture is based on a distinction between men and women's roles in a society. Values such as assertiveness, performance, success and competition characterize masculine cultures. On the contrary, a feminine culture focuses on human relationships, quality of life, solidarity, equality, interest for others and protection of the weak. These values are further searched by women who are more modest, tender and more guided by the improvement of quality of life than men.

According to Hofstede, organizations in masculine cultures encourage the competition and recognize the performance of individuals; these are the features of innovative organizations (Erumban and de Jong, 2006). Organizations adopt ICT for more efficiency and competitiveness which are valued in masculine cultures (Bagchi and al., 2004). In these cultures, the adoption of ICT increases because they permit to obtain useful information to competition (Kovacic, 2005; Erumban and de Jong, 2006), influence the contribution of actors to efficiency (Bagchi and al., 2004) and improve the performance and success chances (Kovacic, 2005). But, it seems that earlier researches find results that contradict the authors' expectations: masculinity has a negative effect on the access to Internet and its use (Gong and al., 2007) and it has no relationship with the adoption of ICT in general (Erumban and de Jong, 2006), and with the e-Government readiness index in particular (Kovacic, 2005).

Moreover, ICT allow more cooperation at work and a better quality of life that are values of feminine cultures (Bagchi and al., 2004). Gong and al. (2007) notice that ICT characteristics, such as Internet, are more appropriate in the feminine cultures because they facilitate the information sharing and the communication between people, groups and organizations. If this potential of communication is the major motive of ICT adoption, then they are more accepted in high femininity countries (Erumban and de Jong, 2006). This idea is supported by Bagchi and al. (2004) who find a strong relationship between feminine culture features and the adoption of the telephone and the cellular phone. So we consider that the e-Government adoption increases in high femininity countries (H3).

4.4 Uncertainty avoidance (UA)

Uncertainty avoidance refers to the attitude toward the risk, the uncertainty, and the new phenomena. The new situations can include surprises and are different of the usual. High UA cultures try to structure life, society, and minimize possibilities to have such situations by laws, formalism and measures of security. Individuals are, generally, more resistant to change, risk averse and less innovative (Kovacic, 2005; Gong and al., 2007). But, cultures that accept the uncertainty (low UA) are more tolerant toward others different opinions. In these cultures, individuals show more tolerance toward the risks, like those associated to ICT, and are more innovative (Bagchi and al., 2004; Gong and al., 2007). According to Bagchi and al. (2004), PC routinize jobs, fax machines and e-mail leave paper records, telephone and cellular phone improve the communication to solve problems more quickly. Consequently, ICT can respond to the needs of reducing uncertainty in high UA cultures. However, ICT adoption is risky. Because these cultures are more risk averse and resist to changes, their adoption of ICT is less important than in low UA countries (Bagchi and al., 2004; Kovacic, 2005; Erumban and de Jong, 2006).

Mixed results are given by earlier studies. Supposing that the UA is negatively associated to Internet use and access, Gong and al. (2007) don't find a relationship between these two variables. Moreover, Bagchi and al. (2004) conclude that the relationship between ICT adoption and UA is not obvious. Kovacic (2005) finds a weak support to the hypothesis that the government of country with a high UA culture has a negative attitude toward increasing the level of e-Government readiness. Contrary to these authors, Erumban and de Jong (2006) confirm the hypothesis that high UA cultures show a lowest rate of ICT adoption than cultures with a low UA. They notice that this cultural dimension is the most significant to the explanation of differences between countries in the adoption of ICT. Therefore, we suggest that e-Government adoption increases in low UA countries (H4).

4.5 Long term orientation / short term orientation (LOT)

This dimension refers to the degree to which a culture values its tradition and how much individuals focus on their past and future (Erumban and de Jong, 2006; Gong and al., 2007). According to Hofstede, cultures with LOT are characterized by values such as persistence, adaptation of tradition to new circumstances, perseverance and the idea that most important events in life will occur in the future. In contrast, cultures with a short term orientation (low LOT) expect quick results and focus on respect for past, tradition and stability.

LOT is the least tested dimension in cross-culture studies (Gong and al., 2007). These authors consider that LOT cultures can better perceive the long term benefits of Internet and, therefore, they are more in favour of the adoption of this innovation. They find that this cultural dimension has a significant positive influence on Internet use and access. This impact increases when introducing the control variable "level of education" in the regression model tested for the variable "broadband penetration". In contrast, Erumban and de Jong (2006) consider that low LOT cultures are more opened to new ideas than high LOT cultures, so that in such cultures the adoption of ICT increases. Though, these authors don't find conclusive results because of the reduced size of the studied sample. So, we suggest that e-Government adoption increases in countries characterized by LOT cultures (H5).

4.6 Control variables

Question on cultural dimensions that have an impact on the PA presence on the Web doesn't imply a deterministic view of the relationship between culture and ICT adoption. On one side, Bagchi and al. (2004, p.31) argue that "*when making prediction about the likely implications culture has for technology use, it is important to avoid an overly deterministic view of either technology or culture*". Kovacic (2005) considers that this relationship is not simply causal. Rather, it is dynamic as the e-Government can have an impact on the national culture. On the other side, even though the UN (2005, p.91) explains disparities between countries in the e-Government adoption by cultural differences, this organization highlights the role of differences in political, economic and social systems, level of development, resource availability, technological infrastructure and human capital. Kovacic (2005) affirms that e-Government adoption depends on the level of democracy in the country, the cost of implementation and the perceived political benefits for the government from implementing an e-Government initiative, and that those more democratic countries are higher ranked on the e-Government readiness list than the less democratic ones.

Therefore, other variables may influence the ICT adoption: "*while cultures can promote, resist, or shape technology use, they do not wholly determine technology use*" (Bagchi and al., 2004, p.31). Hofstede, himself, argues that the five cultural dimensions are statistically correlated to several data of countries. For example, power distance is correlated to income inequalities in a country, and individualism is correlated to Per Capita Gross National Product. He explains that when the effect of other variables (economic variables, for example) is significant, the cultural variables are redundant. But, if the cultural variables are still significant despite of included economic variables, then the effect of culture on observed phenomenon could be confirmed.

Erumban and de Jong (2006) and Gong and al. (2007), in their analysis of the relationship between the national culture and the ICT adoption, study the impact of the level of education attainment. This variable will be studied in the case of e-Government adoption by PA. Gong and al. (2007) find that the education level contributes to explain the Internet access and use. They conjecture that the utilization of Internet requires high levels of education and the researches on innovation diffusion must continue to take it in account. Thus, we expect that e-Government adoption increases in countries where the level of education is high (H6).

5. Methodology

Qian (2007) affirms that since 2000, more than 25 global e-Government surveys are conducted. The most recognised are surveys of *"Accenture, Brown University, Economic Intelligence Unites (EIU), Taylor Nelson Sofres (TN), United Nations, and World Economic Forum/Harvard University"* (Qian, 2007). He adds that the UN report on global e-Government readiness is one of the most read and used by practitioners and researchers for the rigor of its methodology and the richness of data on all UN countries it contains. For this reason, information given in the 2005 report is exploited in this study. More precisely, it is the Web Measure Index (WMI) that serves as a measure of e-Government adoption by PA. In fact, *"it is important to take a closer look at the online public sector offerings in and off themselves. The web measure index assesses the websites of the governments to determine if they are employing e-Government to the fullest. The web measure rankings are different to the e-Government readiness rankings, which are based on a composite index comprising web measure, infrastructure and human capital assessment"* (UN, 2005, p.71).

The scores provided by Hofstede serve for the measure of cultural dimensions. These scores are available in 65 countries and 3 regions (Arab world, East and West Africa) (www.geert-hofstede.com/hofstede_dimensions.php). Countries belonging to these three regions are excluded from the present study since it can be inconceivable to consider that these countries possess the same scores on the cultural dimensions than the region. For Arab world, for example, El Louadi (2004) argues that the imputation of regional scores and dimensions to all Arab countries (have one same score (high) in power distance, are

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relatively collectivist, etc.) is worrying. According to the same author, the complexity of the Arab culture necessitates the study of the Arab values and their inclusion in Hofstede's framework. Among others countries studied by Hofstede, Taiwan and Hong Kong are excluded because the UN report doesn't provide data on their WMI. Therefore, a final sample of 63 countries is examined.

Methods of correlation and regression analysis are applied to the data. Several researchers (Bagchi and al., 2004; Kovacic, 2005; Erumban and de Jong, 2006; Gong and al., 2007) use regression analysis to examine the relationship between national culture and ICT adoption. Regression analysis allows the prediction of values taken by an endogenous variable from a set of explanatory variables x_1, x_2,…, x_p. Its application in this research seems to be adequate. In fact, no major problem of multicollinearity is detected despite of the existence of significant correlations between the following independent variables: PD / ID; ID / LOT; ID / EDU and PD / EDU (table 2). As mentioned by Hofstede, these cultural dimensions have relationships between them and with socioeconomic variables such as the level of education. But, all the values of the variance inflation factors (VIF), which permit to verify if correlations between independent variables cause a multicollinearity problem, are comprised between 1,202 and 4,121. These values are much less than 10, a frequently suggested cut-off value of multicollinearity (Bagchi and al., 2004).

Table 2: Correlation coefficients between independent variables

	IDG1	PDG1	UAG1	MAG1	LOTG1
PDG1	-0,613**				
UAG1	-0,232	0,221			
MAG1	0,095	0,136	-0,040		
LOTG1	-0,430*	0,341	-0,043	0,113	
EDUG1	0,514**	-0,409**	0,013	-0,049	0,014

** Significant at 0.01 level; * Significant at 0.05 level.

6. Results and discussion

In addition to the WMI, UN report (2005) provides data on e-Government service delivery by stages of evolution. These stages may be related to the depth of e-Government adoption by PA. Data show that the PA differ on their presence on the Web, but also they have different scores at the level of these stages. This reflects different levels of e-Government adoption by PA. To verify if the cultural and socioeconomic variables impact can vary according to the level of engagement in these stages of e-Government evolution, coefficients of correlation are firstly calculated (table 3). Results show that:

- At the first stage of e-Government evolution, all correlation coefficients are low and insignificant. They are positive for the variables ID, MA and EDU, and negative for the variables PD, UA and LOT.
- At the second and the third stages, the variables ID and EDU show significant and positive coefficients of correlation. These coefficients are significant and negative for the variable PD. For UA, LOT and MA, coefficients are low and insignificant. They are negative in the case of UA and LOT and positive for MA.
- At the fourth stage, the variables ID, EDU and PD show similar results as those of the second and the third stages. In addition, the UA has a significant and negative coefficient. The coefficients relative to LOT and MA are insignificant. Similar results are obtained at the fifth stage and the WMI.
- Among the independent variables, EDU has the highest coefficients of correlation (in terms of absolute values) which underlines its importance. This coefficient has a higher value at the second stage than the others.

Table 3: Correlation coefficients : e-Government adoption/ independent variables

	ID	PD	UA	MA	LOT	EDU
Stage 1	0,164	-0,131	-0,014	0,156	-0,293	0,163
Stage 2	0,525**	-0,405**	-0,133	0,092	-0,139	0,591**
Stage 3	0,454**	-0,404**	-0,229	0,059	-0,093	0,521**
Stage 4	0,434**	-0,424**	-0,359**	-0,12	-0,116	0,441**
Stage 5	0,406**	-0,296*	-0,298*	0,004	-0,093	0,488**
WMI	0,502**	-0,422**	-0,259**	0,03	-0,126	0,555**

** Significant at 0.01 level; * Significant at 0.05 level.

Thus, the impact of the cultural variables and of the level of education appears progressively with the e-Government evolution. Relationships between these variables that depend on the level of e-Government adoption may exist. To better examine these relationships and identify the most significant variables, a regression analysis (table 4) is done for each of e-Government evolution stages and for the WMI. The coefficient of determination R^2 measures the proportion of the variation in the dependent variable as explained by independent variables in a regression model, and standardized Beta coefficients are used to make statements about their relative importance. A higher Beta value, for a given independent variable, means that this variable is more relevant than the others.

Table 4: Regression results

	Model 2 ($Y = a + b_1PD + b_2ID + b_3MA + b_4UA + \epsilon$)			Model 3 ($Y = a + b_1PD + b_2ID + b_3MA + b_4UA + b_5EDU + \epsilon$)			Model 4 ($Y = a + b_1PD + b_2ID + b_3MA + b_4UA + b_5LOT + b_6EDU + \epsilon$)		
	R^2	Bêta	t (p)	R^2	Bêta	t (p)	R^2	Bêta	t (p)
Phase 1	0,054	-		0,063	-		0,171	-	
Phase 2	0,243	ID (0,423)	5,930 (0,005)	0,433	EDU (0,451)	3,771 (0,000)	0,639	EDU (0,787)	3,972 (0,001)
Phase 3	0,247	ID (0,298)	1,998 (0,05)	0,367	EDU (0,416)	3,288 (0,002)	0,532	EDU (0,635)	2,815 (0,012)
Phase 4	0,305	ID (0,277) UA (-0,261)	1,937 (0,058) -2,302 (0,025)	0,377	EDU (0,320) UA (-0,309)	2,554 (0,013) -2,812 (0,007)	0,438	EDU (0,501)	2,024 (0,059)
Phase 5	0,211	ID (0,366) UA (-0,212)	2,204 (0,032) -1,761 (0,084)	0,308	EDU (0,374) UA (-0,269)	2,832 (0,006) -2,323 (0,024)	0,607	EDU (0,685) PD (-0,607)	3,311 (0,004) -2,238 (0,039)
WMI	0,290	ID (0,364)	2,519 (0,015)	0,421	EDU (0,433) UA (-0,201)	3,577 (0,001) -1,901 (0,062)	0,606	EDU (0,699)	3,376 (0,004)

In a first step of analysis, a first regression model (results of this model are not presented in the table 4), where the five cultural dimensions are included, is tested. Results of this model show that these variables have insignificant relationships with the e-Government adoption by PA at all evolution stages. It is also the case for the WMI. Thus, the hypotheses 1 to 5 are rejected.

Since scores of the variable LOT are only available in 24 countries, this low number may influence the results. For this reason, a second regression model is tested for four cultural variables: PD, ID, UA and MA (Model 2). Results of model 2 (table 4) show that the cultural variables have insignificant coefficient at the first stage of e-Government evolution and that the coefficient R^2 is low (R^2 = 0,054). In this phase, basic and limited information is presented on static Web sites conceived for consultation without possibility of communication or interaction with the PA. Characteristics of these sites don't contradict with the cultural dimensions of a nation. The PA can adopt this stage without cultural constraints or stimulants.

The contribution of cultural variables to the explained variance of the adoption of e-Government increases from the second stage (R^2 is between 0,211 and 0,305). Among the cultural variables, ID shows positive and significant coefficients at stages 2, 3, 4 and 5 and at the WMI. Looking for a better public services delivery and an improvement of its efficiency, PA in individualistic cultures adopts the ICT more then in collectivistic cultures. Therefore, H2 is supported. The coefficient relative to UA is negative and significant at stages 4 and 5, negative insignificant at stage 3 and at the WMI and positive insignificant at stages 1 and 2. Consequently, H4 (the e-Government adoption by the PA increases in low UA cultures) is partially supported. PD has negative and insignificant coefficients at all stages of e-Government evolution and at the WMI. So this variable doesn't have a relationship with e-Government adoption by the PA (but the sign of the relationship is as expected), contrary to what was expected in the hypothesis H1. MA shows insignificant coefficients at all stages of e-Government evolution. Therefore, this variable doesn't have any impact on the adoption of e-Government by PA contrary to what was hypothesised (H3).

In a second step of analysis, the socioeconomic variable EDU is introduced in the regression model (Model 3, table 4). Results show that the value of the determination coefficients R^2 increases. As found in model 2, at the first stage of e-Government evolution, the cultural and the socioeconomic variables don't have any impact on the adoption. This stage concerns a passive presence of the PA on the Web where sites are static. This hasn't contradictions with the cultural variables and doesn't require a high level of education. The education level is an important variable at the second, third, fourth and fifth e-Government stages and at the WMI. Since Beta coefficients are positive and significant, hypothesis H6 is supported. After the introduction of the socioeconomic variable (EDU), ID doesn't have any more influence (Beta are positive and

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insignificant). Therefore, hypothesis H2 is not supported. This can be due to the high correlation between EDU and ID (table 2). In contrast, the coefficients Beta of UA are negative and their significance increases at stages 4 and 5.

The coefficient Beta relative to UA has the highest value at the stage 5. In addition, this cultural variable has a significant negative relationship with WMI. In the first stages (2, 3) of e-Government evolution, the communication and interaction are essentially unidirectional with information flowing essentially from the government to the citizen (UN, 2005). This may not require developed measures of security; thus the importance of the variable UA can be low. But, from the stage 4, online transactions, exchange of personal information and online payments become possible. This requires the development of more secure links (UN, 2005). If citizens consider that the use of e-services offered by PA is insufficiently secure, they may refuse them. In addition to security requirements, the stage 5 necessitates cooperation between different public agencies for their integration. Cooperation is often mentioned among the barriers of e-Government development (UN, 2002; OECD, 2003), so that risk of failure increases. However, decision-makers in PA are risk averse and prefer *"to rely on the tried and true"* (Bartoli, 2005, p.320). So, as expected in the hypothesis H4, UA acts negatively on e-Government adoption by PA.

The influence of the variable PD on the e-Government adoption at all evolution stages and at the WMI is insignificant although it is in the expected negative direction. Consequently, hypothesis H1 is not supported. PD seems to don't have an impact on the adoption of the e-Government by PA.

For the variable MA, the impact at all evolution stages and at the WMI is insignificant. The coefficients Beta are negative at stages 4 and 5 and positive at stages 1, 2, 3 and at the WMI. Therefore, hypothesis H3 is not supported, suggesting that masculine cultures as feminine cultures adopt in the same way the e-Government.

Since Gong and al. (2007) find that the impact of LOT dimension on broadband penetration increases when introducing the control variable "level of education" in the regression model, the variable LOT is reintroduced among the independent variables (model 4, table 4). It appears that the five cultural variables and the socioeconomic variable give better explanation to the variance of the e-Government adoption (the values of the coefficient R^2 increase). The Beta coefficient of the variable EDU still positive and significant becomes higher. Therefore the hypothesis H6 is supported. But with the reintroduction of LOT, the negative Beta of UA becomes insignificant. Consequently, the hypothesis H4 is not supported. This can be justified by the fact that if LOT increases, the long term benefits of the e-Government can be better perceived. As a result, the influence of UA may be counterbalanced. Although the correlation coefficient of LOT and UA is low and insignificant (table 2) its negative sign means that these two variables act inversely.

Besides, the model 4 shows that the variable PD has a negative and significant impact on the evolution to the stage 5 of e-Government adoption and that this impact is limited to this stage. Then, the hypothesis H1 is partially supported. This stage implies the networking of various agencies of PA, cooperation between these agencies, information sharing and major organizational changes (Ebrahim and Irani, 2005). Moreover, it encourages citizens' participation in political processes and decision making and involves the society in a two way open dialogue (ONU, 2005). This can be in contradiction with cultural values of a country where the PD is high: centralized structures, respect of authority, application of formal rules and instructions, preference for status quo. The Beta coefficients of the variables LOT, ID and MA are insignificant. They are negative for LOT and ID and positive for MA. Contrary to expectations, the hypothesis H5, H2 and H3 are not supported and the signs directions are opposite to the proposed relationships. Table 5 gives a summary of results:

Table 5: Summary of results

	Model 1	Model 2	Model 3	Model 4
H 1 (PD)	Not supported	Not supported	Not supported	Partially supported
H 2 (ID)	Not supported	Supported	Not supported	Not supported
H 3 (MA)	Not supported	Not supported	Not supported	Not supported
H 4 (UA)	Not supported	Partially supported	Supported	Not supported
H 5 (LOT)	Not supported	-	-	Not supported
H 6 (EDU)	-	-	Supported	Supported

So, we can conclude that:

- The hypothesis H1 is rejected in the three first models. This contradicts the results of Kovacic (2005) who finds that PD act negatively on WMI, and the results of Bagchi and al. (2004) and

Gong and al. (2007) according to whom the adoption of PC, telephones, phones cellular (Bagchi and al., 2004), and Internet (Gong and., 2007) increases in low PD countries. But, the model 4 gives a minor support for the hypothesis H1, suggesting that PD may be negatively associated with the e-Government adoption by PA.

- The hypothesis H2 is rejected in models 1, 3 and 4 and supported in model 2. In the last case, results corroborate with those found by Kovacic (2005), Bagchi and al. (2004) and Erumban and de Jong (2006). According to the second model, e-Government adoption increases in individualistic cultures and ID is the most significant cultural variable. But this relationship doesn't remain significant with the introduction of the socioeconomic variable EDU (Model 3) and the cultural variable LOT (Model 4).
- The hypothesis H3 is rejected in all models. So, cultural values, as masculinity/ femininity, don't have any impact on the e-Government adoption by PA. Similar results show that masculinity has no relationship with the adoption of ICT in general (Erumban and de Jong, 2006), and with the e-Government readiness index in particular (Kovacic, 2005). But, this result is contrary to those of Gong and al. (2007) who find that masculinity has a negative effect on the access to Internet and its use and Bagchi and al. (2004) who reveal a strong relationship between feminine culture features and the adoption of the telephone and the cellular phone. This result may be explained by the fact that e-Government seems to respond to both feminine and masculine values: it aims at providing an efficient government management, empowerment of citizens through access to information and participation in the public policy decision making (UN, 2005), enhancing the public services quality, establishing trust between PA and the citizens and achieving economic objectives (OECD, 2003; UN, 2004).
- The hypothesis H4 is rejected in models 1 and 4, partially supported in model 2 and supported in model 3. So, the suggestion that adoption of e-Government increases in countries where UA is low gives mixed results. In the same vein, Bagchi and al. (2004) find that the relationship between UA and ICT adoption is not obvious. In addition, the test of the relationship UA – the level of e-Government readiness is only weakly supported in the work of Kovacic (2005).
- The hypothesis H5, i.e. e-Government adoption by PA increases in the countries characterized by LOT cultures, is not supported. This result contradicts the findings of Gong and al. (2007) who note that this cultural dimension has a significant positive influence on Internet use and access and that this impact increases when including the control variable "level of education" in the regression model tested for the variable "broadband penetration". It seems that both researchers and practitioners have highlighted the advantages of e-Government and e-Government programs remain at the top of most countries policy agendas (UN, 2002) independently of the cultural variable long term orientation/ short term orientation.
- The hypothesis H6 is supported. The Beta coefficients of the variable EDU (table 4) are higher than those of the cultural variables suggesting that EDU is more important in the e-Government adoption. The highest coefficient is attained at the stage 2 (table 4). Although, the communication and information flows are still unidirectional (PA → Society), this stage is more sophisticated than the first (UN, 2005). In the beginning, citizens and employees in the PA can face technical problems; the resolution of these problems may require high levels of knowledge. Then, the accumulation of experiences generates know-how and new skills that can be used to engage in the more advanced stages of e-Government evolution.

7. Conclusion

This study is designed to examine whether cultural characteristics explain differences in worldwide e-Government adoption by PA. It is found that results vary according to the regression model tested, and national cultural dimensions influence the e-Government adoption. Among the cultural variables ID and UA are the most significant and PD is of minor importance. However, results show that the cultural and socioeconomic variables, taken together, explain better the e-Government adoption by PA. The level of education attainment is more important since the e-Government requires the recombination of efforts and the expertise of several stakeholders (PA, private partners in the case of outsourcing, etc.) for the development of e-services that respond to the needs of a society. Reciprocally, to be able to use e-services, society must detain the requisite skills.

This study has implications both for practice and theory. e-Government adoption by PA is measured by WMI and by stages of e-Government evolution. So results identify the most significant cultural dimensions by

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stages. To take in to account the significant cultural variables when elaborating policies for e-Government adoption by PA may be important. At a theoretical level, this study suggests to add cultural variables to other theories and models, such as the diffusion of innovations (DOI) theory, the theory of planned behaviour (TPB) and the technology acceptance model (TAM), to study e-Government adoption. Horst (2007), for example, finds that perceived risk by citizens is inversely related to perceived usefulness of e-Government services, and that this later is an important determinant of citizens' intention to adopt e-Government services.

This research is not exempt of reservations. The first limit relates to the measurement of the national culture. Dimensions are derived from Hofstede cultural approach. In addition to its criticisms (Baskerville, 2003; 2005), Hofstede provides regional scores for Arab world, East and West Africa. Since these scores are regional and that countries can have different scores from those of the region, the countries belonging to these regions are excluded from this study despite the availability of data on e-Government adoption in the UN report (2005). Data in this report show that fewer countries evolve to stages 4 and 5 and that the full potential at these stages is unexploited. Different approaches of the e-Government according to countries must to be considered (OECD, 2003). Thus, to be unaware of variables such as political systems, strategic priorities of the governments, and technical and organizational challenges (Layne and Lee, 2001; Ebrahim and Irani, 2005) in the e-Government adoption and particularly the evolution to stages 4 and 5, is another limit.

References

Bagchi, K., Hart, P. et Peterson, M.F., 2004, « National Culture and Information Technology Product Adoption", Journal of Global Information Technology Management, 7, 4, pp.29-46.

Bartoli, A., 2005, Le management dans les organisations publiques, Edition Dunod, Paris.

Baskerville, R.F., 2003, "Hofstede never studied culture", Accounting, Organizations and Society, 28, pp.1–14.

Baskerville, R.F., 2005, "A research note: the unfinished business of culture", Accounting, Organizations and Society, 30, pp.389–391.

Ebrahim, Z. et Irani, Z., 2005, "e-Government adoption: architecture and barriers", Business Process Management Journal, Vol.11, N°5, pp.589-611.

El Jamali, T., Plaisent, M., Benyahia, H., Bernard, P. et Maguiraga, L., 2004, « La France à l'heure du e-gouvernement », 9ème Colloque de l'AIM, « Systèmes d'information : Perspectives critiques », 26, 27 et 28, mai 2004, INT Evry France.

El Louadi, M., 2004, « Cultures et communication électronique dans le monde arabe », Systèmes d'information et Management, Vol.9, N°3, pp.117-143.

Erumban, A.A. et de Jong, S.B., 2006, "Cross-country differences in ICT adoption: A consequence of culture?", Journal of World Business, 41, pp.302–314.

Gong, W, Li, Z.G. et Stump, R.L., 2007, « Global internet use and access: cultural considerations", Asia Pacific Journal of Marketing and Logistics, Vol. 19, N°1, pp. 57-74.

Hall, E.T., 1976, Beyond Culture, Anchor Books, New York, NY.

Hofstede, G., www.geert-hofstede.com/hofstede_dimensions.php, access : 14-09-07.

Horst, M., Kuttschreuter, M.T., Gutteling, J.M, 2007, "Perceived usefulness, personal experiences, risk perception and trust as determinants of adoption of e-Government services in The Netherlands", Computers in Human Behavior, 23, pp.1838–1852.

Kovacic, Z.J., 2005, "The Impact of National Culture on Worldwide e-Government Readiness", Informing Science Journal, Vol.8, pp.143-158.

Layne, K. et Lee, J., 2001, "Developing fully functional e-Government: a four stage model", Government Information Quarterly, Vol.18, N°2, pp.122-136.

Moon, M.J., 2002, "The evolution of e-Government among municipalities: Rhetoric or reality?", Public Administration Review, 62, 4, pp.424-443.

OCDE, 2003, "The e-Government imperative",www1.worlbank.org/publicsector/egov/e-GovernmentImperative.pdf, 199p, access: 5-03-04.

ONU, 2002, "Benchmarking e-Government: A Global perspective, assessing the progress of the UN member states", 81pp. www.golconferenceca/presentations/e-Government_UN.pdf, access: 5-02-04.

ONU, 2003, "World Public Sector Report 2003: e-Government at the Crossroads", unpan1.un.org/intradoc/groups/public/documents/UN/UNPAN012733.pdf, access: 05-09-05, 129p.

ONU, 2004, "Global e-Government readiness report 2004: Towards access for Opportunity", New York, 182p. http://unpan1.un.org/intradoc/groups/public/documents/un/unpan019207.pdf, access: 29-08-05.

ONU, 2005, "From e-Government to E-inclusion", UN Global e-Government Readiness Report, unpan1.un.org/intradoc/groups/public/documents/un/unpan021888.pdf, pp.1-270, access: 21-09-07.

Qian, H., 2007, "UNDESA Initiative on Global e-Government Assessment", pp.1-10, access: 21-09-07, unpan1.un.org/intradoc/groups/public/documents/APCITY/UNPAN024987.pdf.

Rosenberg, N., 1972, "Factors affecting diffusion of technology", Explorations in Economic History, 10, 1, pp.3-33.

World Bank list of economies (July 2007), siteresources.worldbank.org/DATASTATISTICS/Resources/CLASS.XLS, access: 20-09-07.

Zghal, R., 2001, « Technologies de l'information et de la communication, administration publique et culture en Tunisie », 5ème conférence internationale de management des réseaux d'entreprises, Octobre 2001, Tunisie - Mahdia, pp.1-8.

Appendix 1

WMI and characteristics of the 50 first countries (UN, 2005)

Countries	WMI	Rang	Income/ capita*	Development state
1 USA	1.0000	1	High	
2 United Kingdom	0.9962	2	High	
3 Singapore	0.9962	2	High	Developing
4 Republic Korea	0.9769	3	High	
5 Denmark	0.9731	4	High	
6 Chile	0.9115	5	Superior to the average	Developing
7 Australia	0.9038	6	High	
8 Canada	0.8923	7	High	
9 Sweden	0.8654	8	High	
10 Germany	0.8423	9	High	
11 Finland	0.8269	10	High	
12 Mexico	0.8192	11	Superior to the average	Developing
13 Japan	0.8154	12	High	
14 New Zealand	0.8038	13	High	
15 Norway	0.7962	14	High	
16 Malta	0.7923	15	High	
17 Brazil	0.7500	16	Superior to the average	Developing
18 Austria	0.7423	17	High	
19 Philippines	0.7423	17	Lower to the average	Developing
20 Holland	0.7346	18	High	
21 Israel	0.7308	19	High	
22 Belgium	0.7115	20	High	
23 Ireland	0.7115	20	High	
24 Hungry	0.7038	21	Superior to the average	Developing
25 Estonia	0.6962	22	High	
26 Thailand	0.6654	23	Lower to the average	Developing
27 Argentina	0.6577	24	Superior to the average	Developing
28 Romania	0.6423	25	Superior to the average	Developing
29 Mauritius	0.6288	26	Superior to the average	Developing
30 Italy	0.6269	27	High	
31 Colombia	0.615	28	Lower to the average	Developing
32 France	0.6115	29	High	
33 United Arab Emirates	0.6115	29	High	
34 Iceland	0.6077	30	High	
35 Suisse	0.6038	31	High	
36 Slovenia	0.5923	32	High	
37 Czech Republic	0.5885	33	High	
38 India	0.5827	33	Low	Developing
39 Ukraine	0.5808	34	Lower to the average	Developing
40 Malaysia	0.5769	34	Superior to the average	Developing
41 Venezuela	0.5769	34	Superior to the average	Developing
42 Chine	0.5692	35	Lower to the average	Developing
43 South Africa	0.5692	35	Superior to the average	
44 Peru	0.5577	36	Lower to the average	Developing
45 Slovakia	0.5385	37	Superior to the average	
46 Lithuania	0.5231	38	Superior to the average	
47 Turkey	0.5231	38	Superior to the average	Developing
48 Bulgaria	0.5192	39	Superior to the average	Developing
49 Greece	0.5115	40	High	
50 Poland	0.5115	40	Superior to the average	

*World Bank list of economies (July 2007), siteresources.worldbank.org/DATASTATISTICS/Resources/CLASS.XLS, access: 20-09-07.

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