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Moderating Factors in Adopting Local e-Government in Spain

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ABSTRACT *This study analyses the factors that influence citizens' intention to use e-government activities offered by municipalities in Spain. For this purpose, we developed a straightforward user behaviour model that considers the components of the TAM and DOI models simultaneously, harnessing their synergies and factoring in the role of citizens' trust. We also examined the moderating role that population size can play in the model's behaviour. Among the results we obtained, it is important to note that user trust not only improved the model's fit, but also showed a significant effect on intention of use for all the population sizes that we analysed. The other significant relationship for all the samples linked ease of use to perceived usefulness. For the other relationships between variables, we observed the moderating role of size for the populations we considered.*

KEY WORDS: e-Government, DOI, public marketing, population, TAM, trust

1. Introduction

By using information and communications technologies (ICT), governments and public authorities can contribute to an institutional change: from the public management perspective, by improving its efficiency, and from a political perspective, by fostering citizen participation in institutions. Increased ICT use is essential for promoting improvements in the way local authorities communicate and provide public services (Beynon-Davies and Martin 2004). Although many local authorities have made an effort to make their information available online, they have not yet succeeded in changing their internal processes and developing collaborative work between institutions, for which ICT is particularly appropriate (Beynon-

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Davies and Martin 2004, Ford and Murphy 2008). Developing more user-friendly public administration services is often one of the goals sought when implementing state-of-the-art technology (Schedler and Summermatter 2007). The term 'e-government' has been coined to capture this entire potential for change and to depict the most ambitious dimension of ICT's contribution to all levels of public administration.

e-Government efforts can be analysed according to the agents involved in the exchange. One can refer to government to citizen (G2C) relationships when these concern a government and its citizens, government to business (G2B) relationships when a government relates to companies and government to government (G2G) relationships when different public authorities relate to one another (Reddick 2004). Belanger and Hiller (2005) add a fourth category, government to individuals as a part of the political process (G2IP), which involves the relationships the government has with citizens in the context of a democratic process, such as e-voting.

Although G2C initially went through what was referred to as phase I, in which public authorities did little more than provide information (Reddick 2004), public management pressures led to government getting involved in carrying out transactions with citizens, first nationwide and then at a local level, while also providing considerable technological and organisational sophistication in its G2C efforts (Gil-García and Martínez-Moyano 2007).

Despite the steadfast determination to introduce e-government, there are obstacles that set the ultimate goals quite far ahead of the modest results achieved so far. Some of the main obstacles are as follows: functionality issues, identity verification requirements, threats to confidentiality, citizens' preferences for interpersonal relationships and established behaviour patterns that favour offline alternatives (Kolsaker and Lee-Kelly 2007).

e-Government analysis and development studies consider its implications both from a supply and from a demand perspective. The supply perspective analyses how public authorities provide information and public services online, and four stages have been observed in the development of this process: presence, interaction, transaction and transformation (Layne and Lee 2001) In transformation, the full potential of e-government is implemented and involves offering public services from a single contact point with citizens that makes the administration totally transparent to its users, in what is referred to as Electronic Democracy (Layne and Lee 2001) or T-Government (King and Cotterill 2007, Weerakkody and Dhillon 2008).

The second perspective, i.e. the demand perspective, addresses the factors determining citizen's acceptance of e-government proposals (Warkentin *et al*. 2002, Carter and Belanger 2005, Reddick 2009), considering that the factors with a strong influence on the different online consumer behaviour models (Gefen and Straub 2000, Moon and Kim 2001, Pavlou 2003) also have an effect on the adoption of e-government models (Warkentin *et al*. 2002). Nonetheless, there are differences between the two concepts, particularly given that public organisations are responsible for achieving

the best public interest (Jorgensen and Cable 2002), whereas private organisations are clearly profit-oriented. Therefore, it makes sense to pursue a separate line of research for e-government that is conceptually different from that of e-commerce (Warkentin *et al*. 2002, Heeks and Bailur 2007).

Along these lines, it is interesting to examine whether the antecedents of technology acceptance continue to be relevant in the case of e-government, given the greater legitimacy and authority attributed to public organisations. Although governments are essentially political by nature and have certain authority to regulate the use of e-government, its use is optimised when acceptance by citizens is voluntary rather than mandatory (Warkentin *et al*. 2002). Given that both e-commerce and e-government are based on carrying out transactions over large distances, and given the absence of personal interaction, they require trust from consumers or citizens (Belanger *et al*. 2002, McKnight *et al*. 2002, Van Slyke *et al*. 2004), and hence trust is worked into those models (Gefen 2002, Warkentin *et al*. 2002, Pavlou 2003, Belanger and Carter 2008). These considerations lead us to our two main goals in the present study: first, to determine the applicability of traditional models for innovation acceptance to e-government activities, and second, to analyse the appropriateness of including trust in these models, as has already been suggested in previous papers.

In other cases, e-government analysis focuses on the moderating role that certain variables can have in their operation, and several studies highlight the possible moderating role that the population size of a town can play in the acceptance of innovations (Brudney and Selden 1995) as well as in the adoption of e-government (Moon 2002, Holden *et al*. 2003). Hence the third goal in the present study is to examine the moderating role that the population size of a town may have in citizens' willingness to accept e-government efforts offered by the municipality.

2. Explanatory models for e-commerce adoption

The most broadly accepted explanatory model for consumer behaviour is the technology acceptance model (TAM), which was proposed by Davis (1989) and is an adaptation of the theory of reasoned action (TRA) focused on new technology-related behaviour. In particular, this theory pays special attention to the analysis of the effect of external factors on individuals' beliefs, attitudes and intentions (Davis *et al*. 1989).

The TAM replaces the beliefs defined in TRA with two elements referred to as *perceived usefulness* and *ease of use*, based on the assumption that they are beliefs that have an influence on shaping attitudes and, hence, on individuals' intention and behaviour concerning their use of technology (Davis 1989, Davis *et al*. 1989). Perceived usefulness refers to the degree to which an individual considers that using a particular system will improve his or her performance of an activity, whereas ease of use is defined as the degree to which the potential user of the technology expects its use to not

require an effort. The TAM model is considered a robust structure for explaining how users develop their attitudes towards technology and its use (Davis 1989, Hu *et al.* 1999, Koufaris 2002). Despite being widely supported, the TAM model lacks a consensus as to its formulation; alternative specifications have been posited (Davis *et al.* 1989, Adams *et al.* 1992, Chau 1996, Szajna 1996), which in some cases include additional variables (Taylor and Todd 1995, Childers *et al.* 2001, Shih 2004a).

The diffusion of innovations (DOI) model (Rogers 1995) establishes how diffusion of innovations is modelled as a process for gathering information and reducing uncertainty with the purpose of evaluating technology, identifying five elements that can influence it: relative advantage, complexity, compatibility, trialibility and observability of its results. Compatibility is considered to be the fundamental attribute in the explanation of technology-related behaviour (Tornatzky and Klein 1982, Moore and Benbasat 1991, Rogers 1995). Rogers (1995) defines it as 'the degree to which an innovation is seen to be compatible with existing values, beliefs, experiences and needs of adopters'. Usually, e-commerce adoption is associated with previous online experience (Bhatnagar *et al.* 2000, Citrin *et al.* 2000, Park and Jun 2003), which is identified by several authors as a component of compatibility. Carter and Bélanger (2005) point out that citizens are more willing to use online government services if those services are congruent with the way in which they like to interact with others.

Mistrust shown by consumers when it came to making their purchases online was one of the main obstacles for e-commerce adoption (Wang *et al.* 1998, Jarvenpaa *et al.* 2000). Therefore, several studies stress the need to include *trust* in generic adoption models (Gefen 2002, Warkentin *et al.* 2002, Pavlou 2003, Kim and Prabhakar 2004). McKnight *et al.* (2002) developed a model that integrated trust in virtual environments. This model was based on a previous model (McKnight *et al.* 1998) and included trust placed in an institution as well as trust-related behaviour.

3. Developing a model for the intention to use e-government

Although DOI (Rogers 1995) suggests the existence of five elements, later studies (Tornatzky and Klein 1982, Agarwal and Prasad 1998, Carter and Belanger 2005) state that three of these are the strongest determinants: relative advantage, compatibility and complexity. Meanwhile, when developing comprehensive models for technology adoption, it is important to consider the similarity between the TAM and DOI components, because although complexity can be determined according to perceived ease of use, relative advantage is related to perceived usefulness (Venkatesh *et al.* 2003, Carter and Belanger 2005).

Belanger and Carter (2008) point out that trust is essential for developing e-government since it influences intention of use in its many different dimensions. Hence, it is crucial to establish a relationship of trust with the

public to ensure confidentiality of the supplied data and to provide updated and reliable information online (Gilbert *et al*. 2004). Trust in e-government refers to the prevailing perception of the integrity and ability of an agency to provide a service (McKnight *et al*. 2002).

Carter and Belanger (2005) suggest that ease of use, compatibility and trust are significant predictors for citizens' intention to use e-government services. Despite the many models and elements that have been used to describe technology adoption, Benbasat and Barki (2007) argue that only the concept of perceived usefulness offers a solid explanation for intention of use. Along the same lines, Carter and Weerakkody (2008) posit that relative advantage and trust are the elements that influence the intention to use e-government resources. It is also important to consider TAM approaches, which assume that perceived usefulness mediates the relationship between perceived ease of use and intention of use (Davis 1989, Davis *et al*. 1989, Gefen and Straub 2000). On the basis of these approaches, we will consider the following five hypotheses:

H_1: Compatibility has a positive effect on the intention to use e-government
H_2: Perceived ease of use has a positive effect on the intention to use e-government
H_3: Trust has a positive effect on the intention to use e-government
H_4: Perceived ease of use has a positive effect on perceived usefulness
H_5: Perceived usefulness has a positive effect on the intention to use e-government

4. Population size as a moderating factor of e-government efforts

Although many studies analyse the variables that act as moderators in the acceptance of technology, the range of variables ought to be broadened beyond those considered traditionally (Venkatesh *et al*. 2000, 2007). According to Brudney and Selden (1995), population size is considered in studies examining innovation, both from the perspective of organisational and of environmental factors. In terms of the latter, and using the number of inhabitants as its measurement, the literature identifies population size as one of the main catalysts for adopting e-government (Moon 2002, Holden *et al*. 2003).

Larger-sized local governments are more likely to adopt innovative systems because they are subjected to greater pressures to find alternative ways of offering public services while also reducing their costs (Reddick 2009). Along the same lines, Schedler and Summermatter (2007) examined the existence of a positive correlation between the size of a town and the development of e-government initiatives. In other studies, the arguments are somewhat different, pointing out that densely populated cities are quicker to adopt state-of-the-art technologies given the demands made by their citizens

(Choudrie *et al.* 2005, Silverman 2006). Accordingly, it appears that small towns are less likely to develop e-government because personal contact is one of the determining factors in citizen satisfaction with public services (Van Ryzin 2004). However, in some cases size appears to be unrelated to the many aspects of technology adoption in offering public service (Reddick 2009). On the basis of these theoretical assumptions, we posit the following hypothesis:

> *H_6: The intensity of the relationships posited in our model is affected by the town's population size*

5. Field work

5.1. Measurement scale

The model used in this study is based on Carter and Belanger (2005) and includes the constructs of TAM, DOI and some elements from models that try to explain users' trust in virtual environments to create a parsimonious and comprehensive model of the factors influencing citizens' adoption of e-government initiatives.

The compatibility scale is drawn from former studies (Moore and Benbasat 1991, Van Slyke *et al.* 2004) and includes four items. The first two issues regarding compatibility refer to the formulae that are used to gather information and interact with government ('I think using the web would fit well with the way that I like to gather information' and 'I think using the web would fit well with the way that I like to interact with the ...'); the two remaining questions refer to lifestyles and ways of doing things ('Using the web to interact with the ... would fit into my lifestyle' and 'Using the web to interact with the ... would be incompatible with how I like to do things').

Ease of use and perceived usefulness are drawn from the works of Davis (1989) and Gefen and Straub (2000), with four items ('Learning to interact with the ... web site would be easy for me', 'I believe interacting with the ... web site would be a clear and understandable process', 'I find the ... web site to be flexible to interact with' and 'It would be easy for me to become skilful at using the ... web site') and five items ('The ... web site would enable me to complete transactions with ... more quickly', 'I think the ... web site would provide a valuable service for me', 'The ... web site would enhance my effectiveness in searching for and using ... services', 'I would find the ... web site useful' and 'The content of the ... web site would be useless to me'), respectively.

Trust is measured according to a feeling of benevolence towards the public agency (Pavlou 2003, Van Slyke *et al.* 2004) with three items ('I think you can trust ...', '... can be trusted to carry out transactions faithfully' and 'In my opinion ... are trustworthy'). Lastly, and given that there are many conceptualisations of e-government adoption, we will refer to those

most broadly used in the literature: citizens' intention to access e-government to receive information and request public services ('I would use the web for gathering information from ...' or 'I would use the web to inquire about ... services') (Warkentin *et al.* 2002, Carter and Belanger 2005) as well as willingness to use e-government services ('I would use ... services provided over the web') (Gilbert et al. 2004). (4)

5.2. Data gathering

The method used for gathering data was a survey posted on the Internet. To encourage and diversify participants, e-mails were sent out to a variety of groups with a summary of the goals of the survey and a link to the survey form on several local government websites where the answers could be posted; at any rate, the data gathering process was wholly Web-based.

The field work was performed from May through September of 2008. The sample included Internet users throughout all of Spain. From a total of 826 completed surveys, 48 were discarded. All the completed surveys were saved in real time in a database that was structured and designed specifically for the research project. To check the validity of the data during the mailing process and avoid storage errors, three control parameters were saved for each question: user IP address, date and time of response and, lastly, a specific session ID for each hit.

Considering the moderating role of population size in e-government adoption, we used a quota sampling procedure. For reference we used the territorial distribution of Internet users periodically compiled by the INE (National Statistics Institute, http://www.ine.es/en/welcome_en.htm), in the survey included in the New Information and Communications Technologies section about ICT equipment and use in Spanish homes. The results indicate that the sample that was used is very similar to that of the demographic profile for Internet users (Table 1).

5.3. Results

To perform the analysis, the sample was divided into four groups: cities that are province capitals or with populations over 100,000 (Group 1), cities with populations from 50,001 to 100,000 (Group 2), towns with populations from

Table 1. Breakdown of the sample

Population in each municipality	Survey data	INE data
Over 100,000 or provincial capital	52.1%	46.6%
50,001–100,000	14.3%	10.1%
10,000–50,000	19.4%	25.8%
Under 10,000	14.3%	17.5%

315 10,000 to 50,000 (Group 3) and, lastly, towns with populations under 10,000 (Group 4).

The statistical analysis was performed by developing the structural equations model with PLS 3.0 Build 11.30. The partial least square (PLS) method seeks to predict the value of latent variables based on an estimation 320 of the ordinary least square (OLS) and on principal component analysis (ACP). This approach has certain advantages over covariance-based methods, such as its requirements for the distribution of the variables in the sample, the types of variables and the sample size (Chin and Newsted 1999).

325 The scales we used were adaptations of the scales that had been validated in previous studies and whose *content we assume to be valid. Convergent validity* was established by analysing the average variance extracted (AVE), having stated that the AVE values must be higher than 0.5, while in any case the composite reliability of the constructs is higher than 0.7. All the 330 constructs met this requirement (Table 2). To establish the *discriminant validity*, the AVE value must be higher than the variance shared by the construct and the other represented constructs. To simplify the comparison, each element along the main diagonal (square root of AVE) must be higher than the remaining elements in its row and the corresponding column – 335 correlations between constructs – (Barclay *et al.* 1995) (Table 3).

(5) Next, a *nested models* analysis was performed (Gefen *et al.* 2000) to determine whether including trust in the model improved its fit. The R^2 difference calculated using an f^2 statistic enables us to examine the considerable impact of including new relationships in the model or of 340 (6) modifying the existing ones. Moderating effects with values higher than 0.02 are considered weak, those higher than 0.15 are considered moderate and those higher than 0.35 are considered strong.

On the basis of the value of the f^2 statistic (Table 4), we can establish that in all four cases the effect is weak, although the impact of including trust in 345 the intention to use e-government initiatives is stronger in the case of towns with populations up to 50,000, namely Groups 3 and 4.

When we purified the scale for Group 1, we eliminated items Compat4, EaseUse4 and PercUsef5 (Table 2), given that their factor loading was lower than 0.707. In this case, the relationships were significant between 350 compatibility and intention of use (path = 0.138, $t = 2.0292$), between ease of use and perceived usefulness (path = 0.608, $t = 10.5868$), between perceived usefulness and intention of use (path = 0.3853, $t = 5.4644$) and (7) between trust and intention of use (path = 0.1333, $t = 2.9249$) (Figure 1). Conversely, the relationship between ease of use and intention of use was 355 not significant (path = 0.022, $t = 0.3196$).

For Group 2, items Com4, EaseUse4, PercUsef5 and Trust3 were purified (Table 2). For this sub-sample, relationships were significant between compatibility and intention of use (path = 0.250, $t = 1.6951$) and between trust and intention of use (path = 0.141, $p = 1.6437$), but were not significant

Table 2. Items included in the scales, per group

	Group 1			Group 2			Group 3			Group 4		
	Composite reliability	Mean	*SD*	Composite reliability	Mean	*SD*	Composite reliability	Mean	*SD*	Composite reliability	Mean	*SD*
Comp1	0.9220	5.6953	1.7244	0.9490	5.7611	1.5473	0.8910	5.5066	1.7014	0.9100	5.6111	1.9712
Comp2		5.5602	1.7259		5.7080	1.5780		5.3355	1.7916		5.5278	1.8928
Comp3		5.9435	1.6438		5.9735	1.4171		5.7763	1.5483		5.7685	1.9081
Comp4		–	–		–	–		–	–		–	–
EaseUse1	0.9150	5.9361	1.5942	0.8880	6.0265	1.4602	0.8790	5.9868	1.5474	0.9090	5.7963	1.9185
EaseUse2		6.0000	1.5100		6.1150	1.4978		6.2303	1.2694		6.0833	1.6784
EaseUse3		5.6437	1.6994		5.9204	1.6193		5.9803	1.5872		5.5278	2.1233
EaseUse4		–	–		–	–		–	–		–	–
PercUsef1	0.9290	6.3686	1.2895	0.9370	6.3982	1.2589	0.9400	6.2303	1.4621	0.9540	6.1574	1.7222
PercUsef2		6.2359	1.3979		6.3628	1.2625		6.1645	1.4843		6.2222	1.6960
PercUsef3		6.1400	1.4978		6.1504	1.3776		6.2105	1.3010		5.9815	1.7898
PercUsef4		6.4865	1.2399		6.5398	1.1976		6.5132	1.1470		6.3333	1.5575
PercUsef5		–	–		–	–		–	–		–	–
Trust1	0.9030	4.6806	1.8350	0.9260	4.4779	1.9647	0.8740	4.6184	1.8881	0.9280	4.3333	2.1257
Trust2		4.2138	1.7231		3.8584	1.8235		4.0789	1.6564		3.9907	2.0615
Trust3		4.0147	1.8770		3.8938	2.0192		–	–		4.0463	2.2210
IntUse1	0.8930	5.6609	1.9548	0.8940	5.8673	1.7115	0.8940	5.4934	1.9160	0.8930	5.4074	2.1860
IntUse2		4.7690	2.2324		5.0531	2.1196		4.3882	2.1184		4.4630	2.2502
IntUse3		4.7543	2.2418		5.0796	2.1250		4.5987	2.0041		4.4444	2.3934

Table 3. Discriminant validity of the different groups

	Compat	EaseUse	PercUsef	Trust	IntUse
Group 1					
Compat	0.893	–	–	–	–
EaseUse	0.609	0.883	–	–	–
PercUsef	0.627	0.608	0.876	–	–
Trust	0.288	0.318	0.272	0.870	–
IntUse	0.427	0.379	0.515	0.283	0.858
Group 2					
Compat	0.928	–	–	–	–
EaseUse	0.632	0.851	–	–	–
PercUsef	0.749	0.699	0.888	–	–
Trust	0.266	0.188	0.295	0.898	–
IntUse	0.455	0.376	0.440	0.269	0.860
Group 3					
Compat	0.857	–	–	–	–
EaseUse	0.544	0.842	–	–	–
PercUsef	0.577	0.563	0.892	–	–
Trust	0.147	0.199	0.002	0.881	–
IntUse	0.272	0.219	0.349	0.332	0.858
Group 4					
Compat	0.879	–	–	–	–
EaseUse	0.810	0.877	–	–	–
PercUsef	0.707	0.680	0.917	–	–
Trust	0.368	0.348	0.346	0.901	–
IntUse	0.342	0.221	0.299	0.378	0.857

Table 4. Strength of the moderating effect of including trust in the model

Group 1	$f^2 = 0.022$
Group 2	$f^2 = 0.024$
Group 3	$f^2 = 0.118$
Group 4	$f^2 = 0.089$

when they linked ease of use (path = 0.141, $p = 1.6437$) and usefulness (path = 0.152, $t = 0.8203$) with intention of use (Figure 2). The relationship between ease of use and perceived usefulness was also significant (path = 0.699, $t = 8.4352$).

For Group 3, Comp4, EaseUse4, PercUsef5 and Trust3 were eliminated (Table 2). In this case, the relationships were significant between ease of use and perceived usefulness (path = 0.563, $t = 4.8963$), between perceived usefulness and intention of use (path = 0.361, $t = 3.1796$) and between trust and intention of use (path = 0.339, $t = 4.5919$) (Figure 3). The relationships between compatibility and intention of use (path = 0.059, $t = 0.5826$) and between ease of use and intention of use (path = –0.084, $t = 0.7157$) are not significant.

Lastly, in the purification process for Group 4, we eliminated variables Comp4, EaseUse4 and PercUsef5 (Table 2). This sub-sample shows significant relationships between compatibility and intention of use

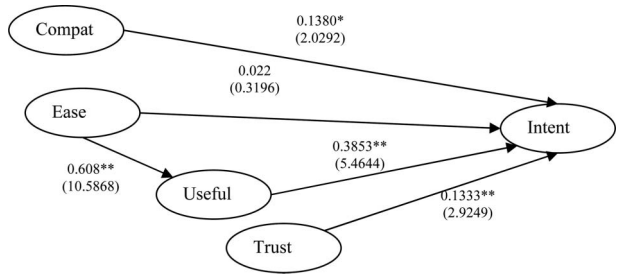

Figure 1. Resulting model (Group 1).

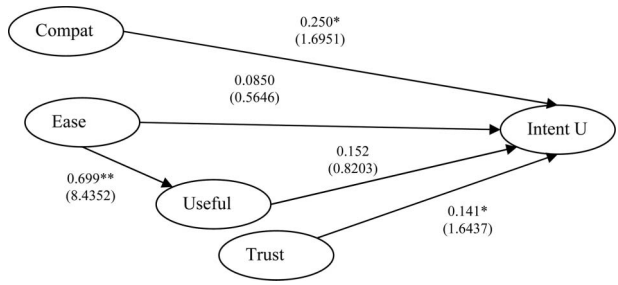

Figure 2. Resulting model (Group 2).

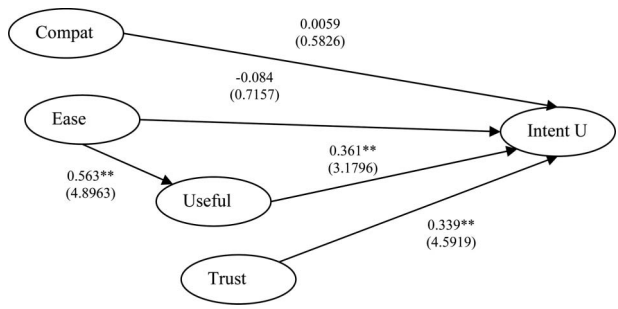

Figure 3. Resulting model (Group 3).

(path = 0.3460, $t = 1.9737$), between ease of use and perceived usefulness (path = 0.680, $t = 6.8476$) and between trust and intention of use (path = 0.2940, $t = 2.6803$) (Figure 4). Conversely, the relationships between ease of use and intention of use (path = −0.240, $t = 1.2151$) and between perceived usefulness and intention of use (path = 0.1160, $t = 0.8629$) were not significant.

In studies attempting to show contingent effects, it is important to determine whether differences exist between the groups and to estimate the

strength of the moderating effects (Qureshi and Compeau 2009) with multi-group analysis (Chin and Newsted 1999).

The second column in Table 5 shows the existence of a significant difference in the relationship between trust and intention of use, but with a greater value in the case of the sample for towns with populations ranging from 10,000 to 50,000. For towns within that range, trust is the component that differentiates both models in terms of their acceptance of e-government. If we analyse the third column, we observe the relevance of perceived usefulness for the acceptance of e-government activities among residents in cities with populations over 100,000 or provincial capitals, and the value is higher for the group with the highest population. When we compare towns with populations ranging from 50,001 to 100,000 with those whose populations range from 10,000 to 50,000, we observe the existence of significant differences in the relationship between trust and intention of use. Again, this shows the relevance of trust for the adoption of e-government initiatives among towns with populations ranging from 10,000 to 50,000. Lastly, significant differences were not observed in the sample for towns with populations under 10,000, those with populations ranging from 50,001 to 100,000 and those with populations ranging from 10,000 to 50,000.

On the basis of the results, we can determine that we must partially reject H_1 and H_5 because the relationship between compatibility and intention of use and between perceived usefulness and intention of use is significant only

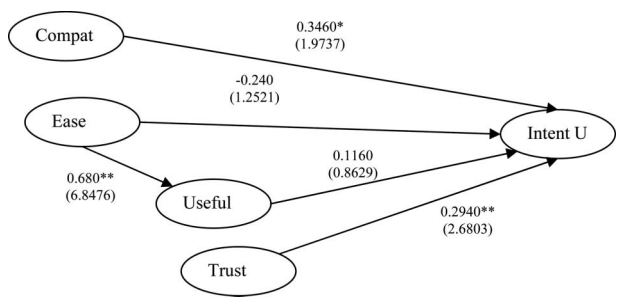

Figure 4. Resulting model (Group 4).

Table 5. Multigroup analysis for population sub-samples

	Group 1–Group 2	Group 1–Group 3	Group 1–Group 4	Group 2–Group 3	Group 2–Group 4	Group 3–Group 4
Comp-Intent	−0.7295	0.6214	−1.3040	1.0618	−0.4081	−1.5134
Ease-Useful	−0.7830	0.3844	−0.5882	0.9141	0.1521	−0.7335
Ease-Intent	−0.4104	0.7955	1.5820	0.8907	1.3318	0.7344
Useful-Intent	1.4192	0.1355	1.7397*	−1.0528	0.1637	1.3976
Trust-Intent	−0.0810	−2.3706*	−1.5392	−1.7066*	−1.0793	0.3548

*$p < 0.05$, $t_{(0.05;\ 499)} = 1.62$. **$p < 0.05$, $t_{(0.05;\ 499)} = 2.33$.

in two of the sub-samples. We must also reject H_2 because ease of use did not show a significant impact on intention of use for any of the samples we used. Conversely, we must accept H_3 and H_4 because the relationship between trust and intention of use and between ease of use and perceived usefulness was significant in the four sub-samples. Lastly, we must also accept H_6, following the observation that population size moderates the behaviour of the model that analyses the antecedents for the intention to use e-government.

5.4. Analysis

According to the results obtained for the sample of towns with populations over 100,000 or provincial capitals, it appears that the intention to use e-government is motivated by compatibility, perceived usefulness and trust, with perceived usefulness mediating the influence of ease of use on that intention to use; in fact, ease of use is the only variable that does not show a significant impact on intention of use.

This behaviour is similar to that of Groups 2, 3 and 4. In the case of Group 3, the only difference is that compatibility does not appear to have a significant effect on intention of use, whereas in Groups 2 and 4 perceived usefulness does not exert an influence on the intention to use e-government activities.

If we analyse the results from a DOI perspective, we find a limited effect of compatibility (in three out of four cases) and of relative advantage (which only appears in half of the sub-samples) on intention of use as well as the non-existent effect of complexity on that variable. What we do observe is the effect of complexity (or the lack thereof) on the relative advantage of e-government activities. Therefore, the results suggest the influence of trust in both the TAM and the DOI models since it is the only variable that has an effect on the intention to use e-government activities in the four sub-samples we used.

6. Conclusions

Although considerable research has been performed on the subject of e-government, carrying its models over directly to local government requires considering as an essential difference the fact that municipalities have a unique feature: they are the government bodies closest to citizens. This general fact determines the existence of a greater responsibility of the government's power and, potentially, a larger impact on its citizens.

Citizens' intention to get involved in e-government depends on several variables that have been mentioned repeatedly in the literature and whose presence in citizens' behaviour in their dealings with local government we have attempted to demonstrate in this study. These variables are compatibility with individuals' beliefs and lifestyles, people's trust in the

technology supporting e-government, ease of use and perceived usefulness. However, there are also factors that can be considered as moderators in the relationship between these variables and the final intention to participate in e-government activities (Venkatesh *et al.* 2007). One of these factors – population size in the town addressed by those activities – has also been examined in the present study and was found to have a relevant influence on the effects that explanatory factors have on e-government adoption, as we will explain later in the paper. In fact, there is a wide variety of local government management models, forms of organisation and specific levels of dedication, which are primarily determined by population size – from virtually non-existent civil service structures in small towns, whose main management asset is the determination of its elected officials, to large, hierarchical corporations in large cities.

All in all, the results of our empirical analysis show that trust is a key element for citizens to adopt e-government (as supported by the TAM and DOI models; Gefen 2002, McKnight *et al.* 2002, Warkentin *et al.* 2002, Pavlou 2003). Therefore, municipalities should convey their commitment to e-government to their citizens, above and beyond considering their online presence as an end in and of itself. Offering high-quality public services along with active transparency policies covering all areas of public management will contribute to the perception of the government's availability and goodwill towards its citizens, and will hence contribute to increasing trust in e-government.

Local governments' efforts in the area of e-government must develop policies aimed at convincing citizens that the municipality and, above all, its civil servants show interest and are capable of providing contents that are focused on citizens and non-bureaucratic services designed to fulfil citizens' needs. Working along these lines not only implies reinforcing citizens' trust in e-government and improving their levels of use but also involves something with deeper political implications, namely fostering transparent relationships and an efficient supply of online public services.

Perceived usefulness also clearly emerges as a moderator in the relationship between perceived ease of use and the intention to use e-government (Davis 1989, Davis *et al.* 1989, Gefen and Straub 2000). In our study, we were able to determine the discriminant validity of the compatibility and relative advantage constructs, measured according to perceived usefulness (Van Slyke *et al.* 2008). The high discriminant validity shown by these concepts proves the appropriateness of measuring relative advantage according to perceived usefulness. Local government influences very specific aspects and needs of citizens' everyday lives, and therefore what is expected of it is solutions to citizens' basic demands and fairly fast results. This may be the reason why perceived usefulness appears to be so relevant at the municipal level.

Ease of use, on the other hand, does not appear to have an effect on intention of use, except in those cases in which it is mediated by perceived

usefulness. Therefore, we can assume that citizens do not consider ease of use as a directly determining element for their participation in e-government activities (Salisbury *et al*. 2001, Pavlou 2003, Shih 2004b), probably because in many cases they are already accustomed to using the online tools used by e-government for other purposes. In fact, ease of use is interpreted by citizens as an element that increases perceived usefulness (contrary to the thesis of Gentry and Calantone 2002); it leads to e-government initiatives being considered more useful and thus, in certain cases, to generating a greater intention of use. Online presence of local government must include an inner structure that provides efficiency in its communication with citizens regarding what they have come to expect based on their prior personal interaction experiences as well as specific help tools that contribute to increasing easy of use. The results of this study indicate that improvements in ease of use will lead to increased intention of use. Therefore, the resulting model is closer to the one posited by Schaupp and Carter (2005), in which compatibility, perceived usefulness and trust are the factors that have a direct impact on the intention to use e-government.

As far as the population size moderating factor is concerned, the fact of living in large cities seems to lead citizens to consider their lifestyles more compatible with the use of the Internet to handle their relationships with local governments. Consequently, for the two sub-samples of larger cities that we analysed (in our study, all those with populations over 50,000), compatibility has a significant influence within the model, unlike what occurs in towns with smaller populations. Citizens of large towns and cities perceive compatibility with their attitudes and beliefs as a key attribute for their intention to use e-government, as they do with new behaviours or technologies (Tornatzky and Klein 1982, Moore and Benbasat 1991, Rogers 1995). This may be due to these city dwellers already being used to handling the technology on account of their lifestyles (Carter and Bélanger (2005) had observed citizens were more willing to use e-government services if they were congruent with the way they liked to interact with other members of society, e.g.).

There are other relationships in the model that are affected by population size. In larger cities (provincial capitals and towns with populations over 100,000), the impact of ease of use is weaker or practically non-existent; and, as we mentioned earlier, not because this factor is irrelevant for citizens, but rather because residents have taken Internet use in stride as a common practice in their communication and exchanges with other social agents. On the other hand, what does stand out in large cities and towns is the high correlation in the logical sequence of the 'ease of use–perceived usefulness–intention of use' variables.

Specifically, the importance of perceived usefulness as a mediator is a common trait among the largest cities we analysed, which keeps them apart both from those with populations ranging from 50,000 to 100,000 (which, as we mentioned earlier, show the same influence of compatibility as the largest

cities) and from those which were the smallest in our sample (population under 10,000). However, the importance of perceived usefulness does not set the largest cities apart from those in the third sub-sample, which includes mid-sized towns with populations ranging from 10,000 to 50,000. Such inconsistent behaviour of the samples in terms of the role of perceived usefulness could be due to the influence of other additional moderating variables: for example, a small town belonging to an urban or rural area (8) (Sing 2004, Noce and McKeown 2008) or, possibly, a town in which the impact of these variables could be influenced by user habits and actual use, given that Wu and Kuo (2008) claim that the stronger these are, the weaker the impact of perceived usefulness and ease of use on intention of use. In any case, this point merits attention in future research.

In addition to providing a greater theoretical understanding of citizens' intention to use e-government, the conclusions of this study provide empirical support for developing differentiated public initiatives and policies according to the population size for each town in order to foster adoption of the range of e-government services offered by public administrations.

According to these results, in larger cities a significant relationship between compatibility and e-government use can become a political opportunity. Traditional efforts aimed at bringing information and services closer to models with which citizens are familiar (e.g. digital forms provided in formats that are similar to the paper documents citizens are used to, standard interfaces for their web sites, etc.) are now clearly surpassed by the public management potential unleashed by the development of the Internet. And, above all, by the use that users make of it: social networks, blogs, wikis, etc. are instruments that foster fast-paced collaboration and exchange of contents, and they can foster proposals stemming from citizen input, giving the citizens a feeling of truly sharing the responsibility of managing their town; or, seen from the other side, they can be used to improve the flow of institutional communication with blogs of elected members of the (9) corporation, etc.

Meanwhile, smaller cities cannot remain impervious to this major transformation. In their case, the primary political goal of their municipal governments must be to carry out initiatives aimed at reducing the digital gap – for which we found evidence in the present study – by working the Internet effectively into citizens' everyday lives.

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