Systems, Signs & Actions
An International Journal on Information Technology, Action, Communication and Workpractices
Vol. 8 (2014), No. 1, pp. 25–42
http://www.sysiac.org/

To use or not to use: Road bumps for citizens' adoption of e-services

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Abstract

In order to increase usage of e-government services, there is a need for better understanding of factors driving citizens' use of such services. This study addresses two main objectives: (1) to assess the influence of trust, perceived sacrifice, and optimism bias on citizens' intentions to use public e-services; (2) to assess the moderating influence of previous use on the relationships between trust, perceived sacrifice, optimism bias and intention to use public e-services. A model of e-service adoption is proposed and tested on a random sample of 422 Swedish citizens. The model confirms the influence of trust and optimism bias; however, trust seems to play a considerably more important role for non-users than for users. Results also suggest that perceived sacrifice in terms of time and effort can be a strong predictor of behavioral intentions. Furthermore, the negative effect of perceived sacrifice on the intention to use e-services is much stronger for those who have used service-related information on municipal web sites than for those who have not. For these citizens, the perceived sacrifice is not decreased by the degree to which they perceive themselves as more competent than the average Internet user. Hence, it will be difficult to retain users who have experienced an e-service as complicated and inefficient, even if these citizens are skilled Internet users. In turn, this may hamper the adoption of other e-services.

Keywords: Citizens, e-service, e-government, trust, adoption, sacrifice, optimism bias

This paper is developed from the previous publication Ek Styvén, M, Wallström, Å, Engström, A, Salehi-Sangari, S (2011) "IT's complicated…": Influence of Perceived Sacrifice and Trust on e-Service Adoption, presented at *EGOV 2011* and published in *Lecture Notes in Computer Science*, 6846, pp. 112–121.

Received: 10 December 2012; Revised: 15 August 2013; Accepted: 23 September 2013
Accepting Editor: Karin Axelsson

1 Introduction

E-government is today viewed as an important way to provide better services to citizens and make public administration more efficient (UN, 2008). However, this great potential only can be realized if citizens are willing and able to adopt the e-services offered by the government. For many years, e-government has been developed based

on governments' internal needs, rather than from the perspective of users' needs and wants (Kunstelj et al. 2007). The assumption was that citizens were waiting for e-services to be developed and all that was needed was more rapid development of such services (Kunstelj et al. 2007). Yet, the acceptance and usage of available e-services has not been as extensive as expected (Hung et al. 2006). In order to increase usage of e-government services, there is a need for better understanding of citizens' requirements and factors driving use of such services (Kolsaker & Lee-Kelly 2008; Venkatesh et al. 2012). Also, considering the increasing dependency on ICT as well as government aims of e-inclusion, it is important to study not only current users, but also non-users (Verdegem & Verhoest 2009).

A lot of the research conducted within e-government adoption has been based on Theory of Reasoned Action (TRA) and the subsequent Technology Acceptance Model (TAM) (Doong et al. 2010; Titah & Barki, 2006). However, further research is needed that addresses citizens' – users as well as non-users – perceptions of e-services as well as their own ability to use such services. This study contributes to the field by proposing a model of e-service adoption that incorporates three main constructs: trust, perceived sacrifice, and optimism bias. First, previous research has identified lack of ***trust*** as a major barrier for the adoption of e-services (Carter & Weerakkody 2008; Schaupp & Carter 2010; Wang & Emurian 2005). For e-commerce in general, several studies have explored the relationship between trust and behaviour, but with respect to e-government adoption, researchers are just beginning to empirically investigate the role of trust (e.g., Belanger & Carter 2008; Teo et al. 2008). Second, as Venkatesh et al. (2012) note, citizens have expectations about the service in terms of time and effort required to use it. In consumer behaviour and marketing literature, this is known as perceived non-monetary ***sacrifice*** (e.g., Lai 1995). Since reduction in sacrifice is said to be more important to consumers than an increase in benefits (Ravald & Grönroos 1996), the perceived sacrifice of using an e-service potentially has a large impact on subsequent adoption. However, this has not yet been explicitly studied in an e-government context. Third, in a situation that may be perceived as risky, i.e. handling personal information online, people's perceptions about their own ability could contribute to explaining their intention to adopt public e-services (Carter 2008; Schaupp et al. 2010). Therefore, we study the influence of ***optimism bias*** on e-service adoption.

According to the theory of planned behaviour, the intention to engage in a particular behaviour is a good predictor of performing the behaviour (Ajzen 1991). Intention to use subsequently has been found to be highly correlated with actual use of information technology (e.g., Belanger & Carter 2008; Pavlou 2003). This study applies intention to use public e-services as the dependent variable for two main reasons. Including non-users as well as current users makes results more generalizable. Moreover, by investigating differences between users and non-users, the e-inclusion perspective is addressed.

Personal experience of government e-services (i.e. previous use) has been found to influence the perceived usefulness of such services (Horst et al. 2007). It is likely that citizens' experience of using e-services can affect also other constructs, such as trust and behavioural intentions. While Horst et al. (2007) did not find significant relationships with any other variables than perceived usefulness of e-services, it is possible that previous use has an indirect, moderating, effect rather than a direct effect. As a moderator, it would affect the direction and/or strength of the relation be-

tween an independent and a dependent variable (Baron & Kenny 1986). This study adds thereby to the body of knowledge by including the potential moderating influence of previous use of public e-services.

Hence, in order to add to the understanding of trust as a salient predictor of consumer behaviour, and in response to calls for further research into citizens' adoption of e-services (e.g., Schaupp & Carter 2010; Verdegem & Verleye 2009), the following objectives are addressed: (1) *To assess the influence of trust, perceived sacrifice, and optimism bias on citizens' intentions to use public e-services*; (2) *To assess the moderating influence of previous use on the relationships between trust, perceived sacrifice, optimism bias and intention to use public e-services*.

The remainder of this paper proceeds as follows: Section two presents the theoretical foundations of the proposed research model and the hypotheses. The methodology of the study is described in section three, which is followed by a presentation and discussion of the results. Finally, conclusions are drawn and limitations of the study are discussed, along with suggestions for further research.

2 Conceptual Background and Hypotheses

2.1 Trust

Trust has been explored and defined in numerous research studies within different areas. A widely used definition of trust is "an expectancy that the promise of an individual or group can be relied upon" (Rotter 1971). As trust reduces behavioural uncertainty, it gives the citizen a perception of having some control over potentially uncertain situations (Pavlou 2003). McKnight et al. (2002) pointed to the importance of distinguishing among different types of trust, and developed multi-dimensional trust measures. Other authors have adapted these measures and used them in diverse contexts, including e-government. For governmental web sites and e-services, trust has been conceptualized as consisting of *trust in the Internet* as the facilitating technology for e-government (also referred to as institutional trust), and *trust in the government* as the provider of the service (Bélanger & Carter 2008; Teo et al. 2008; Schaupp & Carter 2010; Schaupp et al. 2010). In addition, research suggests that a person's general propensity to trust others; i.e., his/her *disposition to trust*, is important as it can affect behavioural intentions via its influence on trust in the Internet and government (Bélanger & Carter 2008; McKnight et al. 2002). We therefore expect that:

H1: Disposition to trust is positively related to trust in the Internet

H2: Disposition to trust is positively related to trust in the government

If citizens trust the service provider (i.e., government), they also might be more inclined to trust the medium through which the service is delivered. Though not hypothesized, Bélanger and Carter's (2008) study showed a very high correlation between trust in the government and trust in the Internet. Similarly, Teo et al. (2008) as well as Horst et al. (2007) found that trust in the government had a significant positive correlation with trust in an e-government website. Hence, we hypothesize:

H3: Trust in the government is positively related to trust in the Internet

Moreover, a number of studies have found that trust influences behavioural intentions such as the intention to use, or continue using, an e-service. The relationship has been tested as a direct link (Pavlou 2003; Chang et al. 2005; Bélanger & Carter 2008; Lean et al. 2009; Schaupp & Carter 2010), as well as indirectly, via for example per-

ceived risk (Schaupp & Carter 2010; Schaupp et al. 2010), attitude (Hung et al. 2006), and e-service quality (Teo et al. 2008). Considering the emphasis on trust in institutions and technology as a precondition for e-commerce and e-government acceptance (e.g., McKnight et al. 2002; Schaupp et al. 2010), the following hypotheses are stated:

H4: Trust in the government is positively related to intention to use

H5: Trust in the Internet is positively related to intention to use

2.2 Optimism Bias

Trust in the Internet has been shown to reduce the perceived risk of using e-commerce and e-government services (e.g., Pavlou 2003; Chang et al. 2005; Schaupp & Carter, 2010). However, some studies suggest that even when citizens perceive high levels of risk, they still are willing to use e-services (Chang et al. 2005; Bélanger & Carter 2008). This behaviour might be explained by *optimism bias*, which is "a systematic discrepancy between individuals' risk perceptions and their actual risk for negative life events" (Campbell et al. 2005). That is, people tend to think that because of their knowledge and ability, they are less susceptible to risk than the average person (Schaupp & Carter 2010; Schaupp et al. 2010). For example, Sjöberg and Fromm (2001) found that consumers were aware of risks related to IT, but these risks were mostly seen as being of concern for other people. Taken together, optimism bias in an Internet context firstly implies optimism about using the Internet in spite of risk, and secondly implies a clear relation to trust in the Internet. For e-government, it seems likely that a higher level of trust in the Internet as a facilitating technology could enhance the degree to which citizens feel that they are more competent than the average Internet user (cf. Schaupp & Carter 2010; Schaupp et al. 2010). Thus:

H6: Trust in the Internet is positively related to optimism bias

In addition, research has found that optimism bias significantly increases the intention to use government e-services, presumably because it diminishes the impact of risk (Carter et al. 2008; Schaupp & Carter 2010; Schaupp et al. 2010). These authors therefore point to optimism bias as an important factor in e-government adoption and call for further research on its influence. Consequently, it is hypothesized that:

H7: Optimism bias is positively related to intention to use

2.3 Perceived Sacrifice

As indicated above, several studies in the information systems area have integrated constructs of perceived risk, primarily in terms of privacy and security, in models of trust. Within marketing and consumer behaviour research, however, negative influences on purchase or usage intentions sometimes also are conceptualized in terms of *perceived sacrifice*, consisting of the total monetary and non-monetary costs associated with acquiring the product or service (e.g., Cronin et al. 1997; Jobber 2001; Tam 2004). While monetary costs (e.g., purchase price) usually are not relevant in the context of e-government services, it can be argued that non-monetary sacrifice, such as the perceived time and effort involved, could work as a barrier toward e-service adoption. That is, if citizens expect that using e-services will be time-consuming and complicated, they are more likely to choose traditional means of receiving the service.

Based on in-depth interviews with taxpayers, Rotchanakitumnuai (2008) suggested that time and effort would not influence intention to use online tax filing for frequent Internet users. However, the relationship has not been tested empirically on a larger sample including both users and non-users of public e-services. In other con-

texts, perceived non-monetary sacrifice has been shown to negatively affect behavioural intentions (e.g., Baker 2002; Kleijnen et al. 2007). Therefore, we expect that:

H8: Perceived sacrifice is negatively related to intention to use

Further, as trust reduces uncertainty (Pavlou 2003; Schaupp & Carter 2010), it is possible that trust in the Internet channel contributes to decreasing perceptions of e-services as time-consuming and complicated to use. This notion is mirrored in Pavlou's (2003) study, in which trust had a significant, positive influence on perceived ease of use. We therefore hypothesize that trust in the Internet would have a significant, negative influence on perceived sacrifice. Formally stated:

H9: Trust in the Internet is negatively related to perceived sacrifice

Finally, it seems probable that citizens who feel that they are more competent than the average Internet user would anticipate lower levels of time and effort involved in using an e-service. Specifically, optimism bias, which we conceptualize in the same way as Carter et al. (2008), Schaupp and Carter (2010), and Schaupp et al. (2010), is expected to reduce the perceived sacrifice. Hence:

H10: Optimism bias is negatively related to perceived sacrifice

2.4 Users vs. Non-Users

Experience of public e-services, in terms of current or previous use of the particular service, has been included in different ways in some earlier studies. Horst et al. (2007) found that citizens' personal experience of one or more e-government services significantly influenced the perceived usefulness of such services, but did not investigate any effects on intention to use or possible moderating influences. In a recent study, Venkatesh et al. (2012) segmented citizens based on their attribute preferences with regard to public e-services. While they did not include an e-service experience/use variable in the cluster descriptions, the authors contended that citizens' Internet experiences may be a better predictor of preferences than the demographic variables.

Adopters and non-adopters of online tax-filing and payment were compared in Hung et al.'s (2006) study of Taiwanese citizens. Among other things, they found that perceived ease of use and perceived risk were significantly related to attitude towards use for adopters but not for non-adopters. This indicates that citizens' personal experiences can affect relationships between attitudinal constructs. However, the authors merely ran the same model separately in the two groups and did not test whether the differences were significant. In addition, group sizes were very uneven, with 1,008 respondents classified as adopters and only 91 as non-adopters.

To contribute to filling the gaps implied above, we examine the moderating influences of citizens' previous use of public e-services on the hypothesized relationships. In this study, "previous use" is broadly conceptualized as having earlier experience of the specific e-service being studied, and/or having searched for information about the particular service at the service provider's web site.

Figure 1 displays graphically the proposed research model incorporating the ten stated hypotheses and the relationships among the constructs.

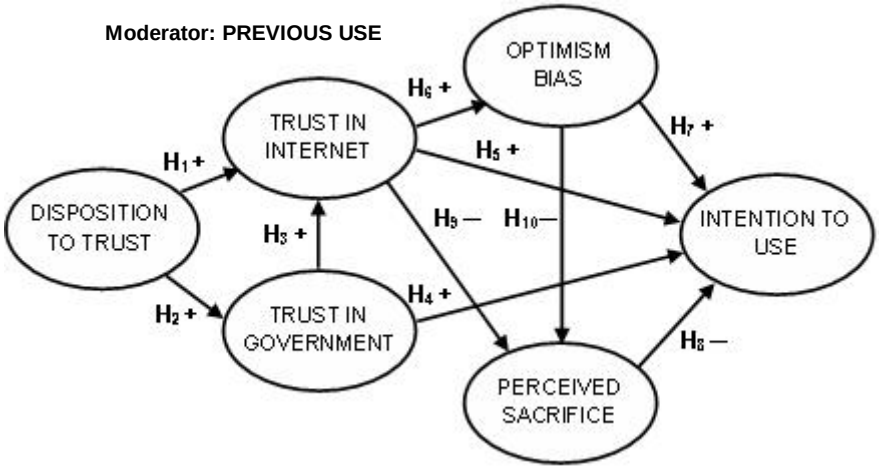

Figure 1: Research Model.

3 Data Collection

To measure the studied constructs, we developed a questionnaire derived primarily from previous literature (see Appendix A). A few items were added based on results from eight focus group interviews with citizens. Seven-point Likert-type scales indicating the strength of agreement with statements were used for all constructs, except optimism bias, for which we used a seven-point scale anchored by 1 (much less able than the average Internet user), 4 (average ability), and 7 (much more able than the average Internet user) (cf. Schaupp & Carter 2010; Schaupp et al. 2010). Questions covering background information such as demographics and Internet use also were included in the instrument.

The context of the study is Swedish municipal e-services. Sweden's 290 municipalities together occupy 18 % of the country's total workforce and 62 % of all employees within the public sector (SCB 2011). Municipalities are responsible for many large welfare services such as childcare, schools and care of the elderly, as well as a broad array of other community services ranging from culture and leisure to infrastructure. Reaching increased efficiency through citizen-focused development of municipal e-services could thus have a considerable impact on the public economy.

In order to possibly cover different target groups, we did two versions of the questionnaire: one in which respondents were asked to think about an e-service for childcare (including application, changes, and supplements) when answering the questions, and one in which respondents should consider an e-service for building permit (including application, changes and supplements). A brief description of the respective e-service was provided in the beginning of the questionnaire, and it was emphasized that no previous experience of these e-services or the municipality's website was needed to be able to answer the questions. All items were identical in the two versions, except a few that referred to the specific e-service (e.g., Intention to Use1: "If I had access to a municipal e-service for childcare/building permit, I would be willing to use it"). To assess use vs. non-use, we included questions about whether the respondent had searched for information about childcare/building permit on the municipality's web site, and whether they had used an e-service for childcare/building

permit at the municipality's web site. A four-point ordinal scale from "No, never" to "Yes, within the last 3 months" was used for these questions.

After pre-test on a small sample of citizens, followed by some adjustments, questionnaires were sent via regular mail to 1,600 randomly selected Swedish citizens. 800 people between 20 and 44 years of age received the childcare version and 800 people between 30 and 64 years received the building permit version. We obtained a total of 422 valid responses (192 childcare, 230 building permit), corresponding to an effective response rate of 26.4%. Assuming that late respondents are similar to those who do not respond, non-response bias was checked by comparing demographics and Internet use variables between the first and last quartile of responses (cf. Armstrong & Overton 1977). T-tests and Chi-square tests did not result in any significant differences between early and late respondents, indicating that non-response bias was not a main concern.

There was an overrepresentation of men in the building permit sample (63%), while the gender distribution in the childcare sample was even, with 52% females. Taken together, the total sample consisted of 56% men. The mean and median age of the total sample was 44 and 42 years, respectively. 88% of the respondents were working (i.e., employed or owners of businesses), with the remaining respondents being students, retirees or unemployed. Half of the respondents had a university education, and 92% of the sample indicated that they used the Internet daily. On average, respondents considered themselves to be experienced Internet users – on a seven-point scale representing strength of agreement with the statement "I am an experienced Internet user", the mean was 5.75. A vast majority of the sample (86%) indicated that they generally visit the municipality's web site at least once in a while; most of them did so rather infrequently (less than once/month). This means that 14% of the respondents said they never visit the municipality's web site.

Among the "childcare" respondents, more than half (58%) had at least some time looked for information about childcare at their municipality's website, while only 17% of the "building permit" respondents had searched for information about building permit. This difference is not surprising considering that childcare can be an ongoing concern for a family during several years, while a building permit usually is a "once in a lifetime" (or never) issue. Similarly, 25% of the childcare respondents had experience from using an e-service for childcare through their municipality's website, while only a handful (3.5%) of the building permit respondents had actually used an e-service for building permit applications. Since many Swedish municipalities offer childcare e-services, but very few have e-services for building permits, this result is quite expected.

We compared the two groups of respondents within the age 30-44, as there were respondents from both the childcare and the building permit sample within this range. T-tests on all quantitative variables and Chi-square tests on nominal variables showed no significant differences, except for information search and use of e-service as described above, and a slightly higher mean of perceived sacrifice in the childcare sample. Exploratory factor analysis also yielded the same factor structure (i.e., according to theory) in both samples. Based on these results, measurement validation and hypotheses testing were performed on both samples jointly.

4 Results

4.1 Measurement Validation

Overall, there were few missing values in the dataset, and all variables could be retained. Little's MCAR test was non-significant ($p = 0.32$), indicating that data were missing at random. Since we wanted to test the hypotheses through structural equation modelling, which does not comply with missing data, the few remaining missing values in quantitative variables were replaced by series mean.

To evaluate and refine the scales, we performed a confirmatory factor analysis using AMOS 20 software. Modification indices and standardized residual covariances pointed to possible problems with two items; one in the trust in government construct and one in optimism bias. These items therefore were removed one by one, which improved model fit. The final measurement model had a normed $\chi 2$ value of 2.24, GFI .94, CFI .97, and RMSEA .05, suggesting good fit between the model and data. Descriptive statistics of the resulting factors are shown in Table 1 below. It can be noted that the means of all three trust dimensions are fairly high, whereas the average level of perceived sacrifice is low. The mean of the optimism bias construct is almost exactly the same as in the study by Schaupp and colleagues, where it was 4.83 (Carter et al 2008; Schaupp & Carter 2010). A one-sample t-test showed that the mean of the optimism bias measure is significantly higher ($t = 13.25$) than the scale midpoint, which corresponds to "average ability". This suggests that respondents overall rate themselves as more Internet savvy than the average Internet user.

Table 1: Descriptive Statistics.

Construct	**Min.**	**Max.**	**Mean**	**Std. Dev.**
Disposition to Trust	1.00	7.00	5.35	1.06
Trust in Internet	1.00	7.00	5.04	1.31
Trust in Government	1.00	7.00	4.89	1.30
Optimism Bias	1.00	7.00	4.81	1.25
Perceived Sacrifice	1.00	7.00	2.22	1.26
Intention to Use	1.00	7.00	5.45	1.57

Next, discriminant and convergent validity among constructs were assessed by examining whether (1) all standardized factor loadings were significant and higher than .50; (2) the squared correlations between each pair of constructs were less than the variance extracted for each construct; and (3) the average variance extracted for each construct was higher than .50 (Fornell & Larcker 1981; Hair et al. 2010). Table 2 on the following page displays the average variance extracted (diagonal values) and the squared correlations between constructs (off-diagonal values). Since all constructs met the stated criteria, they were considered to show sufficient validity.

Table 2: Correlation Matrix.

Construct	Disposition to Trust (DtT)	Trust in Internet (TiI)	Trust in Government (TiG)	Optimism Bias (OB)	Perceived Sacrifice (PS)	Intention to Use (ItU)
DtT	.70					
TiI	.10	.77				
TiG	.11	.13	.74			
OB	.01	.24	.02	.78		
PS	.01	.18	.04	.17	.69	
ItU	.04	.32	.09	.26	.37	.67

Further, the reliability of the constructs was assessed. As Table 3 shows, Cronbach's alphas were well above the suggested cutoff point of .70 and all item-to-total correlations exceeded .50 (cf. Hair et al. 2010).

Table 3: Construct Reliability.

Construct	No. of Items	Cronbach's α	Item-to-Total Correlation
Disposition to Trust	3	.87	.73 – .78
Trust in Internet	3	.91	.77 – .88
Trust in Government	3	.88	.65 – .85
Optimism Bias	3	.91	.78 – .88
Perceived Sacrifice	3	.89	.66 – .88
Intention to Use	2	.76	.64

4.2 Hypotheses Tests

To test the stated hypotheses, we specified a structural model in AMOS 20 according to the research model (see Figure 1). Table 4 on the following page summarizes the results.

Table 4: Structural Model Results.

Hypothesized Path	**Hypothesized Direction**	**Standardized Path Coefficients**	**Result**
H_1: DtT → TiI	+	.22**	Support
H_2: DtT → TiG	+	.33**	Support
H_3: TiG → TiI	+	.29**	Support
H_4: TiG → ItU	+	.10*	Support (weak)
H_5: TiI → ItU	+	.27**	Support
H_6: TiI → OB	+	.48**	Support
H_7: OB → ItU	+	.20**	Support
H_8: PS → ItU	–	-.40**	Support
H_9: TiI → PS	–	-.29**	Support
H_{10}: OB → PS	–	-.27**	Support

Construct	**Squared Multiple Correlations**	**Model Fit**	
Trust in Internet (TiI)	.18	$\chi 2$/df	2.17
Trust in Government (TiG)	.11	GFI	.94
Optimism Bias (OB)	.23	CFI	.97
Perceived Sacrifice (PS)	.24	RMSEA	.05 (PCLOSE .30)
Intention to Use (ItU)	.53		

*) $p<.05$
**) $p<.01$

As the table shows, model fit indexes suggest that the structural model is not disconfirmed by the data, and all ten hypotheses receive empirical support. Altogether, the model explains a fairly high portion (53%) of the variance in the intention to use municipal e-services.

The relationships among the three trust constructs (H_1 – H_3) work as expected. Disposition to trust appears to be more strongly connected to trust in the government than to trust in the Internet. However, the correlation between trust in the government (TiG) and intention to use (ItU) is low (albeit significant at $p<.05$), thus lending only weak support to H_4. Even though the mean of the trust in government measure was very similar to previous research conducted in the US (this study: 4.89, Bélanger & Carter 2008: 4.62, Schaupp & Carter 2010: 4.92), it seems that Swedish citizens' intentions to use municipal e-services are affected mainly by other factors. Findings from the focus groups conducted prior to this survey also indicated that citizens generally tended to trust the municipality, but their intention to use municipal e-services

did not appear to depend on this trust. Some of them said that they trusted the municipality, but not always the Internet.

Trust in the Internet (H_5), optimism bias (H_7), and perceived sacrifice (H_8) all have stronger influence on the intention to use than the trust in government has. In particular, the degree to which citizens expect the use of municipal e-services to be complicated and time-consuming (i.e., the perceived sacrifice) appears to hamper usage intentions. Considering that some earlier studies have found non-significant (see Chang et al. (2005) for a summary) or even positive (Bélanger & Carter 2008) correlations between perceived risk and intention to use, it is possible that the expected hassle involved is a better predictor of behavioural intentions than risk, at least in a context in which the majority are frequent Internet users.

Regarding the influence of optimism bias, the result is similar to previous findings (Carter et al. 2008; Schaupp & Carter 2010; Schaupp et al. 2010), but the effects of trust differs from the studies of Schaupp and Carter (2010) and Schaupp et al. (2010), in which trust in the Internet did not have a significant correlation with the intention to use e-government services. This perhaps could be explained by the fact that the results in those two papers were based on a student sample, while a broader, random sample of citizens was used in this study.

Trust in the Internet is strongly correlated with optimism bias (H_6), explaining 23% of the variance in the construct, and it also decreases perceived sacrifice, as suggested in H_9. In addition, feeling more competent than the average Internet user appears to lower the degree to which one expects using e-services to be cumbersome (H_{10}).

4.3 Users vs. Non-Users

Since there were so few respondents who had ever used an e-service for building permit or childcare (n=55; 13% of the sample), we did not find it feasible to test moderation effects based on use vs. non-use of the actual e-services. Instead, those who had searched for information about building permit and childcare, respectively, via the municipality's website were classified as "users" (n=150; 35.5% of the sample). There were no significant differences between users and non-users in terms of gender and occupation. However, users tended to be slightly younger and higher educated compared to non-users.

To assess the possible differences between these two groups of respondents, we conducted a multiple group analysis in AMOS 20. First, configural invariance was tested by confirming that model fit indexes for the totally free multiple group model were acceptable (Hair et al. 2010). Then, we tested the metric invariance by restricting all measurement weights to be equal between the two groups (Hair et al. 2010). The difference in $\chi 2$ was 6.29 (p=.85), which indicates that factor loadings were equivalent in both groups. Finally, we performed the multiple group analysis by constraining each estimated path to be equal in both groups (i.e., with one degree of freedom). The results are displayed in Table 5. Path estimates which are significantly different between users and non-users are printed in bold and italics.

Table 5. Results of Multiple Group Analysis.

Path	**Standardized path estimates (unconstrained model)**		**Significance of difference between path estimates under constraint**	
	Users (n=150)	**Non-Users (n=272)**	**Change in χ2**	**p**
DtT → TiI	.19(n.s.)	.29**	.50	.48
DtT → TiG	.46**	.46**	.00	.99
TiG → TiI	***.04 (n.s.)***	***.42***	***17.41***	***.00***
TiG → ItU	.02 (n.s.)	.15*	3.00	.08
TiI → ItU	.14*	.32**	3.11	.08
TiI → OB	***.25***	***.45***	***4.21***	***.04***
OB → ItU	.25**	.23**	.05	.83
PS → ItU	***-.58***	***-.31***	***9.10***	***.00***
TiI → PS	-.21*	-.21*	.47	.49
OB → PS	***-.07(n.s.)***	***-.38***	***5.23***	***.02***
Model Fit				
χ2/df	1.60	1.72		
GFI	.89	.93		
CFI	.96	.98		
RMSEA (PCLOSE)	.06 (.11)	.05 (.41)		
Squared Multiple Correlations				
Trust in Government (TiG)	.07	.12		
Trust in Internet (TiI)	.03	.29		
Optimism Bias (OB)	.08	.27		
Perceived Sacrifice (PS)	.05	.31		
Intention to Use (ItU)	.65	.49		

*) $p<.05$
**) $p<.01$

Model fit indexes are acceptable in both groups, suggesting that the structural model is not disconfirmed by the data. The comparison of path estimates between users and non-users show several differences. First, there is a strongly positive relationship

between trust in government (TiG) and trust in Internet (TiI) in the non-user group, but this correlation is not even significant among users. Second, the connection between trust in the Internet (TiI) and optimism bias (OB) is considerably stronger for non-users than for users. Third, the perceived sacrifice (PS) has a much stronger negative influence on the intention to use (ItU) in the user group than it has for non-users. Fourth, while optimism bias (OB) decreases the perceived sacrifice (PS) among non-users, this effect is not significant for users. In addition, if we allow a significance level of $p<.10$, there are also differences in terms of the effect of trust in the Internet (TiI) and trust in government (TiG) on intention to use (ItU), both of which are more influential for non-users than for users. Taken together, the model explains 65% of municipal web site users', and 49% of non-users', intentions to use e-services.

5 Conclusions and Implications

This study integrated three dimensions of trust, optimism bias, and perceived sacrifice in a model to explain Swedish citizens' intentions to use municipal e-services. Hence, the paper contributes to previous research in several ways. First, by including perceived sacrifice as a predictor of intention to use, which has not been done in an e-government context before. Second, by testing the moderating influence of previous use of related information on municipality web sites. Third, by applying the study in a setting, i.e. municipal e-services, that is under-researched within the e-government field.

While the model confirms the influence of trust and optimism bias in the total sample, the results also suggest that perceived sacrifice in terms of time and effort can be a strong predictor of behavioural intentions. That is, as people in general use the Internet frequently, they become more familiar with possible privacy risks and feel that they can handle them, but if they expect that using an e-service will be time-consuming and complicated, they would rather use traditional means of receiving the service. Hence, municipalities and other government agencies should focus on offering as easy-to-use e-services as possible, and also inform citizens about these services and how they can be used.

Furthermore, the moderator test showed that the negative effect of perceived sacrifice on the intention to use e-services is much stronger for those who have used service-related information on municipal web sites than for those who have not. For these citizens, the perceived sacrifice is not significantly decreased by the degree to which they perceive themselves as more competent than the average Internet user. These findings imply that it will be difficult to retain users who have experienced an e-service as complicated and inefficient, even if these citizens are skilled Internet users. In turn, this may hamper the adoption of other e-services.

Concerning the influence of trust, it seems to play a considerably more important role for non-users than for users. While non-users' trust in government is rather strongly connected to trust in the Internet as a contact channel, there is no such relationship among users. Compared to users, trust in the Internet also has a larger influence on non-users' behavioural intentions as well as on their optimism bias. These results suggest that municipalities could integrate trust building in their market communications; especially when focusing on citizens who have no experience in using their web sites. Enhanced trust in the government as a service provider and, primarily, trust in the Internet as the facilitating technology for e-government contribute to high-

er intentions to use, also indirectly by increasing optimism bias and decreasing perceived sacrifice.

5.1 Limitations and Suggestions for Further Research

Although the results in this study are based on a random sample of citizens of varying ages and backgrounds, there are some limitations that should be considered when interpreting the results. First, while the tests for non-response bias did not reveal any significant differences between early and late respondents, the fact that almost 74% did not respond means that generalization to the population should be made with some caution. Still, the response rate of 26.4% is well in line with, or above, similar studies that have used postal surveys. Our sample size of 422 also is relatively large compared to many other user studies in the e-government area.

Second, the use of a cross-sectional survey means that we cannot ascertain causal relationships between constructs in the model. Therefore, additional longitudinal or experimental research is warranted.

Our model was tested in the context of Swedish municipal e-services. While citizens' adoption of e-government in municipalities is relatively under-researched compared to e-government on a national level, it could be worthwhile to study whether this model also applies on other levels and in other countries.

The inclusion of perceived sacrifice in a model of trust and e-government adoption shows promising results. To keep the model parsimonious, we used a unidimensional, three-item measure of perceived non-monetary sacrifice. Future research could address the influence of sacrifice using more comprehensive scales. If there are governmental e-services that involve some kind of economic transaction, it also would be interesting to include a monetary sacrifice construct in the model.

Finally, further studies could explore additional moderating variables; for example, benefits sought, younger vs. older citizens, or frequent Internet users vs. non- or low Internet users.

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Appendix A: Questionnaire Items and References

Construct	Items	References
Disposition to Trust	I generally trust other people	Gefen & Straub, 2004
	I usually trust people until they give me a reason not to trust them	McKnight et al. 2002
	I feel that people are generally well meaning	Gefen & Straub 2004
Trust in the Internet	I would feel safe to submit personal information in connection with using a municipal e-service for building permt/childcare	Adapted from Wang 2002
	The Internet has enough safeguards to make me feel comfortable using it to transact personal business with the municipality's web site	Bélanger & Carter 2008; McKnight et al. 2002
	In general, the Internet is a safe environment in which to transact with the municipality	Bélanger & Carter 2008; McKnight et al. 2002
Trust in the Government	If would I interact with the municipality, I would feel confident that I can rely on the staff to do their part	Adapted from McKnight et al. 2002; Teo et al. 2008
	I am comfortable relying on the municipality to meet its obligations toward the citizens	McKnight et al. 2002; Teo et al. 2008
	I trust that the information on the municipality's web site is correct	Focus groups
	I trust that the information on the municipality's web site is updated	Focus groups
Optimism Bias*	Please rate your ability to perform the following tasks compared to the average Internet user:	
	Submit personal information through the municipality's web site	Schaupp & Carter 2010; Schaupp et al. 2010
	Complete a transaction with the municipality using their web site (e.g., electronic application, notification, reservation)	Schaupp & Carter 2010; Schaupp et al. 2010
	Download forms and documents from the municipality's web site	Schaupp & Carter 2010; Schaupp et al. 2010
	Use an e-ID for log-in or signing in a municipal e-service	Focus groups
Perceived Sacrifice	Compared to other means of contact, it would be time consuming for me to use a municipal e-service for childcare/building permit	Adapted from Gilbert et al. 2007; focus groups
	Compared to other means of contact, it would be strenuous for me to use a municipal e-service for childcare/building permit	Adapted from Gilbert et al. 2007; focus groups
	I think it is difficult to use an e-ID for logging in to a municipal e-service for childcare/building permit	Focus groups
Intention to Use	If I had access to a municipal e-service for childcare/building permit, I would be willing to use it	Adapted from Gilbert et al. 2007
	It is likely that I will use a municipal e-service for childcare/ building permit in the near future	Khalifa & Shen 2008

*) 1 = Much less able than the average Internet user, 4 = Average ability, 7 = Much more able than the average Internet user. All other items anchored by 1 = Strongly disagree and 7 = Strongly agree.