Antecedents of the Adoption of E-Payment Services in the Public Sector

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Abstract

In order to succeed, electronic government initiatives frequently pass a number of different stages, starting with a static Web site used solely for providing information (one-way) and ending with fully interactive sites that are capable of handling a multitude of transactions that may occur in the lifelong relationship between a government and its citizens. The possibility of transferring money online plays an important role for those e-government initiatives that include financial transactions such as paying taxes, fees, or fines. Even though there is a great deal of academic literature on e-payment and e-government issues, this paper combines both topics and proposes a framework and a measurement model that depicts important factors influencing users’ online payment behavior. A structural equation modeling approach has been used to assess the relative importance and the strength of the relationships among different constructs, including users’ previous experience, their trust in e-payment security and the perceived convenience of the payment process. Our results indicate that trust (both in a frictionless use of the system and in e-payment security) can be seen as an important antecedent for the adoption of online payments on the part of the users. From the government’s point of view, the potential for exerting influence seems to be somewhat limited: While national institutions in developed countries are usually perceived as trustworthy, users’ attitudes toward the Internet may be more skeptical, depending on their previous experience.

Keywords: E-government, e-payment

Introduction

Whenever transactions are carried out over electronic networks, finding adequate systems (i.e., technologically sophisticated and trusted by users) that facilitate financial transactions between different parties becomes an issue. Due to the rapid growth of e-commerce, various traditional offline payment methods have been adapted to the needs of the virtual environment and new e-payment systems have been developed to fit the requirements of electronic transactions. In the past, before newly developed systems were introduced, the adoption process of e-payment systems was typically impeded by the usage of traditional payment systems such as credit cards, debit cards, or direct debiting. This has been shown for the United States, where credit cards are still the most frequently used method of e-payment (Singh 2002; Weiner 1999).

Many e-government initiatives strive to integrate e-payment options into their portfolio of services and consequently face the same problems as profit-oriented companies on the Internet. This paper first presents the development and different stage models of e-government and discusses the role of e-payment in e-government. It then empirically evaluates the role of users’ previous experience, their trust in e-payment security, and perceived frictionless use on their general attitude toward e-payment.
Development and Stage Models of e-Government

According to a recent study by eMarketer, e-government initiatives worldwide are making substantial progress, but there is still much room to grow. Only 12 percent of the more than 1,200 governmental Web sites surveyed around the world offer online services. Although 30 percent of the adult population now accesses some aspects of government on the Internet, both males and females of all age groups have serious concerns about interacting with governments online (eMarketer 2003).

There has been substantial research on the differences between public and private organizations regarding innovation. Bozeman and Bretschneider (1986) state that strategies that were developed for the private sector may be valid for the public sector as well, but the problem lies in finding out which approaches and strategies are applicable to public management and which are not. In the late 1970s, Kraemer and Perry (1979) argued that the adoption of computer applications is a political activity rather than the apolitical process often portrayed in the literature on diffusion of innovations. Differences between public and private organizations have been identified in both the organizational environment and managerial activities. Public organizations have been found to operate in an environment of greater interdependence and accountability than private organizations (Bretschneider 1990). Andersen and Kraemer (1994) focus on the differences in the adoption of information technology between two countries (viz. Scandinavia and the United States), concluding that the transitions are evolutionary, not revolutionary. Furthermore, they infer that in the United States, IT systems have been small-scale, have followed functional lines, and have merely automated existing operations, while in Scandinavia, systems have been relatively large-scale, have crossed functional lines, and have reorganized workloads. A recent report by Accenture (2004) presents overall maturity scores of e-government for a large number of countries (not including Austria). Canada comes first, followed by Singapore, the United States, Australia, Denmark, Finland, and Sweden.

According to La Porte et al. (2001), the potential for e-government can best be explained by national income and overall government spending. The success of government services ultimately depends on users’—or rather voters’—satisfaction. While private firms have to focus on profitability, a government’s goals are to some extent set externally. The organization is expected to perform all services necessary for administration, preferably in an effective manner (see Bozeman and Bretschneider 1986), thereby also improving efficiency of democracy by increasing the convenience and timeliness of citizen–government interactions (Watson and Mundy 2001). Hinnant and O’Looney (2003) argue that outside demand from citizens and other stakeholders is likely to initiate online innovations of public organizations.

In order to assess the current state of e-government of a certain country, different stage models have been proposed. In a five-stage e-government framework, financial transactions are expected to be fully functional by means of the World Wide Web or other electronic applications at stage three (Hiller and Bélanger 2001; Moon 2002).

It is important to note that not all government Web sites go through these stages and that they do not pass through them in any specific order (West 2004). Furthermore, many e-government initiatives may not need to accept payments online or they simply do not have the resources that advanced services require. We, therefore, explicitly concentrate only on those e-government initiatives that strive to integrate payment services into their overall portfolio of online services.

E-government in Austria, which will be the focus of our research, is on the cusp of offering transactions online. Governmental Web sites such as tax authorities and municipalities already provide an Internet payment method via www.bezahlen.at, a Web site that uses automatic direct debit transfer services from bank accounts. Other e-payment methods are not offered yet, but in view of their rapid growth they are expected to be introduced in the near future.

The Role of e-Payment in e-Government

Looking at different Internet services, e-payment systems seem to be necessary to ensure the speed and accuracy of electronic transactions (Singh 2002) and, in addition, avoid unnecessary media breaks. More and more Internet users are using e-payment systems. For example, over 30 percent of Austrian Internet users engage in online banking (Statistik Austria 2003). Demand for e-payment systems as part of e-government systems seems to be a logical consequence of this development.

Efficiency, security, cost, and usability are essential prerequisites for users to carry out financial transactions on Web sites successfully (c.f. Berger et al. 1996; Lee 2002; Panurach 1996; Radecki and Wenninger 1999; Shen 1997; Wright 2002). To be considered successful, payment methods have to be accepted (user attitude) and actually used (user behavior). Antecedent assessment of the intention to use e-payment systems may, therefore, become increasingly important in order to ensure the proper implementation of e-payment services, to fulfill people’s expectations, and to avoid costly mistakes or even the widening of the digital divide.
Table 1. Different Stage Models in e-Government Research and the Role of e-Payment

<table>
<thead>
<tr>
<th>Source</th>
<th>Number of Stages</th>
<th>Denomination of Stages</th>
<th>Appearance of e-Payment</th>
<th>Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baum and Maio (2000)</td>
<td>Four</td>
<td>(1) Presence (2) Interaction (3) Transaction (4) Transformation</td>
<td>Stage 3</td>
<td>Completing a transaction online, e.g., paying fines</td>
</tr>
<tr>
<td>Layne and Lee (2001)</td>
<td>Four</td>
<td>(1) Cataloguing (2) Transaction (3) Vertical Integration (4) Horizontal Integration</td>
<td>Stage 2</td>
<td>Conducting transactions online</td>
</tr>
<tr>
<td>Hiller and Bélanger (2001)</td>
<td>Five</td>
<td>(1) Information (2) Two-way communication (3) Transaction (4) Integration (5) Political participation</td>
<td>Stage 3</td>
<td>Pay taxes online</td>
</tr>
<tr>
<td>Moon (2002) adapted from Hiller and Bélanger (2001)</td>
<td>Five</td>
<td>(1) Information (2) Two-way communication (3) Service and financial transaction (4) Vertical and horizontal transaction (5) Political participation</td>
<td>Stage 3</td>
<td>Pay taxes online</td>
</tr>
</tbody>
</table>

We designed a research model centering around users’ previous experience with e-payment systems to test and assess the importance of behavioral antecedents such as prior experience with different payment systems, and also the influence of trust in e-payment security and perceived frictionless use of the online payment systems. All factors together influence people’s attitude toward different e-payment methods and their intention to use such a system. While demographic characteristics play a subordinate role in users’ decisions to carry out transactions over electronic systems (Lee 2002), usage of different payment systems is still known to be dependent on user demographics such as age, education, occupation, etc. (Stavins 2001).

The model we used stems primarily from the theory of planned behavior, which is rooted in the theory of reasoned action (Ajzen 1991). This theory has heavily influenced the technology acceptance model (Davis 1986), which has been used in numerous academic publications assessing the impact of new technologies (for a good overview of different versions of the model, see Gardner and Amoroso 2004).

Despite the significant progress of e-government initiatives in recent years, from a worldwide point of view, a lot is still to be done. Only 33 countries out of the 191 members of the United Nations facilitate online transactions such as submitting forms or paying fines (Swartz 2004). In order to reach the final stages of a fully developed e-government, the possibility to transfer money online is part of all models mentioned above (see Table 1). Figure 1 shows a framework which aligns the role of e-government and its different levels of services with the user’s point of view. In the context of this survey, we concentrate on the financial relations with external, individual users, which occur at the transaction and integration levels. We thereby omit applications such as government-to-business (marketplace) and government-to-individuals on a political level (e-democracy) (Hinnant and O’Looney 2003; Moon 2002). We use a framework with four different stages (information, two-way communication, transaction, and integration), the last of which integrates the phases of transformation and political participation shown in Table 1. One-way communication exists only in the first phase, while in all other stages different levels of interactivity—depicted by two-sided arrows—can be found. As was described above, e-payment functionality is implemented in stages three (transaction) and four (integration).
Figure 1. A Framework for the Interaction of Users and e-Governments

Trust is a fundamental factor when assessing the acceptance of e-payment solutions. We consider trust in the organization not appropriate for this research model. In general, trust in a company plays a role in online purchasing decisions (Yoon 2002), especially when different e-payment systems require the transfer of sensitive personal data such as credit card numbers. However, in the case of e-government, people are usually not able to switch governments. This narrows the decision down to whether the person uses e-government, including e-payment services, or goes the traditional off-line way. Regarding the latter decision, we assume that two other constructs play an important role, namely trust in e-payment security and frictionless use. Previous research has focused on how transparency and interactivity affect citizens’ trust in government, concluding that Internet use is positively associated with transparency satisfaction but negatively associated with interactivity satisfaction, and both interactivity and transparency are positively associated with citizens’ trust in government (Welch and Hinnant 2003).

Since people usually trust people rather than technology (Friedman et al. 2000), we concentrated on how frictionless the usage of e-payment systems is perceived, including ease of use and the level of support users expect to get from organizations if e-payment problems occur. In the case of e-government, users (citizens) usually know their formal counterpart (i.e., the organization), but rarely the person they are actually communicating with, which may be useful to get support.

Hoffman et al. (1999) found that concerns regarding security and privacy grow along with levels of online proficiency. They also state that privacy expectations depend on the medium, which entails that the use of electronic media generates an intense need for control and protection. Based on interviews among bank managers and their potential customers, Aladwani (2001) considered Internet security and consumers’ trust to be of utmost importance for the further development of online banking.

Methodology

We used the Austrian Internet users as our universe for the following reasons. First, in a 2002 General Population Survey (GPS) conducted in all countries of the European Union, Switzerland, and the United States as part of the SIBIS (Statistical Indicators Benchmarking the Information Society) project by RAND, Austria came second in terms of Internet usage for government services. Over 45 percent of Austrian citizens indicated that they preferred the Internet as a way of interacting with government services to traditional ways. Finland leads this ranking with an agreement rate of over 50 percent, while in the United States, less than 40 percent stated that the Internet was their favorite way of handling government issues (Graafland-Essers and Etchedgui 2003). Therefore, it can be said that the general attitude toward communicating with public authorities is comparatively high in Austria.

Second, in a report by Cap Gemini Ernst & Young (2003) for the European Commission, covering all EU member states and Switzerland, Austria came second in terms of services fully available online and fourth in terms of sophistication of e-government services. Between 2001 and 2003, Austria experienced the highest growth rates of all countries in both categories.
Ultimately, in the Austrian public administration, a lot of individual IS-supported business process reengineering projects have been started over the last few years. In early 2000, the Austrian federal government launched an information and communication technology program entitled “e-Europe” to follow up the corresponding decision of the European Council. One major objective was to make key services of the public administration available through general electronic access. As part of the administration’s overall innovation program, the development of an e-government portal was promoted as being crucial for improving the services offered (www.help.gv.at) (Mahrer and Brandtweiner 2004).

The reason for choosing Internet users as our basic population stems from the fact that we want to assess the general attitude toward making online payments of those users who already possess a certain minimum level of online experience (i.e., that they at least use computers for basic communication tasks). On the other hand, it has to be taken into account that the results may not be transferable to all other citizens. In general, online surveys offer a number of advantages, such as low financial resource implications, short response times, the researcher’s control of the sample, and the fact that the data are directly loaded into the data analysis software. At the same time, they have a number of drawbacks, including the fact that Internet usage is not spread evenly across the population and that the required technology may not be available to all citizens (Ilieva et al. 2002).

The Austrian Society for European Policy supported us by sending out a newsletter to a total of 3,542 Internet users, 631 of whom replied (17.8 percent). No incentive was given for filling out the questionnaire. The survey was conducted between March 23, 2004 (the day the newsletter was sent out), and April 12, 2004. A comprehensive pretest, including qualitative interviews with experts, was carried out to assure the understandability of the items. In total, 24 people of different gender, age and educational backgrounds were asked to fill out the questionnaire and, at the same time, to comment on the questions. Their comments were written down and led to a complete revision of the questionnaire in order to increase its understandability.

We used self-programmed sliders to generate a magnitude scale instead of the commonly used category scales, thereby avoiding some weaknesses of the latter, e.g., the loss of information due to the limited resolution of the categories or the inadvertent influence of the investigator on the responses by constraining or expanding the response range available to the respondent. Previous research has shown that there are no overall differences between category scales and magnitude scales and that the latter can be accepted as a valid and reliable alternative, since both methods show considerable degrees of convergent and discriminant validity (Neibecker 1984). In our case, the sliders offered a number of advantages.

- We used a ratio scale with 100 intervals, which enables us to perform all kinds of sophisticated statistical analyses.
- A number of pretests revealed that the sliders made intuitive answers possible and were considered to be “fun” by the users.
- The respondents used the whole spectrum of possible answers, so a central tendency was avoided.
- Likert scales are commonly used with interval procedures, which cause an ongoing discussion in the academic literature. A magnitude scale, by contrast, is equidistant per se.

### Research Model and Hypotheses

Based on a careful literature review, qualitative interviews, and the theory of planned behavior, our research model (see Figure 2) consists of five latent constructs. The interviews, which were conducted with 25 experts from different areas including consumerism, market research, and customer relationship management, covered a broad range of topics and, by using content analysis, were used to assess the direction of the influence among the different constructs.

Based on the relations proposed by the theory of planned behavior (which has been confirmed by several technology acceptance model studies), we propose that past experience (EXP) has a direct influence on both the perceived frictionless use (FRU) when conducting online payments and trust in e-payment systems on the Internet (TRS). Consistent with previous studies, we assume that the attitude toward e-payment (ATT) is positively influenced by perceived support and trust (see Pavlou 2003). Fishbein and Ajzen (1975) also state a positive correlation between attitudes and the intention (INT) to conduct online payments in the near future.

More specifically, our hypotheses are as follow:
H1a: Positive past experiences (EXP) positively affect the perceived frictionless use (FRU).
H1b: Positive past experiences (EXP) positively affect trust in online payment security (TRS).
H2a: Perceived frictionless use (FRU) positively affects the attitude toward conducting payments online (ATT).
H2b: Trust related to online payment security (TRS) positively affects the attitude toward conducting payments online (ATT).
H3: The attitude toward conducting payments online (ATT) positively affects the intention to use e-payment services (INT).

After a confirmative factor analysis, several items had to be discarded due to low factor loadings. Table 2 summarizes the items actually used for the SEM analysis.

Table 2. Items Used in the Structural Equation Model

<table>
<thead>
<tr>
<th>Code</th>
<th>Item</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXP_1</td>
<td>My payments over the Internet have been successful so far.</td>
<td>New</td>
</tr>
<tr>
<td>EXP_2</td>
<td>I have not had negative experiences with Internet payments yet.</td>
<td>New</td>
</tr>
<tr>
<td>FRU_1</td>
<td>For me, it is easy to pay via the Internet.</td>
<td>New</td>
</tr>
<tr>
<td>FRU_2</td>
<td>Payment problems can be rectified easily.</td>
<td>McCloskey (2003)</td>
</tr>
<tr>
<td>FRU_3</td>
<td>Problems caused during payment transactions over the Internet can be dealt with easily by contacting qualified staff members.</td>
<td>New</td>
</tr>
<tr>
<td>TRS_1</td>
<td>It is safe to use Internet payment systems.</td>
<td>Salisbury et al. (2001), modified</td>
</tr>
<tr>
<td>TRS_2</td>
<td>I feel safe when transmitting payment information over the Internet.</td>
<td>Salisbury et al. (2001), modified</td>
</tr>
<tr>
<td>TRS_3</td>
<td>In general the Internet is a secure instrument for sending payment information.</td>
<td>Salisbury et al. (2001), modified</td>
</tr>
<tr>
<td>ATT1</td>
<td>Problematic*</td>
<td>Sawyer and Howard (1991), modified</td>
</tr>
<tr>
<td>ATT2</td>
<td>Dangerous*</td>
<td>Sawyer and Howard (1991), modified</td>
</tr>
<tr>
<td>ATT4</td>
<td>Time-saving</td>
<td>Sawyer and Howard (1991), modified</td>
</tr>
<tr>
<td>ATT5</td>
<td>Convenient</td>
<td>Sawyer and Howard (1991), modified</td>
</tr>
<tr>
<td>INT_1</td>
<td>I will use Internet payment systems more often in the future.</td>
<td>New</td>
</tr>
<tr>
<td>INT_2</td>
<td>In the future I will use the Internet for high-value payments.</td>
<td>New</td>
</tr>
<tr>
<td>INT_3</td>
<td>The Internet will be more important for customer payments in the future.</td>
<td>New</td>
</tr>
</tbody>
</table>

*Reverse coding
Table 3. Characteristics of Respondents (n = 631)

<table>
<thead>
<tr>
<th>Sex</th>
<th>Occupation</th>
<th>Experience on the Internet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>Management</td>
<td>Casual user</td>
</tr>
<tr>
<td>Female</td>
<td>Clerical worker</td>
<td>Good skills</td>
</tr>
<tr>
<td></td>
<td>Self-employed</td>
<td>Experienced user</td>
</tr>
<tr>
<td></td>
<td>Executive</td>
<td>Expert</td>
</tr>
<tr>
<td></td>
<td>Student</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>17.8%</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td>28.8%</td>
</tr>
<tr>
<td>– 29 years</td>
<td>14.8%</td>
<td>30.4%</td>
</tr>
<tr>
<td>30 – 39 years</td>
<td>30.4%</td>
<td>7.2%</td>
</tr>
<tr>
<td>40 – 49 years</td>
<td>25.6%</td>
<td>32.4%</td>
</tr>
<tr>
<td>50+ years</td>
<td>29.2%</td>
<td>4.7%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Frequency of Internet Use</th>
<th>Education</th>
<th>Experience with online Payments</th>
</tr>
</thead>
<tbody>
<tr>
<td>- 5 hours/week</td>
<td>Secondary school</td>
<td>Yes</td>
</tr>
<tr>
<td>6 – 10 hours/week</td>
<td>Apprenticeship/</td>
<td>81.4%</td>
</tr>
<tr>
<td>11 – 15 hours/week</td>
<td>Vocational school</td>
<td>No</td>
</tr>
<tr>
<td>16 – 20 hours/week</td>
<td>High school grad.</td>
<td>18.6%</td>
</tr>
<tr>
<td>20+ hours</td>
<td>University, Technical College</td>
<td>81.4%</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>2.7%</td>
</tr>
</tbody>
</table>

In the following sections, a short overview of the descriptive results will be given, followed by the structural equation model, which will be analyzed in more detail.

Descriptive Results

According to the Austrian Internet Monitor (2004), 66 percent of male and 45 percent of female Austrians use the Internet (4th quarter 2003). The largest user group according to age is the 14 to 19 year-olds (89 percent), followed by the 20 to 29 year-olds (75 percent) and the 30 to 39 year-olds (74 percent). In recent years differences between age groups have disappeared for the most part, as can be seen from the comparatively high percentage of 40 to 49 year-olds (68 percent) and 50 to 59 year-olds (50 percent) (Austrian Internet Monitor 2004). The demographic characteristics of our sample can be found in Table 3. In our sample, male and “senior” users are over-represented, which can be put down to the composition of the mailing list. On the other hand, the sample fits our purposes fairly well, since the issues of paying taxes, fees, and fines online are typically relevant for users older than 19 years.

About one quarter (24.6 percent) of the respondents use the Internet up to 5 hours per week, while 22.3 percent can be categorized as “heavy users” with more than 20 hours of weekly Internet usage. The majority of the respondents (53.1 percent) use the Internet between 6 and 20 hours per week. As far as their current occupation is concerned, most of our respondents are executives (32.4 percent), clerical workers (30.4 percent), or (general) managers (18.6 percent). Most of them have a university or technical-college degree (68.3 percent) or a high school diploma (22.6 percent). Again, the high percentage of respondents with a high level of education can be explained by the composition of our mailing list. The vast majority of the users (81.4 percent) has already had prior experience with e-payment and has typically had positive experiences (median: 98, mean: 85.3, SE: 1.153). Only those users with prior experience were included in the structural equation model.

Structural Equation Modeling

Structural equation modeling (SEM) appears to be the best available statistical technique for testing the hypotheses since SEM includes the indirect effects of one latent variable on another (Nidumolu 1989). Confirmatory analyses for each latent variable were used in order to assess construct validity. The procedures suggested removing two items (EXP_3, ATT_3). The SEM software tool for all analyses was AMOS 4.0 (developed by Arbuckle 1999). The data analysis generated a $\chi^2$ value of 189.01 (df = 82). Figure 3 shows the standardized regression coefficients with their relevant p-values. It can be seen that all hypotheses (and thus the complete theoretical model) are supported by the data. All coefficients are statistically significant ($p = 0.01$ or lower). The error terms of the items ATT_4, ATT_5 and FRU_2, FRU_3 are correlated, which can be explained by theory (Jöreskog 1993).
The results show a strong (positive) relationship between past experience and the perceived frictionless use when conducting online payments, in contrast to experience and trust related to e-payment security. The attitude toward e-payment is strongly (positively) influenced by the perceived frictionless use and trust in e-payment security. Intention to conduct online payments in the near future is strongly (positively) affected by the attitude toward e-payments.

The discussion on goodness-of-fit indices and on how to assess the validity of a structural equation model has been substantial. Most of the software packages utilized for structural equation modeling calculate over 20 different indices. For this study, we selected six indices which have been widely used in reporting the validity of structural equation models. After a brief definition of each of these seven indices, we present the measures of the present study (see Table 4). The root mean square error of approximation is based on the discrepancy per degree of freedom. Brown and Cudek (1993) argued that a value of about 0.08 or less for the RMSEA would indicate a reasonable error of approximation. The goodness-of-fit index (GFI) is a measure ranging from 0 (poor fit) to 1.0 (perfect fit). It represents the overall degree of fit, but is not adjusted for the degrees of freedom. A recommended value for this statistic is 0.90 or higher. Since the distribution of values is strongly affected by sample size, Anderson and Gerbing (1984) recommend the adjusted-goodness-of-fit index (AGFI), which is independent of sample size. The Tucker-Lewis index (TLI), also known as nonnormed fit index (NNFI), combines a measure of parsimony into a comparative index.

### Table 4. Goodness-of-Fit Indices (see Hair et al. 1995)

<table>
<thead>
<tr>
<th>Goodness-of-fit Measure</th>
<th>Levels of Acceptable Fit</th>
<th>Calculated Fit Indices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Root mean square error of approximation (RMSEA)</td>
<td>Average difference per degree of freedom expected to occur in the population, not the sample. Acceptable values under 0.08</td>
<td>0.056</td>
</tr>
<tr>
<td>Goodness-of-fit index (GFI)</td>
<td>Higher values indicate better fit, no established thresholds</td>
<td>0.939</td>
</tr>
<tr>
<td>Adjusted goodness-of-fit index (AGFI)</td>
<td>Recommended Level: 0.90</td>
<td>0.910</td>
</tr>
<tr>
<td>Tucker-Lewis index (TLI) or NNFI</td>
<td>Recommended Level: 0.90</td>
<td>0.951</td>
</tr>
<tr>
<td>Normed fit index (NFI)</td>
<td>Recommended Level: 0.90</td>
<td>0.935</td>
</tr>
<tr>
<td>Comparative fit index (CFI)</td>
<td>Recommended Level: 0.90</td>
<td>0.962</td>
</tr>
</tbody>
</table>
between the proposed and null models, resulting in values ranging from 0 to 1 (Hair et al. 1995). Again, the normed fit index (NFI) is a relative comparison of the proposed model to the null model with values ranging from 0 to 1. The comparative fit index (CFI) compares the hypothesized to the independent model. This measure was developed by Bentler (1990) and can be viewed as an analysis of how much better the hypothesized model is: Values for CFI range from 0 to 1, values greater than 0.90 are recommended (Myerscough 2002).

All of the seven fit indices meet the recommended levels. Table 4 shows that the theoretical model is supported by the data and is appropriate to explain and predict the adoption of e-payment usage.

Conclusions

Our research has shown that past experience has a strong influence on perceived frictionless use, which in turn affects users’ overall attitude and their intention to pay online. While the impact of previous experience on trust in e-payment security seems to be negligible, the impact of trust in e-payment security on the overall attitude toward e-payment is comparatively high. Based on the results of this analysis, the authors arrive at the following recommendations:

- Governmental authorities should offer sufficient levels of support to ensure frictionless use during and after the payment process. This should be done by enabling users to contact capable staff members. Although e-payment makes payment processes more impersonal, this measure at least suggests that users can contact the person in charge, as the lack of a personal or interactive component might have a negative influence on citizens’ experience (see Thomas and Streib 2003).

- Given the important role of past experience, e-government solutions must ensure that their e-payment systems work smoothly and reliably from the very first transaction on.

- E-government should only use secure e-payment systems where personal data is transferred through secure channels and cannot be hijacked by other parties. Information on data security should be easily accessible on the site on which the transaction is conducted. This measure may help users to develop trust in the e-payment systems they use.

- E-government should provide more than one e-payment system for different user requirements. Also, there should not be any incentives or obstructions associated with any form of e-payment or offline payment. The digital divide exists (Thomas and Streib 2003), but e-payment solutions for e-government should not widen it further.

- Individual trust, experience, and attitude toward e-payment are not restricted to e-government but apply to all electronic transactions. Accordingly, e-government activities may influence user behavior at other e-commerce sites and vice versa. E-government may copy already well-established solutions from other sites, but governments also need to be aware that e-government potentially influences the e-payment behavior of electronic commerce users and companies.

Limitations and Further Research

Although the response rate of our online survey was comparatively high (17.8 percent with no incentive given), the sample may not be representative of all Austrian citizens, since the survey was conducted online. On the other hand, the major intention of this paper has been to assess people’s willingness to use e-payment systems, which they can only do if they have access to the Internet. Another limitation may be the usage of a mailing list with a comparatively high percentage of respondents with university degrees or some form of higher education, as was described above. The survey was conducted in Austria, so the results may not be easily transferable to other countries. However, Internet usage in Austria is above the European average (http://www.internetworldstats.com) and attitudes toward e-government and the adoption of such services are rather high compared to other countries, so our findings may constitute a starting point for further research. Austria is a comparatively small country with a high level of Internet proficiency and a high level of trust in governmental services, which may exert a significant positive influence on the hypotheses formulated above and has to be taken into account before any generalization can be drawn.

As far as the scales are concerned more testing is needed to improve the overall fit of the model. Another refinement of the model would include taking into account trust in the government as a separate construct to account for the fact that citizens may have varying degrees of trust, particularly if the model is applied for an international research study.
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