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Risks and Uncertainties in Citizens' Trust and Adoption of E-Government: A Proposed Framework

Research-in-progress

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Abstract

This paper presents a conceptual framework to identify risks and uncertainty as relevant factors for assessing citizens' trusts and their adoption intention of e-government. To strengthen the arguments on the effects of risk aversion and uncertainty avoidance on trust in the adoption intention of e-government, a research model grounded in trust, perceived risk and uncertainty, risk aversion and uncertainty avoidance framework is proposed based on a review of an extensive literature. This study will be conducted by using an online survey questionnaire. The study findings are expected to enhance our knowledge on the factors associated with citizen's intention to adopt e-government.

Keywords e-government, trust, adoption, risk aversion, uncertainty avoidance, citizen.

1 Introduction

Government agencies interact with citizens through a range of channels (Xie et al. 2017). The recent widespread adoption of information and communications technology (ICT) at most social levels seemed to herald the success of electronic channels via e-government. For citizens, these benefits would principally relate to convenience, transparent and accountable service (Christmann 2018). Meanwhile, for public administrations, there are numerous benefits including cost savings per transaction and a broader offer of services and information to citizens (Cartel et al. 2016).

Despite the significant amounts of public investment devoted to enhance e-government over the last decade, citizens' use of this e-government service is still limited (Al-Hujran et al. 2015). Yildiz and Topal (2017) found that the main reason for this limited use of e-government is due to the lack of trust of citizens associated with the risk and uncertainty of e-government. Previous studies provide useful information in understanding trust in technology acceptance (Grandhi et al. 2019; Khasawneh et al. 2013; Kumar et al. 2018; Li et al. 2008; Mou et al. 2017). They, however, only focus on one theoretical perspective. There is a need for theoretical frameworks to comprehensively examine the joint influences of trust, risk aversion and uncertainty avoidance antecedents on citizens' adoption of e-government. Bélanger and Carter (2008) and Kumar et al. (2018) discussed the importance of the risk involved and trust required to encourage citizen's acceptance of e-government. Meanwhile, Sundberg (2019) pointed out that the implementation of e-government is associated not only with high expectations of value realisation but also with high uncertainty and complexity. It is common that citizens refrain from using e-government services due to a lack of trust and perceived risks concerning their private information.

There is also a lack of study directly comparing the moderating effects of risk aversion and uncertainty avoidance in the context of e-government adoption intention (Ali et al. 2018; Venkatesh et al. 2016). On top of that, it is important to distinguish the difference between perceived risks and uncertainties from an individual citizen's perspective. Therefore, this research attempts to provide answers for the following research questions: *What is the role of risks and uncertainties in citizen's trust and their intention to use e-government? Are there any behavioural differences in citizens' responses to risks and uncertainties in their intention to use e-government?* The objectives of this study are two-fold. First, this research attempts to identify the differences between risks and uncertainties in citizen's adoptions of e-government. Second, this research distinguishes the effects of risk aversion and uncertainty avoidance from an individual citizen's perspective on e-government adoption intention. Literature offers limited insights into trust and the different role of risk aversion and uncertainty avoidance in e-government adoption intention. Thus, the findings of this research are expected to contribute to the existing literature by offering insights into the e-government adoption intention through trust, risk and uncertainty lens. This will also help the government agencies to adopt appropriate mechanisms for a successful e-government acceptance.

The paper is organised into five sections. Section two provides the existing frameworks including interrelations between trustworthiness, risk and uncertainty. Section three presents the proposed research framework. Section four describes the proposed methodology and future work. Section five concludes the paper with expected contributions to the research.

2 Theoretical Background

2.1 Trustworthiness

The concept of trustworthiness in the context of e-services adoption refers to the perception of confidence in the electronic marketer's reliability and integrity (Bélanger and Carter 2008; Wibowo and Mubarak 2020; Yang et al. 2019). Perceived trustworthiness plays an essential role in citizens' adoption of e-government services as their confidence in the service providers, and the relevant technologies can influence the intentions to use (Carter et al. 2016; Warkentin et al. 2018). According to McKnight et al. (2002), the perceived trustworthiness of government is a type of institution-based trusts. This is based on a citizen's perception of the government's structures and the relevant regulations or legislation; namely, the services provided a well-structured and regulated government are more likely to be perceived as trustworthy and less risky.

Moreover, the trustworthiness of the internet also influences citizens' confidence in the relevant applications, as e-government services often involve online transactions. Individuals can perceive

more risks when online transactions request their personal information. Consequently, the lower level of trust of internet may challenge the e-government adoption (Carter et al. 2016). Therefore, privacy and security are often highlighted by many studies in this field as the significant factors related to citizens' perceived trustworthiness of e-government services (Bélanger and Carter 2008; Yang et al. 2019).

2.2 Risk and Uncertainty

Trust is necessary when risks exist, as it helps people in overcoming the perceived risk and uncertainty for adopting and using new technologies (Kumar et al. 2018; Li et al. 2008; Wibowo and Mubarak 2020). According to Stone and Gronhaug (1993), it is challenging to use objective measures to evaluate risks for different users. Thus, studies in this field tend to focus on individuals' risk perceptions. Thus, the concept of perceived risk is widely adopted by the studies on users' acceptance of e-government services (Ali et al. 2018; Palaco et al. 2019).

People can perceive various types of risks when they choose a product or service. For example, people may be concerned with the negative impacts of unreliable e-services on privacy (privacy risk), the services failing to meet their expectations (performance risk), the potential loss of benefits or money due to low-quality services (financial risk), the efforts in redoing the same tasks (time risk), affecting social norms (social risk), and concerns about their personal security (psychological risk) (Nam 2018; Palaco et al. 2019; Rotchanakitumnuai 2007; Yang et al. 2019). Therefore, perceived risk has been reported as a significant barrier for the implementation, adoption and use of e-government services in many previous studies (Al-Hujran et al. 2015; Bélanger and Carter 2008; Xie et al. 2017).

Uncertainty refers to the lack of predictability, of structure, of information (Rogers 2003). As for citizens, they usually experience different forms of perceived uncertainties in their decision-making process. They are not always able to get a confirmation regarding what they seek in services (need uncertainty), the source and format of information (information uncertainty), the outcome from using the service (outcome uncertainty), the methods they should utilise to assess the alternatives (knowledge uncertainty), and the range of choices they should consider (choice uncertainty) (Ali et al. 2018; Littler and Melanthiou 2006; Nam 2018; Venkatesh et al. 2016). Therefore, uncertainties have been found to influence people's attitude and use attention towards public services such as e-government in ample studies (Al-Hujran et al. 2015; Akkaya et al. 2012).

2.3 Risk Aversion and Uncertainty Avoidance

The subjectivity of perceived risks results in people's different attitudes towards them. In this context, studies often use the concept of risk aversion to measure individuals' acceptance of risks. This concept is also named as risk avoidance, which refers to whether a decision maker has a tendency to be attracted by alternatives that he or she perceives as less risky than other choices (Hofstede et al. 2010).

The effects of risk aversion are often discussed in different studies on an individual's decision making, as people often perceive the various type of risks. This concept has been most frequently applied to financial studies regarding investors' behaviours based on the perceived risks in their investments (Frijns et al. 2013). Regarding the public sector, it has been demonstrated that intensive internet-users are more likely to accept e-government services as they are less risk-averse to the new technology (Moon and Welch 2005).

Hofstede et al. (2010) stated that uncertainty avoidance signifies the extent of feeling threatened by uncertain or unknown situations. Uncertainty-avoiding individuals are those who are unlikely to tolerate ambiguity and tend to choose something that they can understand and predict (Nam 2018; Quintal et al. 2010). The influences of uncertainty avoidance have been widely discussed in the studies on the public options of new technologies (Al-Hujran et al. 2015).

3 Research Model and Hypotheses Development

Based on the discussion above, this study develops a conceptual framework to investigate the role of trust in determining the citizen's adoption intention of e-government. Particularly, perceived risk and perceived uncertainty were identified as different factors related to citizens' trusts and adoption of e-government. In view of current literature, this study also adopted uncertainty avoidance and risk aversion as the different moderating factors. Figure 1 presents the proposed conceptual framework.

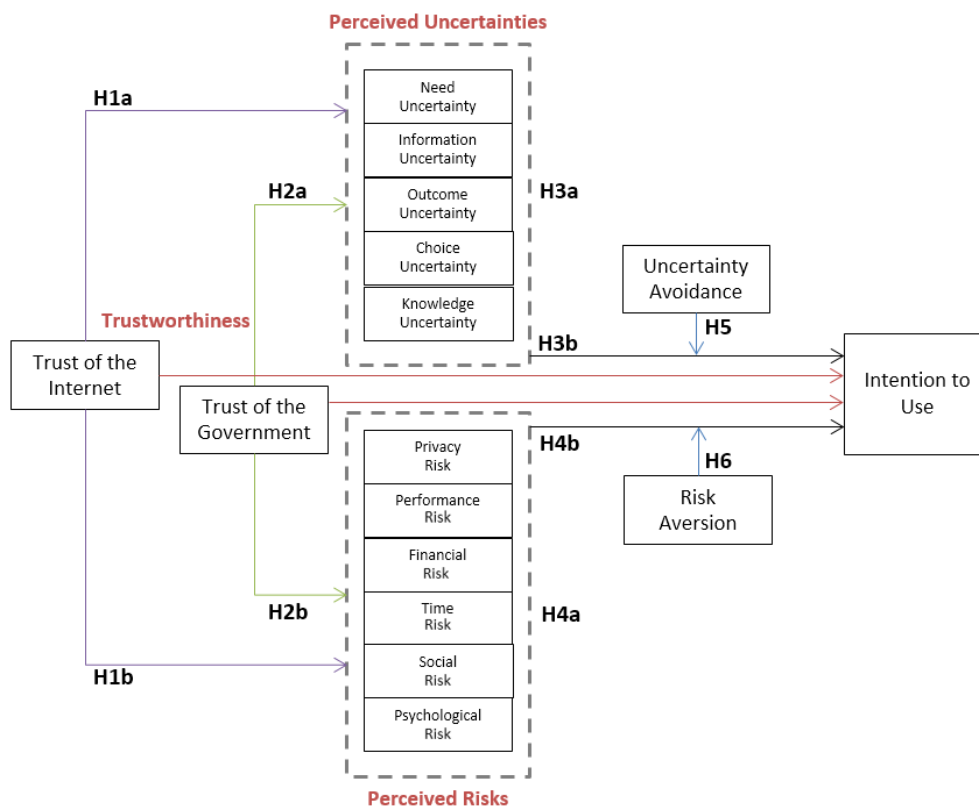


Figure 1: The Proposed Conceptual Framework

3.1 Trust, Perceived Uncertainty and Perceived Risk

Li et al. (2008) believed that trust is considered as an essential factor to overcome users' perceptions of risk and uncertainty before adopting new technologies. However, researchers often study risk and uncertainty as the same concept. For instance, Khasawneh et al. (2013) discussed the perceived uncertainty about the quality of online services as a type of risks. Similarly, Sang and Lee (2009) believed that online transactions via e-government services may involve many risks, which is a combination of uncertainty plus the seriousness of outcome involved.

Some other researchers tend to apply these two concepts as a combined construct. Cartel et al. (2016) showed that risk and uncertainty as an integrated factor for the cross-cultural analysis of e-government adoption in Europe. Thus, these two concepts are frequently studied as an integrated or interchangeable construct (Ali et al. 2018; Lee et al. 2007; Quintal et al. 2010). For example, the uncertainties of a decision's outcome are often seen as a component of risks or a type of unknown risks (Brown and Osborne 2013). Despite the joint presence of the discussions on risk and uncertainty in many previous research projects, only the effect of perceived risk has been included in the theoretical frameworks adopted by many studies on trust (Mou et al. 2017; Zafiroopoulos et al. 2012). Namely, perceived uncertainty was not tested or analysed as an individual and distinct factor in those studies. Consequently, risk and uncertainty were often applied as the same construct by many studies on people's attitudes towards public services. For example, Ifinedo (2005) believed that there is no distinction between uncertainty and risk factors.

However, risk and uncertainty are different concepts (Hofstede et al. 2010). Risks are more specific than uncertainties and are often seen as a probability of a specific negative result. Conversely, uncertainty is a situation in which various outcomes may be equally possible (Williams and Baláz 2015). It means that people are unable to make precise predictions for the outcomes of using a new product or service when they perceive uncertainties. However, it indicates that the users are able to deliberate and evaluate well-defined outcomes and probabilities when they perceive risks (Littler and Melanthiou 2006). Given the differences between these two concepts, it is necessary to test whether citizens' trusts have consistent effects on their perceived uncertainties and risks of e-government. This leads to the following hypotheses:

Hypothesis 1: Trust of the internet decreases the citizens' perceived uncertainty (H1a) and risk (H1b) of e-government

Hypothesis 2: Trust of the government decreases the citizens' perceived uncertainty (H2a) and risk (H2b) of e-government

3.2 Perceived Uncertainty, Perceived Risk and Use Intention

Citizens' perceived uncertainty and risk are believed to affect their perceived usefulness that can accordingly influence the use intention of e-government (Xie et al. 2017). For example, perceived usefulness can be influenced by the subjective norm that refers to a person's perception that most people who are important to him think he should or should not perform the behaviour in question (Venkatesh and Davis 2000). This suggests that perceived social risk is relevant to the perceived usefulness of e-government services. Moreover, perceived risk is believed to reduce citizens' intentions to provide private information and fulfil transactions (Pavlou 2003). The risks for financial, psychological and time loss are also highlighted as the barriers in the adoption of e-government (Mou et al. 2017). Likewise, according to Venkatesh and Davis (2000), the output quality of e-government services will influence the users' perceived usefulness. This suggests that a higher level of outcome uncertainty may reduce perceived usefulness and promote the use intention.

However, these existing studies did not recognise or compare citizens' perceived uncertainty and risk as different concepts. Thus, we proposed the following hypotheses:

Hypothesis 3: Citizens' perceived uncertainty decreases the use intention of e-government

Hypothesis 4: Citizens' perceived risk decreases the use intention of e-government

3.3 The Moderating Effects of Risk Aversion and Uncertainty Avoidance

In relation to risk avoidance and uncertainty avoidance, they are often studied as significant moderators for the effects of perceived risk and perceived uncertainty on users' service perception and usage intentions. For instance, risk-averse consumers present a higher level of behavioural intentions when they are satisfied with the services (Ranaweera et al. 2008). Likewise, uncertainty avoidance moderates the relationship between people's attitudes and their intentions to use e-services (Mou et al. 2017). Uncertainty avoidance is often considered as a cultural control which influences the perceived ease of use for the studies on the adoption of new technologies (Ali et al., 2018; Xie et al. 2017). Thus, the researchers usually use uncertainty avoidance as one of the dimensions to compare different cultural groups in many previous studies regarding the impact of national culture on e-government development. Interestingly, they tend to use the term of uncertainty avoidance to indicate the citizen's tendency to be risk averse. There seems to be an agreement that people with higher levels of uncertainty avoidance are likely to be risk-averse towards e-government services (Akkaya et al. 2012). This implies that uncertainty avoidance and risk avoidance have been applied as the same concept in those previous studies. Given the differences between perceived risk and perceived uncertainty, users' attitudes towards these two factors can be explained by different personalities. For example, there is a positive correlation between individuals' curiosity and uncertainty avoidance, while curiosity negatively correlates risk avoidance (Lauriola et al. 2015). Namely, uncertainty avoidance and risk aversion should be recognised as different factors that play different roles in citizens' adoption of e-government. Thus, these hypotheses are presented:

Hypothesis 5: Uncertainty avoidance moderates the effects of perceived uncertainties on the use intention of e-government

Hypothesis 6: Risk aversion moderates the effects of perceived risks on the use intention of e-government

4 Proposed Methodology and Future Work

The goal of this in-progress-research paper is to investigate the differences of perceived risks and uncertainties related to citizens' trusts and their behavioural intentions, and the moderating effects of risk aversion and uncertainty avoidance in e-government acceptance. A sample size of 750 will be collected from citizens in Australia. A quantitative approach using an online survey instrument will be the preferred method for data collection to test the research model. Construct items will be tested using a 5-point Likert scale ranging from (1) Strongly Disagree to (5) Strongly Agree. The variables and measurements are presented in Table 1.

Variables	Measures	Sources
Trust	Trust of the Internet Trust of the Government	Warkentin et al. 2018
Perceived Uncertainties	Need Uncertainty Information Uncertainty Outcome Uncertainty Choice Uncertainty Knowledge Uncertainty	Ali et al.2018; Littler and Melanathiou 2006; Nam 2018; Venkatesh et al. 2016
Perceived Risks	Privacy Risk Performance Risk Financial Risk Time Risk Social Risk Psychosocial Risk	Nam 2018; Palaco et al. 2019; Pavlou 2003; Rotchanakitumnuai 2007; Yang et al. 2019
Intention to Use	Intention to Use	Warkentin et al. 2018
Uncertainty Avoidance	Uncertainty Avoidance	Quintal et al. 2010
Risk Aversion	Risk Aversion	Quintal et al. 2010

Table 1. Variable and Measures for the Proposed Research Model

The survey questionnaire comprises of three parts. The first part includes questions seeking responses on essential demographic characteristics such as participant's age, gender, education level and occupation. The second part seeks responses from the participants on their e-government experiences, and general evaluation. The final part requires participants to specify the extent to which they agree or disagree on the developed hypotheses. Respondents are also provided with additional space to provide suggestions at the end of the questionnaire. Structural Equation Modelling will be used to analyse the data and produce findings.

5 Expected Contribution

This study is expected to have both theoretical and practical implications. From the theoretical side, this study will contribute to the IS body of knowledge on the differences of risks and uncertainties in citizens' trust and adoption of e-government. On the practical side, this study provides insight for government agencies to clarify the relevant factors affecting e-government adoption, which is necessary for successful e-government development and implementation. This study focuses on citizens' adoption of e-government. Thus, further research should be conducted to investigate whether the findings can be applied to other fields.

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