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A Comprehensive Analysis on Citizen Adoption of E-Government Services: A Cross-Cultural Analysis

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Zusammenfassung

Problemstellung und Ziel der Arbeit: Trotz ihrer hohen Relevanz, befindet sich die Forschung im Kontext E-Government, verglichen zu der weit entwickelten Forschung zu E-Commerce, noch in ihrem Anfangsstadium. Es besteht ein dringender Bedarf an Forschungsarbeit, die die charakteristische Art und Komplexität dieser Disziplin differenziert behandelt und dabei Aspekte wie die digitale Spaltung, Governance in der öffentlichen Verwaltung und Bedürfnisse der Bürger zentral in Theorie und Praxis berücksichtigt. Speziell die anhaltenden Bedenken von Bürgern gegenüber G2C-Dienstleistungen weisen auf die Notwendigkeit einer spezifischen Forschung hin, die ein umfassendes Verständnis über die Einflussfaktoren ihrer Akzeptanz schafft. Da sich gezeigt hat, dass kulturelle Wertesysteme das Akzeptanzverhalten der Bürger beeinflussen, ist eine Betrachtung aus länderspezifischer Perspektive erforderlich. Dies erlangt zusätzliche Bedeutung dadurch, dass bisherige wissenschaftliche Forschungsbeiträge innerhalb dieser Disziplin größtenteils in den USA durchgeführt wurden, die sich hinsichtlich kultureller Charakteristika von Europa unterscheiden. Ziel dieser Dissertation ist es, Determinanten der E-Government Akzeptanz zu identifizieren und ein detailliertes Verständnis über diese zu schaffen. Dafür werden innerhalb dieser Arbeit die beiden Länder Schweden und Deutschland betrachtet.

Forschungsdesign und Methodik: Die Arbeit verfolgt einen deskriptiven und kausalen Forschungsansatz. Ihr vorausgehend wurde eine repräsentative deskriptive Studie durchgeführt in Deutschland, die die Determinanten, Hindernisse und Sorgen von Bürgern bezüglich E-Government Dienstleistungen untersuchen. Auf Basis daraus gewonnener Erkenntnisse wurde das passende Forschungsmodell für den Kontext dieser Analyse gewählt, welches zwei Faktoren des Vertrauens sowie die Risikowahrnehmung von Bürgern in Rogers' Diffusionstheorie integriert. Die Korrektheit des Modells wurde mittels des kovarianzbasierten Strukturgleichungsmodell-Verfahrens (SEM) validiert. Durch multiple Gruppenvergleiche wurde das Modell neben der Analyse von nationalen Unterschieden auf Differenzen zwischen demographischen Gruppen sowie zwischen Nutzern und Nichtnutzern von Online-Steuererklärungen getestet. Mithilfe zwei weiterer repräsentativer Untersuchungen wurden, anschließend zu der konfirmatorischen Forschung, Änderungen im Akzeptanzverhalten der Bürger über einen zeitlichen Verlauf beobachtet.

Ergebnisse: Aus den Studien können als dominierende Determinanten der E-Government Akzeptanz die Aspekte Datenschutz, Datensicherheit und Zuverlässigkeit der Systeme identifiziert werden. Gemäß a priori theoretischer Erwartungen wurde beobachtet, dass deutsche Befragte größere Bedenken als schwedische Befragte aufweisen, was den höheren Index der Unsicherheitsvermeidung Deutschlands bestätigt. Ebenso zeigen die Studien einen klaren Unterschied der Determinanten individueller Akzeptanz gegenüber Einführung einer Online-Steuererklärung zwischen deutschen und schwedischen Befragten auf.

Forschungsbeitrag: In Bezug auf die Kritik an der deutschsprachigen IS Forschung für ihren starken Fokus auf hohe Praxisrelevanz bei vergleichsweise geringer wissenschaftlicher Qualität, bietet diese Dissertation auf vielfältige Weise wertvolle Beiträge zu der wissenschaftlichen E-Government Forschung. Dies basiert primär auf ihrer methodologischen und empirischen Qualität in der E-Government Akzeptanz- und Vertrauensforschung aus kulturübergreifender Perspektive. Ein wichtiger Beitrag wird durch die umfassenden empirischen Studien gegeben, die das Akzeptanzverhalten der Bürger in Schweden und

Deutschland repräsentativ aufzeigen und anhand der Merkmale Geschlecht, Alter und formaler Bildung gewichten. Ergänzend zeichnet sich diese Forschungsarbeit durch Verwendung von SEM-validierten Gruppenvergleichen aus. Obwohl es sich dabei um eine zuverlässige Methode für kulturübergreifende Analysen handelt, wurde diese bisher in nur wenigen Artikeln der IS Fachzeitschriften angewandt. Darüber hinaus wurde in dieser Dissertation eine theoriebasierte, empirische Analyse durchgeführt, die die Determinanten der E-Government Akzeptanz deutscher Bürger anhand einer repräsentativen Stichprobe untersucht. Da die bisherige Forschung in diesem Bereich hauptsächlich auf in den USA durchgeführten Studien basiert, ergibt sich somit ein besonderer Beitrag dieser Arbeit durch die Schaffung eines umfassenden Verständnisses über das Akzeptanzverhalten der Bürger zweier europäischer Staaten.

Praxisbeitrag: Diese Dissertation bietet wertwolle Erkenntnisse für die Praxis und zeigt ein differenziertes Bild über das Akzeptanzverhalten von Bürgern gegenüber E-Government Dienstleistungen auf. Ebenso verdeutlicht die umfassende Analyse, dass Unterschiede in der Akzeptanz von G2C-Dienstleistungen aufgrund kultureller Unterschiede auch zwischen Bürgern vergleichbar entwickelter Länder auftreten. Diese Erkenntnisse bieten der Deutschen Bundesregierung Empfehlungen an, zur Unterstützung ihrer Zielerreichung, der bundesweiten Nutzung von E-Government Dienstleistungen. Zusätzlich wird ein detaillierter Aufschluss über Unterschiede bei Faktoren der G2C Akzeptanz verschiedener demographischer Gruppen sowie zwischen Nutzern und Nichtnutzern von Online-Steuererklärungen gegeben, die von deutschen und schwedischen Behörden sorgfältig berücksichtigt werden sollten.

Limitationen und zukünftige Forschung: In zukünftigen Forschungsarbeiten sollten drei Herausforderungen dieser Studie behandelt werden. Dazu zählt insbesondere die Verwendung eines Kulturdimensionsschemata als kulturelles Rahmenmodell, da die darin aufgestellte Annahme kultureller Homogenität innerhalb eines Landes nicht notwendigerweise den tatsächlichen Bedingungen entspricht. Zusätzlich wurden aufgrund der gewählten Datenerhebungsmethode ausschließlich Haushalte mit PC und Internetzugang betrachtet. Darüber hinaus besteht die Möglichkeit, dass die Kultur bei ähnlich entwickelten Staaten nicht als einziger Faktor für Unterschiede im Akzeptanzverhalten angenommen werden kann. So können zwischen Schweden und Deutschland, trotz vergleichbarem wirtschaftlichen Wohlstand und fortschrittlicher Telekommunikations-infrastrukturen, weitere Gründe für diese Unterschiede bestehen.

Abstract

Problem Situation and Motivation: In contrast to the vast amount of literature into e-commerce, research on e-government is still in its infancy. There is a crucial need for e-government specific research that addresses the distinctive nature and unique complexities surrounding it. In particular, citizens' needs have to be taken into account in e-government practice. In contrast to frequent use of social media, e-commerce and online banking, the lack of interest towards e-government services on the demand side has resulted in more specific research to increase understanding of adoption factors within the last decade. Furthermore, espoused cultural values are shown to influence the adoption behavior of nations therefore the adoption of e-government needs to be examined from the perspective of national culture. Yet, most of the prior research in this context was conducted in the U.S., which is distinct from Europe with regards to cultural characteristics.

Purpose: The objective of this thesis is to investigate and understand the determinants of G2C e-government adoption in a cross-cultural context. Since prior research has not examined e-government adoption behavior of the German nation by testing a theoretical model with a representative sample, the primary objective of this thesis is to shed light on the citizens' perspective in Germany by examining the salient determinants of adoption. Being at a similar stage of economic growth and having similar technological infrastructures, Sweden, which enjoys leadership rankings in G2C e-government benchmarks, was selected as a culturally distinct European nation for comparison with Germany.

Methodology: This work combines descriptive and explanatory research in order to provide a comprehensive understanding of G2C e-government adoption. Preceding the confirmatory research, a descriptive study was conducted in Germany utilizing a nationwide representative sample to investigate the determinants, barriers and concerns influencing citizens with regard to e-government services. Insights gained from this descriptive study enabled the selection of the appropriate model for the research context and the nations of analysis. This research instrument, which integrates trust and risk perceptions into the Rogers' Diffusion of Innovations Theory, was validated using covariance based structural equation modelling (SEM). Besides examining national differences by conducting multi-group comparisons, the research model was also tested to reveal differences between demographical groups as well as between online tax filing users and non-users. The confirmatory research was followed by two descriptive studies, which enabled the observation of possible changes in the adoption behaviors of citizens over time.

Findings: The four consecutive descriptive studies showed that the factors and barriers related to security, data protection, and reliability play an important role in decision making of citizens. In accordance with the a priori theoretical expectations, the German respondents were observed to have greater concerns than the Swedish respondents confirming the relatively higher uncertainty avoidance index of the German nation. Compatibility, perceived risk, relative advantage, complexity and subjective norm were found as antecedents of the adoption of online tax filing in Germany, which should be considered by the Federal Government in the future. The findings also indicated that citizens expect to see clear benefits from G2C e-government over traditional methods of interaction with public authorities. Factors related to usability and technical support were found to be important in Germany, but considered less important in

Sweden. The multi-group moderation analysis in SEM showed that demographical groups differed in terms of the determinants of G2C e-government adoption.

Theoretical Contributions: This dissertation makes contributions to the G2C e-government literature, trust research and cross-cultural research at several levels. Considering that the German speaking IS community was criticized for focusing heavily on high relevance and having poor rigor by IS scholars, this dissertation provides an important contribution to G2C e-government literature. Although multi-group SEM is recognized as a reliable method for cross-national research, a few papers in this area were published in major IS journals, which is a distinguishing aspect of this thesis in terms of its rigor. Furthermore, this thesis aims to offer an important empirical contribution as well, by employing representative samples in four comprehensive empirical studies conducted in two European countries, weighted by central features of gender, age and formal education.

The theoretical contribution of this work should also be emphasized considering the lack of studies on theory testing in G2C e-government literature. It is the first theory-based study which investigates salient determinants of G2C e-government adoption by the German citizens. Furthermore, this thesis recognizes the multidimensional nature of trust and addresses the role of trust in G2C e-government context, which remains relatively under-researched. Finally, since most of the IS adoption and trust literature is based on studies conducted in the U.S., this thesis contributes to e-government literature and cross-cultural research by a comprehensive analysis comparing adoption behaviors of two developed European nations.

Practical Implications: This dissertation provides valuable insights into the citizen perspectives on e-government adoption, which has not received much research to date. The comprehensive analysis indicated that citizens of Germany and Sweden have different perceptions regarding adoption of G2C e-government services. The outcome of this research facilitates a broader understanding of G2C e-government adoption in the German nation, which should support the Federal Government in reaching its goal of widespread adoption of e-government services. A further contribution to practice is the identification of factors, barriers and concerns of different user groups distinguished by gender, age and formal education which sheds light into to the differences of demographic groups in E-Government.

Limitations: Three limitations of this study should be addressed in future research. This study utilizes Hofstede's cultural dimensions as the cultural framework which is premised on the assumption of cultural homogeneity within a given country and this may not hold. Second, only households having a PC and those with Internet access were considered in this research due to the selected data collection method. Third, although Sweden and Germany are both highly developed countries with advanced telecommunications infrastructure and economic welfare, culture may not be the only reason for the differences between the nations.

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List of Abbreviations

AGFI	Adjusted Goodness of Fix Index
AMOS	Analysis of Moment Structures
ANOVA	Analysis of Variance
AVE	Average Variance Extracted
B2C	Business to Consumer
CAWI	Computer Assisted Web Interviewing
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CLX	Complexity
CMB	Common Method Bias
CMP	Compatibility
CMV	Common Methods Variance
CFA	Confirmatory Factor Analysis
CR	Composite Reliability
CRM	Customer Relationship Management
CSE	Computer Self-Efficacy Model
CVS	Chinese Value Survey
DEXA	Database and Expert Systems Applications
df.	Degrees of freedom
DOI	Diffusion of Innovations Theory
DTPB	Decomposed Theory of Planned Behavior
E-Commerce	Electronic Commerce
E-Government	Electronic Government
E-Business	Electronic Business
E-Services	Electronic Services

ECEG	European Conference on e-Government
EFA	Exploratory Factor Analysis
eGK	Electronic Health Insurance Cards (German: Elektronische Gesundheitskarte)
EGOV	Electronic Government Conference
ELENA	Electronic Wage Verification System Projekt (German: Elektronisches Entgeltnachweis)
ELSTER	Electronic Tax Declaration (German: Elektronische Steuererklärung)
ePass	E-Passport Project (German: Elektronischer Reisepass)
G2B	Government to Business
G2C	Government to Citizen
G2G	Government to Government
GFI	Goodness of Fit Index
GLOBE	Global Leadership and Organizational Behavior Effectiveness
GSS	Group Support System
HICSS	Hawaii International Conference on System Sciences
ICT	Information and Communication Technologies
IDV	Individualism versus Collectivism Index
IND	Indulgence versus Restraint Index
IS	Information Systems
IT	Information Technology
USE	Intention to Use
KMO	Kaiser-Meyer-Olkin Measure of Sampling Adequacy
LISREL	Linear Structural Relations
LTO	Long-Term Orientation versus Short-Term Orientation
M-Government	Mobile Government

MAS	Masculinity versus Femininity Index
MATH	Model of Adoption of Technology in Households
ML	Maximum Likelihood
MPCU	Model of PC Utilization
NEGS	National E-Government Strategy
NEGZ	National E-Government Centre of Excellence (German: Das Nationale E-Government Kompetenzzentrum)
NPA	New personal ID Cards (German: Neuer Personalausweis)
NPM	New Public Management
PBC	Perceived Behavioral Control
PC	Personal Computer
PDI	Power Distance Index
PEOU	Perceived Ease of Use
PLS	Partial Least Squares
PPR	Public Sector Process Rebuilding
PR	Perceived Risk
PRA	Pragmatic versus Normative Index
PU	Perceived Usefulness
RA	Relative Advantage
RMSEA	Root Mean Square Error of Approximation
SD	Standard Deviation
SN	Subjective Norm
SCT	Social Cognitive Theory
SEM	Structural Equation Model
SNS	Social Networking Site
SPSS	Statistical Package for the Social Sciences

SRMR	Standardized Root Mean Square Residual
TAM	Technology Acceptance Model
TLI	Tucker-Lewis Index
TOG	Trust of Government
TOI	Trust of Internet
TPB	Theory of Planned Behavior
TRA	Theory of Reasoned Action
Tukey-HSD	Tukey’s Honest Significant Difference
UA	Uncertainty Avoidance
UAI	Uncertainty Avoidance Index
U.S./USA	United States of America
UTAUT	Unified Theory of Acceptance and Use of Technology
WI	Wirtschaftsinformatik
WVS	World Values Survey

1 Introduction

1.1 Problem Statement and Motivation for this Research

Information systems are implemented for the purpose of improving the effectiveness and efficiency of organizations (Hevner et al. 2004). With the rise of the *New Public Management* (NPM) concept from the 1980s onwards, a series of reforms intended to improve the performance of public organizations began. The use of ICT and its application by the government to provide the public with information and services is known as *e-government*[1] (UN Public Administration Programme 2014) and has become a key facilitator for modernization in public administrations within the last two decades (Becker et al. 2008).

When evaluating the feasibility of e-government systems, it is important to view the issue from multiple perspectives (Wolf/Krcmar 2005). E-government systems promise vast time and cost savings within an organization and society (Dwivedi et al. 2011). However, it should be noted that the drivers of e-government initiatives are mainly political rather than economic (Scholl 2005). Government leaders place great emphasis on e-government because they are aware that citizens assess their success in terms of their initiatives and the benefits they create for society. E-government can also be effectively used to increase citizen participation in political processes, to improve government's image and to facilitate democratic elements such as online voting. The Digital Agenda for Europe (European Commission 2016a), which is part of the Europe 2020 initiative, underscores the need for greater transparency and enhanced trust between citizens and governments.

Besides the benefits for the government, e-government services promise to be valuable for the public. Citizens are obligated to contact public authorities for various reasons during their lifetime, i.e. applying for birth certificates, submitting tax declarations, and registering vehicles. Access to public services digitally around the clock, saving travel time and costs and eliminating the need for waiting in long queues at public authorities are discussed among other important drivers for citizens to change their established way of communicating with public authorities (Weerakkody et al. 2009a).

Prior literature on barriers to e-government adoption[2] indicates that citizens are worried about contacting their governments online rather than using traditional methods of communication. Concerns about *inadequate security and privacy* safeguards in electronic environments and *distrust in government* can be major impediments to the take-up of e-government services (Colesca 2009b). Citizens are worried about online disclosure due to the uncertainties and risks regarding privacy of the transferred data, vulnerability to online fraud or identity theft. Various surveillance scandals further intensify the concerns of potential users (Jäger 2016). While privacy is highly desired, absolute privacy for online contexts is mostly unattainable. Since the behavior of the trustee cannot be monitored or guaranteed in online contexts (Gefen et al. 2003),

[1] E-government services are commonly distinguished in different categories according to their main target groups. The most common interactions include the ones between government and citizens (G2C) and government and business enterprises (G2B). This thesis examines determinants of e-government adoption by citizens therefore the term e-government is used to refer to e-government in the G2C context.

[2] In prior IS/IT literature and hence in this thesis, the terms 'diffusion', 'acceptance' and 'adoption' are used interchangeably to refer to user acceptance of information systems and technology, in particular G2C e-government services. The analysis of Dwivedi et al. (2008a) reveals that *adoption* is the most frequently used term among them, which will also be preferred in this work.

individuals make decisions in exchange for outcomes that are perceived to be worth of the risk of personal information being disclosed (Krasnova et al. 2011).

Trust has received a considerable amount of attention in IS literature as an effective instrument to deal with risk perceptions in computer-mediated transactions (Pavlou 2003; United Nations 2012). The Privacy Calculus Theory states that the cumulative influence of *trust* and *expected benefits* can outweigh the perceived risk of disclosing personal information (Dinev/Hart 2006). The direct relationship between the level of trust and willingness to use online technologies has been confirmed in various contexts (Jarvenpaa et al. 2000; Gefen 2000; McKnight et al. 2002; Lee/Turban 2001). Due to its importance, trust has been recognized as an essential precondition for the adoption of online technologies (Beldad et al. 2010). The European Commission (2016a) has also recognized trust and security, as one of the main goals of Digital Agenda for Europe. Venkatesh et al. (2016) proposed quite recently transparency and trust as two key means of reducing citizens' uncertainty in e-government services drawing from the Uncertainty Reduction Theory (Berger/Calabrese 1975).

Compared to mature e-commerce literature, e-government literature is still not considered mature. While previous research considered e-government being in its infancy phase (Carter/Campbell 2011), according to more recent research it has progressed past infancy, yet still far from being considered mature (Scholl 2015). The "*poor state*" of e-government research is noticeable in terms of *lack of rigor* in the collection and analysis of data as well as lack of clarity about methodologies and research frameworks (Heeks/Bailur 2007, 261). Being concerned about its ability to address the future challenges of e-government in practice, scholars have explicitly called for "deeper e-government research" (Grönlund 2010b, 23). A review of prior literature reveals mostly exploratory and descriptive studies, which may be useful in practical terms but do not result in significant contributions to the aforementioned literature as they "do not tell us what is happening inside the black box of e-government" (Yildiz 2007, 660). While exploratory and descriptive studies are suitable for the initial phases of academic research (Bhattacherjee 2012, 6), they should be followed by *more structured causal research* and *theory testing* (Grönlund/Andersson 2006) for the explanation of the motives underlying *intentions of behaviors* (Singleton/Straits 2010; Neumann 2006, 35).

As an emerging field of research, our knowledge about the *citizen perceptive* in e-government remains limited. Since the priorities in implementing e-government were mostly on the supply side for many years, the demand side of e-government has received much less attention. According to Aichholzer (2005), "this neglect could no longer be held up when more and more signals of deficits in service take up and usage began to show up throughout the Europe" (p. 93). The success of government services depends largely on how well the citizens make use of them (Kumar et al. 2007). Several recent studies show that successful acceptance of public services by citizens continues to be way below their potential (United Nations 2014; European Commission 2015c; Krcmar et al. 2015; Accenture 2014). Systematic empirical studies examining *expectations, needs and concerns of citizens* regarding G2C e-government services – preferably utilizing *representative* samples in order to enable generalizations to the whole population – are urgently needed. Understanding which determinants are considered crucial by which demographical group would enable the development of precise strategies in order to reach specific user groups.

Particularly noticeable within various e-government benchmark studies are the dramatic differences in adoption rates between nations. In addition to the telecommunications infrastructure and national e-government strategy, economic differences influence ICT

accessibility substantially, which is usually discussed under the topic of the *digital divide*. Yet, when economic, political and physical factors have been considered, any remaining difference in adoption rates is likely to be attributed to differences in *national culture* (Erumban/De Jong 2006). Culture is a less tangible but a very important cause of difference among nations. Indeed, prior literature has already recognized the significant role of espoused cultural values in accounting for the technology adoption behaviors of individuals (Srite/Karahanna 2006; Carter et al. 2016; Cyr 2013).

Scholars in IS technology adoption have already called for caution regarding the *transportability* of technology adoption models between different national cultures without empirical verification (Bagozzi et al. 2000; Benbasat et al. 2008). As noted by Benbasat, Gefen and Pavlou (2008), this becomes especially critical "in the context of trust which is at the *heart of culture*" (p. 6). Being closely related to culture, trust needs to be examined from the perspective of national culture (Jarvenpaa et al. 2000; Gefen/Heart 2006; Doney et al. 1998; Fukuyama 1995; Hofstede 1980; Pavlou/Chai 2002). Cultures reveal important aspects about risk perceptions, privacy concerns and beliefs in a nation, which play an important role in citizens' intentions to adopt e-government services. Yet, almost all trust literature is based on studies carried out in the U.S. (Gefen/Heart 2006), which is distinguished by its exceptionally high level of *individualism* (Hofstede 1980).

There are many dimensions in which national cultures differ. Although a variety of cultural frameworks have been suggested to guide national level of cultural research and analysis, the framework suggested by Hofstede (1980) has become a cornerstone in cross-cultural research. One of the most distinguishing cultural factors for adoption of online technologies is the *uncertainty avoidance index dimension* (UAI) which shows the risk propensity within a nation. *Risk* is an essential concept in understanding adoption of online technologies, especially the ones involving transfer of *sensitive personal data*, as in the case of e-government. The UAI dimension is found to be the *most influential* national cultural value affecting the adoption of IS (Straub et al. 1997; Sundqvist et al. 2005; de Luque/Javidan 2004).

While most e-government initiatives remain far below their expected potential, some countries adopt e-government faster than others (Akkaya et al. 2012a; United Nations 2014; Cap Gemini 2015). Well-developed countries such as Sweden, Netherlands and Republic of Korea enjoy top rankings in global benchmarks. Despite its advanced telecommunications infrastructure, Germany has never reached top rankings in e-government (United Nations 2014). The adoption rate of e-government continues to be low especially in the household context (Krcmar et al. 2015; Krcmar et al. 2014; Krcmar et al. 2013). How German citizens decide to use or not to use online public services offered by their government remains far from being understood. Neither the comprehensive literature analysis conducted in this work, nor other reviews of the G2C e-government literature, revealed any empirical study which investigates the salient determinants of G2C e-government adoption by citizens on a theoretical basis.

A review of the literature indicates that the German nation is widely considered to be *risk-averse* (The Lauder Institute 2009; Hofstede et al. 1991; Brodbeck et al. 2002; House et al. 2004). Data protection and privacy is a matter of the utmost importance within the German nation. Not surprisingly, Germany has one of the strictest data protection laws within the world (Akkaya et al. 2012a). On the other hand, German citizens are not skeptical of online technologies. A recent survey investigated online usage behavior of the German citizens between 30 and 49 years old (Initiative D21 2015). Accordingly, 95 of them search content online, 64 percent of them participate in social networks such as Facebook and WhatsApp, and

71 of them shop online (Initiative D21 2015). Although more than 80 percent of the online users are concerned about data protection and security issues, they do not hesitate to continue using e-commerce, Facebook and online banking (Initiative D21 2013).

However, the fact that the German nation is willing to adopt other online technologies but refrain from using G2C e-government services may be caused by specific concerns citizens have with government. The perceptions of citizens regarding *low trustworthiness* of the Federal Government may be a possible reason hindering nationwide adoption of e-government services.

It is known that the greatest barrier to e-government is the *unwillingness to share personal information* with the government (Accenture 2012). The storage of highly sensitive personal information by the government was the main reason for the delays and failures of various nationwide initiatives ranging from the Electronic Health Insurance Card Project (eGK) (German: Elektronische Gesundheitskarte)(Bölsche 2008) to the Electronic Wage Verification System Project (ELENA) (German: Elektronisches Engeltnachweis) (Oppong 2009). The term "*transparent citizen*", which implies a complete fluoroscopy (X-Ray screening) of a citizen in terms of his or her personal data and tracking of online activities, has become the metaphor for data misuse and violation of privacy by government (Akkaya et al. 2012a). In addition to increased sensitivity due to *past experiences* of surveillance in the German national history; frequent data scandals and discussions[3] in the media intensify the sensitivity of citizens (reuters 2013; Poitras et al. 2013; theguardian 2013).

Although the crucial need to foster citizen trust towards online public services has been set as "one of the highest priorities for government in Germany" (PUBLICUS 2010), research in this context is extremely scarce. This is a quite noteworthy issue which deserves a closer empirical examination. I argue that understanding G2C e-government services adoption in Germany requires a multi-faceted perspective including examining trust beliefs of the public, their risk perceptions as well as their specific concerns related to sharing personal data with the government, in addition to the universally accepted technology adoption constructs.

1.2 Research Objectives and Research Questions

Drawing on existent literature on technology adoption, trust and espoused cultural values, this thesis empirically investigates the salient factors affecting decision making by citizens about using G2C e-government services. Germany will be analyzed in detail due to the research gap underlined in the previous section. Since it has been widely accepted that espoused cultural values influence decision mechanisms of citizens regarding adoption of online technologies (Srite/Karahanna 2006), the survey will also be conducted in Sweden. In order to achieve high external validity, samples will be selected to be representative of their populations, weighted by central features of gender, age and formal education.

From a methodological point of view, this research pursues quantitative research methods. By combining *descriptive research* with *explanatory research*, a thorough understanding of G2C e-government adoption is intended. A *confirmatory* research approach is selected in order to test the research model derived from prior literature. User perceptions and intentions can change over time (Lee et al. 2003b), which is why a *multiple-snapshot cross-sectional* design is most appropriate, to enable the monitoring of changes in population over time.

[3] "Big Brother is watching you"(Orwell 2009).

Three main research questions guide this thesis. The first research question (RQ1) aims to provide a theoretical framework consisting of various concepts, existing theories and previous research, which relates this work to the broader fields of IS:

1. What are the theoretical foundations of technology adoption research, and the impact of trust and espoused cultural values, in terms of existing frameworks, theories, models and concepts?

This research question will be broken down into the following specific sub-questions:

1.1. What are the theoretical foundations of technology adoption research?

1.2. What are the theoretical foundations of trust research?

1.3. What are the theoretical foundations of research into espoused cultural values?

Although literature on technology adoption in the context of G2C e-government context is relatively sparse, the theoretical framework of this work combines different research streams ranging from technology adoption to espoused cultural values in IS. Trust is another key concept of this research, which is related to privacy and security concerns of the potential users. By describing the broader context of related frameworks, theories, model and concepts that underpin this thesis, RQ1 provides a strong basis for the development of the questionnaire, selection of the research model and definition of the research hypotheses. The first research question will be addressed using a comprehensive literature review.

The second research question (RQ2) aims to gain initial insights by identifying the key variables influencing decision making by citizens about adoption of G2C e-government services in Germany and Sweden. Besides factors influencing their adoption decisions, barriers hindering their adoption as well as concerns related to data protection and privacy are questioned:

2. Which factors influence German and Swedish citizens' decision to use G2C e-government services and which barriers and data protection specific concerns hinder them from using these services?

This research question will be broken down into the following specific sub-questions:

2.1. Which factors influence citizens' decision to use G2C e-government services in Germany and which barriers hinder them from using these services? What are their specific concerns regarding data protection and privacy?

2.2. Which factors influence citizens' decision to use G2C e-government services in Sweden and which barriers hinder them from using these services? What are their specific concerns regarding data protection and privacy?

2.3. In what aspects do the factors, barriers and concerns regarding G2C e-government services usage differ between citizens of Sweden and Germany?

2.4. How did factors, barriers and concerns regarding G2C e-government services adoption change from 2010 to 2013 in Germany?

2.5. How did factors, barriers and concerns regarding G2C e-government services adoption change from 2011 to 2013 in Sweden?

Four descriptive studies will be conducted to answer RQ2. In order to achieve generalizability of the results to the entire populations in question, nationwide representative samples will be employed. The conceptual framework provided in Chapter 3 and the broad literature review given in Chapter 4 will be used in the questionnaire development. The results of the first two descriptive studies will be analyzed in detail. Besides analyzing factors, barriers and concerns for each nation individually, the results will also be compared to enable the identification of between-country differences and possible changes over time. Such an analysis will deliver a validated set of variables which will provide guidance on the selection of the research model. The derived research model will be used in the theory-based confirmatory analysis of the next research question. Such an analysis is compulsory considering the lack of research on G2C e-government adoption behavior of the German citizens. This approach follows the suggestion of De Vaus (2001), who argues that the researcher must have a clear understanding about the facts and dimensions of the phenomenon, before asking causal questions. The second research question will be addressed using *survey research* and multiple-snapshot cross-sectional analysis.

The third research question (RQ3) aims to analyze salient determinants of G2C e-government adoption based on the theoretical framework provided in RQ1 and the set of variables identified in RQ2. Besides a detailed examination of determinants using the specific example of online tax filing[4], the research question will attempt to distinguish between determinants based on various demographics and previous context specific experience:

3. What are the salient determinants of G2C e-government services adoption and how do gender, age, formal education and previous experience in online tax filing moderate the relationships among the proposed model constructs?

This research question will be broken down into the following specific sub-questions:

3.1. How does an integrated research model that identifies the impact of technology adoption constructs, trust and risk perceptions on citizens' intention to use G2C e-government services look like?

[4] Online tax filing is the most used e-government service in the EU28 (eurostat 2013b), which was selected as the specific G2C e-government service example in this thesis.

3.2. What are the salient determinants of G2C e-government services adoption in Germany?

3.3. What are the salient determinants of G2C e-government services adoption in Sweden?

3.4. How do these factors differ between online tax filing users and non-users, gender groups, age groups and formal education groups?

3.5. Do Swedish citizens perceive higher risk and exhibit lower trust than German citizens?

After developing the research model and hypotheses based on the findings of the previous research questions, the research instrument guiding the explanatory study will be designed. As the main research objective in confirmatory research is theory testing and confirmation (Gefen et al. 2011), the data analysis will be conducted using *Covariance based Structural Equation Modeling* (SEM). Data analysis follows the two-step methodology (Anderson/Gerbing 1988) where the measurement model is evaluated separately from the structural equation model. Finally, the different determinants of gender, age, formal education, user vs. non-user groups will be assessed by using moderators in multi-group SEM.

1.3 Outline and Structure of the Thesis

The contents of this thesis are presented in eight chapters. The structure of this thesis is illustrated in

Figure 1.1 below, which does not strictly represent an overview of the sections under each chapter of the dissertation. Rather, fundamental concepts under each chapter are presented.

While Chapters 2 to 4 focus on conceptual and theoretical foundations underlying this research, Chapters 5 to 7 provide empirical insights[5] into various aspects of G2C e-government services adoption in a cross-cultural context. The studies conducted in 2010 and 2011 are analyzed in detail in Chapter 5 and Chapter 6 respectively, while Chapter 7 presents a comparison of four descriptive studies conducted between 2010 and 2013.

Chapter 2 outlines the philosophical perspectives and research design in social research. It introduces contrasting approaches to research epistemology and ontology. Different research methods, purposes and time dimensions in research are discussed. After providing an overview of research strategy and research design within the IS, the chapter concludes with the philosophical perspectives and research design of this work.

Chapter 3 focuses on the conceptualization and classification of e-government services. After summarizing the characteristics of e-government services, they are contrasted with e-commerce services. Then, various stage models for categorizing and evaluating the progress of public service development are presented and compared. Various e-government studies and surveys which are commonly used as benchmarking tools to assess e-government development worldwide are discussed. The concept of Government 2.0, supported by Web 2.0 technology enablers, and principles of open government are presented. The chapter also analyzes barriers to e-government, which may hinder adoption of these services by citizens. A comparison of

[5] The E-Government Monitor Project (http://www.egovernment-monitor.de) forms the empirical basis of this thesis.

G2C e-government development in Germany and Sweden concludes the chapter, which lays out the basis of empirical analysis in the following chapters and research questions.

Chapter 4 is dedicated to the theoretical foundations of technology adoption research. Following the conceptual definitions, the extant literature on technology adoption theories, models and constructs as well as the theoretical foundations of trust and espoused cultural values is reviewed. This chapter aims to answer RQ1 in detail. Prior research in technology adoption, trust and espoused cultural values in G2C e-government services context are discussed in order to elaborate on the shortcomings of current research, which concludes the chapter.

Chapter 5 aims to answer RQ2 based on the analysis of descriptive studies in 2010 and 2011. In particular, factors influencing citizens' decision to use G2C e-government services as well as barriers and concerns which hinder them from using these services will be examined. Besides analyzing Germany and Sweden separately, the empirical results will be compared between the countries and between the years[6].

Chapter 6 is dedicated to identifying the determinants of G2C e-government adoption based on a theoretical model, which aims to answer RQ3. The analysis of the empirical data will be conducted by using Covariance based Structural Equation Modeling technique and multi-group analysis. The integration of moderators enables prediction of determinants based on age, gender, and formal education groups separately. Furthermore, determinants for online tax users and non-users will be compared.

Chapter 7 presents a comparison of all E-Government Monitor studies that were conducted between 2010 and 2013 in terms of the factors, barriers and concerns discussed in RQ2. Although the results of the studies conducted in 2010 and 2011 were elaborated upon in Chapter 5 and Chapter 6 in detail, this chapter aims to provide a more recent overview of the phenomenon from the descriptive perspective. A comparison of all studies enables the observation of stability or change in these aspects over time. The results for Germany and Sweden are analyzed separately, in order to present a clear picture of G2C e-government adoption in both countries over a specific time period.

Chapter 8 concludes this thesis by interpreting the empirical findings of this thesis, which are presented in Chapters 5 to 7. After discussing the theoretical and practical implications of this research, it concludes by outlining research limitations and suggestions for future directions of research.

[6] The survey was conducted in 2010 only in Germany and in 2011 in Germany and in Sweden. Therefore, in Chapter 5, descriptive results over the two years can only be compared for Germany. A comparison of descriptive results in Sweden between the years of 2011 and 2013 will be presented in Chapter 7.

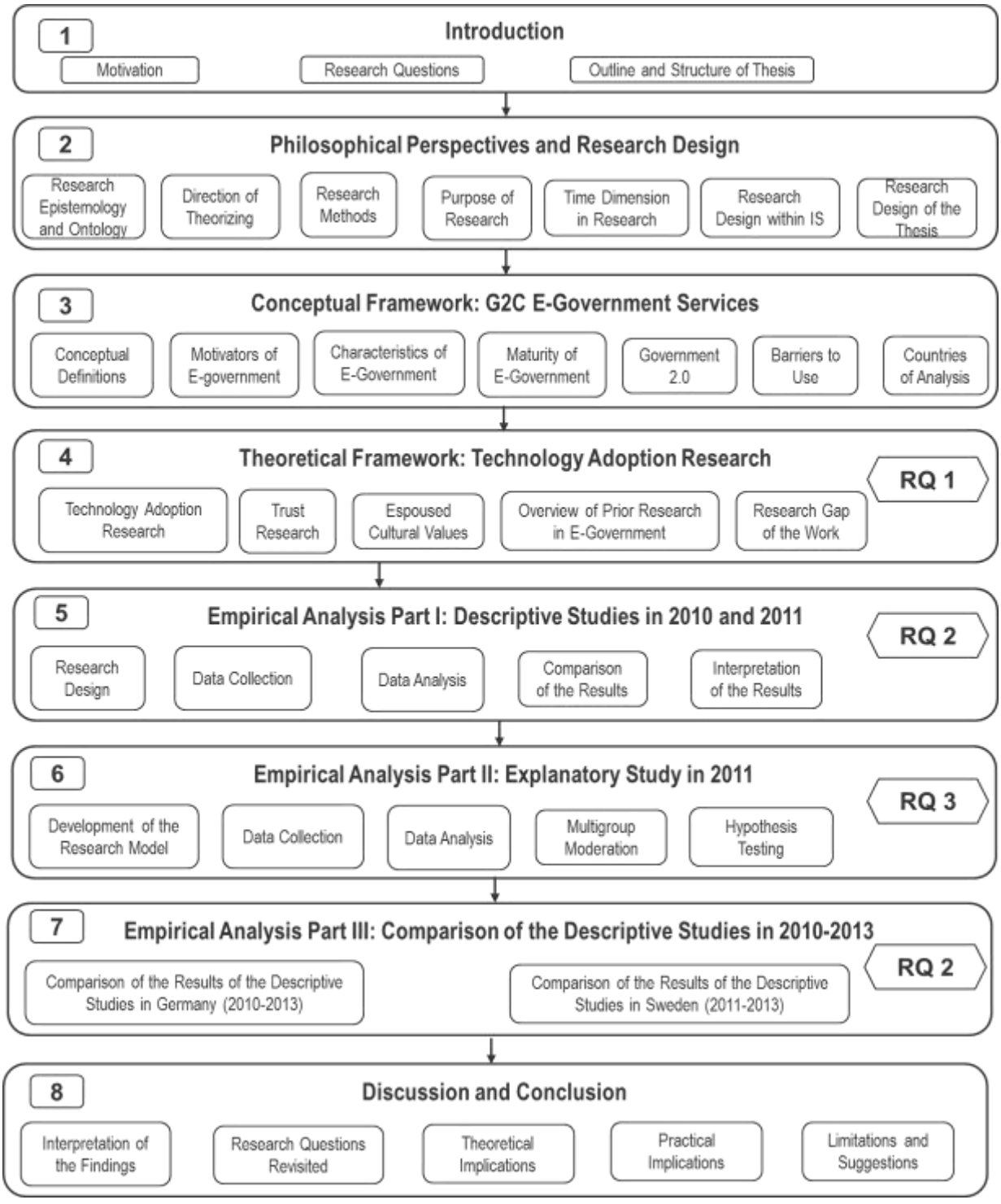


Figure 1.1. Structure of Thesis
Source: Own Illustration

2 Philosophical Perspectives and Research Design

This chapter summarizes the epistemological basis and ontological orientation of the research which follows and presents the scientific research methods, applied research strategy and time scales used.

According to Hevner (2004), two paradigms characterize research in IS that are being complementary but distinct (Hevner/Chatterjee 2010, 270). *Design Science* is a relative young discipline that seeks to create innovations. It has roots in engineering disciplines. Outputs produced by design science include representational constructs, methods, models and instantiations. *Behavioral Science* attempts to develop and verify theories which predict or explain human or organizational behavior (Hevner et al. 2004). Having roots in natural science research methods, Behavioral Science has a longer history.

Results provided by behavioral research inform practitioners about interactions among people, technology, and organizations. Information systems are designed to improve the efficiency and effectiveness of organizations. To achieve this goal, these interactions must be managed successfully (Hevner et al. 2004). Design science and behavioral science are two complementary but distinctive paradigms (March/Smith 1995). The underlying research paradigm of this thesis is *behavioral science*. Hence, research strategies and research designs discussed in this chapter cover mainly the behavioral science context, i.e. social science research.

2.1 Research Epistemology and Research Ontology

Research epistemology deals with the question of "what is (or should be) regarded as acceptable" and valid knowledge in a discipline (Bryman 2012, 27). According to Burrell and Morgan (1979), the epistemological and ontological assumptions form the philosophical basis of the research process. *Epistemology* deals with our assumptions about knowledge and how to obtain it (Hirschheim 1992). *Ontology* refers to our assumptions about the nature of being and existence; for example whether the world consists mostly of social order or constant change (Bhattacherjee 2012, 18). This foundation has an impact on every aspect of the research process, including choice of research topic, applied methodology, and research design.

2.1.1 Research Epistemology

Every research project is based on critical assumptions about the validity of research and the appropriate research methods (Myers 1997).

Various definitions of the epistemological paradigms have been proposed. Guba and Lincoln (1994) initially defined four underlying paradigms of research: positivism, post-positivism, critical theory, and constructivism although a decade later they acknowledged flaws in this classification system (2005). Orlikowski and Baroudi (1991), following Chua (1986), suggest three approaches: *positivist, interpretive,* and *critical epistemology*.

This thesis follows Orlikowski and Baroudi's three-fold classification of the paradigms within research epistemology, which has been widely recognized in IS literature (Klein/Myers 1999).

An *interpretive* approach is mostly associated with hermeneutics, ethnography, phenomenology and case studies (Lee 1991). The *positivist* approach, on the other hand, involves procedures such as inferential statistics, hypothesis testing, mathematical analysis, experimental and quasi-experimental design (Lee 1991). The doctrine of positivism is the oldest and perhaps most widely used approach to the study of society (Evans/King 2006, 136). Interpretive research is not new but holds a strong minority position. Over the last few decades, interpretive approaches have been drawing greater attention in social science (Walsham 1995). *Critical* social research is less commonly seen in academic journals (Neumann 2006, 81).

It is important to note that there are no clear cut distinctions among different research epistemologies. Within IS research, there is debate about the potential of combining positivistic and interpretive research (Lee 1991). Clearly, both positivist and interpretive approaches have significant value (Weber 2004). Although a detailed analysis and examination of different epistemological approaches goes beyond the focus of this thesis, a broad overview of the classification of Orlikowski and Baroudi should be given.

2.1.1.1 Positivist Epistemology (Positivism)

Positivism puts into practice a view of science that has its origins within the philosophy of science known as "logical positivism" or "logical empiricism" (Lee 1991). It was initially developed by the French philosopher Auguste Comte (1798-1857) and remained the prevailing scientific paradigm in social research until the 1990s.

As researchers shifted away from less precise techniques towards rigorous techniques of natural sciences, positivism became dominant in the US (Neumann 2006, 87). A major tenet of positivism is that the methods of science are the only legitimate methods for social science research (Lee 1991). The ultimate purpose of any type of research is scientific explanation. Therefore, methods of natural science should be used to identify and measure social structures.

Positivism is based on the underlying assumption that physical and social reality is *independent* of those who observe it. Objective reality exists beyond the human mind. The goal of the researcher should be discovering the objective physical and social reality without intervening in the phenomenon of interest (Orlikowski/Baroudi 1991). Positivism combines deductive logic with precise empirical observations (Neumann 2006). Researchers are concerned with the hypothetic-deductive testability of theories (Chen/Hirschheim 2004). The researcher links the abstract ideas to precise measurements of the social world. It is important for the researcher to remain natural and the data collected by the researcher is assumed to be objective. Researchers seek rigorous and exact measures by carefully analyzing the results. It is commonly used in market research, policy analysis, and sociology.

Since *hypotheses* are the core of positivism, the term requires definition; and according to Atteslander (2003, 22), a hypothesis is an attempt to explain the unexplained environment. Positivist researchers typically begin their research by deducing hypotheses from theory in form of cause-effect statements. Then data is gathered with positivist instruments, for example by conducting a survey, to test the factors identified by the underlying theory. Finally, *statistical methods* are used to test the theory's predictions.

The epistemological belief of positivism is concerned with the empirical testability of theories in terms of verification or falsification (Orlikowski/Baroudi 1991). Therefore, the objective of

statistics is the rejection of the null hypothesis, which assumes that the data in the independent variables have no effect on the data in the dependent variable (Choudrie/Dwivedi 2005). Theoretical hypotheses are derived from theory and predict a difference in the dependent variable or relationship between the dependent and independent variables. Technically, all statistical tests test the null hypothesis first, which is rejected in favor of alternative hypothesis within the stated degrees of confidence intervals. Thus, the theoretical hypothesis is supported if the null hypothesis is rejected.

Post-positivism is a recent evolution of positivism. The strictly empirical nature of positivist philosophy led to the development of a "milder form of positivism" (Willis 2007) during the mid-late 20th century which is called post-positivism (Bhattacherjee 2012, 18). It is consistent with positivism in the assumption that an objective world exists but assumes that reasonable inferences about a phenomenon can be made by using a combination of logical reasoning and empirical observations. In post-positivism, deriving knowledge only through observation and measurement is understood to be too demanding (Straub et al. 2004c). Instead, post-positivism is based on the concept of critical realism. Critical realists believe that there is a reality exists which is independent of our thinking, and the objective of science is to try and understand it. Hence, knowledge is gathered not only by deduction, but through both deduction and induction (Straub et al. 2004c).

2.1.1.2 Interpretive Epistemology (Interpretivism)

Interpretivism (also known as anti-positivism) is the view that methods of natural science are inadequate for conducting social research. This school of thought argues that people and their institutions as well as the physical and social artefacts created by them are fundamentally different from the physical reality examined by natural science. Consequently, studying the social world requires a different research approach, reflecting the distinctiveness of the human social world from the subjects of natural science (Bryman 2012, 28). A specific physical artifact or a particular human action can have different meanings for different individuals as well as for the observing social scientist. Therefore, the researcher should *interpret* the subjective meaning of behaviors and empirical realities rather than being purely objective (Lee 1991).

In the context of IS, *positivist* philosophy has been the dominant epistemology (Orlikowski/Baroudi 1991), however, the interpretive approach has gained increasing attention as a legitimate epistemological alternative to the more traditional positivist approach since the beginning of 1990s (Walsham 1995). An increasing number of interpretive papers are being published in the mainstream IS journals, highlighting the emergence of interpretivism in IS research (Johari 2009).

2.1.1.3 Critical Epistemology (Critical Research)

Critical research differs from positivist and interpretive epistemologies, both of which aim to predict or explain the status quo. Critical researchers question a priori assumptions and challenge the status quo (Orlikowski/Baroudi 1991).

While some researchers argue that critical research is not a legitimate approach within the IS discipline (e.g., Kvasny/Richardson 2006), there is nonetheless an increased effort to focus on

critical perspectives in IS research (Myers/Klein 2011). Although this approach remains relatively underrepresented compared to positivistic and interpretivistic research (Orlikowski/Baroudi 1991), principles and guidelines are being published for applying this philosophy to actual research methodologies (Wynn/Williams 2012; Myers/Klein 2011).

2.1.2 Research Ontology

Ontology raises basic questions about the known reality (Guba/Lincoln 1994). There two main ontological paradigms, which represent the two ends of the continuum: *objectivism* and *constructionism*. Some authors argue that these two approaches are complementary rather than oppositional (Cronjé 2006).

Objectivism asserts that social phenomena occur independent of social influence (Bryman 2012). There is one true reality, which can be observed following the objective methods of science. *Constructionism* (also referred to as *constructivism*) implies that social phenomena is continually being created by social actors (Bryman 2012).

Bryman (2012, 36) illustrates the difference between the two ontological orientations with the examples of organization and culture, which are the most common and central terms in social sciences. According to the objectivist ontology, an organization has rules, regulations and standardized procedures. People are required to do their assignments. Individuals have to conform to the requirements, values and mission statement of the organization. Similarly, individuals are constrained by cultures and their internalized beliefs and values. Constructionism challenges the suggestion that organization and culture confront social actors as external realities. According to this ontology, organization and culture are emergent realities in a continuous state of revision.

2.2 Direction of Theorizing

There are two broad methods of reasoning to explain the relationship between theory and research: *inductive* and *deductive*. Depending on researcher's objective, a scientific study may use one of these stances.

2.2.1 Inductive Theorizing

This approach is known as *theory-building* research. The process of induction involves drawing broader generalizations and deriving theories from specific observations of the empirical world. The researcher begins with observations, and then detects patterns or regularities, which are finally refined and elaborated into general conclusions and theoretical concepts. This approach has *bottom-up* logic. Since the theory comes after observation, it is called *ex post facto theory* or *post factum theory* (Merton 1968).

Inductive theorizing is by nature, more open-ended and exploratory. It is commonly associated with *qualitative* research. Many researchers use a specific kind of inductive theorizing called *grounded theory*. Inductive reasoning is especially useful when there are few prior theories.

2.2.2 Deductive Theorizing

This approach is known as *theory-testing* research. In contrast to inductive research, the researcher begins with a clear theoretical picture about the topic of interest. Therefore, it has *top-down* logic. On the basis of theoretical considerations, the researcher decides which observations to make and defines propositions. He or she deduces at least one testable hypothesis that must then be subjected to empirical analysis. Researchable concepts are embedded within the hypothesis; thus the researcher specifies which data needs to be collected in relation to the concepts argued by the hypothesis (Bryman 2012). The test of hypotheses with specific empirical data leads to confirmation or falsification of the original theory (or theories). If the predictions are not correct, this suggests the rejection or modification of the theory.

Deductive theorizing is one of the core assumptions of positivism (Straub et al. 2004c). It is especially useful if there are many competing theories and researchers are interested in knowing the most appropriate theory for the dynamics of a specific context (Bhattacherjee 2012). Deductive reasoning is typically associated with a *quantitative* research approach.

2.2.3 Direction of Theorizing in Social Science Research

Although it is important to distinguish between theory-testing and theory-building approaches in empirical research, they should be seen as part of an ongoing research process (De Vaus 2001, 8). Theory is the outcome of inductive research, whereas it is an input of deductive research (see

Figure 2.1 below). Theories guide empirical observations and empirical observations improve theories. Each iteration between theory and data contributes to better explanation and enhances our understanding of the phenomenon of interest (Bhattacherjee 2012). Theories are only valuable if they are applicable to reality. Similarly, pure observations and raw data have only limited usability if they cannot contribute to the development of meaningful theories.

It is seldom the case that a genuinely pure deductive or inductive approach is taken in actual research. Even though some studies may be purely deductive or inductive, most social research involves a combination of induction and deduction (Bryman 2012, 27). For instance, *triangulation* has both inductive and deductive components (Tashakkori/Teddlie 1998). Furthermore, theory testing may suggest contributions to theory based on the empirical evidence, therefore may also function as theory building. Alternatively, researchers may use both approaches at various points in a study (Neumann 2006), for example combining inductive exploratory questions with deductive confirmatory questions in the same study (Al-Qeisi 2009).

De Vaus (2001, 11) recommends having a skeptical approach to research. Although researchers can easily find some evidence consistent with almost any theory, it is wiser to adopt a skeptical approach to explanations and look for evidence that could disprove the theory. It is not possible to evaluate every possible explanation. Yet, the more alternative explanations are eliminated, the more confidence has the researcher in theory but should avoid thinking that the theory is *proven*. Similarly, theory should not be rejected simply because an observation does not match its predictions. Rejection of a theory requires multiple disconfirmations “using different measures, different samples and different methods of data collection and analysis” (De Vaus 2001, 15).

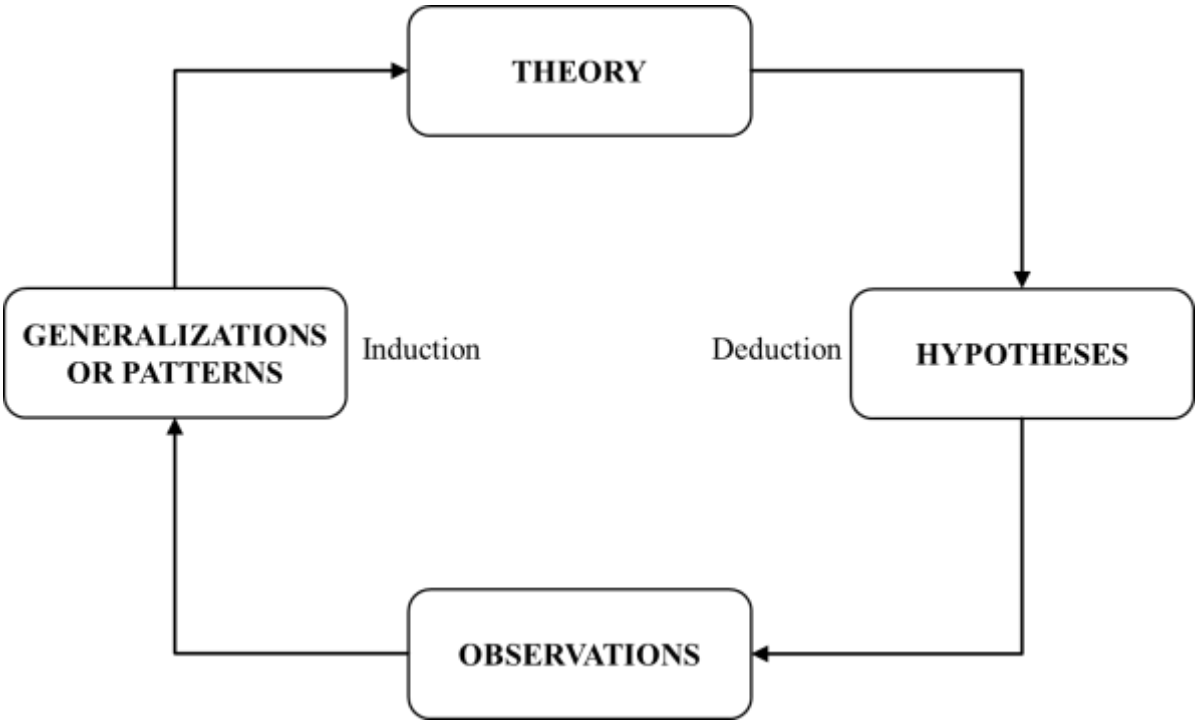


Figure 2.1. The Continuous Cycle of Research
Source: Own Illustration based on (Bhattacherjee 2012, 4)

According to Bhattacherjee (2012) "theory building and theory testing are particularly difficult in the context of social sciences, given the imprecise nature of the theoretical concepts, inadequate tools to measure them, and the presence of many unaccounted for factors that may influence the phenomenon of interest" (p. 4). He (2012) argues further that "unlike theories in the natural science, social science theories are rarely perfect, which provides numerous opportunities for researchers to improve those theories or build their own alternatives" (p. 4).

2.3 Research Methods

Research Methods can be placed into two main categories: qualitative and quantitative research methods.

Krcmar (1998) postulates that appropriate research method depends on the research phenomenon and the existing knowledge about it. Therefore, research methods should follow research questions. Interpretive researchers commonly prefer qualitative methods, whereas quantitative methods are often used by positivist researchers. Nevertheless, the underlying epistemology does not necessarily imply the use of specific research methods (Myers 1997), at least for researchers espousing a qualitative approach. Quantitative research must, by its nature, follow positivistic epistemology. Qualitative research, however, can have a positivist, interpretive or critical approach. For instance, case research is widely used for exploration and hypothesis generation (interpretive research), but it can also be used for providing explanations and for testing hypotheses (positivist research) (Benbasat et al. 1987). Indeed, the well-known case study research of Yin (2003) has a positivist approach since he recommends the use of

hypotheses and propositions. Yet, the interpretive and critical positions are not meaningful for the purposes of quantitative research (Straub et al. 2004b).

The choice of research method influences the way of data collection and analysis. Although the choice of a type of research does not specifically force a particular data collection or data analysis technique, research approaches may be better served by a subset of data collection and data analysis techniques (Straub et al. 2004b). It should also be considered that specific research methods require different skills, assumptions and research designs (Myers 1997). In this section, the fundamental characteristics of qualitative and quantitative research methods are summarized.

2.3.1 Qualitative Research

Bryman (2012) defines *qualitative research* as "a research strategy that usually emphasizes words rather than quantification in the collection and analysis of data" (p. 36). This type of research emphasizes an inductive approach to the relationship between theory and research (Bryman 2012). Social reality is assumed to be undergoing constant change and created by individuals.

Action research, case study research and ethnography are some examples of qualitative research methods (Myers 1997). Typically, researchers rely on the following methods of data collection: observations, transcript analysis, interviews, focus groups and observational techniques (Straub et al. 2004b). Qualitative research is appropriate for a wide range of areas such as product design (e.g., for the purposes of requirements elicitation).

As Neumann (2006) points out "qualitative researchers look for patterns or relationships … early in a research project, *while they are still collecting data*" (p. 459). The initial results guide subsequent data collection. Myers (1997) discusses the fact that, unlike quantitative research, the distinction between data gathering and data analysis is not clear in qualitative research. Thus, he suggests that *modes of analysis* is a more appropriate term than data analysis in qualitative research. Modes of analysis are based on textual analysis of written and verbal expressions. Example modes of analysis in qualitative research include hermeneutics, semiotics and approaches that focus on narrative and metaphor (Neumann 2006, 459).

The main aim of data analysis in qualitative research is moving towards generalizations and theory by identifying patterns in the collected data. Qualitative researchers code data to arrange measures of variables into a machine-readable format in order to perform statistical analysis (Neumann 2006, 460). The data analysis process can be enhanced by using software tools to speed up the qualitative analysis (e.g., ATLAS.ti).

2.3.2 Quantitative Research

Bryman (2012) defines *quantitative research* as "a research strategy that emphasizes measurement in the collection and analysis of data" (p. 36). Quantitative research generally adopts a deductive approach. The underlying epistemology is positivism. Social reality is assumed to be an external and objective.

Quantitative research aims to deliver generalizable conclusions across groups of people or societies. It is a confirmatory research approach. The selected sample is typically *much larger*

than qualitative research, which enhances the generalizability of the results (Hair et al. 2009). Ideally, researchers should use sample sizes that are representative of the population.

Examples of quantitative research methods include formal and numerical methods such as field experiment, laboratory experiments, free simulation experiment, experimental simulation, adaptive experiment, archival research, opinion research and field study (Straub et al. 2004b). Commonly used quantitative data collection methods are questionnaires with close-ended questions, archival data, objective measurement and experiments. Qualitative research is appropriate for various purposes such as conducting market research (e.g., to understand customers' needs in order to better advertise and market the product and service portfolio of a business).

As stated by Neumann {, 2006 #24, quantitative researchers begin data analysis after "they have collected all of the data and condensed them into numbers" (p. 458). Data analysis generally utilizes mathematically based methods. Statistical tools and packages such as the SPSS (Statistical Package for the Social Sciences) are essential elements of analysis in quantitative research. The analysis includes descriptive statistics measuring central tendencies or dispersion, but can also include inferential statistics to draw conclusions. *Multivariate statistics* and regression break down the collected data even further and enable simultaneous observation and analysis of multiple outcome variables. For instance, multivariate statistics can be used to determine what factors attribute to differences between specific groups.

In order to use numerical analysis, raw data collected by quantitative research must itself be numerical. Many subjects of research, on the other hand, may not seem to produce any quantitative data. The quantitative researcher should know in advance what type of data he or she is looking for and carefully design all aspects of the study *before* any data is collected. For example, *attitudes and beliefs* do not naturally exist in quantitative form. Yet, we can convert phenomena of interest into quantitative data, so that it can be analyzed numerically. Let's say, we are researching the respondents' perception of usefulness of online tax filing. We may design a questionnaire statement such as "Online tax filing enables me to accomplish my tax filing more quickly" and ask respondents to give answers as a number (1 for 'strongly agree' to 7 for 'strongly disagree'). In such a way, we can collect quantitative data about people's perceptions.

The qualitative and quantitative research methods each have *weaknesses* which are compensated for by the *strengths* of the other {Steckler, 1992 #95}. One other strength of qualitative research is the fact that it can be relatively inexpensive due to the relatively small sample sizes. However, quantitative researchers can collect large amounts of quantitative data in a very short period of time by using structured data collection methods. Collecting large amounts of in-depth data is extremely time consuming and expensive in qualitative research. The greatest strength of quantitative methods is that it produces factual, reliable outcome that is usually generalizable to some larger population. Qualitative research, on the other hand, is not appropriate for generating statistical descriptions of large populations. Since the observations and interpretations are subjective and personal, the results may be biased. Qualitative research has integral to its nature, potential problems with reliability for the sake of validity (Kaplan/Maxwell 2005).

The greatest strength of qualitative methods is that they generate rich and detailed data, which is not possible in quantitative research due to large number of participants. Quantitative methods, whilst producing more testably reliable results, do not take into account the effects of

variables that have not been included in the research model. Therefore, researchers employing positivist, quantitative methodologies must strive for sufficient *validation*. Straub and his colleagues (1989; 2001) warned IS researchers that findings and interpretations of positivist, quantitative research are threatened without solid validation of instruments. The guidelines offered by Straub in (1989) were confirmed as critical in 2000[7] (Boudreau et al. 2001) and in 2004 (Straub et al. 2004c):

- researchers should pretest and/or pilot test their instruments to assess as many validities as possible,
- IS journal editors should require researchers to prepare an "Instrument Validation" sub-section of the "Methodology" section, which includes the various validity and reliability assessments of the instrument,
- researchers should use previously validated instruments, without making significant changes in the validated instrument,
- researchers should undertake formal validation (i.e. structural equation modeling, and other techniques for thoroughly assessing convergent and discriminant validity)

These guidelines aim to encourage appropriate research standards in quantitative scientific research, which have also been followed in this doctoral thesis.

2.3.3 Mixed Methods Research

Even though researchers usually conduct either qualitative or quantitative research, some researchers combine two or more research methods, which is called *mixed research method* (Chen/Hirschheim 2004), *triangulation* (Webb et al. 1966) or *mixed methodology* (Bryman 2006).

Qualitative and quantitative types of research methods can be combined within a research project (Lee 1991). If the principle method is quantitative, qualitative research can be used as preliminary or follow-up and vice versa. Good discussions of mixed methods research can be found in (Flick 2011; Bryman 2006; Kaplan/Duchon 1988; Jick 1979). Some papers published in the top IS journals suggest combining research methods and provide guidelines for conducting and assessing pluralist (Mingers 2001) or mixed methods approaches (Venkatesh et al. 2013), also for critical research (Zachariadis et al. 2013).

2.4 Purpose of Research

Research studies can be grouped into *exploratory*, *descriptive*, or *explanatory* research depending on what researcher is trying to accomplish.

[7] The analysis was conducted in 2000 and was published in MIS Quarterly in 2001.

2.4.1 Exploratory Research

The goal of exploratory research is to create initial ideas and insights in new areas of inquiry. Exploratory research is undertaken when relatively little is known about a phenomenon and is best suited to preliminary research endeavors. In social sciences, it may be used to provide a perspective on approaching social inquiry.

According to Bhattacherjee (2012), exploratory research "may not lead to a very accurate understanding of the target problem" (p. 6) but may be useful to understand the nature and extent of it. Hence, exploratory research may provide useful information to more in-depth research or lay the descriptive foundation of future research. The outcome of exploratory research may be hypotheses.

Qualitative research methods are commonly used for data gathering including in-depth interviews, focus groups, and case studies. Since exploratory research is the initial research, before more conclusive research is undertaken, there are usually no clearly defined independent and dependent variables, preset categories of observation and analysis (Singleton/Straits 2010, 107). Exploratory researchers, therefore, must be creative and flexible in order to discover new issues.

Exploratory research usually involves a small group of subjects. These people are almost never randomly selected to participate. Therefore, the results of exploratory research can neither be generalized, nor provide definitive answers about the overall population.

2.4.2 Descriptive Research

The goal of descriptive research is to convey a verbal picture of a population in terms of the variables considered important. Descriptive study is much more *structured* than exploratory study. It is used quite frequently in social sciences to understand the average *behavior of a population* or to describe a social phenomenon accurately.

Good descriptive studies provoke the causal research questions of explanatory research. While good descriptive studies contributing to our knowledge of society are fundamental to the social research, unfocused surveys and case studies reporting trivial information may fail to identify and describe a phenomenon.

The description provided by this form of research should be systematic (for example, to create a set of categories or classifications). If the researcher has a basic idea about the research phenomenon and wants to provide a detailed picture of it, descriptive research is appropriate. It may focus on individual subjects or investigate large groups of subjects. Field research, content analysis, and surveys are the most commonly employed data gathering methods.

Descriptive research provides a detailed picture of the subject (Neumann 2006, 35). Researchers can also employ qualitative research techniques but quantitative research methods are more common in practice. However, raw data may not be very meaningful, especially if there is a lot of it. It may be too complex to depict information. By using descriptive statistics, data is summarized in a meaningful way, which enables simpler interpretation of data. Statistical tools and packages such as SPSS (Statistical Package for the Social Sciences) are essential toolkits of descriptive researchers. Descriptive studies provide information on the frequency and

average number of occurrences or summary data on measures of central tendency (e.g., mean, median, mode) and measures of statistical dispersion (e.g., range, standard deviation, variance).

The main limitation of descriptive research is that it simply provides an account of a situation without attempting to investigate causation. In order to understand what causes a specific behavior or motivation, causal research analyzing the relationship between variables is needed.

2.4.3 Explanatory Research

This type of research is also known as *causal research*. The goal of explanatory research is to provide an understanding of why things are the way they are. Explanatory research is highly structured and must be carefully planned (Singleton/Straits 2010, 108). In social sciences, explanatory research provides insights into, and explanations of, the observed social phenomena. For instance, causal research is appropriate if the objective of research is to understand people's *attitudes* and *motivations* causing a certain behavior.

As stated by Bhattacherjee (2012), most academic research is explanatory, "though some amount of exploratory and/or descriptive research may also be needed during initial phases of academic research" (p. 6). Compared to other purposes of research design, explanatory research is more *rigid* by definition as it is used to seek the answers to problems and derive conclusions based on a comparison of a theory-based model and empirical data (Singleton/Straits 2010; Akkaya et al. 2012a). By building on exploratory and descriptive research, explanatory research goes on to identify the causes and reasons something occurs (Neumann 2006, 35; Akkaya et al. 2013). Explanatory research provides insight about whether a particular action is likely to produce a particular outcome based on the analysis of numeric data.

Explanatory research is concerned with hypotheses testing and theory verification (Dubé/Paré 2003). Positivist, quantitative research methods are commonly used (Straub et al. 2004b). Explanatory researchers employ experiments or structured questionnaires for gathering data. As discussed in (Akkaya et al. 2012a); McNabb (2013) suggests that if descriptive and explanatory research are used together, the descriptive study is used to define the key variables in research context, which is followed by the explanatory study to test the cause-and-effect relationships between them. For instance, descriptive research may reveal the existence of negative correlation between data protection concerns and intention to use e-government services, but it is not a sufficient empirical evidence to show that higher levels of risk perceptions cause lower levels of e-government adoption.

Seeking explanations for observed phenomena, problems, or behaviors requires strong theoretical and interpretation skills (Bhattacherjee 2012, 6). Data analysis techniques in explanatory research are much more complex than other types of research. Explanatory research is very complex, and limited by the fact that there may be other factors influencing the causal relationship, which makes it harder for researchers to say with confidence what caused the observed effect. In particular, the analysis of people's attitudes and motivations may involve deeper psychological considerations that even the respondent may not be aware of. One important issue in explanatory research is the need for validation of the research instruments that are used to collect data on which findings are based (Straub et al. 2004a). As discussed previously, prior literature strongly suggests that researchers use previously validated instruments without making significant changes to them (Boudreau et al. 2001; Straub et al. 2004c).

2.5 Time Dimension in Research

The time dimension is an important element of any research design and execution. Studies can be conducted at a single point in time or might follow individuals over a long period. This leads to two types of research design in terms of the issue of time: *cross-sectional research design* and *longitudinal research design*.

2.5.1 Cross-Sectional Research Design

Cross-sectional research design gives a snapshot of a sample drawn from a specified population *at a single, fixed time point*[8]. Cross-sectional research design involves the collection of data on more than one case (often much more). Quantitative or quantifiable data on different variables are collected and analyzed to detect patterns of association (Bryman 2012, 58). It is the most common design approach in social research.

Cross-sectional research design is often called a survey design, because surveys are frequently employed (Bryman 2012, 59). However, as other research methods including structured observation and content analysis can also be used, the term cross-sectional research design is preferable to the cross-sectional surveys. Cross-sectional research can be exploratory, descriptive, or explanatory (Neumann 2006, 37). When random methods of sampling are employed, external validity of cross-sectional studies is strong. It is a less costly alternative compared to longitudinal research design.

In one-shot cross-sectional research design, researchers collect data once, at a single point in time (or more or less simultaneously). Despite the ease and flexibility of use, this approach cannot capture social processes or change in a population over a period of time. Instead, each cross-sectional data set needs to be collected at two or more points in time. This leads to *multiple-snapshot cross-sectional research design*, which is a specific type of cross-sectional design that involves more than one single point of data collection. Consequently, this design overcomes the limitation of (one-snapshot) cross-sectional research in capturing change in a population over a time period.

Multiple-snapshots cross-sectional research design is also known as *successive independent samples design* or *trend study*. Data is collected at two or more points in time with an independent sample, which means that a new sample is drawn for each of the successive cross-sectional studies. Such an approach enables researchers to observe possible changes in the features of the units over time. According to Russell and Purcell (2009, 116), this design is especially suitable for research endeavors to assess *attitudes*, *behaviors*, or *changes in population characteristics across time*.

Although multiple-snapshot cross-sectional design provides an improvement over the one-snapshot cross-sectional version, it demands rigorous planning. Since each study requires a new sample drawn from the population, the researcher may not determine with certainty the extent to which the population truly changed because the results are based on different samples of people. Therefore, the researcher should:

[8] The term "one point in time" does not necessarily mean that data is collected simultaneously. Rather, the data is collected as short a time period as possible (Singleton/Straits 2010, 272).

1. select samples that are equally representative of the population, weighted by central features such as gender, age and formal education,
2. employ the same research method,
3. ensure a high level of consistency between questions of the research instrument

Moreover, the researcher should conduct statistical tests in order to compare the results of the different samples in order to interpret how significant the differences in results are.

Although most authors (cf. Orlikowski/Baroudi 1991; Chen/Hirschheim 2004) distinguish between one-shot cross-sectional studies and multiple-snapshot cross-sectional designs, some authors classify the latter as longitudinal (Neumann 2006, 37). However, according to Orlikowski and Baroudi (1991), there is an important difference between the two designs. Multiple-snapshot cross-sectional designs employ a research instrument administered at several time intervals, whereas the longitudinal approach implies continuous studies over an uninterrupted period of time, sometimes for months or even years (Orlikowski/Baroudi 1991).

2.5.2 Longitudinal Research Design

Longitudinal research design examines information from people across a period of time. Due to its high costs, it is not frequently used in social research. It is common to distinguish two types of longitudinal research: *panel research* and *cohort research* (Bryman 2012, 63):

1. *Panel research* is a longitudinal study in which the researcher observes exactly the *same* group of respondents across at least two (and often more) time periods. Data collection is repeated at fixed intervals. A panel study needs rules to inform how to permit individuals to join and leave the sample. New eligibility for sample inclusion should be defined carefully.
2. *Cohort research* is a longitudinal study in which information about a group of people who share a certain characteristic or have shared a common experience within a given period of time is traced at regular discrete points in time (Singleton/Straits 2010, 274). A commonly used cohort includes all people born in the same year (called birth cohorts). Researchers can study the whole cohort or a random selected sample of it. It is similar to the panel study, but the cohort rather than the exact same people are observed.

Though longitudinal research design is methodologically relatively strong, it is employed less often. Longitudinal research typically involves high costs and can be very time-consuming. Tracking people in panel research over long periods of time is quite difficult because some participants may lose interest, move, die, or cannot be located (Neumann 2006, 38).

2.6 An Overview of Research Strategy and Research Design within the IS Research

Positivism in sociological practice dominated in Britain, Canada, Scandinavia, and the USA during the 1960s and 1970s (Neumann 2006). By the 1980s and 1990s, a decline was observed in European journals, while it remained dominant in North American journals (Gartrell/Gartrell 2002). Orlikowski and Baroudi (1991) analyzed articles published from 1983 to 1988, finding that the positivism devastatingly dominated the IS research (96,8%), with a minority of interpretive research (3,2%). In the analyzed timeframe, no empirical research was published following a critical approach. In the 1980s, interpretivism has started to emerge as an alternative epistemology (Walsham 1995).

Chen and Hirsschheim's (2004) analysis of IS research between 1991 and 2001 showed that 81 percent of publications had a positivist approach with 19 percent presenting an interpretivist orientation. Another study conducted by Arnott and Pervan (2008) confirmed the ongoing dominance of positivism in IS Research. In U.S. journals, 95,7 percent of empirical papers followed the positivist approach while only 4,3 percent were interpretivist. In contrast, European journals presented a more balanced orientation, with 56 percent positivist, 41,9 percent interpretivist and 1,6 percent both approaches.

Positivism has been the prevalent epistemology for research on the adoption of technology, within the Anglo-American IS research. Choudrie and Dwivedi (2005) presented diagnostic evidence about positivism in technology adoption research through a content analysis of articles published in peer reviewed journals including MIS Quarterly, Information Systems Research, European Journal of Information Systems, and Information Systems Journal. The findings suggest that the *positivist epistemology* and the *survey research* method were used primarily to investigate the individual adoption and IT usage behaviors.

A number of scholars have performed empirical examinations of the methodological and paradigmatic base of IS research in different time frames. In the Anglo-American context, quantitative research methods of survey research and experiments were commonly employed. Orlikowski and Baroudi (1991) found that *survey research* was the most commonly used research method (49,1%) in U.S. journals followed by *laboratory experiment* (27,1%) and *case study* (13,5%). Given the relatively positivist dominance of the Anglo-American context, it is not surprising that quantitative research methods were the dominant research designs. The analysis of Chen and Hirschheim (2004) confirmed the ongoing popularity of the survey method (41%) and the increased substantial recognition of case studies (36%).

Analysis of research published in the European Journal of Information Systems from 1997 to 2007 delivered the European perspective on IS research (Dwivedi/Kuljis 2008). The most common research method in the European journals, as opposed to U.S. journals, was the case study approach, followed by surveys. In terms of time dimension, *cross-sectional* studies were clearly the predominant form of research in information systems with 90 percent of the articles using them (Orlikowski/Baroudi 1991). *Multiple snapshot cross-sectional research* designs and *longitudinal* studies account for 4,5 percent and 3,9 percent respectively.

In the German-speaking IS community, known as Wirtschaftsinformatik (WI), on the other hand, *design science* (Hevner et al. 2004) has been the dominant paradigm (Becker/Pfeiffer 2006). A content analysis of 300 articles published between 1996 and 2006 in the journal WIRTSCHAFTSINFORMATIK revealed that about 70 percent of the publications use the

design science paradigm, whereas only 30 percent of them can be categorized under *behavioral science* research (Wilde/Hess 2007). In contrast to IS research in the Anglo-American context, empirical quantitative studies were quite rare (only 10%). A trend towards increased usage of quantitative research methods was observable. While quantitative research methods were the method of choice for 30 percent of the researchers in 1999, they were used by 50 percent of researchers in 2006.

It is important to mention the long-lasting debate over *rigor versus relevance* in IS research. Researchers are advised to seek a balance between methodological rigor and practical relevance in their research practices. Some authors argue that rigor and relevance are oppositional (Robey/Markus 1998). If relevance is the main goal, then some elements of disciplinary rigor may need to be sacrificed. If research should conform to the norms of science, applicability to practice may be limited. Many others believe rigor and relevance need to be considered distinct rather than trade-off characteristics of scientific research (Winter 2007; Lee 1999). If a study fails to provide correct and reliable results, the authors or the publishing organization may be seen as untrustworthy. However, besides being methodologically sound, research should also be relevant to practitioners. If the applicability to practice is missing, there is a risk that research is unlikely to be supported by companies. Thus, most researchers agree that, one should consider both rigor and relevance in IS research (Winter 2007).

Highly regarded researchers of IS (Boudreau et al. 2001; Straub 1989) argued that IS discipline would greatly profit from increased research rigor and provided guidelines on conducting more rigorous positivist IS research. Some other IS researchers criticized positivistic IS research for having lack of relevance to practice and called for increased relevance (Benbasat/Zmud 1999; Lee 1999; Dubé/Paré 2003). Lack of relevance is considered by some authors as the cause of the low recognition of the IS discipline in business practice (Winter 2007). Benbasat and Zmud (1999) identified five reasons that much of the existing IS literature lacks sufficient relevance:

1. an emphasis on rigor over relevance in business schools, IS researchers and the editors of top IS academic journals;
2. the difficulty of building upon the previous work of others due to multiplicity of theoretical frames and reluctance of researchers to adopt existing research instruments;
3. the dynamism of the IS field;
4. limited exposure of IS researchers to practical contexts of IT-related usage;
5. the research-oriented academic institutions and their academic patronage system

Having identified the reasons, Benbasat and Zmud (1999) provided basic guidelines for the IS community to increase relevance in their research efforts and articles. As discussed by Winter (2007), "different from IS, relevance was never regarded as a problem in WI" (p. 404). Instead, WI provides a relatively higher research contribution to business practice, by helping to solve critical problems. A relatively large amount of industry funding is a sign of "the appreciation of WI research in practice" (Winter 2007, 404). The high demand for WI graduates in industry demonstrates also the importance of research in German practice.

Unity of research and teaching is a fundamental characteristic of universities in Germany, especially for applied fields like WI (Winter 2007). Most research projects are focused on

developing artefacts, in many cases in cooperation with industry. Buhl and König (2007) refer to the highly relevance of WI research as its 'unique selling point' that should be specifically enhanced so that universities can better prepare students for the work force and challenges of the global IS research.

Heinrich (2005) criticized that, WI research neglects rigor while targeting high relevance. In his analysis of articles published in WIRTSCHAFTSINFORMATIK between 1990 and 2003, he pointed out to the fact that research methods were explained by only 11 percent of the analyzed articles. Moreover, he argued that research methods are not sufficiently covered in the WI curricula of the German universities. As a result, most of the researchers lack knowledge on research methods, which is essential for conducting research with scientific rigor. After his critical remark, there has been an increased emphasis on rigor in WI research. According to analysis of (Becker et al. 2009), 20 percent of the articles published in WIRTSCHAFTSINFORMATIK in the time period of 2004 to 2007 stated research methods of their studies explicitly. Moreover, about 50 percent of all articles analyzed addressed the issue of rigor vs. relevance and fulfilled the requirements by delivering theoretical artefacts and a detailed discussion of the applied research methods (Becker et al. 2009).

2.7 Philosophical Perspectives and Research Design of the Thesis

This thesis is expected to contribute to the research in the context of behavioral science in WI. By employing a positivist, objectivist, deductive approach in the specific context of e-government, the author of this thesis aims to shed light into determinants of G2C e-government adoption based on an empirical test of hypotheses. Being an emerging field of research, there are not many studies in the specific context of e-government adoption. Some cultural contexts such as Germany have never been subject to large scale empirical research. Therefore, the author aims to generate the valuable insights about the phenomenon of interest through a descriptive study, which is used to generate the theoretical framework of the explanatory study. Fundamental theories from a relatively mature field of IS – IS technology acceptance research (see Section 4.2) – are tested in the new domain of e-government, therefore a confirmatory research approach is pursued. In particular, the author of this thesis aims to test the research model derived from the selected theories by using a positivist research design of survey research as suggested in literature (Bhattacherjee 2012, 41).

Quantitative methods are employed in a combination of descriptive and confirmatory research. In order to study change in behaviors and attitudes of the population, *multiple snapshots cross-sectional design* is selected. Empirical data is collected with nationwide representative surveys of household e-government use which are equally representative of the populations, employing the same research method and with a high level of consistency between questionnaires to ensure the generalizability of results as suggested in literature (Dooley 2001).

The main focus of this thesis has been placed on understanding the determinants of e-government adoption in the household context of Germany due to the existence of research gap in this area. However, as the author argues that espoused cultural values influence the adoption of e-government services, a cross-cultural analysis have also been performed. Thus, besides providing a comprehensive understanding of e-government in Germany, this thesis is also expected to make a valuable contribution to cross-cultural research in e-government by comparing findings regarding e-government adoption in Sweden and Germany.

2.8 Summary

This chapter has outlined the epistemological foundations of social research, which provide a roadmap for researchers through a research endeavor. It is important to clarify the purpose and scientific approach to the research in the initial stages of a research project.

Research design refers to the overall strategy in studying a scientific problem. It constitutes the blueprint for collecting, measuring and analyzing data. Furthermore, every research project has some underlying assumptions about validity of research. The *epistemological foundation* is related to the basic assumptions guiding that research. There are typical forms of research strategies associated with research epistemologies and research methods. Quantitative research methods commonly go along with positivist epistemology, while qualitative research methods are often used by interpretive researchers. Nevertheless, the underlying epistemology does not necessarily determine the choice of research methods (Myers 1997). Even though quantitative researchers should employ the positivist epistemology, qualitative researchers can choose positivist, interpretivist or critical research designs according to their research designs and research questions (Straub et al. 2004c). Other assumptions are related to the underlying *research ontology* (objectivism versus constructionism) and the *direction of theorizing* (induction versus deduction), which needs to be clarified in the initial stages of a research undertaking.

After defining underlying philosophical paradigms, the researcher should outline the *purpose of research* (exploratory, descriptive and explanatory) and the *time dimension of research* (cross-sectional or longitudinal research). After deciding on the *research method* (qualitative, quantitative and mixed methods research), researchers should decide on *data collection methodology* as well as *data analysis methodology*. Although researchers are flexible in selecting their data collection methods depending on their research designs, time and budget requirements (De Vaus 2001, 15), it is important to integrate different components in a coherent and logical approach.

It is important to distinguish between Anglo-American IS research community and the German-speaking WI research community. While positivist, quantitative studies dominate in IS research, researchers in WI commonly employ qualitative research methods. IS research underlines the importance of using methodologically sound scientific rigor. WI, on the other hand, has always worked in a close cooperation with the practice and aimed to deliver usable designs as one of the outcomes. Source of research funding of IS and WI is also a factor emphasizing rigor or relevance characteristics of a research project. In the overall, these differences have been clearly reflected in the research design. About 70 percent of the WI studies use the design science paradigm, whereas only 30 percent of them can be categorized under behavioral science research (Wilde/Hess 2007).

In the following chapter (Chapter 3) the conceptual base of this thesis is discussed.

3 Conceptual Framework: Government to Citizen (G2C) E-Government Services

This chapter provides the conceptual framework of the following research, namely Government to Citizen (G2C) e-government services.

Electronic government refers to the utilization of information and communication technologies to improve the efficiency, effectiveness and the accessibility of the public services. During the *dotcom bubble* (also known as the Internet boom) of the late 1990s, there was a rapid rise in Internet-based start-up companies. Motivated by successful implementations in the business sector as well as the worldwide pressure of the NPM reforms, governments started utilizing ICT to modernize their own service delivery. Consequently, the first government websites have emerged in the late 1990s.

3.1 The Concept of New Public Management

Changes in public sector accounting during the 1980s led to the rise of the "New Public Management" concept (Hood 1995). Although public administration had been subject to a constant process of reform and modernization since the 1950s (Becker et al. 2012, 14), the idea of technical modernization in this area started with the new public management reforms.

The NPM concept refers to a series of reforms from the 1980s onwards intended to improve the efficiency and performance of governments and public sector organizations. Governments were expected to become more efficient and customer oriented. Hood (1995) summarizes the following seven dimensions of change implied by NPM (p. 96):

1. "Unbundling of the public sector into corporatized units organized by product … (i.e. erosion of single service employment)" (Hood 1995, 96)
2. "More contract-based competitive provision, with internal markets and term contracts … (i.e. distinction of primary and secondary public service labor force)" (Hood 1995, 96)
3. "Stress on private-sector styles of management practice … (i.e. move away from double imbalance public sector pay, career service, non-monetary rewards, due process employee entitlements)" (Hood 1995, 96)
4. "More stress on discipline and frugality in resource use … (i.e. less primary employment, less job security, less producer-friendly style)" (Hood 1995, 96)
5. "More emphasis on visible hands-on top management … (i.e. more freedom to manage by discretionary power)" (Hood 1995, 96)
6. "Explicit formal standards and measures of performance and success … (i.e. erosion of self-management by professionals)" (Hood 1995, 96)
7. "Greater emphasis on output controls … (i.e. resources and pay based on performance)" (Hood 1995, 96)

The NPM philosophy posits that social and technical systems applied successfully in the private sector can be used for modernizing the public sector. The use of IT and the Internet have become prime drivers of new public management reorganization and numerous reforms have taken place throughout the world (Warkentin et al. 2002). Public organizations were expected to shift from an internal orientation determined by strict bureaucratic rules towards an external orientation aiming to meet citizens' needs. Such radical change is not easy to implement. Besides technical aspects, there are organizational and cultural elements which prove resistant to change.

Although some authors argue that the private sector philosophy is not suitable for the public sector (Beynon-Davies/Williams 2003), most countries have started adopting NPM principles to some extent. The adoption of NPM has varied enormously from country to country, between organizations and over time. Some countries have gone a long way with NPM, while others remain more selective with the adoption of reforms due to their national circumstances (Pollitt et al. 2007). For instance, countries such as Sweden and the UK adopted a "pay for performance" approach immediately whereas no major changes in public administration were made in Germany and Switzerland at federal level in the 1980s. Indeed, 'Verwaltungspflege' "was a common watchword in Germany over that decade" (Hood 1995, 98).

The global pressure for introducing NPM reforms has led to the rise of e-government implementations throughout the world. Politicians all over the world have started considering the application of ICT to modernize governments and their interactions with their stakeholders including citizens, businesses, and other governmental organizations. E-government promised to transform not only the delivery of the most public services, but also the fundamental relationship between government and its various stakeholders. In the 1980s, e-government was increasingly promoted as an essential part of NPM. Researchers and practitioners were enthusiastic about e-government and its potential for utilizing information technology to enhance governance. For instance, Warkentin et al. (2002) argued that e-government adoption was "a critical component in the creation of an efficient and responsive new public management" (p. 162). Some authors emphasized its potential going beyond NPM reforms and named it "as the second revolution in public management after NPM" (Teicher et al. 2002, 387).

Before analyzing the potential of e-government from several perspectives, it is necessary to provide a definition of the concept. In prior literature, various definitions of e-government have been suggested, and these are discussed next.

3.2 Definition of E-Government

There is no universally accepted definition of e-government. Being an increasingly global phenomenon with varying applications worldwide, some authors have criticized the vagueness of the e-government concept (Aldrich et al. 2002). A number of definitions have been suggested in prior literature according to varying e-government focus (Seifert/Petersen 2002).

One of the simplest definitions was suggested by the OECD (2003), which refers to e-government as "the use of information and communication technologies, particularly the Internet, as a tool to achieve better government" (p. 63). Means and Schneider (2000) in (Yildiz 2007) considered e-government as relationships "between governments, their customers (businesses, other governments, and citizens), and their suppliers (again, businesses, other governments, and citizens) by the use of electronic means" (p. 121). According to Brown and

Brudney (2001) in (Yildiz 2007) e-government is "the use of technology, especially Web-based applications to enhance access to and efficiently deliver government information and services" (p. 1).

With the advancements in e-government literature, the participatory aspect of e-government has gained importance. Bertelsmann Foundation (2001) has suggested distinguishing between e-government and *balanced e-government*. Although this definition was made more than a decade ago, it suggested a wider understanding of the concept integrating the citizen participation aspect: balanced e-government "combines electronic information-based services for citizens (e-administration) with the reinforcement of participatory elements (e-democracy)" (Bertelsmann Foundation 2001, 4). In Germany, the most commonly used definition is the so-called *Speyer definition*, which defines e-government as "the business activity of public administrative agencies in correlation with the governance and administration reliant upon information and communication techniques under participation of citizens and internal administrative communication partners" (Lucke/Reinermann 2002) in (Fetzer 2006, 130).

Becker, Algermissen and Falk (2012) defined e-government "as the simplified handling of information, communication and transaction processes for providing an administrative service through the use of information and communication technologies within and between authorities and between authorities and private individuals or companies." (p.21). Recognizing the increasing maturity of e-government services, the concept of *transformational government* has increasingly gained popularity. As summarized by Dwivedi, Weerakkody and Janssen (2011) based on previous literature, transformational government "covers broader organizational and socio-technical dimensions which involve radically changing the structures, operations and most importantly, the culture of government" (p.13). By definition, transactional government was characterized by a radical restructuring of the public sector (Parisopoulos et al. 2009) and its rigid, bureaucratic governance models. This perspective suggests the reorganization of processes in a cross-functional way through Business Process Reengineering (BPR) approaches (Hammer/Champy 1993).

The definition of e-government used in this is the one suggested by the United Nations (2014). This definition encompasses the aspects of *citizen focus* and *benefits* of e-government services. The emerging notion of *open government* is also covered with its characteristics of citizen empowerment and e-participation:

> *"E-government is defined as the use of ICT and its application by the government for the provision of information and public services to the people. The aim of e-government therefore is to provide efficient government management of information to the citizen; better service delivery to citizens; and empowerment of the people through access to information and participation in public policy decision-making."*

It is also important to clarify the concept of *governance*, which is commonly used in the context of public administration. Although governance is frequently confused with government, it is necessary to distinguish the two terms (Fukuyama 2013, 3):

"Governance is a government's ability to make and enforce rules and to deliver services, regardless of whether that government democratic or not... The government is an organization which can do its functions better or worse; governance is thus about execution, or what has traditionally fallen within the domain of public administration."

Although Fukuyama refers to governance in the domain of public administration, governance need not necessarily be conducted exclusively by governments (Keohane/Nye Jr 2002). Governance is relevant to all organizations including private companies and non-governmental organizations. As summarized by Palvia and Sharma (2007) based on previous literature, electronic governance (e-governance) refers to utilizing ICT "at various levels of the government, the public sector and beyond, for the purpose of enhancing governance" (p. 2).

After having defined the concept e-government, subcategories of e-government services should be defined. E-government initiatives are divided into in four main categories based on the involved actors, which is discussed next.

3.3 Subcategories of E-Government

Four main subcategories of e-government (also known as *types of e-government*) have been defined according to the actors involved in electronic communications and interactions. The most common interactions in e-government include the ones between government and citizens (G2C), government and business enterprises (G2B), government and their employees (G2E), and government and other public agencies (G2G) (Siau/Long 2006).

3.3.1 Government-to-Citizen (G2C) E-Government

G2C E-government deals with the electronic communication and interaction between government and *citizens* (Siau/Long 2006). Citizens get online information and in some cases, complete government transactions (Mofleh et al. 2009) (i.e. online registration of a vehicle without waiting in long lines or waiting for forms to be mailed). G2C e-government also enables and reinforces the participation of citizens through discussion platforms and opinion polls.

3.3.2 Government-to-Business (G2B) E-Government

G2B E-government consists of the electronic interactions between public authorities and *business organizations* (Siau/Long 2006). It allows private businesses to receive government information online and complete some transactions with public administrations (i.e. bid submission) (Mofleh et al. 2009).

The adoption of e-government services by business organizations has its own dynamics, with considerations such as external pressure and information compliance requirements (Tung/Rieck 2005).

3.3.3 Government-to-Government (G2G) E-Government

G2G E-Government refers to the electronic sharing of data and information systems between *government organizations* and departments (Siau/Long 2006). Governments around the world increasingly aim to serve citizens and businesses from a single access point (i.e. one stop government), which necessitates an effective collaboration and cooperation among different governmental organizations and departments. This type of e-government is especially important for countries with complex federal structures consisting of national, regional and local governmental organizations. For instance, citizens and businesses should not have to submit documents and data to an additional department, if they are already available at other government authorities. This requires sharing information and databases between governmental agencies.

Furthermore, G2G e-government encompasses communication and data interchange between foreign government organizations, which is also highly relevant for establishing consistent standards of legislation and law enforcement on an international scale (e.g., to prevent cybercrime).

3.3.4 Government-to-Employee (G2E) E-Government

G2E e-government refers to the online communications and electronic interactions between government agencies and their *employees* (Siau/Long 2006). It deals with the relationships, interactions and transactions between government and employees (Ndou 2004). Employees are internal customers of governments. Taking into account needs and requirements of employees (e.g., compensation and pension plans, benefit eligibility policies, training and learning opportunities) is essential for e-government to become customer oriented. It involves expertise in human resource management and requires very careful handling. This type of e-government can be effectively used to promote knowledge sharing, and improve employee satisfaction and retention. Being a relatively under-researched subcategory of e-government, G2E deserves more empirical research.

The e-commerce and e-government matrix (see

Figure 3.1 below) provides a segmentation of services based on supplier and receiver of e-government services. An example is provided for clarity in each case. This matrix should however be used with caution, as there is not always a clear border between the different segments. Although the distinction between different subcategories may be quite clear for services in initial stages of maturity, it becomes blurred for services in higher stages of maturity.

SERVICE RECEIVER

SERVICE SUPPLIER	CONSUMER/CITIZEN	BUSINESS	GOVERNMENT
CONSUMER/CITIZEN	C2C (Ebay)	C2B (Freelance)	C2G (application for job opening in the public sector)
BUSINESS	B2C (Amazon)	B2B (BMW)	B2G (e-procurement)
GOVERNMENT	G2C (online car registration)	G2B (online permit applications)	G2G (communication between the federal and local states in Germany)

Figure 3.1. E-Commerce and E-Government Matrix
Source: Own Illustration based on (Lucke/Reinermann 2002)

One of the fundamental reasons for politicians to implement e-government is to bring public administrations closer to the public (West 2000). Therefore, the majority of e-government initiatives are designed to support G2C and G2B.

Various benefits of e-government motivate governments worldwide to implement e-government services are discussed next.

3.4 Motivational Reasons for Implementing E-Government Services

Electronic government has become no longer just a service delivery option, "but a necessity for countries aiming for better governance" (Gupta/Jana 2003, 365). Several governments around the world make substantial and financial commitments to implement e-government services. Motivational reasons for implementing e-government services have been the subject of previous research.

In a comprehensive review of e-government literature; Dwivedi, Weerakkody and Janssen (2011) concluded that most e-government studies analyzing motivational themes of e-government research fall under five distinct categories (p. 13):

1. *Political Forces*

   Unlike e-commerce, the drivers of e-government initiatives are "mainly political rather than economic" (Scholl 2005, 2). E-government can increase public participation in political processes, enhance transparency and build trust between citizens and

government. Research related to political forces investigates motivational aspects including increased e-participation and higher transparency.

2. *Economic Forces*

   E-government aims to reduce costs for both the government itself and its target users. Self-service can dramatically reduce costs for both parties. Research related to economic forces focus on cost savings, reduced bureaucracy and increased efficiency.

3. *Social Forces*

   E-government offers citizen empowerment through access to information (Al-Shafi/Weerakkody 2010). All citizens across the country are targeted by e-government, overcoming geographical limitations, including the elderly and people with special needs. Research related to social forces examines supply and demand factors that are required for a successful end-to-end service delivery. The studies related to this theme range from learning and education needs for employees of governments and citizens, to adoption factors by citizens including perceived usefulness and perceived ease of use (Davis 1989).

4. *Technological Forces*

   According to Dwivedi, Weerakkody and Janssen (2011), the use of ICT "provides the necessary infrastructure for seamless communication and flow of information both within government and with its stakeholders" (p. 14). By increasing access to public information, governments become more transparent to citizens and businesses. Research related to technological forces investigates the influence of ICT design features on individuals' adoption behavior including data security, accessibility features and confidentiality perceptions.

5. *Managerial Forces*[9]

   Research related to managerial forces "aims at identification and measurement of specific managerial strategies and behaviors" (Dwivedi et al. 2011, 14) which are vital on e-government implementation. Motivational forces in this category include the influence of management support and the existence of well-executed process reengineering strategy.

The motivational themes of e-government discussed above are influenced by various benefits of e-government services. Overall, e-government promises to deliver a number of benefits to the society. The potential increase in efficiency of government, cost savings and reduced administrative burdens are substantial. The time saved by delivering and obtaining services electronically around the clock is one of the main advantages e-government for both parties. By

[9] Although this category is suggested as a motivational category by its authors, it describes rather the existence of managerial strategies and management support as a critical success factor in e-government implementation.

delivering the service electronically, governments save enormously on personnel costs. In fully functional e-government, citizens are not obligated to spend time queuing at government offices or on the phone during office hours. Rather, they are given the opportunity to access public information and e-government services conveniently by using various communication channels. In this respect, e-government gives empowerment to the individual by letting them decide when and where to access online services.

Weerakkody et al. (2009a) summarizes the most common e-government benefits discussed in literature as follows (p. 3):

- "delivering electronic and integrated public services through a single point of access to public services 24 hours a day, seven days a week" (Weerakkody et al. 2009a, 3);
- "bridging the digital divide so that every citizen in society will be offered the same type of information and services from government"(Weerakkody et al. 2009a, 3);
- "facilitating citizens' participation by using ICT innovatively to provide access to policy information" (Weerakkody et al. 2009a, 3-4);
- "rebuilding customer relationships by providing value-added and personalized services to citizens and businesses"(Weerakkody et al. 2009a, 4);
- "fostering economic development and helping local businesses to expand globally" (Weerakkody et al. 2009a, 4); and
- "creating a more participative form of government by encouraging online debating, voting and exchange of information" (Weerakkody et al. 2009a, 4)

Citizen benefits of e-government should be maximized to encourage citizen uptake of electronic services. People are inherently resistant to change therefore governments should make sure that there are clear incentives for using online services rather than more traditional means of communicating with the government.

E-government services have some unique characteristics, which need to be taken into account in research and practice. The next section provides an overview of these characteristics.

3.5 Characteristics of E-Government Services and Comparison with E-Commerce Services

3.5.1 Characteristics of E-Government Services

E-Government utilizes the Internet for the delivery of services to its target users in a similar way to e-commerce and other online services. Yet, there are also specific characteristics of the e-government context which need to be taken into account by researchers and practitioners. A number of context specific factors have been identified in literature (Dwivedi et al. 2011; Bharosa et al. 2008):

- *Social inclusion*

  Government should provide equal access to the entire population. This includes elderly, disabled, less computer literature, migrants, and poorer citizens, who may not have Internet access (Dwivedi et al. 2011; Bharosa et al. 2008).

- *Accountability*

  Government should allocate resources, create policies and provide services in the best interest of the public (Jorgensen/Cable 2002). Ultimately, government is accountable to the public and to legislative bodies for decisions taken.

- *Fragmented and complex landscape*

  The governmental landscape is quite complex and consists of many agencies at different levels, varying in size, scope, objectives and information systems (Dwivedi et al. 2011; Bharosa et al. 2008).

- *Legislation*

  Laws and regulations determine the public sector structure, which influences the implementation and execution of government services (Dwivedi et al. 2011; Bharosa et al. 2008).

- *Lack of choice*

  The nature of the relationship between citizens and governments is a mandatory one (Dwivedi et al. 2011; Bharosa et al. 2008). Citizens do not have any other choice because government does not have any competitors.

- *Knowledge of laws needed*

  Citizens are expected to know what the law demands from them (Dwivedi et al. 2011; Bharosa et al. 2008).

- *Volatile public values*

  Many government services are driven or influenced by public values, which may be potentially in conflict (Dwivedi et al. 2011; Bharosa et al. 2008).

- *Public governance*

  In federal countries, decision-making authority is dispersed over federal, state and local areas. All these levels have their own political systems (Dwivedi et al. 2011; Bharosa et al. 2008).

- *Time perspective*

  Governments should have a long term perspective to guarantee a sustainable society, while politicians are often chosen for a predefined time period (e.g., Dwivedi et al. 2011; Bharosa et al. 2008).

E-government is frequently compared with e-commerce ((Carter/Bélanger 2004a; Warkentin et al. 2002)), which will be discussed next.

3.5.2 Similarities and Differences between E-Government and E-Commerce

E-government and e-commerce have a lot in common, but there are also significant differences between them. Based on an extensive literature review, Barzilai-Nahon and Scholl (2007) found numerous *similarities* between e-government and e-commerce in the following areas: "(1) process improvements, (2) backend (process) integration, (3) cost savings, (4) information sharing, (5) vertical and horizontal e-systems integration, (6) increased responsiveness and service quality, (7) standardization efforts and (8) the criticality of senior leadership support" (p. 3).

In prior literature, five fundamental *differences* between e-government and e-commerce have been discussed (Dwivedi et al. 2011). First, it is essential to understand the difference between commercial business as a *for-profit* organization and government as a *non-profit* organization. The most fundamental difference between the two, is the *reason for existence,* which brings with it distinct drivers and motivators. A commercial business is generally founded to generate profit for their entrepreneurs and shareholders. Thus business is profit driven. Government is elected by the public to serve the society for a pre-defined time period so drivers of e-government are mainly political. This basic difference in intrinsic nature has a vital influence on the allocation of resources, management of services or products, short and long-term strategies.

The second difference is the *accountability*. A commercial business should account for its activities and accept responsibility for them in order to strengthen its reputation and competitiveness. Yet it has no obligation to disseminate information or be transparent to the public. Government, on the other hand, is expected to be transparent and accessible. It has an *obligation* to explain the decisions and actions to the people it serves.

A third difference is in the *stakeholder expectations*. Financial resources and profitability are the focal point of managerial decision making for a business because managers are assessed by stockholders based on financial statements (e.g., the financial bottom line). Government is service oriented and has an entirely different set of stakeholders (Dwivedi et al. 2011). As there is not a financial bottom line for government, it is not easy to measure its performance (Drucker 1995, 108):

> *"The results of a non-profit institution are always outside the organization, not inside…Only when a non-profit's key performance areas are defined can it really set goals. Only then can the non-profit ask: Are we doing what we are supposed to be doing? Is it still the right activity? Does it still serve a need?… Are we still in the right areas? Should we change?"*

For a government, the key performance area is serving the citizens, who have elected it. Citizen satisfaction is the ultimate measure of success for governments and politicians. Government should channel all its resources to satisfying the needs and desires of citizens. It pursues some political goals and should manage its scarce resources efficiently but its main focus is usually not on financial resources. Fourth, government has to *serve all citizens without any exceptions*, while a commercial business is free to choose its customers, focus on a specific market segment and customize its product and service portfolio accordingly. Finally, *the expectations citizens*

have of government are much higher than of a commercial business, as their main duty is serving citizens.

Consequently, the dynamics of e-government services are similar to, but not the same as e-commerce services, which results in a specific research area. However e-government research is still in its infancy therefore the field lacks theoretical frameworks that are specifically developed for e-government. The specific need for e-government theories and methodologies which reflect the complex nature of e-government has already been addressed in prior literature (Dwivedi et al. 2011, 11):

> *"Aspects like accountability, transparency, digital divide, legislation, public governance, institutional complexity and citizens' needs are challenging issues that have to be taken into account in e-government theory and practices."*

As a result, many researchers employ theories from similar IS contexts, which are mostly tested in e-commerce. By doing so, researchers base their arguments on the similarities between the two domains. For instance, Beldad (2010) points out that although e-government is substantially different than e-commerce, the intangibility of online transactions which heightens perceptions of online risks is a common feature. Thus, he argues that models aiming to determine trust antecedents in e-commerce are also applicable in understanding trust formation process in e-government. Similarly, Carter and Bélanger (2005) integrate constructs from the Technology Acceptance Model and Diffusion of Innovation Theory and "expect the directional impacts of the constructs tested in prior e-commerce research to be the same in the context of e-government" (p. 15).

To conclude, it is common for researchers in e-government to use information systems models and theories tested in e-commerce contexts. For example, the salient factors that influence the adoption of e-government services are commonly analyzed by using theories in Technology Adoption Research, which have been mostly validated in e-commerce. Until e-government develops as an independent branch of research, researchers do not have many other options rather than adapting theories from similar contexts. Among these contexts, e-commerce is preferred based on the similarities already discussed. However, Dwivedi, Weerakkody and Janssen (2011) stress that "the e-government environment is much more complex than the IS and e-business domains … and these theories have limitations when applying to the e-government field" (p. 15). Therefore, IS theories should be enhanced with additional constructs to account the context and specific conditions of the e-government domain (Orlikowski 2000). Furthermore, the theories adopted should be validated in the new domain as well as in the relevant cultural contexts. According to Yildiz (2007), such empirical data can "contribute to the literature by creating new theoretical arguments, providing new concepts and categories that would enhance our understanding of e-government policy processes and actors" (p. 657), which would lead to development of e-government specific theories, models and methodologies.

With the increasing interest on utilizing IT in the public sector, a number of maturity models have been suggested to monitor whether governments are on the right track (Andersen/Henriksen 2006). There are also several benchmark studies, which compare and rank countries according to their e-government development levels. The next section provides an

overview on the commonly used e-government maturity models and the selected benchmark studies.

3.6 Assessing Maturity of E-Government Services

With the ongoing progress in online service delivery in public administrations all over the world, many countries have put in place e-government initiatives to enhance public services and underlying processes. This has led to research on evaluating and benchmarking the level of maturity of e-government initiatives.

So called "stage models" have been developed for categorizing and evaluating the progress of public service development. Some of these models assess development from the perspective of technological sophistication, while others aim to analyze the level of maturity based on level of interaction with users. The stages in these maturity models are also used to rank countries for their e-government implementation levels (United Nations 2014; European Commission 2012). Some of the well-known maturity models of development in prior literature are summarized below.

3.6.1 Maturity Models of E-Government Development

First governmental efforts in e-government usually start with an online presence. Combining lessons learned from these initiatives with the users' demands and changes in society governments move to higher stages of e-government implementation, which promise the critical benefits of e-government. A number of frameworks have been proposed to understand e-government development process, in terms of service delivery.

3.6.1.1 The Maturity Model of Layne and Lee

One of the first and most widely-recognized e-government maturity models has been suggested by Layne and Lee (2001). The authors posit a model of four stages of growth for fully functional e-government (Layne/Lee 2001, 124):

Stage I: Cataloguing

At this stage of maturity, governments are focused on establishing an online presence for the government (Layne/Lee 2001, 124). Functionalities at this stage are quite limited such as cataloguing government information and presenting it on the web (Layne/Lee 2001, 124). Toward the end of this stage, users can search for and view detailed government related information and access to downloadable forms.

Stage II: Transaction

The initiatives at this stage focus on connecting internal government systems to online interfaces. By empowering users to deal with their governments online, the critical benefits of e-government such as elimination of paperwork, time savings, and convenience of using e-

services anytime anywhere begin to emerge. Databases in public administrations support online transactions. Functionalities at this stage are more advanced, allowing interactive completion of a process online rather than simply downloading a form and taking it personally to a public authority. An example e-government services at this stage is birth registration.

Stage III: Vertical Integration

According to Lee (2010), "vertical integration initiates the transformation of government services rather than automating existing processes" (p. 226). At this stage of maturity, government functions at different levels such as those of local, state and federal governments are integrated (Lee 2010). Users are able to access the service of higher levels (at the state or federal level) from their local portal. For example, there can be a link between a drivers' license registration system at a state level and the national database of licensed truckers for cross checking (Layne/Lee 2001).

Stage IV: Horizontal Integration

At the final stage of maturity, systems are integrated not only across different levels but also across different functions and services of government (Layne/Lee 2001). Such integration facilitates a unified and seamless service for the target users, so called "one-stop government" (Lee 2010). For example, a citizen can register a vehicle and file his/her tax online at the same time because systems in both agencies work from the same database or share information.

As seen above, this maturity model is focused on technical integration of the processes (back-end e-government) rather than on services and user perspective (front-end e-government).

3.6.1.2 The Maturity Model of Andersen and Henriksen

The Public Sector Process Rebuilding (PPR) maturity model proposes four phases of e-government maturity (Andersen/Henriksen 2006, 242):

Phase 1: Cultivation

This phase is characterized by horizontal and vertical integration and use of intranet within government, and limited user services such as downloading forms.

Phase II: Extension

This phase is characterized by heavy use of intranet and a personalized interface for processes.

Phase III: Maturity

This phase is characterized by the abandoning of intranet, by transparent processes and offering personalized services for users.

Phase IV: Revolution

This phase is characterized by data mobility across organizations and applications and the ambition to transfer data ownership to users.

The PPR maturity model was developed based on the Layne and Lee model (2001). Although Andersen and Henriksen (2006) argue that the PPR model is focused more on the front-end government with an emphasis on services and users perspective, this model has not received much attention.

3.6.1.3 The Maturity Model of the United Nations

The United Nations (2014) defines the following four stages of online service development (p. 195):

Stage 1: Emerging information services

Government websites deliver information on public policy and other regulations as well as available government services (United Nations 2014). Users can access ministries of government through the links provided (United Nations 2014). Information on what is new in the public administrations is provided with links to archived information (United Nations 2014).

Stage 2: Enhanced information services

The e-government online presence delivers enhanced *one-way* or simple two-way e-communication between public administration and users such as forms to download (United Nations 2014). Government websites are multi-lingual. Relevant public information is enhanced with audio and video capability.

Stage 3: Transactional services

The e-government online presence allows *two-way* interaction between government and users, including receiving inputs on policies, programs and regulations (United Nations 2014). An electronic authentication of the user's identity is required (United Nations 2014). Government websites process transactions such as downloading and uploading forms, online tax filing and applying for license renewals (United Nations 2014).

Stage 4: Connected services

Government proactively requests opinions from users using interactive tools. Collective decision-making, participatory democracy and user empowerment are implicit in this stage of e-government maturity. Departments and ministries of public administration are integrated in a seamless manner. Governments have rather a user-centric approach than a government-centric

approach (United Nations 2010). Services are categorized under life events and tailor-made services are provided.

The above discussion presents an overview of the most widely cited e-government maturity models in prior literature. Although some other maturity models have been discussed in literature, a detailed analysis of all models goes beyond the scope of this thesis. Table 3-1 below provides a comparison of various stage models. A detailed comparison of stages in e-government development models can be found in (Maheshwari et al. 2011) and (Lee 2010).

Although the model of Layne and Lee is the most cited maturity model in e-government literature (Maheshwari et al. 2011), no one model has been accepted as standard. This is not surprising considering the relatively immature nature of the e-government domain. The classifications, methodologies and objectives of these models vary greatly and create confusion among researchers (Lee 2010):

> *"The models seem to be incongruent with each other as they are based on different perspectives and use somewhat different metaphors. This presents a difficulty not only in understanding different research results, but also in planning future actions for e-government."*

Existing e-government maturity models distinguish between stages ranging from three to six. Furthermore, a service can be classified as belonging to different categories in different models (e.g., e-payment appears in second stage of Layne and Lee model but in the third stage of the Moon model (Treiblmaier et al. 2004)). This is partly caused by the differences in the conceptual definitions. For instance, the model of Andersen and Henriksen (2006) includes vertical and horizontal integration in its initial stage 'cultivation', but this is one of the final stages in Layne and Lee model (2001). In the former, integration is limited to internal operations of government while the latter takes different levels and functions of government into account (Lee 2010). There are even differences in categorization within the same organization; for instance, the United Nations categorized 'emerging presence' and 'enhanced presence' separately in 2001, combined them into one stage between 2003-2008 and separated them once again in 2012, with a minor name change to 'emerging information services' and 'enhanced information services'.

Stage Model	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6
Gartner Group (Baum/Di Maio 2000)	Web presence	Interaction	Transaction	Transformation		
Deloitte Research (2000)	Information publishing and dissemination	Two way transaction	Multi-purpose portals	Portal personalization	Clustering of common services	Full integration and enterprise transaction
Layne and Lee (2001)	Catalogue	Transaction	Vertical integration	Horizontal integration		
Hiller and Bélanger (2001)	Information dissemination and catalogue	Two-way communication	Service and financial transaction	Vertical and horizontal integration	Political participation	
United Nations (2001)	Emerging presence	Enhanced presence	Interactive presence	Transactional presence	Seamless presence	
Wescott (2001)	Email and Internet network	Interorganization and public access to information	Two-way communication	Allowing exchange of value	Joined-up government	Digital democracy
Moon (2002)	One-way communication	Two-way communication	Service and financial transaction	Integration	Political participation	

to be continued on the next page…

Stage Model	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6
World Bank (2002)	Publish	Interaction	Transact			
Accenture (Rohleder/Jupp 2003)	Online presence	Basic capability	Service availability	Mature delivery	Service transformation	
United Nations (2003)	Emerging presence and enhanced presence	Interactive presence	Transactional presence	Networked presence	E-participation index	
West (2004)	Billboard stage	Partial service delivery stage	Portal stage	Interactive democracy		
Siau and Long (2005)	Web presence	Interaction	Transaction	Transformation	E-democracy	
United Nations (2005)	Emerging presence and enhanced presence	Interactive presence	Transactional presence	Networked presence	E-participation index	
Andersen and Henrisken (2006)	Cultivation	Extension	Maturity	Revolution		
United Nations (2008)	Emerging presence and enhanced presence	Interactive presence	Transactional presence	Connected	E-participation index	

to be continued on the next page…

Stage Model	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6
Klievnik and Janssen (2008)	Stove-piped applications	Integrated organization	Nationwide portals	Inter-organizational integrations	Demand-driven, joined-up government	
United Nations (2012, 2014)	Emerging information services	Enhanced information services	Transactional services	Connected services		

Table 3-1. Comparison of Stage Models in E-Government
Source: Own Illustration based on (Maheshwari et al. 2011)

It is significant that none of these models embrace technological, organizational, user and service perspectives all together. Most of them focus on technological integration however e-government is more than a technological phenomenon as it encompasses complex interactions of government with citizens, businesses, employees and other governments. Although there are some unsatisfactory attempts to encompass all perspectives of e-government in the literature (cf. Andersen/Henriksen 2006), the stage model proposed by Lee (2010) has been one of the most useful models. Based on a meta-synthesis of the existing e-government stage models in e-government literature, he suggested the following framework (see Figure 3.2 below**):**

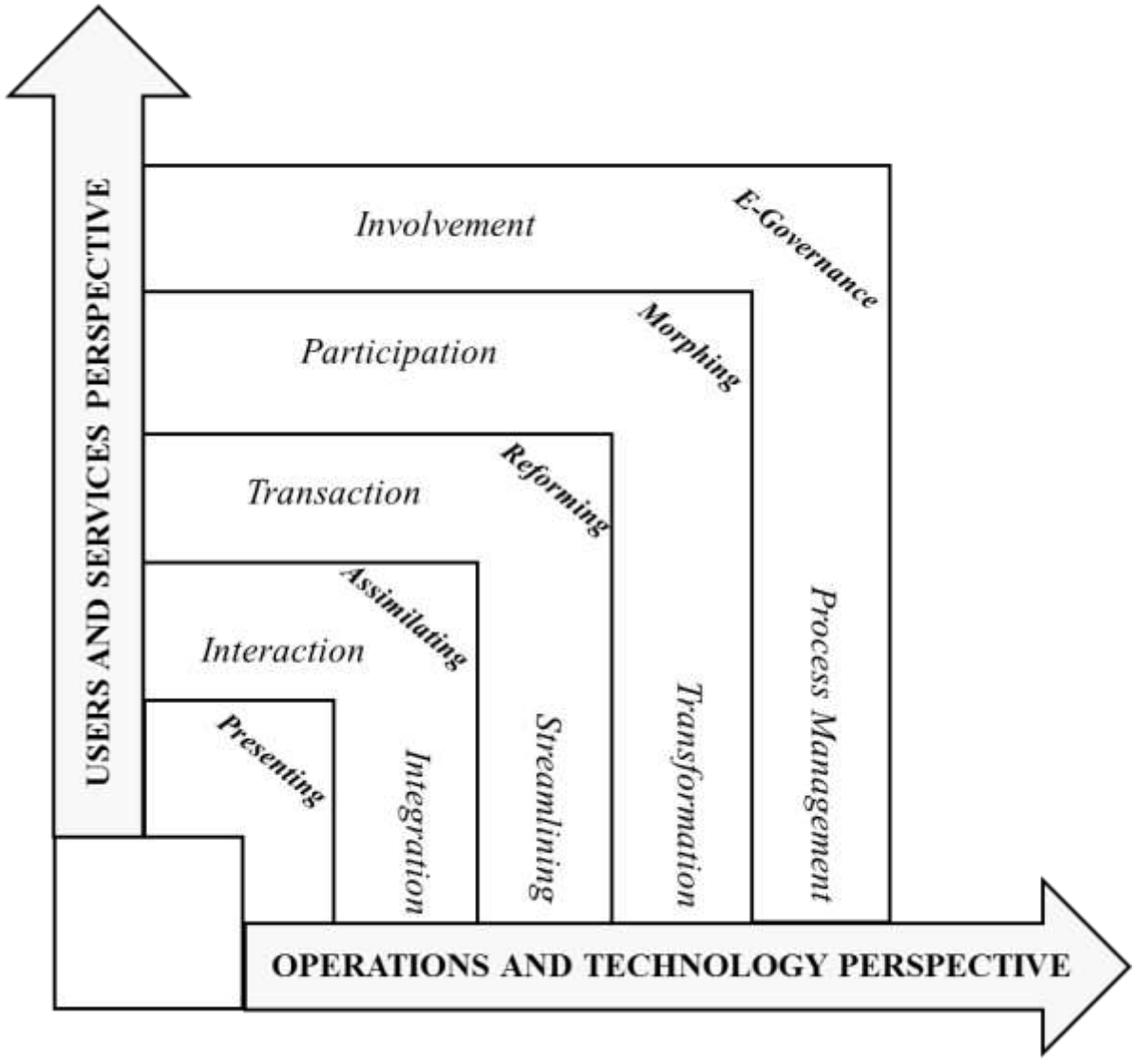


Figure 3.2. A Common Frame of Reference for E-Government Stage Models
Source: Own Illustration based on (Lee 2010)

By combining different perspectives, this model defines four metaphors on two clearly differentiated themes of 'users and services perspective' and 'operations and technology perspective'. The metaphor of *presenting* "does not contain separate themes as it represents a simple information presentation, but other metaphors contain clearly differentiated themes" (Lee 2010, 228):

Presenting

This phase refers to presenting information in the information space.

Assimilating

This phase combines the stages of interaction for ‘users and services’ and integration for ‘operations and technology’ perspectives. Processes and services replicate the ones in the real world (Lee 2010).

Reforming

This level combines the stages of transaction for ‘users and services’ and streamlining for ‘operations and technology’. Processes and services are reformed to match the information space requirements, to create a more efficient fit (Lee 2010).

Morphing

This phase combines the stages of participation for ‘users and services’ and transformation for ‘operations and technology’. The scope of processes and services in the information space are changed to create a more effective fit with the processes and services in the real world (Lee 2010).

E-Governance

This level combines the concepts of involvement for ‘users and services’ and process management for ‘operations and technology’. Processes and services are “synchronously managed, reflecting citizen-involved changes with reconfigurable processes and services” (Lee 2010, 224).

It is important to note that, not all e-government projects follow all stages in a sequential order (Joseph/Kitlan 2008; Lee 2010). However caution is advised in case stages are skipped. Though it may be possible in terms of ‘operations and technology’, implementing such rapid changes would not be easy from the ‘users and services’ perspective (i.e. processes on the real world) (Lee 2010).

Independent of the selected e-government maturity model, governmental organizations seek to reach the higher stages of maturity for several reasons such as saving time, cost and effort. Each successive stage represents a higher level of collaboration and integration, hence a higher level of information sharing, reaching full and seamless integration at the final stages. Stage models are also used to assess e-government readiness in several countries and rank them accordingly based on different criteria, and this function is discussed next.

3.6.2 E-Government Benchmark Studies and Surveys

There are a number of surveys which are commonly used as benchmarking tools to assess e-government development worldwide. Such surveys are intended to provide two types of comparison: firstly, the benchmarking of a country in respect to the others and secondly, the assessment of e-government development within a country over the years to make sure that e-government implementation is moving in the right direction.

3.6.2.1 United Nations E-Government Survey

The United Nations (UN) E-Government Survey has been conducted by the Department of Economic and Social Affairs of the United Nations since 2004. It provides an assessment of the use and potential of ICT to transform the public sector in its member countries on a comparative basis (United Nations 2014). Although some G2B e-government services are mentioned in UN studies, the survey focuses mostly on G2C and G2G e-government (United Nations 2010, 2012, 2014).

By assessing e-government readiness and development, the survey enables comparison and ranking of the nations. Based on several indices, a so called 'e-government development index (EGDI)' is calculated rating each nation relative to all other UN member countries (United Nations 2012). In this aspect, the survey is the most comprehensive e-government benchmark study in the world.

The most recent report was published in 2014 covering 193 member countries of the United Nations (2014). This survey used five indicators of e-government development to calculate EGDI as a composite indicator measuring the service availability and e-government readiness of the nations (United Nations 2012). Mathematically, it is calculated by taking the weighted average of three dimensions of e-government: *online services index*, *telecommunication infrastructure index* and *human capital index* (United Nations 2012).

The *online services index* reflects the scope and quality of online services. It is calculated based on the assessment of "national portal, e-services portal and e-participation portal, as well as the websites of the related ministries of education, labor, social services, health, finance, and environment as applicable" (United Nations 2014, 191). The *telecommunication infrastructure index* represents the development status of telecommunication infrastructure in the country. It is calculated based on the estimated number of "Internet users per 100 inhabitants, number of main fixed phone lines per 100 inhabitants, number of mobile subscribers per 100 inhabitants, number of wireless broadband subscriptions per 100 inhabitants and number of fixed broadband facilities per 100 inhabitants" (United Nations 2014, 187). The International Telecommunication Union is the primary source of data for this indicator. The *human capital index* refers to the human capital in the country. It is a composite of "adult literacy rate and the combined primary, secondary and tertiary gross enrollment ratio" (United Nations 2014, 189). The United Nations Educational, Scientific and Cultural Organization is the main source of data for this indicator (United Nations 2014).

The UN e-government survey also provides a classification of the available online services in a member country in four stages defined by the United Nations Maturity Model (see Section 3.6.1.2 above). Furthermore, the study ranks countries according to their *e-participation indices* and *environment indices*. *E-participation index* reflects how well citizens are engaged and

supported in their interaction with the government. *Environment index* represents the "use of e-government to provide information and services to citizens on environment related issues" (United Nations 2014, 191).

The studies are accessible at http://unpan3.un.org/egovkb.

3.6.2.2 The European Commission eGovernment Benchmark (Cap Gemini)

The Cap Gemini Group provides a benchmark for online services on behalf of the European Commission since 2001 (also known as *the EU eGovernment survey*). The survey focuses on G2C and G2B e-government services.

Until 2011, the survey was focused on measuring service availability and sophistication (European Commission 2013). Starting from 2012, the survey reports on priorities set by the European Commission in eGovernment Action Plans (European Commission 2015c). Such an alignment leads to reporting on progresses made in countries on the indicators set by the European Commission.

One interesting finding of this report is the segmentation of respondents according to their attitudes toward e-government: *e-government believers, potential drop-outs, potential users* and *non-believers* (European Commission 2013). *E-government believers* have used e-government services within the last 12 months and indicated that they would prefer to use them in the future. *Potential drop-outs* have used e-government services but have indicated a preference for another method for interacting with government in the future. *Potential users* have not used e-government but have an online channel preference for interaction with government. Finally, *non-believers* have not used e-government services before and have no preference for e-government use.

The most recent report was published in 2015 presenting the findings of the 2014 e-government survey (European Commission 2015c). The survey included an analysis of online users from 33 countries, and delivered fairly comprehensive insights into e-government development in Europe.

The limitation of this benchmark is assessing countries based on only a few life events[10]. The studies are accessible at https://ec.europa.eu/digital-agenda/en/pillar-7-ict-enabled-benefits-eu-society.

3.6.2.3 Eurostat

Eurostat is the statistical office of the European Union, which collects and publishes information on ICT usage in households and by individuals in the EU. Data is collected annually based on model questionnaires. The aim of the survey is the timely provision of statistics on individuals' access to, and use of ICT at European level (eurostat 2013a). The survey covers subjects including security and trust, ICT competence and skills, barriers of ICT utilization, use of e-government and ubiquitous connectivity (eurostat 2013a).

[10] The most recent study assessed online sophistication of services based on the life events of 'losing and finding a job', 'studying', 'starting a business', 'moving', 'owning a car', 'small claims procedure' and 'regular business operations' (European Commission 2015c).

The collected data is also used to assess the progress of countries towards reaching goals endorsed by the European Union such as the Digital Agenda (European Commission 2016a), the European E-Government Action Plan (European Commission 2010) and E-Government Benchmark Framework (e.g., European Commission 2012). Statistics are accessible at http://epp.eurostat.ec.europa.eu.

3.6.2.4 Accenture's E-Government Leadership Report

Accenture is a management and consultancy company which also publishes reports on public service and government. From 2000 to 2006, the "eGovernment Leadership" series was published reflecting the e-government maturity of the selected countries on an international e-government landscape. The last eGovernment Leadership study was conducted in 2006 covering 22 countries around the world (Accenture 2006).

Since 2007, Accenture has been publishing reports with a special focus. Usually, one of the themes from the service portfolio of the company in the public sector such as leadership in customer service is the focus of the reports. Surveys tend to be on a relatively smaller scale than previously, with fewer questions and countries. The survey in 2012 investigated special factors such as ease of accessing government, availability of citizen-centered services, multichannel delivery and the level of digitalization (Accenture 2012). The most recent report "Digital Government: Pathways to Delivering Public Services for the Future" was published in 2014 assessing the performance of ten countries in digital government. In this study, Germany ranked ninth in digital government performance and performed lowest among the ten countries in citizen satisfaction (Accenture 2014).

Although the reports have been based on professionally conducted studies, it should be kept in mind that Accenture's E-Government Reports are not designed to deliver an e-government benchmark study for academic purposes. Indeed, Accenture reports have been criticized due to "the objective of raising the profile of the company concerned in the e-government services market" (Bannister 2007, 177).

The studies are accessible at http://www.accenture.com.

3.6.2.5 Economist Intelligence Unit Digital Economy Rankings

Since 2000, the Economic Intelligence Unit of the Economist Group has worked in cooperation with IBM to assess the quality ICT infrastructure of countries and the extent to which citizens, businesses and governments use it for economic and social benefits on a global scale (The Economist Intelligence Unit 2010). Previously known as *IBM E-Readiness Rankings*, the study was renamed as the *Digital Economy Rankings* in 2010 (The Economist Intelligence Unit 2010). The rankings are calculated by considering about 100 quantitative and qualitative criteria measuring social, political, economic and technological development of countries.

Data sources include the United Nations (http://www.un.org), the Economist Intelligence Unit (http://www.economist.com/topics/economist-intelligence-unit), the World Bank (http://www.worldbank.org), and the World Intellectual Property Organization (http://www.wipo.int).

The most recent study was published in 2010 benchmarking 70 countries (The Economist Intelligence Unit 2010). Country scores were calculated based upon numerous indicators in six distinct categories: "connectivity and technological infrastructure, business environment, social and cultural environment, legal environment, government policy and vision, consumer and business adoption" (The Economist Intelligence Unit 2010, 3). The studies are accessible at http://www.economist.com/topics/economist-intelligence-unit.

3.6.2.6 E-Government Monitor

E-Government Monitor (Krcmar et al. 2016; Krcmar et al. 2014; Krcmar et al. 2011b, 2012; Krcmar et al. 2013; Krcmar et al. 2015; TNS Infratest 2010) provides a focused benchmark study on selected countries, which delivers detailed findings on success factors and barriers to e-government adoption. Since 2010, the study has been conducted by ipima (http://www.fortiss.org/en/sectors/public-administration), Initiative D21 (http://www.initiatived21.de) and TNS Infratest (http://www.tns-infratest.com) annually.

Compared to other benchmarks described above, E-Government Monitor focuses on a smaller number of countries. The most recent version, published in 2016, analyzed Germany, Austria and Sweden (Krcmar et al. 2016). Rather than aiming to deliver a broad overview of e-government adoption in numerous countries, the study provides a detailed screening of underlying determinants of, and barriers to e-government diffusion as well as usage of mobile devices and open government services in the selected nations. Most of the survey questions remain the same over the years in order to enable comparability of the survey results. In addition, the study has been continuously enhanced to reflect the increasing demands and expectations users have of e-government. Furthermore, this study distinguishes itself by the utilization of representative samples, which provides results with high external validity. The studies are accessible at http://www.egovernment-monitor.de.

The above analysis reveals that there are several benchmark studies on e-government. Yet, there is a clear lack of consistency between different benchmarks (Vintar/Nograšek 2010; Bannister 2007; Jansen 2005). Most countries have widely varying scores on the ranking lists of different studies. Indeed, this is quite normal, because generally studies cannot be meaningfully compared with each other; they all have different scopes, scales, objectives, methodologies, budgets, and data sources. Based on a comprehensive analysis of various e-government benchmarks, Bannisster (2007) concluded that global benchmarks "are not a reliable tool for measuring real e-government progress" (p. 185). He argued that the analysis of a large number of countries demand standardization, which is nearly impossible, and the attempt to enforce it can lead to loss of quality in information. As a possible remedy, he suggests using *in-depth case studies of the selected countries* rather than analyzing hundreds of countries. One such benchmarking study is the E-Government Monitor, which forms the empirical basis of this thesis.

3.7 Government 2.0

As discussed previously, e-government is an evolutionary phenomenon involving various stages of implementation. The initial stages are characterized by low complexity and low level of integration. E-government at this stage is commonly referred to as *Government 1.0*. Most Government 1.0 projects were in information or communication stages of maturity, failing to reach the final stages of e-government. They were *government-centric* emphasizing the automation of current administrative processes and government operations. However, with such projects government agencies often failed to meet users' needs online.

As governments progress towards higher stages of growth, systems are integrated across different functions which results in higher efficiency and effectiveness in using information technology. Indeed, at higher stages of e-government, citizen demands push governments to become more service oriented. Citizens expect their voices to be heard and their requests implemented in governmental decisions and policies. Implementation of such a revolution towards citizen participation and collaboration requires utilization of more advanced technologies than in Government 1.0. This new generation of e-government initiatives encompasses a broader perspective on public administration, which is known as *Government 2.0* (Chun et al. 2010).

Government 2.0 projects aim for higher stages of maturity promoting shared governance to transform how the government operates, in terms of seamless information flow, high levels of transparency and collaborative decision making (Chun et al. 2010). Hence, although Government 2.0 involves the new technology of Web 2.0, it is much more than just a higher stage of e-government in terms of technology. Embracing the values of Web 2.0 applications, governments become more transparent, accountable, participatory and inclusive. Making government more accessible, participatory and transparent requires substantial changes to the *status quo* and *governance*.

One important lesson from failure of Government 1.0 projects was the examination and, if necessary, reorganization of administrative processes before transferring them to a digital environment rather than automating the existing processes (also known as the "organization before technology" concept) (Becker et al. 2012). After dealing with various challenges and partial failures, governments worldwide have recognized the necessity of delivering more *citizen-centric* e-government services in a more effective and responsive way, with higher transparency, participation and collaboration. These requirements lead to a fundamental shift in e-government implementations, which become a global trend in the public sector.

3.7.1 Open Government

The concept of *open government* (see

Figure 3.3 below) constitutes an essential part of Government 2.0 initiatives. Fountain (2001) defines open government as the governing doctrine in which citizens are allowed to access documents and policies of governments for the sake of an effective public oversight. Open government is based on the following three principles:

1. *Transparency*

Government should be transparent. Transparency in government through ICT (also known as *e-transparency*) promotes increased accountability and discourages corruption by providing information to citizens about what the government is doing. Public authorities should conduct their work more openly; disclose information about their operations and decisions including administrative policies as well as their actions to meet their legal information dissemination obligations (McDermott 2010). Public information should be easily accessible, searchable and integrated to enhance transparency (Chun et al. 2010).

Facilitating transparency requires substantive changes within government (especially in *cultures* which do not promote openness and transparency (Bertot et al. 2010b)), but many governments have claimed success in reducing public sector corruption through the adoption of ICT (Shim/Eom 2008).

2. *Participation*

Government should be participatory. Participation in government through ICT (also known as *e-participation*) encourages citizen engagement by providing opportunities for the public to participate in the political, technical and administrative decisions that affect them. Transparency and citizen participation are regarded as cornerstones of democracy in the technological age (also known as *e-democracy*) (Bertot et al. 2010b).

Public authorities should provide feedback mechanisms and search for innovative tools and practices to promote higher levels of citizen participation (McDermott 2010). Furthermore, governments should use some methods (e.g., collaborative tagging) to determine which data is useful and relevant for their operations and decision-making (Chun et al. 2010).

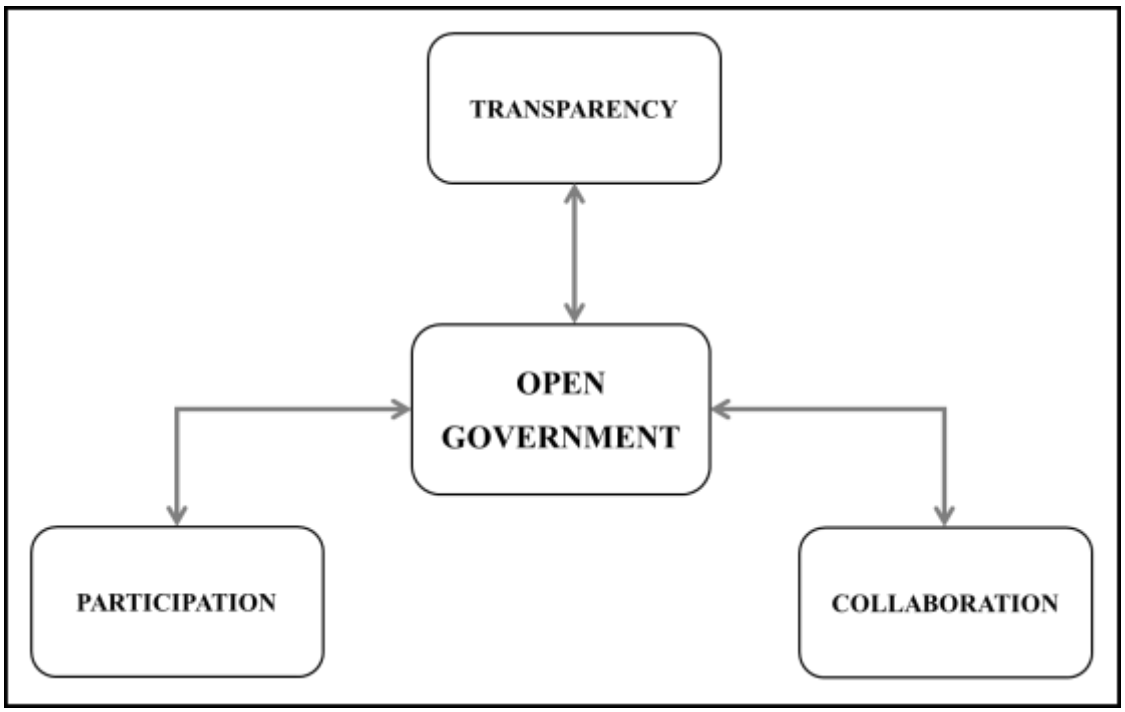


Figure 3.3. Three Principles of Open Government
Source: Own Illustration based on (Chun et al. 2010)

Some regimes are ambivalent about citizens directly participating in government decisions (Roberts 2004). Proponents argue that the collective knowledge, ideas and ability of the population can enhance government's effectiveness and improve the quality of its decisions. On the other hand, direct citizen participation may be countered by skepticism and resistance. For instance, civil servants may not be enthusiastic about direct citizen participation in political processes. Furthermore, citizens lack the technical, political and administrative expertise, which is another issue that needs to be considered (Roberts 2004).

3. Collaboration

Government should be collaborative. Collaboration should be implemented internally and externally. Internally this demands cooperation among government agencies across all levels. External collaboration actively engages citizens and businesses to improve the effectiveness of their government.

Public authorities should use technology platforms to work together with stakeholders within and outside the public organizations, provide descriptions of websites where the public can learn about existing collaborative efforts, and search for innovative methods to increase collaboration with the public (McDermott 2010). Governments should promote collaboration at all levels. Yet, for this to be successful, data integration and interoperability need to be achieved through semantic mediation so that the public data is meaningfully integrated (Chun et al. 2010). As in the case of participation, governments should use appropriate methods (e.g., collaborative tagging) to filter and extract valuable information.

Research has shown that increasing transparency and providing greater access to government information through the use of ICT increases trust among citizens (Shim/Eom 2008; Bertot et al. 2010b) and this improved *citizen trust* is one of the main benefits of open government.

Within the last decade, open government has become a priority of several governments. President Barack Obama issued a Memorandum on Transparency and Open Government underlying the ensurement of public trust and establishment of a system of transparency, participation and collaboration in the U.S. (The White House 2009). Within the Europe, *participation* and *democratic decision-making* have been set as explicit goals set in *eGovernment Action Plan*s of the European Commission (2016a; 2005). These documents state the objectives and expectations of European public organizations, which should be adopted in the national IT strategies and programs of the individual European countries. The use of Web 2.0 technologies has been implicitly listed in these plans. The new *EU eGovernment Action Plan 2016-2020 (European Commission 2015b)* and the *Digital Agenda for Europe* (European Commission 2016a) support further the provision of a new generation of e-government services and aim

towards "a knowledge-based, sustainable and inclusive economy for the European Union as set forth in the *Europe 2020 Strategy*" (European Commission 2016b).

3.7.2 Tools and Practices of Web 2.0 for the Public Sector

Social media tools and Web 2.0 applications offer the potential to take the evolution of e-government in new directions by enhancing transparency and promoting e-participation. A particular set of web-based technologies have received considerable amount of emphasis in the context of Government 2.0:

- *Weblogs (Blog)*

  A weblog is a web-based interactive application in which the content is presented in a structured format of information, often displayed in a chronological order (Bertot et al. 2010a). Blogs can be used for a variety of purposes but most are focused towards expressing opinions and sharing information on specific topics with others. Blogs typically consist of text, images, audio, video or a combination of these.

- *Microblogs*

  A micro-blog is a web-based platform that is used to share information about current events or personal opinions primarily through mobile devices (Chun et al. 2010). Microblogging is a combination of social networking and blogging. A well-known example is Twitter (https://twitter.com).

- *Wikis*

  A wiki is a web-based tool that allows collaborative authoring and editing of content dynamically via a web browser. A well-known example is Wikipedia (https://www.wikipedia.org). The process of utilizing "a group of people or a community to accomplish a specific task, often collaboratively, with the aim of having easier access to a wide variety of skills and experience" (Oliveira et al. 2010) is known as *crowd- sourcing*.

- *Mashups*

  A mashup is an application that uses contents from two or more external data sources, combines, integrates and highlights hidden connections between them and thus creates new value-added information (Chun et al. 2010). Structured data i.e. extensible markup language (XML) and application programming interfaces (API) are two essential prerequisites for mashups (Bertot et al. 2010a).

- *Social Networking and Media-sharing*

Social networking sites are web-based services to build online communities for promoting interaction with other users having similar interests. There are general platforms (e.g., Facebook https://www.facebook.com), mobile applications (e.g., https://web.whatsapp.com) as well as professional networks (e.g., XING http://www.xing.com).

Media sharing platforms include photo sharing, video sharing, document sharing and slide sharing. Most of these platforms enable social networking including functionality for evaluation and making comments. Flickr (https://www.flickr.com) is a well-known example of image hosting website; whereas YouTube (http://www.youtube.com) is popular for video sharing. DocStoc (http://www.docstoc.com) is being increasingly used for sharing documents and SlideShare (http://www.slideshare.net) for sharing presentations.

- *Content Syndication*

  Content syndication refers to making part or all of a website's content available by use by other services as web feeds (Hammersley 2003). By using content syndication, information can be frequently updated and pushed to subscribers with content based on their pre-selected interests (e.g., the latest news). Really Simple Syndication (RSS) and Atom syndication are two commonly used XML-based formats for web feeds.

Government could actively use these technologies to increase transparency, participation and collaboration with the public; for instance by generating a Facebook page, a YouTube channel and/or a Twitter account for an open dialogue with the public. Creating blogs where individual citizens have the opportunity to publish comments would increase collaboration. Information could be syndicated on official websites (e.g., RSS) enabling constantly updated information to be made available to the public.

Web 2.0 technologies can also serve indirectly to promote openness and reduce corruption in a country. In such a case, content is not likely to be provided by the government. Rather, individuals share secret data and documents with political significance to reveal corruption. Wikileaks (https://wikileaks.org) is an international organization which disseminates documents, photos and videos to reveal unethical behavior in governments and institutions. Wikileaks publishes data on a wiki, microblog and social media. In another political example; Facebook, Twitter and YouTube enabled an instant sharing of videos, audios and transcripts related to a massive corruption scandal involving the Turkish Prime Minister Erdogan, who banned these platforms temporarily to avoid the further distribution of media (Dorell/Kotsev 2014).

3.7.3 Opportunities and Threats of Web 2.0 Technologies in the Public Sector

The exploitation of Web 2.0 technologies[11] by public administrations looks quite promising and governments worldwide commit to strategic plans for Government 2.0. Yet, their adoption by

[11] Although there are some discussions about the rise of Web 3.0 and the semantic web technologies, its applications in the public sector remain quite rare and goes beyond the scope of this thesis.

governments is still in its initial stages and a considerable amount of research is required to reach maturity. Such a significant evolution, requiring a *change of perspective* from government-centered thinking to user-centered orientation cannot be expected to happen from one day to the next. Furthermore, the use of Web 2.0 technologies may not be exclusively beneficial. Although societies around the world seem to be enthusiastic about the frequently stated benefits of Web 2.0, potential risks of these applications should also be taken into account. De Kool and van Wamelen (2008) summarize the opportunities and threats of Web 2.0 in the public sector as follows (p. 6):

1. *Social interaction versus isolation*

   Web 2.0 enables online "social interactions and communication between people all over the world" (de Kool/van Wamelen 2008). At the same time, the number of people who isolate themselves from the real world is increasing (de Kool/van Wamelen 2008).

2. *Participation versus exclusion*

   Web 2.0 stimulates people to participate in society and democracy (de Kool/van Wamelen 2008). This is however only true for people who are actively using the Internet. The elderly, handicapped people and people with limited financial or technical skills may become excluded (de Kool/van Wamelen 2008).

3. *Quantity versus quality data*

   Web 2.0 offers the possibility to share large amounts of information for increasing transparency. However, such an information-overload is not always beneficial. It raises concerns about the reliability and the accuracy of the information provided.

4. *Information sharing versus information protection*

   Web 2.0 makes it easy to share information (de Kool/van Wamelen 2008). Sharing and distribution of information may lead to violation of copyrights or privacy concerns. Furthermore "possible abuse of personal information, the risk of hacking" (de Kool/van Wamelen 2008) and unwanted messages (spam) are among the possible concerns.

5. *Unlimited ambitions versus limited possibilities*

   Web 2.0 can increase expectations and lead to high ambitions (de Kool/van Wamelen 2008). Nevertheless, different barriers can hinder the introduction of new applications; lack of qualified employees, cultural resistance against change (de Kool/van Wamelen 2008), and lack of financial resources may limit the potential use of these technologies.

As seen above, e-government promises greater efficiency and effectiveness of public sector operations as well as increased transparency, participation and collaboration. Although many e-government projects are being implemented, the majority of projects fail. Besides the

financial and opportunity costs, failure of early e-government initiatives increases barriers for future e-government projects by creating frustration in governments, and loss of credibility and trust among the public. Hence, it is essential to understand the potential barriers to it and look for ways to reduce risks. The next section aims to increase awareness of barriers to a successful e-government implementation.

3.8 Barriers to E-Government

Challenges to e-government can be categorized under *supply-side barriers* and *demand-side barriers.* Supply-side barriers are identified and synthesized by Ebrahim and Irani (2005) based on a critical examination and analysis of studies, which examine difficulties and barriers that have been experienced in public sector organizations. Their classification defines four main categories of barriers: technological, organizational, operational, and personal related barriers (see Table 3-2 below).

Not all barriers to e-government development come from within public authorities. There may be an inevitable resistance in society to using government's online services. The success of online public services depends largely on how well the citizens make use of them (Kumar et al. 2007). The E-Government Survey conducted by United Nations (2012) summarizes the following demand-side barriers:

1. *Accessibility barriers (Digital Divide)*

   Governments should ensure the digital inclusion of all citizens to allow their participation through ICT. Social exclusion is caused by unequal access to the Internet. The Organization for Economic Cooperation and Development (OECD) defines the term "digital divide" as follows (OECD 2001, 5):

   "Digital divide refers to the gap between individuals, households, businesses and geographic areas at different socio-economic levels with regard both to their opportunities to access information and communication technologies (ICTs) and to their use of the Internet for a wide variety of activities"

   This definition seems to focus on the *technology* aspect. Cullen (2001) defines the digital divide as the gap that exists between individuals who have access to information and communication technologies and those without such access or skills. This broader definition, which includes access to technology as well as the *skills* required to use ICT, is more appropriate, as having mere access to technology is not enough to ensure digital inclusion; individuals need relevant skills to use online technologies, especially with regards to protecting their privacy and security.

	Barriers
Operational barriers	- Shortage of reliable networks and communication infrastructure - Lack of standards and common architecture policies - Incompatibility and complexity of the existing systems - Restrictions of the existing internal systems regarding their integrating capabilities - Lack of integration across government systems - Lack of enterprise architecture - Lack of documentation especially in case of custom systems
Personnel related barriers	- Lack of IT training programs in government - Shortage of well-trained IT staff in market - Lack of knowledge regarding e-government interoperability - Unqualified project managers - Shortage of salaries and benefits in public sector - Turnover of IT specialist staff - High cost of external IT consultants

to be continued on the next page…

	Barriers
Security related barriers	- Threats from hackers and intruders - Threats from viruses, worms and Trojans - High cost of security applications and solutions - Unauthorized external and internal access to systems and information - Lack of knowledge for security risks and consequences - Need for reassurance that transaction is legally valid - Lack of security rules, policies and privacy laws - Inadequate security of government hardware and software infrastructure - Lack of risk management policies - Unsecured physical access to public building
Organizational barriers	- Lack of coordination and cooperation between departments - Lack of effective leadership support and commitment among senior public officials - Unclear vision and management strategy - Complexity of business processes and concerns related to effort involved in process reengineering - Changes in government and politics - Resistance to change at all levels (status quo) - Shortage of financial resources in public sector organizations

Table 3-2. Supply Side Barriers to E-Government
Source: Own Illustration based on (Ebrahim/Irani 2005)

The older generation, individuals with lower education and poorer citizens are frequently discussed as being socially excluded from online technologies. Evidence from studies which analyze the influence of socio-demographic factors including age, gender, income and education in creating a digital divide (cf. Niehaves et al. 2012) suggest that gender (specifically male), income and education have a positive influence on e-government adoption, whereas age has a negative influence.

Countries are increasingly considering *multi-channel service delivery* mechanisms to complement their standard Internet based e-government services (Dwivedi et al. 2011). Besides the Internet, communication with citizens should be extended to mobile-based channels such as mobile web and mobile applications, digital television, free access to public services through kiosks or wireless devices. Access through digital TV is especially important for reaching older people or people who do not use the Internet. The government in the UK successfully reaches this segment of the population by using digital television. According to the latest survey of United Nations (2012), 57 percent of the digital TV users in the UK are over 45 years old, 67 percent are not working – hence do not have Internet access at work – and 48 percent of them rarely or never use the Internet.

2. *Lack of benefits*

There must be clear citizen benefits for using e-government services rather than the more traditional means of communication or transaction. Governments can even provide *incentives* to encourage usage of online services, which can help citizens to overcome natural resistance to change.

Convenience is found to be a stronger incentive than mere cost-savings (United Nations 2012) or privacy, when the benefits of an online transaction outweigh the value of privacy (Beldad et al. 2009). The number and maturity of available services in a government's e-service portfolio also impact convenience. Many countries have only a limited portfolio of e-services (United Nations 2012), which leads to low usage figures. Another issue is the *maturity level* of the available services. Higher stages of e-government maturity result in more people willing to use online tools, while e-services in the earlier stages of maturity can make citizens more reluctant to enter into electronic transactions with public authorities.

3. *Concerns over trust, security, privacy*

Concerns of individuals regarding security and privacy have a striking negative influence on citizens' willingness to engage in electronic communications with government (Hoffman et al. 1999). Indeed, the survey by the United Nations (2012) clearly underlines that "they are mentioned *as a major reason* for non-usage of e-government services" (p. 105).

Unlike traditional environments in the physical world, perceptions concerning privacy and security in online environments hinder use of online transactions. The facelessness and intangibility of online transactions heighten perceptions of online risks. Individuals lose control over their personal data when they decide to transmit them online

(Hoffmann/van Kaenel 2010). In a large-scale empirical study, Akkaya et al. (2011) identified the factors of inadequate security of transferred data, fear of becoming a "transparent citizen" and lack of confidential handling of sensitive data as the specific concerns of citizens regarding data protection and security. These three aspects were considered as important by more than 50 percent of the respondents, independent of their gender, age and degree of education.

As mentioned in the report of United Nations (2014), trust in using e-government services is also critical in addition to privacy and security. Previous experiences, existing relationships and beliefs of citizens about government organizations will obviously affect their approach to online public services. If individuals have conflict prone and inflexible relationships with public authorities, their trust in government is likely to be low. If citizens do not trust in the ability and technical capacity of governments to provide high quality services in a secure environment, they are likely to have low expectations and continue using traditional methods. Similarly, if citizens believe that government is trying to collect information for other purposes, they will be less willing to send information electronically due to privacy concerns.

Trust in the Internet is related to privacy and security concerns; in particular, first-time users have greater concerns regarding security and privacy of online transactions and may rely heavily on web site cues (Koufaris/Hampton-Sosa 2004). Hence, clear policy statements on privacy regarding any information that may be collected as well as security assurances should be provided. According to the United Nations E-Government Survey (2012), only 41 percent of the member states publish a privacy statement and only 20 percent of them "have a visible security policy with a secure link feature clearly indicated on their government website" (p. 105).

It is important to note that transparency leads to greater trust (United Nations 2012). Therefore, the global effort towards more transparency in public authorities is likely to foster citizens' trust in government, helping to eliminate this barrier.

4. Usability Barriers

Usability refers to the intuitive design of technologies that enable users to engage with the content embedded within the technology (Bertot et al. 2010b). It is a broad term encompassing ease of use, availability of support, ease of understanding and searchability.

Usability barriers work against citizen benefits from online services and impede the uptake of e-government services. E-services should be easy to find, understandable in terms of language and intuitive to help get things done quickly (Davey et al. 2011). Some people are concerned about making mistakes due to unfamiliarity of the electronic medium. Some others cannot find the information they are looking for due to poor technical design of the portals (Krcmar et al. 2013; Krcmar et al. 2015). Evidence suggests that reading levels of government web sites are higher than those recommended, which makes it too difficult for elderly people to read (Davey et al. 2011). Providing search engines is particularly important, "as they are the most common entry point for government website interactions" (United Nations 2012, 106). Online and offline support should be provided, which has been stated as a barrier to use of e-

government services (Krcmar et al. 2015; Krcmar et al. 2013; Krcmar et al. 2014). Moreover, it is critical for government organizations to keep their websites up-to-date, well maintained and robust.

Studies reveal that usability of e-government portals needs to be improved. Only 15 percent of the national portals in United Nations member states provide a glossary of words and 27 percent of them provide a tutorial to guide users in accessing their services (United Nations 2012). Within the EU, 41 percent of individuals reported having problems when using e-government portals (eurostat 2013c). About 24 percent of them had experienced technical problems, 23 percent found the information to be insufficient, and 13 percent experienced lack of support to obtain the right information (eurostat 2013c). According to the same statistics, 16 percent of e-government users were mostly dissatisfied with the ease of using and finding services on e-government portals (eurostat 2013c).

5. *Lack of Citizen Centricity and Focus on User Needs*

A recent survey reveals that government services are not tailored to meet the specific needs and priorities of their diverse users (Krcmar et al. 2015). This is quite challenging for citizens because government is composed of several administrative levels with different task and competencies. To remove this barrier, an increasing number of governments all over the world implement *one stop government portals*, which implies a single portal of government from the citizens' perspective. Citizens have a single point of contact with the government rather than searching for responsible authorities. Online services are grouped around citizens' needs and situations in terms of life-events such as getting married, travelling abroad or having a child (known as *life-event concept).*

Citizen satisfaction and feedback incorporation are closely related to citizen centric design. If citizens are satisfied with e-services, they are likely to use them again and suggest them to other individuals. Government should continuously improve its services based on feedback. Research in similar contexts demonstrated that appropriate feedback mechanisms induce trust in online transactions (Ba/Pavlou 2002). Therefore, feedback incorporation (i.e. concerning improvement of their e-services) can promote citizens' trust in public authorities. However, most governments do not monitor and incorporate feedback by citizens. As an example, "only 13 percent of the United Nations member states provide outcome on feedback received from citizens concerning the improvement of their services" (United Nations 2012, 107). Only in 9 percent of these nations enable citizens to "tag, assess and rank content on their website" (United Nations 2012, 107).

Citizen-centric approach indicates a shift "from what services governments can provide to what citizens really need" (United Nations 2012, 106). The need for a *change of perspective* from government-centered thinking to user-centered orientation was underlined by Wolf and Krcmar (2007) almost a decade ago. Yet, this is a complex issue with technological, operational and organizational perspectives. Its implementation requires a complex framework of three-layers (Tambouris/Spanos 2002): "the front-office, which includes a portal where services are provided in terms of life events, the mid-office where composite services are created (to correlate life events with core processes) and their execution is coordinated; and the back-office where core processes are performed" (p. 287). Such a framework becomes much more cumbersome in federal

countries with varying tasks and competencies at federal, state and local authority levels. Besides technological and operational perspectives, such a radical change may be hindered by the bureaucratic culture of organizations, consideration of which should not be neglected.

Nowadays, an increasing number of governments around the globe use the Internet as a medium of communication and transaction with citizens. Even though e-government has been recognized as a catalyst for better service provision, its successful acceptance by citizens remains a challenge. Every country adopts at a different pace, which may be influenced by various supply-side or demand-side barriers. The same barriers may have different impacts in different country situations. Different national characteristics and historical experiences make it even more difficult to predict the adoption behaviors of nations. Therefore, policymakers should identify significant barriers that are valid in their countries with empirical studies and develop a concrete operational strategy to minimize negative usage factors.

The next section provides an overview of e-government development levels in the two countries, which have been empirically analyzed in this thesis.

3.9 E-Government Development in the Countries of Analysis

This thesis is focused on understanding salient factors influencing adoption of e-government services based on four large-scale empirical studies. Germany is analyzed due to the lack of research regarding e-government adoption for this nation. Sweden was selected for comparison with Germany due to the differences in cultural values, differences in e-government development levels and similarity of the economic growth levels between the two countries, which will be elaborated further in Section 5.1.2.

E-government and ICT based rankings of Germany and Sweden in international benchmarks and surveys (which are discussed in Section 3.6.2 above) have been used in the analysis (see Table 3-3 below). As discussed previously, some rankings vary significantly. This can be explained by the differences in objectives, available budgets, sample groups analyzed, survey questions and research methodology as well as the year of empirical analysis.

3.9.1 E-Government in Sweden

The Swedish government utilizes ICT to the full extent in order to make public administration public-oriented. Besides its well-known global leadership in mobile innovations and e-healthcare services (gemalto 2010), Sweden enjoys high recognition in various e-government rankings. Although e-government projects challenged the traditional Swedish model of governance, the high level of determination shown by the government has enabled the public-oriented strategy vision to become a reality. The Swedish model of governance was a highly decentralized one, in which public agencies and authorities enjoy large autonomy, according to the Swedish constitution. But to be public-oriented, this model had to be adapted and evolved, which meant changes to governmental practices that were laid down almost three hundred years ago (CAIMED 2003).

The project 'The 24/7 Agency' was a Swedish vision of a public administration providing online services round the clock, seven days a week (The Swedish Cabinet Office 2013). One of the main objectives of this project was to provide a single point of access to citizens regardless of how the responsibility is distributed among different public authorities. This project contains ambitious goals such as "all government services which can be delivered electronically, should be delivered electronically, provided that this is technically feasible and economically defensible" (CAIMED 2003, 5). Furthermore, citizens should be able to choose between different service channels. Services should be designed in a way that facilitates access for everyone. Citizens should be able to use single points of access which necessitated several changes in public administrations such as back-office integration and more collaboration.

The Swedish government continuously adapts public services to the needs of citizens and businesses. The Swedish Open Government Data portal was launched in 2013 with various data sets that are reusable for commercial and non-commercial purposes. Furthermore, citizens can access to information on government laws, regulations and policies online via the portals of http://www.regeringen.se, http://www.government.se and http://www.sweden.se. It should be particularly mentioned that the first two portals listed above can be displayed in sixteen languages whereas the latter provides information in seven languages. To improve user satisfaction in the future e-government initiatives, citizens are asked about what they think of the services available (The Swedish Cabinet Office 2013). In February 2014, the Government launched the http://www.psidatakollen.se portal which displays to which extent the Swedish authorities comply with the eGovernment Delegation guidelines in open data (European Commission 2015a). In order to present a clear picture of the current digitization of the country, the online portal digital http://digitalasverige.se was developed which enables anyone to search, and share data as well as compare the progression of the nation with other countries (European Commission 2015a).

The tax return service in Sweden is one of the most advanced e-government services in the world. The groundwork for this service was laid several years ago when the tax authority collected information about individual's income, tax payments, assets possessed, bank statements and other relevant information (gemalto 2010). Since then, citizens only report their personal identity numbers via telephone, by mobile short message service or simply by ticking a box on the tax authority's website. The flexibility provided to the population is enormous. In order to make sure that the privacy regarding use of personal data is protected, the Swedish Data Inspection Board was tasked in addition to Personal Data Act, which came into force in 1998 (European Commission 2015a). The Data Inspection Board have a history of being very strict regarding threats to privacy without complicating the use of new technologies (Grönlund 2010a).

The Swedish Government has long concentrated its efforts on simplifying administration for its population. The main objective of the 'E-government Action Plan' was "to make it as simple as possible" for people to access public administrative services and to achieve flexible e-government based on users' needs (The Swedish Cabinet Office 2011). Providing citizens with multi-channel access and making sure that e-government is available to everyone have been among the main goals of this plan. Electronic signatures were legally introduced in 2000 as a valid instrument for citizen government interaction (Grönlund 2010a). Sweden was one of the first countries to introduce mobile signatures, which provided considerable convenience when interacting with public services (gemalto 2010). Foreigners living in Sweden can access

information in in sixteen languages in order to reach residents who might otherwise experience language difficulties (The Swedish Tax Agency 2016).

Besides increased convenience and multichannel delivery, the Swedish Government has taken efforts to eliminate accessibility problems for disabled people. It has improved its national website with accessibility features such as reading content aloud for individuals with visual disabilities, added video in sign language for people with hearing problems and provided the option of configuring font size, font type and background color for visually challenged and elderly users (United Nations 2012).

Benchmark studies on e-government reveal that the government is on the right track. The take-up of e-government services by citizens is very high. Achieving excellence and constantly improving up on it requires a lot of effort and determination. The national Digital Agenda strategy reflects the fact that the Swedish Government focuses further on simplifying people's lives and maintaining high standards of excellence in a changing environment (The Swedish Cabinet Office 2014).

	SWEDEN	GERMANY
United Nations E-Government Survey (United Nations 2012, 2014)	E-government ranking - 14 in 2014 - 7 in 2012	E-government ranking - 21 in 2014 - 17 in 2012
	Online service ranking - 17 in 2012	Online service ranking - 25 in 2012
	Infrastructure ranking - 9 in 2012	Infrastructure ranking - 13 in 2012
	Human capital ranking - 24 in 2012	Human capital ranking - 35 in 2012
	E-participation ranking - 7 in 2012	E-participation ranking - 5 in 2012
OECD (OECD 2014)	- Approximately 79 % of the population interacted with public authorities within the last 12 months - Approximately 50 % of the population sent filled forms within the last 12 months	- Approximately 52 % of the population interacted with public authorities within the last 12 months - Approximately 17 % of the population sent filled forms within the last 12 months
The European Commission eGovernment Benchmark (CapGemini) (Cap Gemini 2015)	- Categorized in the 'Mature Cluster' which signifies the highest level of penetration and a high level of digitization	- Categorized in the 'Progressive Cluster' which is characterized by a low level of penetration and a medium level of digitization

to be continued on the next page…

	SWEDEN	GERMANY
The European Commission eGovernment Benchmark (CapGemini) (European Commission 2013)	- 66 % of the respondents used e-government for at least one life event in the past 12 months	- 45 % of the respondents used e-government for at least one life event in the past 12 months
	- 47 % of the respondents are e-government believers	- 21 % of the respondents are e-government believers
	- 29 % of the respondents are e-government non-believers	- 50 % of the respondents are e-government non-believers
Eurostat (eurostat 2013c, 2013b)[12]	- 78 % of individuals have used e-government within the last 12 months	- 49 % of individuals have used e-government within the last 12 months
	- Only 4 % of the population have never used the Internet	- Only 13 % of the population have never used the Internet
	- 92 % of the population use the Internet at least once a week	- 80 % of the population use the Internet at least once a week
	- 93 % of the households have internet access at home	- 88 % of the households have Internet access at home
ITU[13] (United Nations ITU 2015)	- 89.6 % of the households have internet access at home - 93.3 % of the households have a computer at home	- 89.5 % of the households have Internet access at home - 87.1 % of the households have a computer at home

to be continued on the next page…

[12] The most recent usage statistics provided by Eurostat refers to usage in 2013.
[13] ITU is an institution of the United Nations which is responsible for conducting research and publishing global rankings in information and communication technologies

	SWEDEN	GERMANY
Accenture's Digital Government Report (Accenture 2014)	- This country was not analyzed in this report	- In Citizen Service Experience, Germany was ranked the last among ten countries - Only 28 % of the respondents are fairly satisfied with the quality of public services, whereas only 3 % percent are very satisfied - According to 43 % of the respondents customization of the services should be the first priority of the government
E-Government Monitor (Krcmar et al. 2015; Krcmar et al. 2013; Krcmar et al. 2014)	Use of E-Government Services - 75 % in 2015 - 71 % in 2014 - 53 % in 2013 Lack of Trust in Government as a Barrier to E-Government Adoption - 25 % in 2015 - 27 % in 2014 - 29 % in 2013 Privacy and Security concerns as a Barrier to E-Government Adoption - 25 % in 2015 - 32 % in 2014 - 34 % in 2013	Use of E-Government Services - 39 % in 2015 - 45 % in 2014 - 36 % in 2013 Lack of Trust in Government as a Barrier to E-Government Adoption - 50 % in 2015 - 57 % in 2014 - 49 % in 2013 Privacy and Security concerns as a Barrier to E-Government Adoption - 51 % in 2015 - 66 % in 2014 - 57 % in 2013

Table 3-3. Comparisons of the Countries analyzed in this Thesis in various Benchmark Studies

Source: Own Illustration based on the sources listed in the table

3.9.2 E-Government in Germany

3.9.2.1 Historical Development of E-Government in Germany

Germany is the fourth largest economy in terms of total GDP in the world (International Monetary Fund 2012) and is also known for its well-developed national telecommunication infrastructure. E-government strategies and initiatives have been part of the political agenda over the last decades. The Federal Government is dedicated to enabling Germany to become one of the top e-government players in Europe. The Government set the widespread adoption of e-government services as part of its national strategy (The Federal Government 2005). However, the importance of e-government varies at the federal, state and municipal levels (Fetzer 2006). There is a certain degree of concern that e-government requires a significant investment in infrastructure and know-how, therefore e-government develops slowly in states and municipalities which lack financial means[14] (Fetzer 2006). Resistance to e-government among civil servants, who may be afraid of losing their jobs or privileges, is another issue in Germany (PUBLICUS 2010).

An overall modernization of public administration in Germany has started with the 'Modern State – Modern Administration' reform which aims to achieve a more modern and efficient administrative structure with a strong focus on new public management (The Federal Government 2001). The first-generation e-government initiative 'BundOnline 2005' was announced in 2000 with the aim of bringing 376 federal services online by 2005. The federal government reached this goal almost six months ahead of schedule, serving citizens around life events through the portal bund.de (http://www.bund.de) (Fetzer 2006).

Over the years, the content of bund.de portal has changed. In its current version, the portal lists job offerings in the public sector, real estate owned by the Federal Government and public tenders rather than e-government services for citizens and businesses. The contact details of public authorities on the federal level are listed in a document. Online services are restricted to providing information and downloading forms rather than any transactional services. Back-office integration of public authorities is still lacking. For example, the online service 'Application for Travel Identity' directs the user automatically to the web-page of the Federal Police. Citizens are asked to leave their feedbacks and improvement suggestions. Although there is an English version of the portal, it is far from being a translation of the content into English. It barely consists of three paragraphs of text stating the English version only gives a general information about Germany.

The 'BundOnline 2005' initiative was the first administrative modernization project that was focused on federal level agencies and their services. However, based on the German basic law (Grundgesetz), federalism is a strong principle which assigns legislative and administrative competencies not only to the national government but also to the states and local authorities. Due to different tasks and competencies at three hierarchical levels, citizens are faced with different administrative units. Therefore, additional projects besides modernizing federal level agencies were necessary. Recognizing this need, the Federal Government has started three more

[14] Actually, e-government initiatives lead to enormous cost savings and economic benefits for public authorities (Wolf/Krcmar 2005) which can be calculated by using the 'eGOV-calculator' developed by IAO (Fraunhofer IAO 2005).

initiatives. The 'MEDIA@Komm' (1999-2003) project and its successor 'MEDIA@Komm-Transfer' (2004-2006) projects coordinated e-government efforts on a municipal level, while the 'Deutschland Online' initiative aimed to intensify cooperation and coordination between different levels of German governance. The first two projects were initiated by the Federal Ministry for Economic Affairs and Energy (German: Bundesministerium für Wirtschaft und Technologie), while the latter was a project of the Federal Ministry of the Interior. Although these three projects are accepted as milestone projects in modernization of public administration in Germany, they have not successfully tapped the full potential of e-government in Germany. The follow-up initiative 'E-Government 2.0' was introduced for the time period of 2006-2010 encouraged by the European i2010 program (Commission of the European Communities 2005), however it has also fallen well short of its objective of "enabling Germany to become one of the e-government leaders of Europe" (IT Planning Council of the Federal Ministry of the Interior 2010).

Currently, e-government development in Germany is quite heterogonous. There is a diversity of pilot projects and applications at different levels. The "Digital Administration 2020" has been announced in 2014 for administrative modernization at the federal level (The Federal Government 2016a). In contrast to sophisticated transactional services such as Electronic Tax Declaration (German: Elektronische Steuererklärung) (ELSTER) on the federal level, e-government development varies enormously at state and local authority levels. Although there is no one-stop federal portal, citizens can search and find information about the responsible authorities for their specific issues, which are displayed based on the provided keywords (http://www.behoerdenfinder.de). Furthermore, the government offers a single government service telephone number 115 at the local level (Federal Ministry of the Interior 2016). By using this telephone service, citizens can contact their local government without having to search for the responsible authority. Heterogeneity exists especially in terms of the state portals. Some states have developed quite advanced e-government portals in several languages whereas others only offer basic services. For instance, the state of Bavaria provides online services through its portal categorized under life events in German and in English (http://www.verwaltungsservice.bayern.de). The design of the site allows configuration of font size and background color. The site also offers a service to read the content of pages aloud via speaker. Services can be searched alphabetically or by life events. Users can receive support via e-mail and by phone. However, due to lack of back-office integration, citizens are still re-directed to the separate web sites of responsible authorities (e.g., for example for the online tax filing service of ELSTER).

The service-bw portal of Baden-Württemberg (http://www.service-bw.de) is one of the most developed state portals in Germany. Users can filter services by entering their postcodes or town names so that the portal contents are displayed for a specific town. There is an option of storing personal documents in a virtual document safe securely and in encrypted format. Services are categorized under various life events. Detailed information on procedures, forms, points of contact and online services are displayed in three languages (German, English and French). Citizens can give feedback and comment on the policies and services of the Regional Administrative Offices of Baden-Württemberg. In contrast, the state portal of Hessen (http://www.egovernment.hessen.de) is designed relatively simple with general information about e-government strategy of Germany, announcements about IT and e-government events and a few federal level services. The portal is only accessible in German.

Since 2010, the Federal Government in Germany has announced a number of strategies and taken considerable steps to promoting e-government at all levels. The first step was determining strategies to overcome the economic, social and technological challenges of the 21st century. In 2010, the IT Planning Council of the Federal Ministry of the Interior (German: IT Planungsrat - Bundesinnenministerium) announced the federal, state and local governments' *"National E-Government Strategy"* (NEGS) designed to guide e-government development in Germany (IT-Planungsrat 2010). It was part of the broad ICT strategy of the German Federal Government – *"Digitale Agenda Deutschland"* (Digital Germany 2015) – which was aligned with the goals of the Digital Agenda for Europe (European Commission 2016a). Furthermore, German cabinet ministers gave their approval to the "Digital Agenda 2014-2017", which aims to provide fast broadband Internet across the country including the rural and urban areas (The Federal Government 2016b).

The NEGS sets out specific goals and priorities in the e-government area. The main goals of the strategy are delivering user-centric, innovative, cost effective and efficient services with increased transparency, data protection and security. Promotion of participation by citizens and businesses and higher utilization of IT in public administration should also be achieved. The NEGS is a joint strategy aiming to eliminate the differences in the online sophistication of services offered by the states and local governments. The 'E-Government Map' (https://www.e-government-landkarte.de), launched by the IT Planning Council, provides a transparent overview of the ongoing projects at federal, state and local levels. Each project description includes information on project partners and target user groups, strategic and operational goals, project timeline, and specific contribution to NEGS targets.

As a second step, Germany achieved a new legal basis in 2013 to facilitate electronic communications between citizens and business and public administration, which is known as "E-Government Act" (German: E-Government-Gesetz). To achieve this several changes were necessary to public administrations. A secure e-mail communication service, *De-Mail*, was introduced in 2010 to encrypt digital communications between citizens, businesses and administrations online. Besides e-commerce and online banking, De-Mail promises various benefits for e-government. Similarly, new personal ID cards (NPA) (German: Neuer Personalausweis) introduced in 2010 have an optional e-ID functionality, which can be used for online identification in e-government. However, most public departments do not offer De-Mail as a communication channel or NPA for online identification. Lack of usage scenarios for citizens as well as security and privacy concerns during transmission of sensitive data hinder acceptance of De-Mail and e-ID functionality of the NPA: only 8 percent of the German population have a De-Mail account (Krcmar et al. 2016), 47 percent of the population have the new personal ID card, of which only 13 percent have activated e-ID function of their identity cards (Krcmar et al. 2016).

The "E-Government Act" and the "Digital Germany 2014-2017" strategy urge public administrations at the federal level to open up a digital channel, provide De-Mail communication and online identification through e-ID of the NPA, provide file documents digitally, promote electronic payment in administrative procedures and supply machine-readable data files to the public (open data). Although only federal level authorities are obligated to offer De-Mail communication and identification through NPA – not state and local public authorities – it would enable secure electronic communications between government agencies and individual citizens.

3.9.2.2 Electronic Tax Declaration Project (ELSTER)

The online tax filing service is the one of the most advanced e-government services available in Germany (Akkaya et al. 2012a). ELSTER (German: Elektronische Steuererklärung) was introduced as a pilot project "in 1999 by the Ministry of Finance for electronic transmission of income tax declarations nationwide" (Akkaya et al. 2012a, 2533). According to the law, income tax declaration and wages tax return fall under the responsibility of the Federal Government but the administration is handled by the individual states. The nation-wide project coordinator of this service is the Bavarian State Ministry of Finance in Munich.

Besides tax payers, companies and tax advisors are other potential user groups targeted by ELSTER. Indeed, its usage is compulsory for businesses since 2006. It provides considerable advantages compared to manual tax filing. The state tax authorities announced to "give priority to processing the tax declarations that are submitted through ELSTER" (Akkaya et al. 2012a, 2533), in order to support its adoption (Bavarian State Ministry of Finance 2016). This is especially beneficial for individuals who are expecting tax refunds. A detailed web portal (http://www.elster.de) has been designed targeting seven user groups including employees, employers and tax advisors. Besides detailed explanations on use scenarios, project flyers and short video manuals are provided. A special support hotline (telephone and e-mail) has been provided for this e-government service which is available during the entire week including weekends and national holidays. There is a twitter (https://twitter.com/eliaselster) and blog link (http://blog.elster.de/wordpress) on the ELSTER online portal to enhance participation of citizens and receive their feedback. The Government provides free software for preparation and online transmission of income tax declarations, which "checks for the completeness and plausibility of the data entered in the form" (Akkaya et al. 2012a, 2533). A calculation of approximate tax refunds is also provided which would be paid on the basis of the declared data. The software is updated periodically to guarantee state of the art security technology.

Personal signature is an essential aspect of a tax statement in Germany. Although ELSTER has supported submission of forms electronically since its initiation; digital signatures available on the market were expensive and complicated. On the other hand, printing a summary of the declaration, signing it manually and sending it to the responsible Ministry of Finance by post required a change in media. One of the milestones of ELSTER was the introduction of the *online authentication* in 2006. Since then, tax returns can be completed fully online. The necessity of a paper-based signature is replaced by the free downloadable personal digital certificate 'ELSTER Basis' which enables secure identification. Furthermore, additional assistance is provided through step by step explanations and videos on the ELSTER portal.

In 2012, the Ministry of Finance announced a free additional feature to increase convenience. After successful registration on the ELSTER portal, selected fields on the tax declaration form will be automatically 'pre-filled'. This feature remains optional. Although it brings time savings, citizens in Germany seem to be concerned about the collection of data by government and the possible difficulty of editing the automatically pre-filled fields (Krcmar et al. 2013).

The information on wage tax returns for employees (German: Lohnsteuerbescheinigungsdaten) is transmitted digitally eliminating the change in media between online and paper-based forms. Since 2013, citizens can use the e-ID function of their new personal cards for a secure authentication to ELSTER which enhances its convenience. Yet, its adoption rate remains relatively low compared to other nations (Akkaya et al. 2012a). In order to foster acceptance of

the online tax initiative the government has even initiated a lottery to win a brand-new sports car and expensive hotel vouchers (Bavarian State Ministry of Finance 2011).

3.9.2.3 Barriers to E-Government Adoption in Germany

In contrast to Sweden; Germany continues to remain among the middle ranks in European e-government benchmarks. Being a relatively large country with the division of authority and execution, one of the main challenges is offering homogenous e-government services at all levels of governance. In fact, the *complexity* of the German government structure presents a real challenge to success in e-government. Yet, citizens in Germany demand better service from their Government: 48 percent of the citizens are either "fairly dissatisfied" or "very dissatisfied" about the quality of public services in Germany (Accenture 2014).

Germany has one of the most advanced ICT infrastructures in Europe but there is still much to be done in terms of the service portfolio and delivery. Although Germany has been recognized as one of the top performers in terms of full online availability (Cap Gemini 2010), best practice services are mostly offered at the federal level. The *online sophistication of services* suffers especially at state and local levels. There is a clear need for e-services at high maturity levels which promise greater benefits for all stakeholders. For 56 percent of citizens, not being able to complete an e-government transaction fully online is a barrier to use (Krcmar et al. 2015) and 54 percent state that they cannot find what they are looking for on e-government portals (Krcmar et al. 2015).

Lack of awareness of the existing e-government services is another cause of low adoption in Germany. For instance, 60 percent of citizens are not aware of the open government services (Krcmar et al. 2015) and 73 percent of the respondents have never used an open government service (Krcmar et al. 2015). Since the government does not provide a single point of access to all services, citizens do not have any channel to be informed about what is new.

Another problem is *lack of enthusiasm* on the demand side (Fetzer 2006; PUBLICUS 2010). Studies reveal that individuals, who actively use other online platforms, are *reluctant* to use online methods to interact with public authorities (Akkaya et al. 2012a). In 2015, only 39 percent of citizens had used e-government services within the last twelve months (Krcmar et al. 2015). In fact, lack of citizen acceptance has been a special challenge in most of the previous large-scale initiatives such as the Electronic Health Insurance Card, the Electronic Wage Verification System and the New Identity Cards, which will be further elaborated in the next section. This problem applies specifically to services offered by the government, and in contrast Germany is a frequent user of other online technologies and online social networks. There were are twenty-three million users of Facebook in Germany (statista 2016). The household Internet penetration is 78 percent of the whole population (Initiative D21 2015). Among online users, 64 percent use Internet banking regularly (Initiative D21 2015) and about 64 percent shop online (Initiative D21 2015).

Even the most advanced e-government service, ELSTER, is used by only 36 percent of the online population in Germany, in contrast to 73 percent in Austria and 60 percent in Sweden (Krcmar et al. 2016). As explicitly stated by the Federal Minister of the Interior Dr. Thomas de Maizère, the Federal Government is aware of the resistance towards e-government among both the general public and public authorities (PUBLICUS 2010). Yet, the continuing efforts in

Germany are mostly focused on the supply side. Although this is indispensable to successful e-government, a better understanding of the demand side is crucial.

The willingness of the German nation to disclose private information to others through online social networks might sound contradictory with the elevated privacy concerns in the society (Akkaya et al. 2012b). However, a study on Facebook showed that Germans present less personal information about themselves and are more worried about privacy issues (Krcmar et al. 2011b). Moreover, willingness of an individual to disclose personal information in one *context* does not imply his or her consent to share personal information in another. Rather, the privacy expectations of citizens should be appraised for each specific context separately. One may value privacy less in online social networks context – or may not be even aware about the massive amount of self-disclosure due to other benefits – but expect a high privacy level in other contexts such as online shopping or e-government (Meckel et al. 2011). Previous research shows that privacy concerns do not have a significant negative effect on intention to use of online social networks (Jung et al. 2011; von Stetten et al. 2011), while being one of the highest concerns in online banking (Initiative D21 2015) and e-government (Krcmar et al. 2015). This may be explained by the differences of motivations and received benefits in using different online platforms. People use online social platforms mainly for hedonic and social benefits. Indeed, Krasnova et al. (2010b) found users of online social platforms disclose information due to "the convenience of maintaining and developing relationships and platform enjoyment" (p. 109). Thus, their privacy concerns may not inhibit them to expose personal information in online social platforms. Online banking, online shopping and e-government services are probably used only for functional benefits. Therefore, the role of privacy as a barrier to use of these systems is not comparable with each other.

3.9.2.4 Sensitivity of the German nation towards data protection and privacy

As discussed in (Akkaya et al. 2012a) in detail, it is known that the perceptions of citizens regarding the risks involved in online transactions are one of the major barriers hindering adoption of online technologies (Schaupp/Carter 2010). In fact, "citizens are increasingly aware that technology can be used to collect sensitive data" (Akkaya et al. 2012a, 2532). In a recent survey, 53 percent of the German respondents who stated being concerned about data protection, is particularly worried about collection of data by government for tracking purposes (Krcmar et al. 2015). It is widely accepted that national culture facilitates or impedes adoption of technologies by shaping citizens' perceptions (Gefen/Heart 2006). The *low risk propensity* of the German population has already been empirically shown in other studies (Krasnova et al. 2009; Münchner Kreis 2013; The Lauder Institute 2009) and recognized in cultural frameworks (e.g., Hofstede et al. 1991).

Indeed, the high risk aversion of the German nation is a part of everyday life, as discussed in (Akkaya et al. 2012a) in detail. A close analysis reveals that "Germany has one of the *strictest* data protection laws in the European Union" (Akkaya et al. 2012a, 2534). According to the German constitution (in German: Grundgesetz), every individual has the right to decide the use of his own personal data by any third party (The Federal Republic of Germany 1983; Akkaya et al. 2012a).

In 2006, the European Union announced regulation to retain telecommunications data for an effective contribution to the fight against international terrorism (Akkaya et al. 2012a). Shortly

after the pass of law in Germany in 2008, fears were raised over abuse of data retention and misuse of personal data (Akkaya et al. 2012a). Due to heavy protests, the law was suspended in 2010 by the German Federal Constitutional Court as it "posed a serious infringement of personal privacy that contravenes Germany's constitution" (The Federal Constitutional Court 2010).

As discussed in Akkaya, Wolf, Krcmar (2012a), "the sensitivity of citizens towards storage and use of personal data had an important negative influence on adoption and continued use of online public services" (p. 2534) . Many nationwide initiatives involving transfer of sensitive personal data such as the 'Electronic Wage Verification System Project' (ELENA), the 'Electronic Health Insurance Project' (eGK), the 'E-Passport Project' (ePass), the 'German Identity Cards Project' (NPA) were heavily criticized by the public, non-governmental organizations and political parties due to direct infringement to personal privacy (please see (Akkaya et al. 2012a) for a more detailed discussion).

3.10 Summary

Chapter 3 delivered a broad overview of the relevant conceptual framework in the research field of e-government. Before defining the concept of e-government in Section 3.2, the series of reforms to improve the efficiency of public sector organizations from the 1980s onwards (known as New Public Management) has been presented, and this constitutes the basis of the e-government concept.

Various subcategories of e-government such as G2C and G2B were presented in Section 3.3. Section 3.4 discussed the motivations for public administrations to implement e-government initiatives including political, economic, social, technological and managerial forces. Being a relatively immature field of research, it is common for researchers to test theories and concepts in e-government which have been validated in other IS contexts. One frequently used domain is that of e-commerce. Although these two types of service have some common characteristics, e-government is distinguished by specific characteristics which need to be taken into account. These characteristics as well as the comparison of e-government and e-commerce services were presented in Section 3.5. The ongoing progress in online service delivery by public administrations all over the world has raised questions about the assessment of different e-government service initiatives. In order to compare and evaluate the progress of e-government development from different perspectives, a number of maturity models have been proposed, which were reviewed in Section 3.6. This section also includes various benchmark studies, which analyze the developmental stages of e-government services and the individual progress of different countries.

Most first generation e-government projects were designed as government-centric, these have failed to meet the expectations citizens have of online services. This has led to an increasing emphasis on designing and offering *citizen-centric* services by public authorities. Citizens' requirements for greater transparency, participation and collaboration have opened up a new era in e-government research, known as Government 2.0. The principles of Open Government, tools and practices of the Web 2.0 for the public sector and the associated opportunities and benefits of these technologies for governments were summarized in Section 3.7. Section 3.8 gave an overview of barriers to e-government which included supply-side barriers (such as operational and personal related barriers in governmental agencies) and demand-side barriers

(such as the Digital Divide). Another important demand-side barrier was related to concerns over trust, security and privacy, which are empirically analyzed in this thesis (see Chapters 5 and 6). Finally, Section 3.9 was dedicated to present the state-of-the-art e-government development in countries of analysis of this thesis.

The following chapter (Chapter 4) provides discussion of the foundations of technology adoption, which forms the theoretical base of this thesis.

4 Theoretical Framework: Technology Adoption Research

Having introduced the conceptual framework, a clear picture of the theoretical basis underlying this thesis will now be presented. This thesis can be broadly categorized as Technology Adoption Research. More precisely, a theoretical framework to examine the factors influencing adoption of G2C e-government services has been derived from a synthesis of components of Technology Adoption research, trust research and cross-cultural research.

As seen in the previous chapter, e-government initiatives up to now have mostly focused on supply. The needs, expectations and desires of citizens remain relatively under-researched which is reflected in the low adoption rate of e-government globally. The main aim of this thesis is to understand the citizen perspective by shedding light on target users' decision making mechanisms in the contexts of using online public services. One special focus of this thesis is how citizens perceive risk with respect to privacy and security related concerns. This thesis argues that national culture influences perceptions of individuals, as well as their beliefs and values, which in turn affect their behaviors regarding IS innovations. As a result, this work combines various concepts from different streams of literature to develop a theoretical framework for the analysis of G2C e-government adoption, which will be presented and discussed in this chapter.

4.1 Introduction

As defined by Bacharach (1989), a *theory* is a statement of relationships among concepts within a set of assumptions and constraints. Assumptions and constraints specify boundaries which define the limitations in applying the theory. Theory attempts to answer the questions of 'why' (De Vaus 2001, 5; Bacharach 1989; Kaplan 1964; Merton 1968). Rather than just describing or predicting phenomena, a theory should explain why things happen. Theory explains behavior, events, structure or phenomenon. Lewin's (1945) famous statement of "nothing is so practical as a good theory" is still as important as ever. Good theories "advance knowledge in a scientific discipline, guide research toward crucial questions and enlighten the profession of management" (Van de Ven 1989, 486).

According to Bhattacherjee (2012), "scientific research proceeds along two planes: a *theoretical plane* and an *empirical plane*" (p. 12) (see Figure 4.1 below). In particular, "constructs are conceptualized at the theoretical (abstract) plane, while variables are operationalized and measured at the empirical (observational) plane" (Bhattacherjee 2012, 12). The theoretical plane is more abstract, while the empirical plane is measurable. Variables are objective representations of abstract constructs. As stated by Bacharach (1989), "constructs are related to each other by *propositions* and the variables are related to each other by *hypotheses*". Propositions are logically deduced implications drawn from a theory. They postulate associations between constructs, typically with a cause-effect relationship (e.g., if X occurs, then Y follows). Hypotheses are empirical formulation of propositions which are empirically testable.

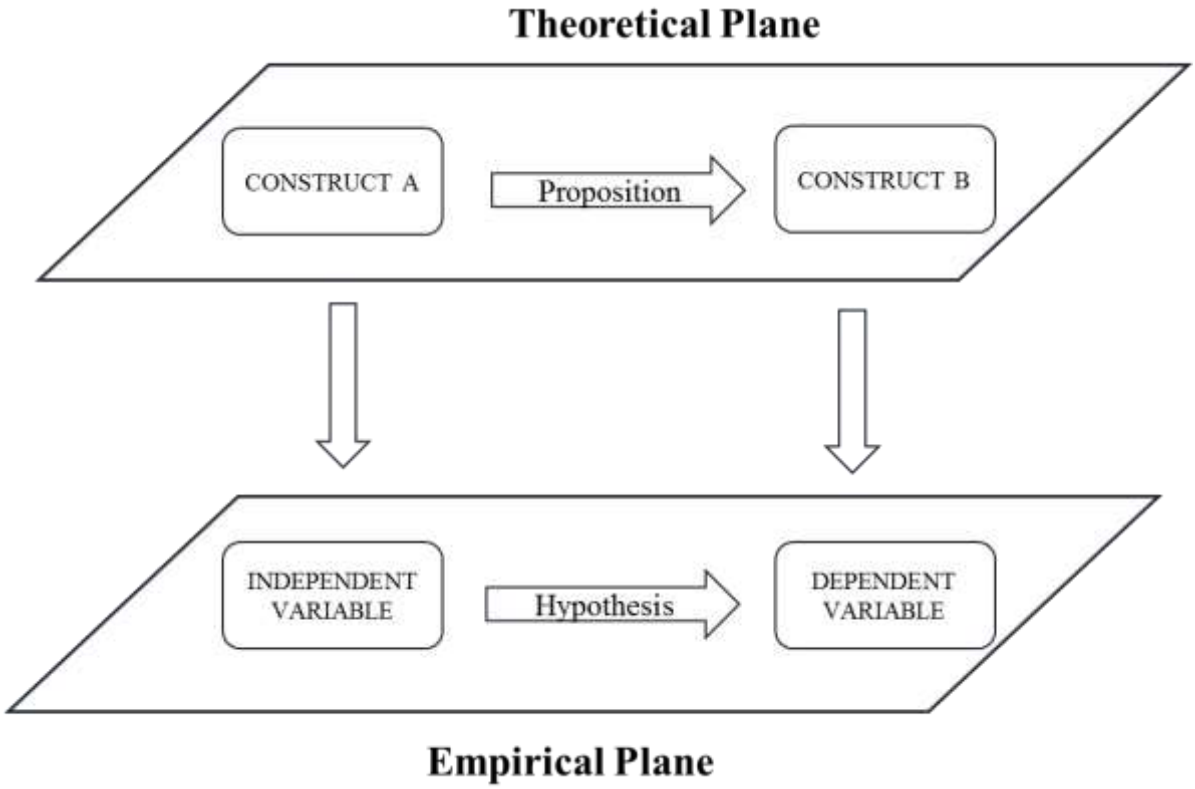


Figure 4.1. Theoretical and Empirical Planes of Scientific Research
Source: Own Illustration based on (Bhattacherjee 2012, 27)

There are two main approaches to empirical research: theory-testing and theory-building. As explained in section 2.2, theory-testing begins with a theory and uses deductive reasoning to derive a set of propositions from it. In contrast, inductive reasoning is used to derive a theory from observations in a theory-testing approach.

4.1.1 Attributes of a Good Theory and Criteria for Evaluation

Although previous research has proposed different criteria on defining the characteristics of a good theory, in particular how and why one theory is better than an alternative theory (Bacharach 1989; Whetten 1989; Dubin 1978; Kaplan 1964; Merton 1968), there is a lack of consensus on what constitutes strong versus weak theory in social sciences (Sutton/Staw 1995).

Bacharach (1989) discussed two main criteria for the evaluation of theories: *falsifiability* and *utility*. Falsifiability refers to the refutability of a theory. Scientific theories can never be proven, only disproven[15] (Popper 1959). There is always the possibility that one negative instance will conflict with a long-standing theory and disprove it. Researchers cannot exhaust *all* instances. The second criterion refers to the usefulness of theory. A useful theory should both explain and predict phenomena. If a theory is often used to make predictions but do not provide explanations, it is regarded as an incomplete theory (Bacharach 1989).

[15] Even though most philosophers of science would agree, some authors disagree (Lakatos 1968).

According to (Dubin 1978) in (Whetten 1989), a complete theory must contain *What*, *How*, *Why*, *When*, *Where* and *Who* elements (see Table 4-1 below). *What* and *How* elements describe a theory, while *Why* elements explain a theory. Description and explanation are essential ingredients of a theory. *Who, Where* and *When* elements place limiting conditions on the propositions derived from a theoretical model. As stated by Whetten (1989) in Fisher (2012), "these are temporal and contextual factors set as the boundaries of generalizability" (p. 492).

Elements of a Theory	Description	Building Blocks of a Theory
What (What concepts are important for explaining a phenomenon?)	The essential, or constituent, elements of a behavioral phenomenon	Constructs or variables
How (How are these concepts related to each other?)	The relationship between the constructs	Propositions
Why (Why are these concepts related?)	The underlying assumptions	The logic underlying the model
When, Where, and Who (Under which circumstances do these concepts and relationships work?)	The boundaries of generalizability	Boundary conditions and limitations

Table 4-1. Building Blocks of a Theory
Source: Own Illustration based on (Whetten 1989; Bhattacherjee 2012; Dubin 1978)

The limiting conditions of a theory (*Who, Where, When*) are typically found out through subsequent tests of theoretical statements (*What, How, Why*). Testing theories in various settings reveals the inherent limiting conditions, which make the theory even stronger. The theorist, who constructed the theory, cannot be expected to be aware of all the possible limiting conditions. They tend to consider the theory only in familiar surroundings and at one point in time (Whetten 1989). Thus, caution is advised in assuming the applicability of a theory in the absence of such experimental evidence.

4.1.2 How to Build a Theory?

Constructing a good and strong theory is time consuming and difficult but a strong theoretical contribution is essential for contribution into prior literature. Having a weak theoretical basis or providing an inadequate theoretical contribution are among common reasons for rejection in well-established journals (Sutton/Staw 1995).

On the other hand, new theories are often subject to measurement error due to absence of experimental evidence in various settings. As discussed above, limitations and boundary conditions of a theory are typically set after a wide range of experiments in various settings. This is a serious threat to the applicability and generalizability of a new theory as the core propositions generated from such a theoretical model may not be correct in an untested context. Most researchers, therefore, use the well-established theories in IS rather than trying to build up their own. As a result, IS literature contains enormous amount of empirical data on a set of well-known theories in different contexts.

Sutton and Staw (1995) claim that the problem with theory-building lies in the gaps in social science education and lack of talent. According to Sutton and Staw, social science faculties do not train students adequately in theory construction. Moreover, not many researchers have the talent to become a good theorist. In order to motivate researchers to come up with new theories, previous research provide some guidelines on theory-building. Established theory-building guidelines (Kaplan 1964; Dubin 1978) are, however, criticized for being too standardized for application in many topical areas in management (Van de Ven 1989). Steinfeld and Fulk (1990) in (Bhattacherjee 2012, 29) discuss four approaches to theory building that can be applied in all areas of research:

1. "build theories inductively based on observed patterns of events or behaviors" (Bhattacherjee 2012, 29) (grounded theory building)
2. "conduct a bottom-up conceptual analysis to identify different sets of predictors relevant to the phenomenon of interest" (Bhattacherjee 2012, 29) (inductive approach)
3. "extend or modify existing theories to explain a new context" (Bhattacherjee 2012, 29) (deductive approach)
4. "apply existing theories in entirely new contexts by drawing upon the structural similarities between the two contexts" (Bhattacherjee 2012, 29) (deductive approach)

Not all of the above approaches are considered as a substantive contribution in recognized journals of IS. Whetten (1989) discusses a set of criteria upon which to judge value-added contribution to theory development in his highly cited paper. Though simply adding or subtracting constructs from an existing model typically does not change its core logic, important changes in the factors or relationships within the model can result in theoretical contributions. The most creative, but also the most difficult approach is applying a perspective from other contexts and fields to a new area of study.

4.2 Theoretical Foundations of Technology Adoption

As discussed in the previous section, well established theories of IS are commonly used by researchers due to the difficulties involved in constructing new theories. This section provides the theoretical foundations of technology adoption predicting individual acceptance behavior. It is a broad area including sociology, social psychology and technology. First, behavioral

theories from sociology and social psychology are presented. Then models[16] of IS adoption based on behavioral theories are discussed.

4.2.1 Social Psychological Theories

4.2.1.1 The Diffusion of Innovations Theory (DOI)

Rogers' theory of *Diffusion of Innovations* (also known as the Innovation Diffusion Theory) is one of the most widely used theoretical frameworks of technology adoption and diffusion. It explains how innovations are adopted within a population of potential users. The diffusion of innovation concept can be traced back to French sociologist Gabriel Tarde (1903), who attempted to explain why some innovations are adopted and spread throughout a society, while others are ignored. He has not specified the key diffusion concepts but provided valuable insights for future researchers. In 1962, Everett M. Rogers has defined key diffusion concepts and developed the Diffusion of Innovations Theory based on observations of 508 diffusion studies (1962). Rogers' theory can be applied to both individuals and organizations.

Diffusion of innovations refers to the tendency of new ideas, products, technologies, and practices to spread within a social system. Rogers (1995) defines diffusion as "the process through which an innovation is communicated through certain communication channels over time among the members of a social system" (p. 5).

The diffusion of new ideas, according to Rogers, is mainly affected by four key elements: (1) *the innovation itself,* (2) *communication channels,* (3) *time* and (4) *the social system* (Rogers 1995). Rogers (2003) defines an *innovation* as "an idea, practice or object that is perceived as new by an individual or other unit of adoption" (p. 12). Innovations may include new technologies, practices, or ideas (Bhattacherjee 2012). It should be remarked that an innovation, which have been invented a long time ago, is an innovation for individuals, if it is perceived as new by them. According to Rogers (1995), communication is "the process in which participants create and share information with one another in order to reach a mutual understanding" (p. 5). *Communication channels*, on the other hand, are "the means by which messages get from one individual to another" through mass media and interpersonal channels (Rogers 1995, 18). Rogers' model includes the *time* dimension in diffusion research, which he argues is one of the strengths of his model (Rogers 2003). This aspect is mostly ignored in other diffusion research. The fourth element of diffusion in Roger's model is the *social system*. He defines social system as "a set of interrelated units that is engaged in joint problem-solving to accomplish a common goal" (Rogers 1995, 23). According to Rogers (1995), "the members of units in a social system may consist of individuals, informal groups, organizations, and/or subsystems" (p. 23).

The main focus of the Diffusion of Innovations Theory is the certain channels by which information about an innovation is communicated among the participants within a social system. Communication occurs through channels between individuals or institutions that originates a message. Mass media channels include TV, radio and newsletters. Interpersonal channels refer to the communications between individuals. Members of a social system have different preferences for relying on mass media or interpersonal contacts when making decisions regarding adoption or rejection of an innovation. Rogers (1995) argues that diffusion

[16] Similar to Dubin (1978) and Whetten (1989), this thesis does not distinguishes between a model and a theory.

is a social process that involves interpersonal communication. Mass media channels are more effective in creating initial knowledge about innovations, whilst interpersonal communication channels are more effective in changing attitudes (Rogers 1995, 19; Brancheau/Wetherbe 1990).

Diffusion of innovations is essentially a process of communication. According to Rogers, the innovation-diffusion process is divided into following stages: (1) *knowledge,* (2) *persuasion,* (3) *decision,* (4) *implementation* and (5) *confirmation* (Rogers 2003). At the *knowledge* stage, a person is exposed to the innovation and seeks information about it. When the person forms a negative or positive attitude towards the innovation, he or she is in the *persuasion* stage. At the *decision* stage, the innovation is either adopted or rejected by the individual. He or she puts the innovation into practice at the *implementation* stage, at which point the innovation decision has been made. The final decision about continuing to use the innovation is made at the *confirmation* stage. The decision of innovation can be reversed if the person is "exposed to conflicting messages about the innovation" (Rogers 2003, 189). Typically, these five stages of innovation follow each other in a sequence.

Another main contribution of the DOI theory is in the 'adopter' categories of innovation diffusion. Rogers classifies five adopter categories in his innovation adoption framework: (1) *innovators,* (2) *early adopters,* (3) *early majority,* (4) *late majority* and (5) *laggards* based on their time of adoption. As explained by Rogers (2002), "this categorization is based on the percentage of individuals (or organizations) under each portion of the normal curve, marked off by standard deviations from the mean" (p. 990) (see Figure 4.2 below).

Innovators are the first group of individuals (2,5 percent) in a system to adopt an innovation. This group requires a shorter adoption period than any other adoption group because they are willing to take risk. The next 13,5 percent of the individuals in a system are the e*arly adopters*. Innovators and early adopters are usually have a better education and a greater knowledge about technology. They tend to rely more on mass media for information about the innovation. *Early majority* are the next 34 percent of the individuals in a system to adopt an innovation. This group of adopters interacts frequently with peers and is conscious in terms of adopting a new idea. They weigh the pros and cons of an innovation before deciding to adopt or reject it. The next 34 percent of the individuals in a system are referred to as *late majority*. They are skeptical and risk averse. As they depend mainly on word of mouth communication rather than on the mass media, the individuals in this group adopt an innovation because most of their friends have already adopted it. The last 16 percent are the *laggards*. They tend to be suspicious of change and require certainty that a new idea will not fail before they can adopt it. Similar to late majority, laggards rely more on interpersonal sources rather than the mass media as their primary source of information about the innovation. By the time they adopt an innovation, it can possibly be already outmoded. The DOI theory suggests that the distribution of individuals, on the basis of their time of adoption of an innovation follows a classical normal distribution curve when plotted over time (Rogers 1995). It is important to note that not everyone in a population adopt an innovation. The adopter categories refer to the ones, who will eventually adopt an innovation, rather than the entire population.

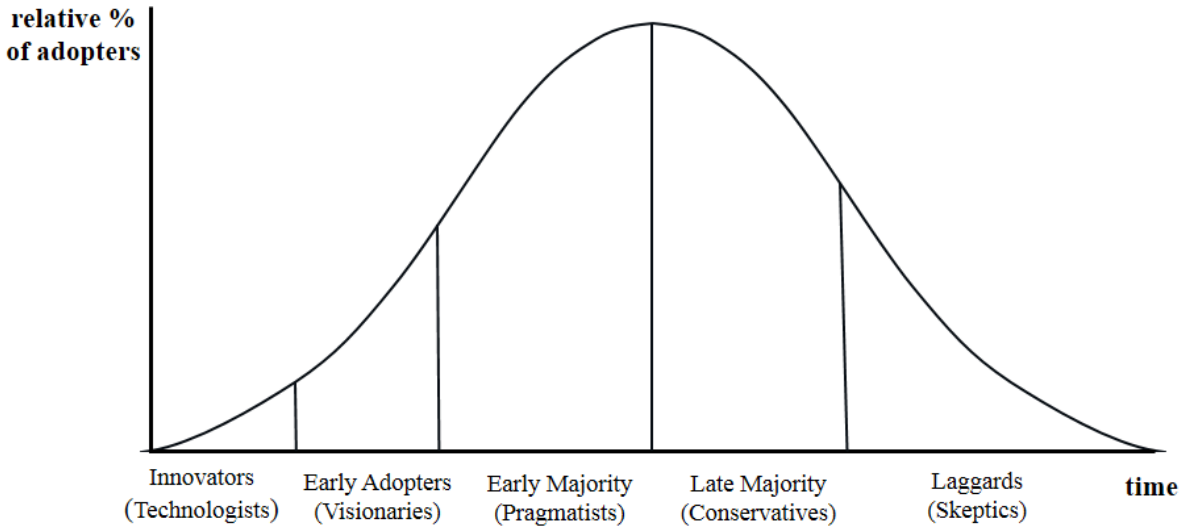


Figure 4.2 The Diffusion of Innovations Theory
Source: Own Illustration based on (Rogers 1962)

Rogers has also attempted to explain why some innovations spread more quickly than others. The attributes of an innovation and its perceptions by individuals, determine an innovation's rate of adoption. According to Rogers (2003), "the decision to adopt or reject a technological innovation is essentially an uncertainty reduction process" (p. 232). The characteristics that shape adopters' innovation adoption decisions are (1) *relative advantage,* (2) *compatibility,* (3) *complexity,* (4) *trialability* and (5) *observability* of the innovation.

Relative advantage is the degree which an innovation is perceived as being superior to existing substitutes. It is important to note that an innovation may not have a considerable objective advantage; instead, the perception of potential adopters and their personal judgments of the expected benefits of the innovation is all that matters. *Compatibility* refers to the extent that the innovation is perceived as being consistent with past experiences, current needs and values of the potential adopter. *Complexity* refers to the extent of difficulty involved in understanding and using the innovation. *Trialability* is the extent to which the innovation can be experimented with on a trial basis. *Observability* is the extent to which the benefits and other results of using the innovation are visible to others.

Complexity is negatively correlated to the adoption of an innovation, while the remaining four factors are positively correlated with the adoption rate. Consequently, innovations perceived as having greater relative advantage, compatibility, trialability, observability and less complexity will likely to spread more quickly than the others. Based on a meta-analysis of studies, Tornatzky and Klein (1982) found *relative advantage*, *compatibility* and *complexity* as the most significant predictors of innovation adoption. These three attributes are consistently identified as critical adoption factors in IS research (Kwon/Zmud 1987b).

Researchers from a wide range of disciplines have used the DOI as a framework. Mahler and Rogers (1999) studied diffusion of interactive communication innovations based on the example of the adoption of telecommunication services by German banks. Fields in which of the DOI theory has been applied in order to study prediction of diffusion include health service organizations (Lee 2004), agriculture (Adesina/Zinnah 1993) and school education (McCormick et al. 1995). Besides studying individual adoption, there are also successful

examples of its application to study factors of organizational innovation (Mustonen-Ollila/Lyytinen 2003). In IS context, the DOI theory was tested in several settings such as the adoption of spreadsheet software (Brancheau/Wetherbe 1990), electronic data interchange (Premkumar et al. 1994), end-user computing (Brancheau/Wetherbe 1990) and Internet banking (Tan/Teo 2000).

Sultan and Winer (1993) challenge the DOI theory, in particular the profile of adopters proposed by Rogers. They argue that an 'innovator' regarding one innovation may well be a 'laggard' for another, suggesting that innovativeness should be regarded as a relative phenomenon. Lyytinen and Damsgaard (2001) argue that the DOI theory is not suitable for studying the diffusion of complex technologies as it does not offer adequate constructs to deal with collective adoption behaviors. As in the case of most diffusion research, the DOI theory has also been criticized for having a "pro-innovation bias", which assumes that all innovations are beneficial and should be adopted by every individual within the population. This does not allow for inefficient innovations to die off quickly without being universally adopted or being replaced by better innovations (Bhattacherjee 2012, 34).

The DOI theory has a considerable positive impact on IS research, and some authors have proposed modification of the theoretical framework by adding new constructs (Brancheau 1987; Green et al. 1987). One of the widely recognized extensions to the DOI was made by Moore and Benbasat (1991). They selected and refined a set of constructs from the DOI theory and extended it by including concepts of result demonstrability, image and voluntariness of use to study technology adoption by individuals.

4.2.1.2 The Theory of Reasoned Action (TRA)

Developed by Martin Fishbein and Icek Ajzen (1980; 1975), the *Theory of Reasoned Action* is one of the most extensively referenced theories to predict and understand motivational influences on human behavior. As implied by the name, the Theory of Reasoned Action assumes that individuals behave in a sensible manner by taking account of available information and consider the consequences of their actions while making decisions about engaging in behaviors (Ajzen 1985, 12).

Drawn from social psychology, the theory of reasoned action assumes that the behavior is under the individual's volitional control (also known as *volitional behaviors*[17]). Ajzen and Fishbein (1980) assert that behavioral intentions are a function of "two basic determinants, one personal in nature and the other reflecting social influences" (p.6): (1) *attitude toward the behavior* and (2) *subjective norm* (see Figure 4.3 below). These two constructs are assumed jointly to determine behavioral intention. In other words, intention of a person is determined by his or her attitude toward performing the behavior and the social influence associated with this behavior. All other variables are assumed to influence intentions indirectly, through their effect on either attitudes or subjective norms and behaviors (Fishbein/Ajzen 1975).

Attitude is personal evaluation of the behavior (e.g., whether it is a good or bad behavior and whether the actor likes or dislikes the behavior). TRA is concerned with attitudes toward behaviors and not with the more traditional attitudes toward objects, people or institutions

[17] Volitional Behavior is a behavior which does not require skills, abilities, opportunities and the cooperation of others (Fishbein/Ajzen 1975).

(Ajzen 1985, 12). The *subjective norm* is "the person's perception that most people who are important to him think he should or should not perform the behavior in question" (Fishbein/Ajzen 1975, 302). Although a person's intention to perform a behavior is the immediate determinant of the action; intentions can change over time therefore the longer the time interval between measurement of intention and observation of behavior is, the greater the likelihood that unforeseen events will produce changes in intentions (Ajzen 1985, 12). The TRA has the following three boundary conditions (Fishbein/Ajzen 1975):

(1) the degree to which the intention and the behavior correspond with respect to their levels of specificity including action, target, context and time (Fishbein/Ajzen 1975),

(2) the stability of intentions between the assessment of intention and observation of the behavior (Fishbein/Ajzen 1975),

(3) the degree to which the behavior is under completely volitional control of the individual (Fishbein/Ajzen 1975).

The third boundary condition implies that the TRA can only applied if the person can decide at will if he or she wants to perform the behavior. The theory has a strong predictive utility for voluntary behaviors (Madden et al. 1992). Contrary to expectations, the model performed well even in studies in which the initial boundary conditions were violated (Sheppard et al. 1988). However, by definition, TRA should not be applied if the behavior is not completely under subjects' volitional control or if the situation involves a choice problem (Sheppard et al. 1988).

TRA cannot explain spontaneous, impulsive or habitual behaviors (Bentler/Speckart 1979) because engaging in such behaviors may not be due to a conscious decision by the individual. The TRA also excludes behaviors that may require special skills, unique opportunities and resources, or the cooperation of others to be performed (Liska 1984). To increase its explanatory scope, modifications to the TRA have been proposed. Sheppard, Hartwick and Warschaw (1988) suggested modifying the TRA to account for goal intentions, choice situations and differences between intention and estimation measures. Other authors have proposed expansion of the theory with additional variables (e.g., inclusion of moral obligations (Gorsuch/Ortberg 1983), habit (Towler/Shepherd 1991) and competing attitudes (Davidson/Morrison 1983)).

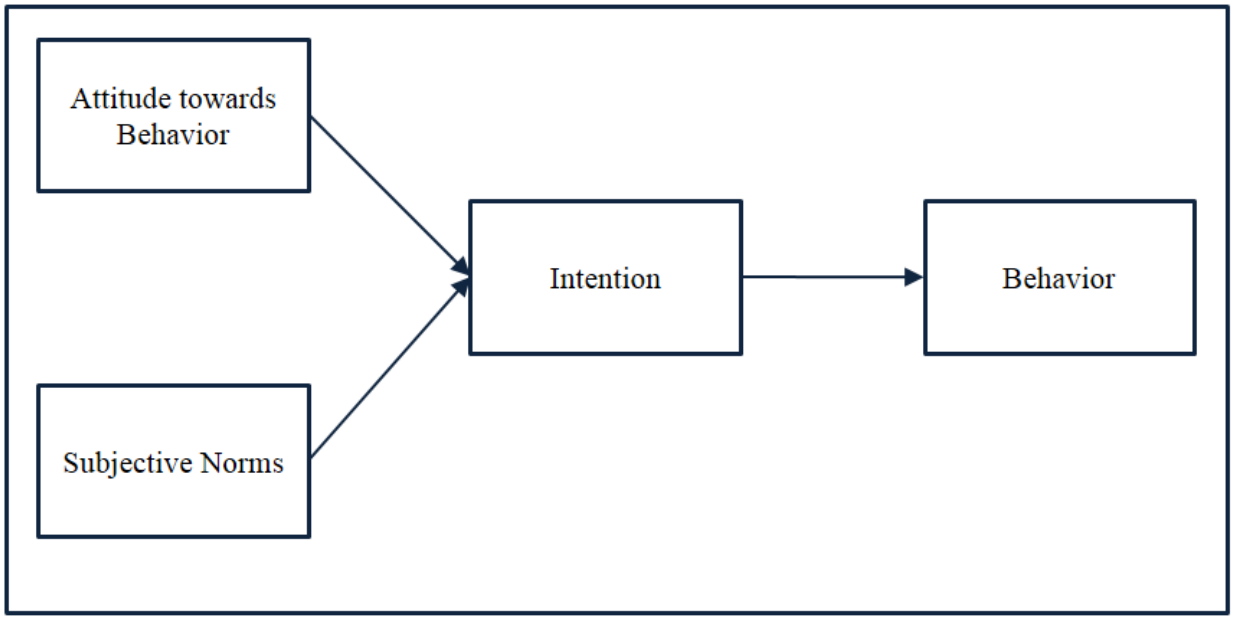


Figure 4.3 The Theory of Reasoned Action
Source: Own Illustration based on (Ajzen/Fishbein 1980)

The TRA has been examined empirically in a variety of situations, especially in social psychology (Eagly/Chaiken 1993; Sheppard et al. 1988). Studies of various volitional behaviors that have provided test contexts for the TRA including limiting sun exposure (Hoffmann III et al. 1999), coupon usage (Shimp/Kavas 1984) and using condoms (Albarracin et al. 2001). TRA has only been tested in a few contexts within the IS field (e.g., online grocery shopping (Hansen et al. 2004).

The Theory of Reasoned Action provides a solid and coherent theoretical base which can be used to understand and predict human behavior within the defined constraints. Yet for circumstances, in which behavior is not under volitional control, the mere formation of an intention is not sufficient to predict behavior (Wünderlich 2009). Criticisms of the Theory of Reasoned Action mostly focus on its limited applicability. While defining the explanatory framework of the TRA, Fishbein and Ajzen pointed out that most behavior of interest to social scientists is under volitional control (Fishbein/Ajzen 1975). There are, however, a wide variety of behaviors that require abilities, skills and social cooperation which would be of considerable interest to social scientists (Liska 1984; Sheppard et al. 1988).

Another question raised about the TRA is dichotomy of behaviors as volitional or non-volitional. Liska (1984) argues that most behavior is neither volitional nor non-volitional, but ranges from behavior which requires no special skills, resources or cooperation of others to behavior which requires considerable amount of skills, resources or cooperation of others (Crawley/Koballa 1994). Most behaviors, which seem to be under complete volitional control (e.g., voting), involve some skills and the cooperation of others (Liska 1984; Eagly/Chaiken 1993). Moreover, the TRA posits that attitudes and subjective norms have separate influences on behavioral intentions. However, studies show that attitudes and subjective norms are positively correlated (Miniard/Cohen 1981; Warshaw 1980).

Finally, Eagly and Chaiken (1993) questioned whether attitudes and subjective norms are the *only* meaningful influences on behavioral intentions for volitional behavior (Hale et al. 2002).

They proposed that the TRA can be improved by adding predictors to the model. Similarly, Sheppard, Hartwick and Warshaw (1988) discuss modification of the model to account for goal intentions, choice situations and differences between intention and estimation measures. While Fishbein and Ajzen (1975; 1980) initially asserted that the TRA was a sufficient explanation of volitional behaviors, Ajzen (1991) accepted a decade later the possibility that some other factors (e.g., moral obligation, affect and past behaviors) may also predict intentions and behaviors (Hale et al. 2002).

The TRA applies to only a limited range of behaviors. Ajzen (1985) expanded the explanatory domain of the TRA by adding perceived behavioral control (PBC) as an additional antecedent of behavioral intentions. The Theory of Planned Behavior, which additionally attempts to predict non-volitional behaviors, is discussed next.

4.2.1.3 The Theory of Planned Behavior (TPB)

The *Theory of Planned Behavior* (Ajzen 1985, 1991) is a widely accepted social theory to predict both volitional and non-volitional behaviors. As the extension of the TRA; a main assumption of the TPB is that people usually behave in a sensible manner by taking account of available information and the implications of their actions (Ajzen 1991).

Besides the attributes of attitude and subjective norm as key drivers of intention defined in the TRA, *perceived behavioral control* [18] was added to account for circumstances when the behavior in question is not under complete volitional control (see Figure 4.4 below). Perceived behavioral control is defined as "one's perception of how easy or difficult it is to perform the behavior" (Eagly/Chaiken 1993, 185). The inclusion of perceptions of control extends the applicability of theory from simple volitional behaviors to achievement of goals (e.g., weight loss) which is dependent upon performance of a complex series of other behaviors (Conner/Armitage 1998). It is similar to Bandura's (1982) *self-efficacy* construct in the Social Cognitive Theory (see Section 4.2.2.4 below). Self-efficacy describes the judgments of individuals regarding their capabilities to perform certain actions required to deal with prospective situations (Bandura 1982). Self-efficacy influences the selected activities, preparation for them and the amount of effort that is exhausted for their completion. Bandura's (1997, 1982) research shows people prefer to engage in behaviors that are believed to be achievable.

[18] The measure of perceived behavioral control has also received a great deal of attention in explaining the relation between health related beliefs and behaviors (Armitage/Conner 2001).

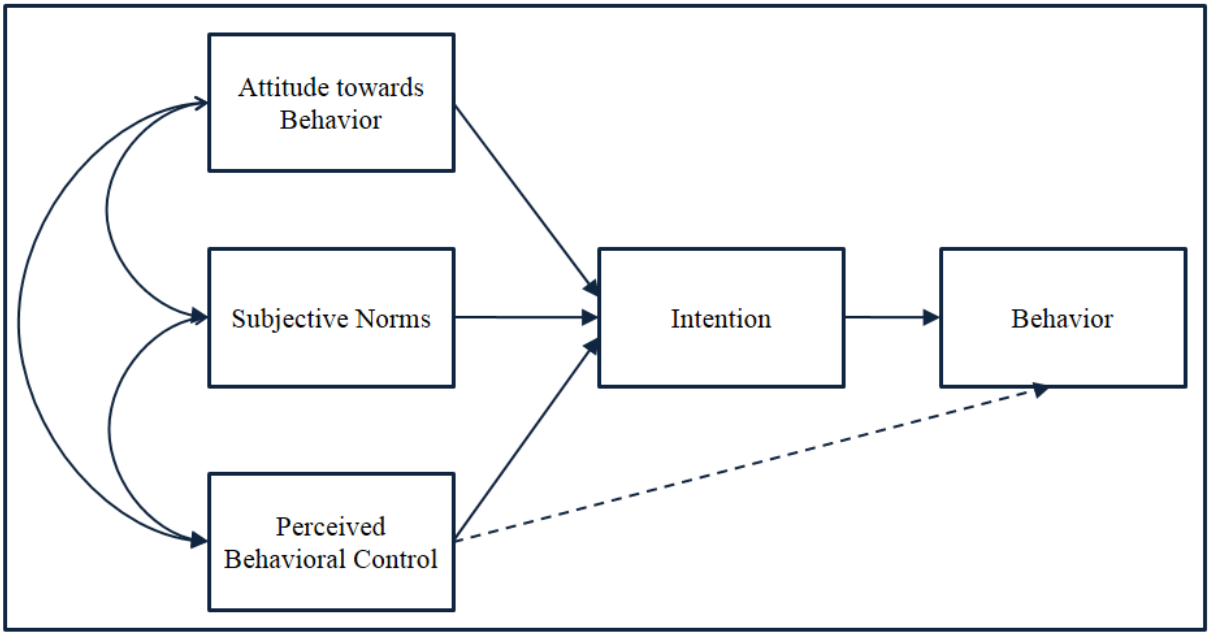


Figure 4.4 The Theory of Planned Behavior (Original Version)
Source: Own Illustration based on (Ajzen 1991)

Ajzen (1991) argues that the PBC and self-efficacy constructs can be used interchangeably (Armitage/Conner 2001). However, Bandura (1986) does not agree, stating that PBC and self-efficacy represent quite different concepts. Numerous scholars have provided empirical evidence for a distinction between self-efficacy and PBC (Armitage/Conner 1999; Terry/O'Leary 1995; Manstead/van Eekelen 1998). Accordingly, self-efficacy refers to cognitive perceptions of control based on internal control factors, while PBC is related to external factors (Armitage/Conner 2001). The study of Dzewaltowski, Noble and Shaw (1990) found that self-efficacy predicts behavior much better than PBC.

Ajzen (1991) states that "the relative importance of attitude, subjective norm and perceived behavioral control in the prediction of intention is expected to vary across behaviors and situations" (p. 188). PBC is assumed to have both direct and indirect effects on behavior. In situations where the attitude of an individual is strong, or where social norms are dominant, PBC may not be a strong predictor of intentions (Armitage/Conner 2001). In such cases, intention predicts behavior and PBC should not exert any influence on the intention-behavior relationship. The addition of PBC becomes especially useful as volitional control over behavior decreases (Ajzen 1991, 185). In cases, where behavioral intention would only result in small amounts of the variance in behavior, PBC should be an independent predictive of behavior. Having said that, it is important to keep in mind that the effects of PBC on behavior are based on the assumption that PBC represents volitional control accurately(Armitage/Conner 2001).

Belief concepts were discussed in the original work of Ajzen, but were not included in the model as separate constructs (Ajzen 1991). In his later work, Ajzen (2005) stated "According to the Theory of Planned Behavior, the major determinants of intentions and behavior follow reasonably from – and can be understood in terms of – behavioral, normative and control beliefs" (p. 134). This led to extension of the TPB with the addition of beliefs: *behavioral beliefs, normative beliefs* and *control beliefs* (see Figure 4.5 below) (Ajzen 2005).

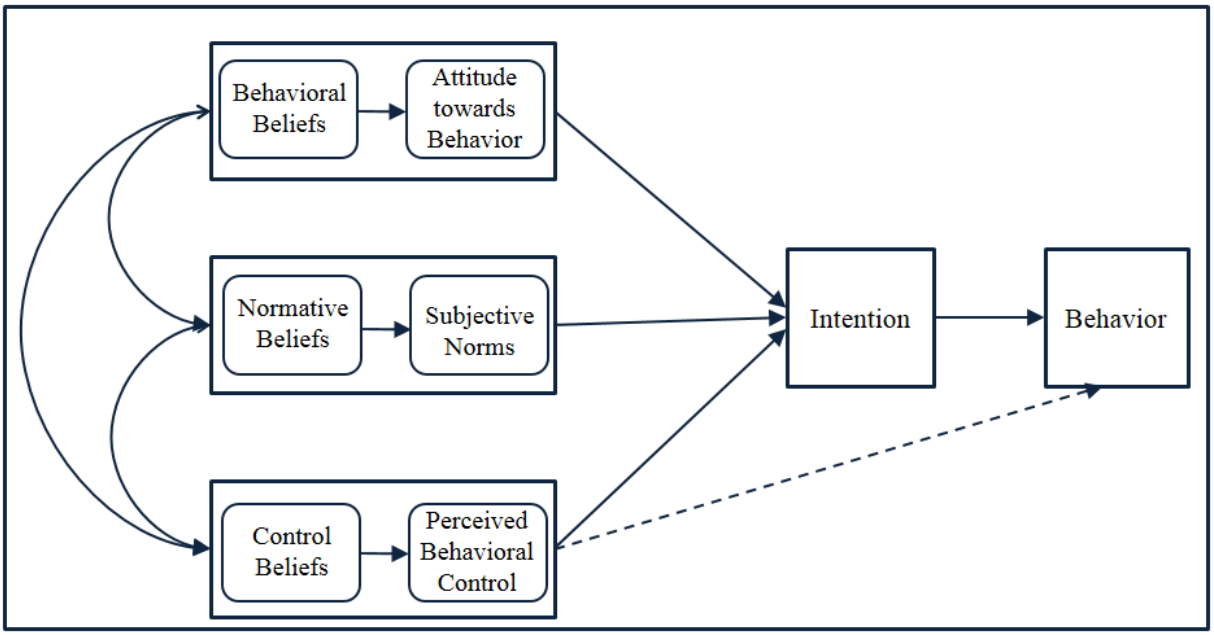


Figure 4.5. The Theory of Planned Behavior (Updated Version)
Source: Own Illustration based on (Ajzen 2005)

Several variables may influence the beliefs of individuals such as age, gender, personality and past experiences. Ajzen argues that all these factors can influence individual's beliefs and as a result, his or her intentions and behaviors. Even though Ajzen does not mention the influence of culture explicitly, he accepts its effect on individuals implicitly (Ajzen 2005, 134):

> *"Clearly, people growing up in different social environments can acquire different information about a variety of issues, information that provides the basis for their beliefs about the consequences of a behavior, about the normative expectations of important others and about the obstacles that may prevent them from performing a behavior."*

The TPB has been widely applied in predicting behavioral intentions in areas as diverse as doing regular exercises (Hausenblas et al. 1997), complying with speed limits (Elliott et al. 2003; Conner et al. 2003) and committing parasuicide (O'Connor/Armitage 2003). In the IS context, it was tested in contexts including Internet purchasing (George 2004) and electronic commerce adoption across cultures (Pavlou/Chai 2002).

TPB is essentially an extension of the TRA developed to overcome the limitations of the TRA. Empirical evidence reveals that the extended theory performs better than TRA for predicting and explaining intentions and behaviors in several domains (Sheeran/Taylor 1999; Hausenblas et al. 1997; Hansen et al. 2004; Madden et al. 1992; Ajzen/Madden 1986).

There are also some criticisms of the TPB. Eagly and Chaiken (1993) criticize the TPB for not providing a sufficient understanding of the relation between intention and behavior. Moreover,

they question whether merely having control over a behavior is grounds for predicting behavior. Similarly, Bagozzi (1992) argues that attitudes and subjective norms are necessary but not sufficient determinants of intention. Since not every person behaves in accordance with his or her intentions, intentions are not a sufficient impetus for action (Conner/Armitage 1998). Eagly and Chaiken (1993) also criticized the omission of *plans* from the Theory of Planned Behavior, which may be especially serious for behaviors that are not fully under volitional control of the individual (Hale et al. 2002).

Mathieson (1991) compared the Theory of Planned Behavior with the Technology Acceptance Model (Davis et al. 1989) (see Section 4.2.2.1 below) to predict an individual's intention to use an IS. He concluded that the TPB — which lacks technology adoption variables — did not provide as complete an explanation of intention as the TAM. Ajzen (1991) argues that the TPB is "… in principle, open to the inclusion of additional predictors if it can be shown that they capture a significant proportion of the variance in intention or behavior after the theory's current variables have been taken into account" (p. 199). Until now, the Theory of Planned Behavior has been subject to several empirical studies which have suggested expansion of the TPB with further constructs including emotions, self-identity and moral norms (Evans/Norman 2003), anticipated emotions and desires (Perugini/Bagozzi 2001), disconfirmation and satisfaction (Hsu et al. 2006), trust, perceived usefulness and ease of use (Pavlou/Fygenson 2006).

The Decomposed Theory of Planned Behavior (Taylor/Todd 1995c) extends the Theory of Planned Behavior by decomposing the attitudinal beliefs, and is discussed next.

4.2.1.4 The Decomposed Theory of Planned Behavior (DTPB)

The *Decomposed Theory of Planned Behavior* (Taylor/Todd 1995c) (also known as Combined TAM and TPB) is an extended version of the TPB which decomposes belief structures into multi-dimensional belief constructs. Drawing upon constructs from the innovation characteristics literature[19] (Rogers 1983), Taylor and Todd introduced the DTPB. The results of confirmatory factor analysis revealed that decomposing attitudinal, normative and control beliefs of the TPB into specific belief dimensions improved the accuracy of the model prediction (see Figure 4.6 below) (Taylor/Todd 1995c).

Attitude is predicted by the constructs of *compatibility, ease of use* and *perceived usefulness*. The antecedents of subjective norm are *peer influence* and *superior's influence*. Control beliefs are predicted by *self-efficacy* and two categories of facilitating conditions. *Resource facilitating conditions* represent the resource related factors, whereas *technology facilitating conditions* are related to technological compatibility, which may constrain or enable usage (Taylor/Todd 1995b).

[19] Taylor and Todd (1995b) selected the three salient characteristics of an innovation (Rogers 1995), which are demonstrated to be consistently related to adoption decisions (Tornatzky/Klein 1982).

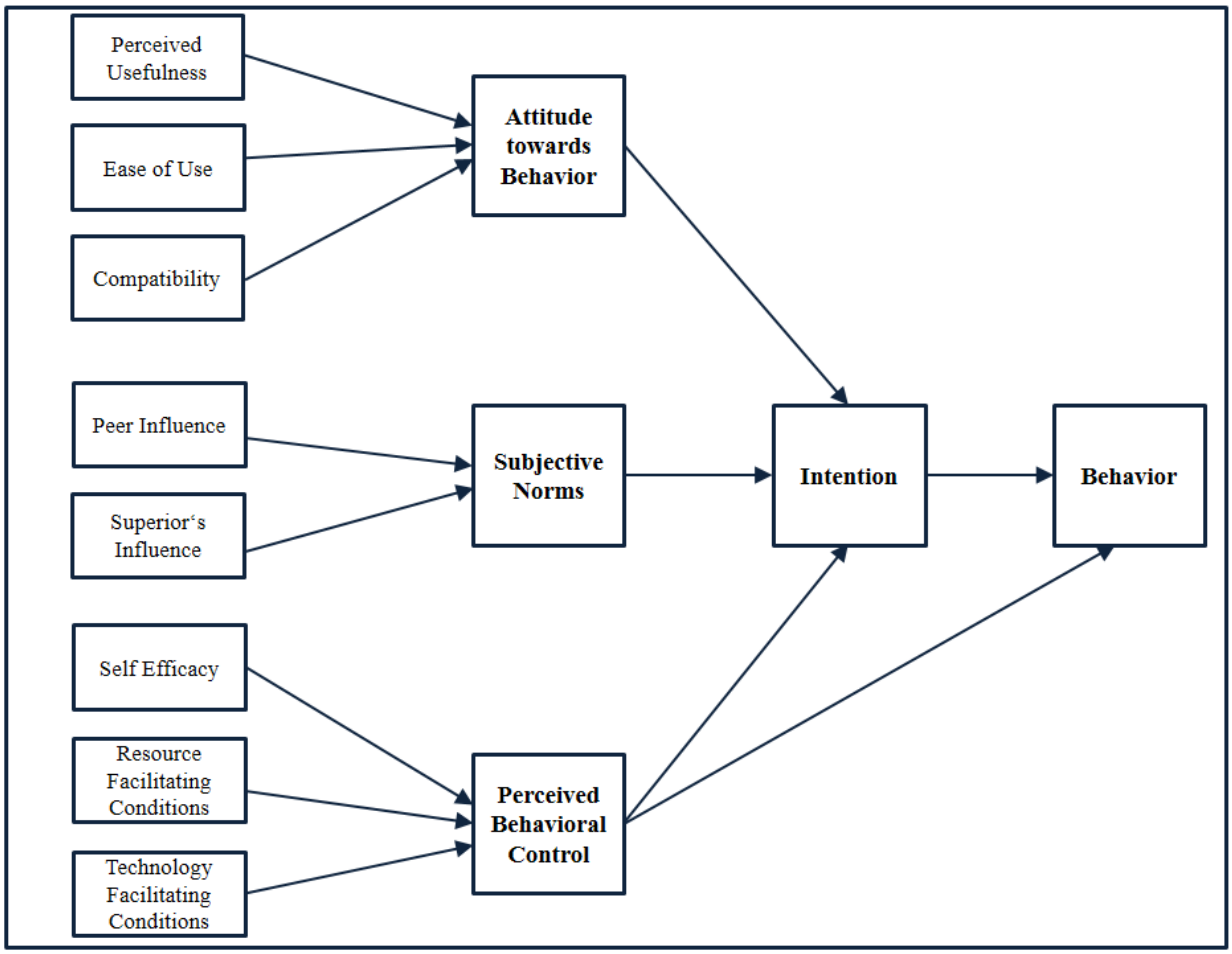


Figure 4.6 The Decomposed Theory of Planned Behavior
Source: Own Illustration based on (Taylor/Todd 1995c)

According to Taylor and Todd (1995c), decomposing beliefs into multi-dimensional constructs provides several advantages. First, it provides a better understanding of relationships between the antecedents of intention and the belief structures (Shimp/Kavas 1984). Second, it can be applied across a variety of situations and contexts. Finally, by focusing on specific beliefs, the model provides an explicit set of factors that may explain adoption.

Taylor and Todd (1995c) presented that the DTPB explains intention to use and subsequent usage of IS better than the original TPB. By incorporating additional factors, such as peer influence, superior's influence, and perceived behaviors that are not present in TAM, the DTPB also provides a better understanding of IT usage than the TAM (Taylor/Todd 1995c). However, a review of the adoption literature discloses that this theory has not gained as much popularity as its predecessors. The DTPB has only been tested in a few contexts such as Internet banking (Shih/Fang 2004), electronic services (Hsu/Chiu 2004) and instructional technology use (Shiue 2007).

Bagozzi (1992) argues that, given that the fit statistics and explanatory power are equivalent, the most parsimonious research model should be selected. The goal of researchers should be to create simple models that have a high explanatory power. Thus, theories with the smallest number of parameters are preferred, as each parameter adds some uncertainty to the model. The DTPB is not one of the most parsimonious models explaining IS usage, which may be a possible explanation of its low utilization rate.

Next, various models in IS-Adoption based on different theories of behavior are elaborated.

4.2.2 Models of IS-Adoption Based on Behavioral Theories

Before discussing the existing IS Adoption models in literature, a conceptual clarification needs to be made. Bhattacherjee (2012) defines a *model* as "a representation of all or part of a system that is constructed to study that system (e.g., how the system works or what triggers the system)" (p.14). He argues that a theory explains a phenomenon, while a model represents it. Yet, not all theories in IS are represented with a model (e.g., The Absorptive Capacity Theory (Cohen/Levinthal 1990)).

In IS adoption literature, however, the concepts of *theory* and *model* are frequently used interchangeably. Since IS adoption research deals with the influence of various factors on the usage behavior of individuals, visual models are employed for a better understanding of the relationships between numerous constructs. Hence, in line with prior literature (e.g., Dubin 1978; Whetten 1989), this thesis does not distinguish between a model and a theory.

4.2.2.1 The Technology Acceptance Model (TAM) and Variants

The *Technology Acceptance Model* by Fred Davis (1989) is considered to be the most influential theory for explaining an individual's acceptance of information systems (Lee et al. 2003b). The theoretical base of the model is the Fishbein and Ajzen's (1975) TRA. TAM is adapted by Davis (1989) "to provide an explanation of the determinants of computer acceptance… while at the same time being both parsimonious and theoretically justified" (p.985).

The TAM proposes two fundamental salient beliefs as determinants of intention towards IT usage: *perceived usefulness* and *perceived ease of use. Perceived usefulness (PU)* is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis et al. 1989, 320). *Perceived ease of use (PEOU)* refers to "the degree to which a person believes that using a particular system would be free of effort" (Davis et al. 1989, 320). PEOU is related to assessment of intrinsic characteristics of an IS system such as the ease of use, ease of learning, and understandability of interface. PU reflects the user assessment of extrinsic characteristics including efficiency and effectiveness of the system (Gefen/Straub 2000).

Consistent with the TRA, the beliefs of individuals determine their attitudes concerning the use of an application. Behavioral intentions are determined by these attitudes, which lead to actual system use. PEOU is posited to directly impact the PU and PU as a mediator between the PEOU and behavioral intention (see

Figure 4.7 below).

The majority of prior studies using the TAM have found that perceived usefulness is the main determinant of usage (Karahanna/Limayem 2000; Davis 1993; Davis et al. 1989; Venkatesh/Morris 2000). The role of PEOU in TAM, however, remains controversial (Gefen/Straub 2000) in that some studies show that PEOU affects IS use (Chin/Gopal 1995; Venkatesh 1999) while some others have not found a direct link between the PEOU and IS adoption (Szajna 1994; Keil et al. 1995).

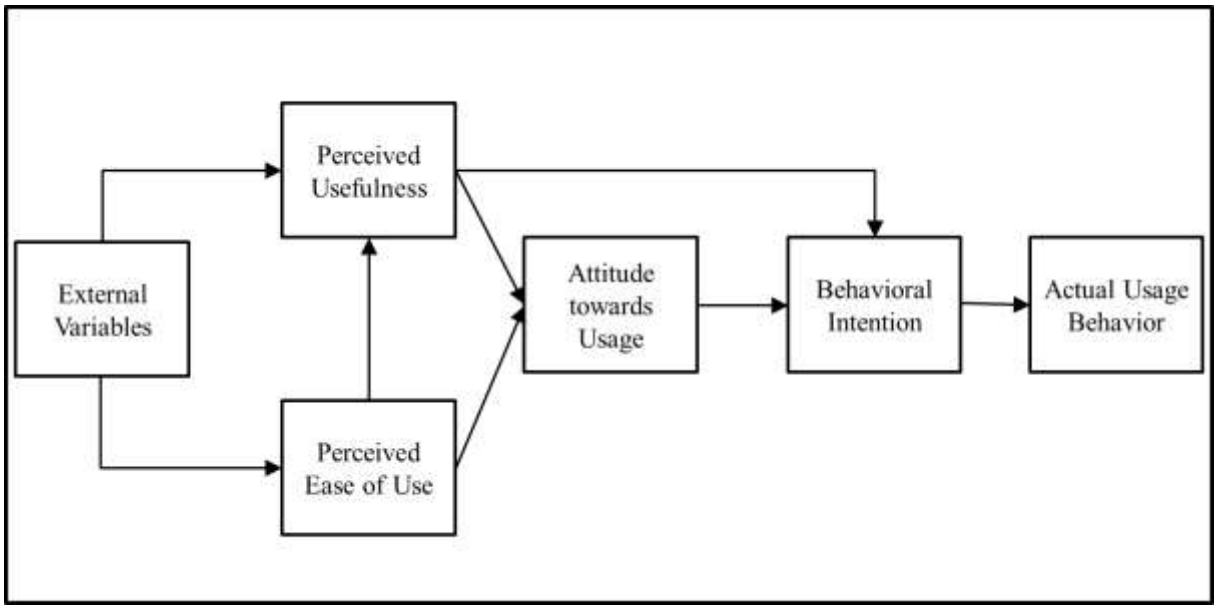


Figure 4.7 The Technology Acceptance Model[20]
Source: Own Illustration based on (Davis et al. 1989, 985)

Since its introduction, the TAM has received considerable attention throughout different domains of IS (Kwon/Zmud 1987a). Williams et al. (2009) examined 19 peer-reviewed journals between 1985 and 2007 and concluded that the TAM and its associated constructs were the predominantly ones used in IS acceptance and diffusion research. Adams, Nelson and Todd (1992) replicated TAM in five different applications (word processors, graphics, spreadsheets, e-mail and v-mail) and confirmed the consistency of TAM explaining user acceptance behavior. Davis (1993) examined the model in a 112 user field study regarding two end-user systems and found that the TAM successfully explained the adoption of both technologies. Hendrickson, Massey and Cronan (1993) found that for both PU and PEOU, the scale elements showed significant test-retest reliability result. Finally, Segars and Grover (1993) and Subramanian (1994) measured the influence of PU and PEOU on reported levels of usage by employing structured equation modeling and concluded that Davis' scales demonstrate both reliability and validity.

The model has been used in a variety of contexts to predict the antecedents of IS system usage. Besides its initial scope of predicting e-mail system and file-editor usage (Davis 1989); the model has been applied to voice mail usage (Karahanna/Limayem 2000; Adams et al. 1992), database (Hendrickson et al. 1993), spreadsheets (Mathieson 1991; Venkatesh/Davis 1996; Hendrickson et al. 1993), the World-Wide-Web (Moon/Kim 2001), e-commerce (Gefen/Straub 2000) and YouTube use behaviors (Yang et al. 2010).

Some studies have investigated the TAM's boundary conditions. As stated by Bagozzi (2007); "it is unreasonable to expect that one model, and one so simple, would explain decisions and behavior fully across a wide range of technologies, adoption situations, and differences in decision making and decision makers" (p. 245). Adams, Nelson and Todd (1992) suggested the

[20] The original TAM proposed by Davis (1986, 24) did not include the component of Behavioral Intention. In a later version (Venkatesh/Davis 1996, 453) the Attitude component was removed.

moderating effects of factors such as culture, gender and task type need to be examined for TAM variables. Straub (1994) applied TAM in two different countries and concluded that culture played an important role in the attitude toward a communication media. In another study, Gefen and Straub (1997) found that gender had a moderating effect on PU and PEOU. Similarly, Venkatesh and Morris (2000) confirmed that men's technology usage decisions were more strongly influenced by PU compared to women. In contrast, women were more strongly influenced by PEOU and subjective norms. Finally, Gefen and Straub (2000) found that the task itself is the main determinant of whether PEOU directly affects use intention.

A statistical meta-analysis of the TAM using 88 published studies showed that the TAM is a valid and robust model (King/He 2006). Davis, Bagozzi and Warshaw (1989) found that compared to the TRA, the TAM provided a much simpler and powerful explanation of the acceptance intention of MBA students regarding a word processor because the beliefs related variables were context independent. Mathieson (1991) and Hubona and Cheney (1994) compared the TAM with the TPB and found that the TAM is a simpler but more powerful model explaining users' technology adoption behaviors. Similarly; Davis, Bagozzi and Warshaw (1989) compared the TRA with the TAM and concluded that the TAM is a more parsimonious and powerful theoretical model. Even though, Taylor and Todd (1995c) found that the DTPB and the TPB give a more comprehensive explanation than the TAM, the TAM was found a successful predictor of IS acceptance behavior of different technologies in most studies.

Despite the TAM's significant contributions and robustness, researchers point out its several limitations. Self-reported use data is the primary shortcoming of the model. Many studies employing the TAM use self-reported usage data to measure system use rather than actual use data (Legris et al. 2003; Lee et al. 2003b). Second, most TAM studies use students as participants therefore results obtained from these studies cannot be generalized to the rest of the population (Lee et al. 2003b; Legris et al. 2003). Students may have different motivations such as grades or attention from their teachers (Legris et al. 2003; Lee et al. 2003b). Third, most TAM studies explain voluntary use of technology. However, in practice, most organizations require employees to use a mandatory system with little choice for alternatives (Lee et al. 2003b). Legris (2003) also remarked that most TAM studies were conducted with university students however a university context has significantly different determinants than a business context. Fourth, the commonly used example of the introduction of office automation software might not be an example of a complex technology. The fundamental constructs of TAM were criticized for not fully reflecting the variety of user task environments which limits its applicability (Moon/Kim 2001). Dishaw and Strong (1999) pointed out its lack of task focus. Fifth, the dominance of one time cross-sectional studies in TAM studies is another important limitation since user perceptions and intentions can change over time (Lee et al. 2003b). Finally, low explanations of variance (in general between 25% and 40 %) by the independent variables (Lee et al. 2003b) and the omission of external variables are other shortcomings of the TAM (Legris et al. 2003).

Benbasat and Barki (2007) criticized the intense focus on TAM within the IS research community. They believe that this approach diverts researchers' attention away from important phenomena, i.e. the antecedents of the TAM's belief constructs or important consequences of IS adoption. Straub and Burton-Jones (2007) discussed that the risk of common methods variance (CMV) (Podsakoff et al. 2003) is high due to utilization of the same measurement method for independent and dependent variables in self-reported beliefs.

Due to its parsimonious structure, several attempts have been made to extend or modify the TAM. Davis (1986; 1989) himself argued that future research should address the influence of other variables on ease of use, usefulness and user acceptance. Researchers have generally suggested broadening the TAM following one of the three approaches (Wixom/Todd 2005):

1. introduce factors from other models (Wixom/Todd 2005),
2. introduce additional belief factors or alternatives (Wixom/Todd 2005),
3. examine external variables as antecedents and moderators of PEOU and PU (Wixom/Todd 2005)

Dishaw and Strong (1999) integrated the task-technology fit model with the TAM and provided empirical evidence with more explanatory power than the TAM alone. Factors from the Innovation Diffusion Theory such as compatibility (Chen et al. 2002) and trialability (Karahanna et al. 1999) were also suggested. McFarland and Hamilton (2006) suggested extending the TAM with the selected contextual variables of the Compeau & Higgins' computer self-efficacy model (1995b) (see Section 4.2.2.4 below).

One of the most popular elaborations of the TAM is related to the inclusion of the *normative component*. Davis (1986; 1989) justified the exclusion of subjective norm on empirical grounds[21] but argued that extending the TAM to account for social influence is an important area that needs to be researched. According to Warshaw (1980) in Malhotra and Galletta (1999), the subjective norm factor in the TRA "makes it difficult to distinguish if usage behavior is caused by the influence of referents on one's intent or by one's own attitude" (p. 14). The person in question may perform an act, because it is consistent with his or her own attitude, not because of the referent's influence (Davis Jr 1986). In their extended version of the TAM, Venkatesh and Davis (2000) have instead used the social normative influence concept of Kelman (1958) which suggests that individuals accept social normative influences because they hope to achieve an approval from other people or groups. Several researchers suggested extending the TAM with the factor of subjective norm (Malhotra/Galletta 1999; Teo et al. 2008a; Venkatesh/Morris 2000) also as an antecedent of PEOU and PU (Karahanna/Limayem 2000). Due to importance of the social norm component in technology adoption studies, Srite and Karahanna (2006) suggested a new terminology of "extended TAM" which combines the TAM with the social norms.

Moon and Kim (2001) argued that most prior TAM researchers focused on extrinsic motivation and suggest a model where playfulness is included as an antecedent of attitude, reflecting the user's intrinsic belief. Wixom and Todd (2005) suggest integrating user satisfaction with technology acceptance. Some researchers extend the TAM with the antecedents of PEOU and PU. Some antecedents that have been analyzed until now include social influence about usage of the medium (Karahanna/Limayem 2000; Lu et al. 2005), control, intrinsic motivation, and motivation (Venkatesh 2000), and personal innovativeness (Lu et al. 2005).

[21] Neither Davis, Bagozzi and Warshaw (1989) nor Mathieson (1991) found significant effect of subjective norms in their studies. Hartwick and Barki (1994) suggest, however, that this finding may be due to the subjects and context of each study. Davis, Bagozzi and Warshaw examined use of a word processing package by MBA students and Mathieson studied the use of a spreadsheet package by undergraduate students. In neither case can normative influences be expected to be strong.

There are two main expanded versions of the TAM framework, known as the *TAM2* (Venkatesh/Davis 2000) and the *TAM3* (Venkatesh/Bala 2008). The TAM2 clearly defines the antecedents of PU as well as two moderating variables. Both s*ocial influence processes* (subjective norm, voluntariness and image) and *cognitive instrumental processes* (job relevance, output quality and result demonstrability) are posited to influence user acceptance (Venkatesh/Davis 2000). This extended model was tested across four organizations and demonstrated up to 60 percent of the variance in perceived usefulness (Al-Qeisi 2009).

The TAM3 was proposed by Venkatesh and Bala (2008) as a combination of the TAM2 and three new relationships between PEOU, PU, computer anxiety and behavioral intention, which are moderated by experience in using the new system. Even though Venkatesh and Bala argue that the TAM3 adds richness and insights to our understandings of IS adoption, the original TAM model continues to be the widely recognized parsimonious and robust model of technology acceptance.

Some other extensions of the TAM have also been proposed such as Technology Readiness Acceptance Model (TRAM) (Lin et al. 2007) and Mobile Wireless Technology Acceptance Model (MWTAM) (Kim/Garrison 2009). However, except the TAM2, none of these extensions have gained as much popularity as the original model within the IS community.

4.2.2.2 The Motivational Model (MM)

Researchers in psychology distinguish between two distinct types of motivation to perform a behavior or engage in an activity: intrinsic motivation and extrinsic motivation (Deci 1972; Vallerand 1997). The Motivational Theory, which was originally developed in psychology to explain behavior, has been adapted in various domains (Vallerand 1997). Davis, Bagozzi and Warshaw (1992) apply the motivational theory to the IS domain to predict information technology adoption and use behavior of individuals. The *Motivational Model* of technology usage posits that *extrinsic and intrinsic motivations* determine individuals' intention to use technology.

Extrinsic motivation is defined as "the performance of an activity because it is perceived to be instrumental in achieving valued outcomes that are distinct from the activity itself" (Davis et al. 1992, 1112). It refers to behaviors carried out to attain external rewards (e.g., status, approval or passing grades) (Deci 1972). Perceived usefulness and subjective norm are examples of extrinsic motivation (Venkatesh 2000).

Intrinsic motivation is related to pleasure, enjoyment and satisfaction derived from performing a specific behavior (Vallerand 1997). It refers to behaviors performed out of interest and enjoyment. Users perform an activity "for no apparent reinforcement other than the process of performing the activity per se" (Davis et al. 1992, 1112). Perceived enjoyment and playfulness are examples of intrinsic motivation (Davis et al. 1992; Venkatesh 2000).

Previous research in psychology suggests that both extrinsic and intrinsic motivations are essential (Deci 1972, 1971). However, intrinsic motivations are found to be more effective to develop and enhance motivation in private individuals. External reinforcements, such as large payments can lead to increased performance in employees however these create financial dependency which in turn decreases intrinsic motivation (Deci 1972). If a person receives

interpersonal rewards such as verbal reinforcements, he or she will not perceive them as controls of his behavior so it will increase his or her self-determination.

Davis, Bagozzi and Warshaw (1992) found that perceptions of people regarding the usefulness of computers for improving their job performance (extrinsic motivation), and their degree of enjoyment (intrinsic motivation) are the main influence factors for using computers in the workplace. Der Heijden (2004), on the other hand, found that intrinsic motivational dimensions of perceived enjoyment and perceived ease of use are stronger determinants of use intentions than perceived usefulness, which is an extrinsic motivation. Hackbarth, Grover and Yi (2003) also demonstrated the strong relationship between the intrinsic motivation of computer playfulness and perceived ease of use.

The effect of intrinsic and extrinsic motivations in IS usage has been analyzed in various contexts including Internet usage (Teo et al. 1999), online shopping (Shang et al. 2005), computer technology training in the workplace (Venkatesh/Speier 1999) and Internet based learning (Lee et al. 2005b).

Venkatesh and Spier (1999) extended the Motivational Model by adding person's mood (i.e. how one feels at a particular point of time) as an antecedent of intrinsic and extrinsic motivation. In a later study, the motivational model was integrated with the TAM to provide a much richer understanding of technology use (Venkatesh et al. 2002).

4.2.2.3 The Model of PC Utilization (MPCU)

The M*odel of PC Utilization* is an adaptation of Harry Charalambos Triandis' (1977) Theory of Human Behavior from a social psychology to an Information Systems context (Thompson et al. 1991). The model was introduced by Thompson, Higgins and Howell to predict the acceptance and usage of information technologies (see Figure 4.8 below). It was developed to predict the factors affecting utilization of PCs rather than to examine antecedents of behavioral intention. The MPCU identifies factors influencing computer utilization including *job-fit, complexity, long-term consequences, affect towards use, social factors* and *facilitating conditions* (Thompson et al. 1991).

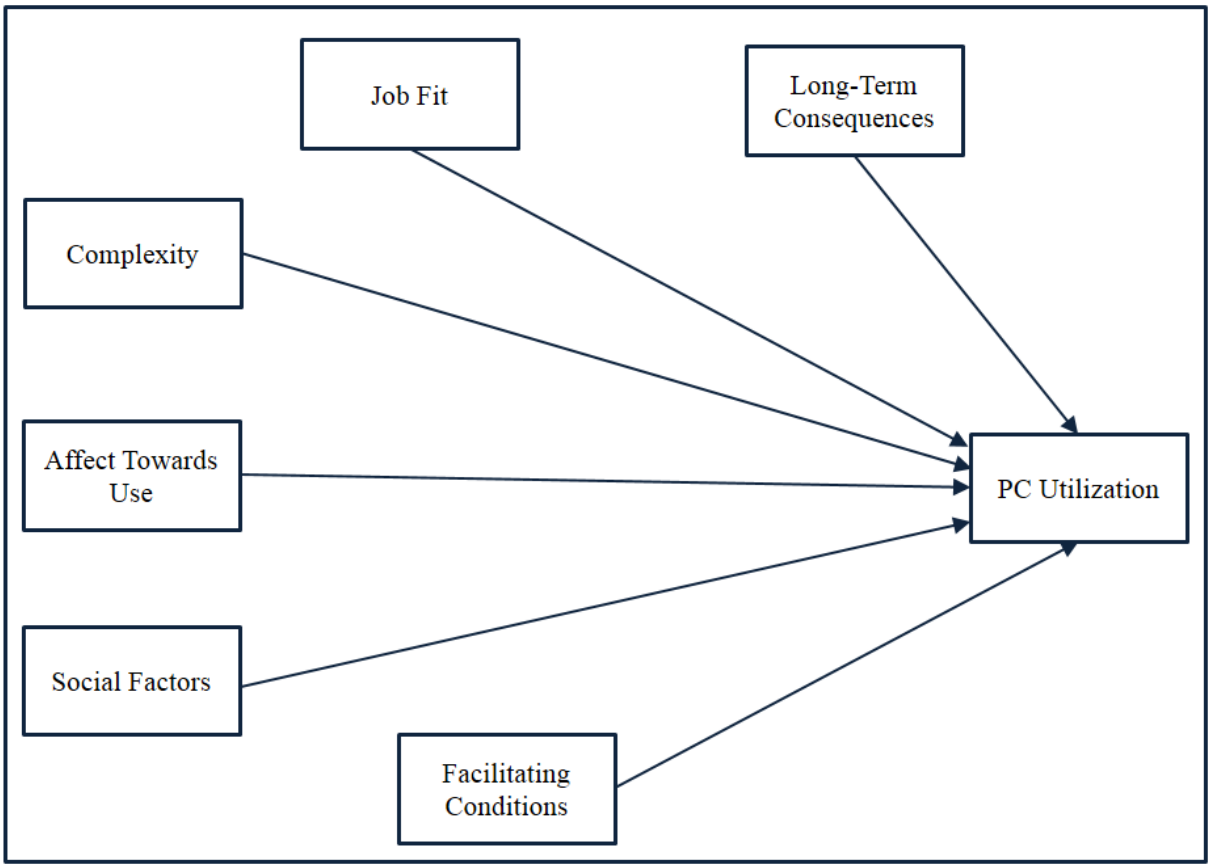


Figure 4.8 The Model of PC Utilization
Source: Own Illustration based on (Thompson et al. 1991; Triandis 1980)

Triandis proposed a theoretical network of various constructs. The MPCU provide three main adjustments to Triandis' model. First perceived consequences are delineated into three dimensions: complexity, job fit and long term consequences. The first two are near term consequences and the third one is future oriented. Second, it excludes habits which can be measured by considering how frequently a behavior occurs (Triandis 1980). This is identical to the measure of utilization in the MPCU therefore it was omitted from the model[22]. Finally, Triandis' model includes other variables such as culture, social situation and genetic biological factors, which were not considered in the MPCU.

Thompson, Higgings and Howell (1991) provide the following definitions for the constructs included in their model. *Complexity* is "the degree to which an innovation is perceived as relatively difficult to understand and use" (Rogers/Shoemaker 1971) in (Thompson et al. 1991, 128). *Job fit* is the degree "to which an individual believes that using a PC can enhance the performance of his or her job" (Thompson et al. 1991, 129). *Long-term consequences* refer to "outcomes that have a pay-off in the future, such as increasing the flexibility to change jobs or increasing the opportunities for more meaningful work" (Thompson et al. 1991, 129). *Affect towards use* is defined as " the feelings of joy, elation, or pleasure, or depression, disgust, displeasure, or hate associated by an individual with a particular action" (Triandis 1980) in (Thompson et al. 1991, 127). *Social factors* refer to " the individual's internalization of the

[22] However, Thompson, Higgins, and Howell (1991, 130) acknowledge that habits "are clearly an important determinant of behavior".

reference groups' subjective culture, and specific interpersonal agreements that the individual has made with others, in specific social situations" (Triandis 1980) in (Thompson et al. 1991, 126). Finally, *facilitating conditions* are "objective factors, out there in the environment, that several judges or observers can agree make an act easy to do" (Triandis 1980) in (Thompson et al. 1991, 129) such as training.

Thompson, Higgins and Howell (1991) found no evidence for the influence of affect towards use and facilitating conditions on PC utilization. The rest of the variables were found to influence PC utilization as suggested. In a later study, Thompson, Higgins and Howell (1994) examined the influence of prior experience on utilization of personal computers by using their own conceptual model. The results suggested that prior experience influence utilization directly.

The MPCU distinguishes itself from the TRA and the TPB by seeking to predict usage behavior rather than intention. While the TRA is used widely in IS literature, the MPCU includes many of the same constructs and elaborates them (Thompson et al. 1991). Venkatesh et al. (2003) state that the MPCU measures usage rather than intention, which is the focal point of the other behavioral models and theories of technology acceptance. Moreover, it can be used to predict individual adoption behavior of a wide range of IS (Venkatesh et al. 2003).

Prior research has already recognized that not all factors influencing success or failure of end-user computing are equally controllable. Cheney (1986) classify them into three categories: controllable, partially-controllable and uncontrollable. Similarly, some factors of the MPCU are more controllable than the others. Practitioners should focus on more controllable and feasible aspects to support the utilization of information technologies, e.g., training courses aimed at reducing the perceived difficulty of using a PC can improve actual usage by decreasing the perception of complexity (Thompson et al. 1991).

4.2.2.4 Computer Self-Efficacy Model based on Social Cognitive Theory

The Social Cognitive Theory (SCT) was originally developed by Bandura (1986) as a social learning theory to explain human behavior. Compeau and Higgins (1995b) adapted the SCT and formulated the *Computer Self-Efficacy Model (CSE)* to predict individual computer utilization and use (see Figure 4.9 below).

The Social Cognitive Theory suggests a model of causation involving triadic reciprocal determinism (Bandura 1986). In this model of reciprocal causation; environmental factors, cognition and other personal factors as well as behaviors influence each other bidirectionally (Bandura 1986). This triadic reciprocality is a fundamental assumption of the SCT and the CSE. Accordingly, cognitive competences of an individual influence the behavior of using a technology (Compeau et al. 1999). The individual makes self-evaluations about the adequacy of this behavior by considering the consequences of it, forms beliefs about his or her capabilities and develop expectations of future behavior. People tend to avoid activities that they believe exceed their capabilities and more willing to get involved in the ones, which are perceived as more manageable. Successful interactions with technology influence cognitive perceptions, which in turn influence the individual's future behavior.

The CSE differs from most of the other behavioral theories in technology adoption research. The TPB, the TAM and the DOI assume unidirectional causal relationships, whereas the CSE

follows the SCT in positing that variables in the model are determinants of each other. Compeau and Higgins (1995b) note that while theories such as TAM and DOI have a specific focus on beliefs and outcomes, the SCT provides a broader insight into other beliefs that may affect behavior of an individual, independent of perceived outcomes.

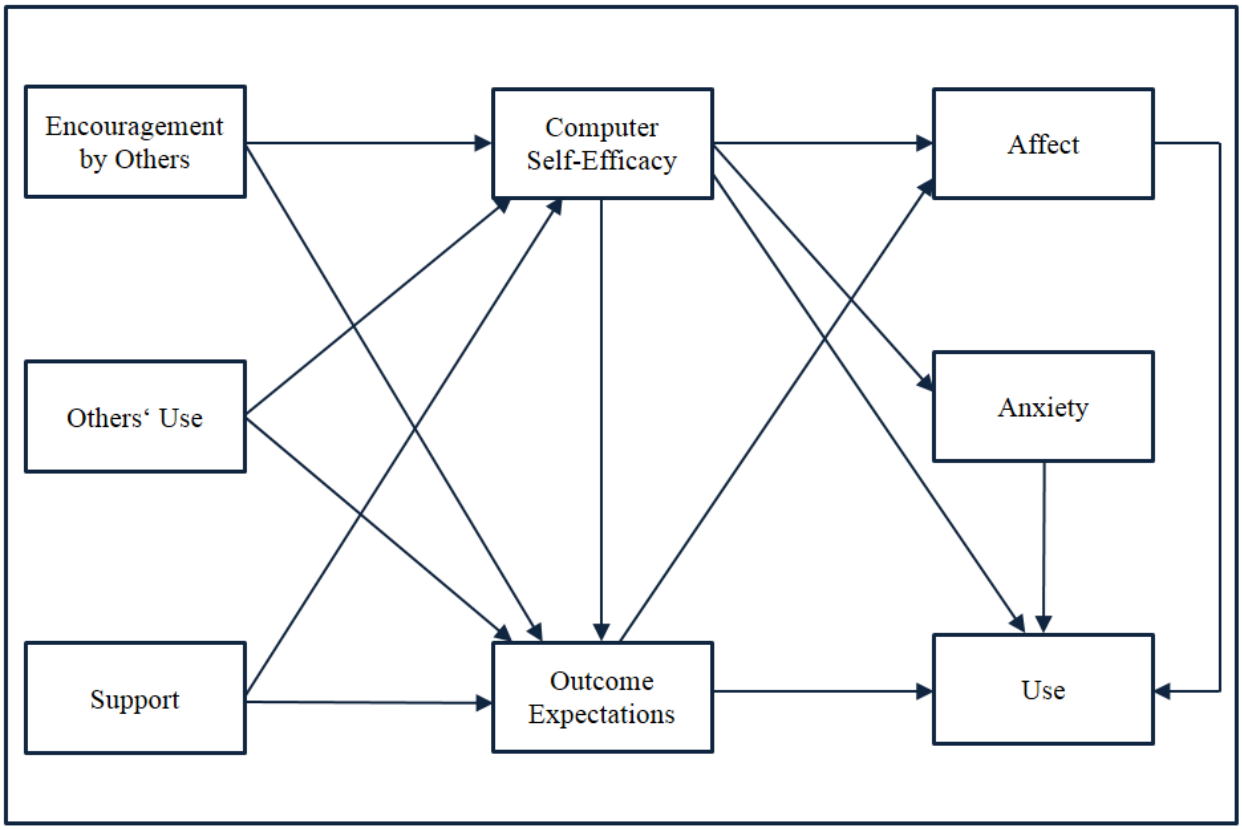


Figure 4.9. The Computer Self-Efficacy Model based on Social Cognitive Theory
Source: Own Illustration based on (Compeau/Higgins 1995b)

In particular, *outcome expectations* and *self-efficacy* are the key concepts of the Computer Self-Efficacy Model. *Outcome expectations* include personal and performance-related ones. Personal-related outcome expectations are related to individuals' higher self-esteem, feelings of joy and the sense of accomplishment. Performance-related outcome expectations[23] are related to successful task completion. If an individual believes that an action will result in desired outcome, he or she will be more likely to take a particular action.

Self-efficacy refers to the perception of one's own ability to achieve a task. It is concerned with the personal judgment of skills (Compeau/Higgins 1995b) which has both a direct and indirect influence (through outcome expectations, affect and anxiety) on usage. Individuals having high self-efficacy tend to use computers more frequently and experience less computer anxiety. Compeau and Higgins (1995b) identified three dimensions of self-efficacy: magnitude, strength and generalizability. *Magnitude* refers to the perceived level of task difficulty, *strength* is concerned with the level of conviction and *generalizability* refers to the extent to which perceptions of self-efficacy are limited to particular situations (Compeau/Higgins 1995b). The

[23] This phenomenon is comparable with perceived usefulness (Davis 1989), job-fit (Thompson et al. 1991), extrinsic motivation (Davis et al. 1992) and relative advantage (Rogers 2003).

CSE posits that both personal and performance-related outcome expectations are influenced by self-efficacy. Other key constructs of the model, which are known as affective factors, are affect and anxiety. *Affect* is concerned with whether an individual likes a particular behavior (Compeau/Higgins 1995b). *Anxiety* refers to an individual's feelings of nervousness in performing a behavior (Compeau/Higgins 1995b).

Prior research has shown the importance of self-efficacy and outcome expectations in the contexts of computer training, computer and Internet use, and knowledge sharing in virtual communities (only outcome expectations) (Chiu et al. 2006). Compeau and Higgins (1995b) discovered that performance-related outcomes had more significance than personal-related outcomes. In particular, computer self-efficacy had a strong effect on outcome expectations, affect and anxiety, and actual computer use. Moreover, encouragement of others and others' use of computers in a workplace found to influence self-efficacy and outcome expectations. In a longitudinal study, Compeau, Higgins and Huff (1999) provided evidence on the robustness of the CSE as well.

Next, the Unified Theory of Acceptance and Use of Technology is discussed, which aims to capture the essential elements of eight technology acceptance models discussed above.

4.2.2.5 The Unified Theory of Acceptance and Use of Technology (UTAUT)

Venkatesh et al. (2003) proposed the *Unified Theory of Acceptance and Use of Technology* to present an integrated and comprehensive understanding of the factors behind technology use from a user standpoint. The UTAUT combines constructs of eight widely used and validated models of technology adoption, aiming to capture their essential elements.

Venkatesh and his colleagues reviewed all significant user acceptance models and synthesized eight extensively used models and their variations — the DOI, TRA, TPB/DTPB, TAM/TAM2, DTPB, Motivational Model, Model of PC Utilization and the CSE based on SCT — which resulted in the UTAUT (see

Figure 4.10 below). The UTAUT was formulated based on the conceptual and empirical similarities across models (Venkatesh et al. 2003).

The UTAUT integrates three core antecedents of behavioral intention — *performance expectancy*, *effort expectancy*, and *social influence* — while *facilitating conditions* determine actual use behavior[24]. These four determinants summarize all the behavioral antecedents of the eight theories in technology adoption which were considered in the development of the model (see Table 4-2 below). The key moderators of the UTAUT are gender, age, voluntariness and experience. By integrating them, the UTAUT attempts to explain how individual differences influence technology adoption and use.

It should be noted that, while some of the existing adoption models (e.g., the TAM (Davis 1989)) were originally developed and mostly tested within a university context, the UTAUT was developed for an employee acceptance and use setting. It is suggested as a useful tool to assess the likelihood of acceptability of a technology within an organizational context (Venkatesh et al. 2003). By accounting for 70 percent of the variance in usage intention and

[24] Venkatesh et al. (2003) theorize that facilitating conditions do not have a significant influence on behavioral intention because this effect has already been captured by effort expectancy.

about 50 percent of the variance in actual use, UTAUT demonstrates "a substantial improvement over any of the original eight models and their extensions" (Venkatesh et al. 2003, 467). Consequently, the variance explained by the UTAUT is relatively high for IS research. For further improvements, Venkatesh et al. suggested that the boundary conditions of the UTAUT as well its validity in new contexts should be tested in future research.

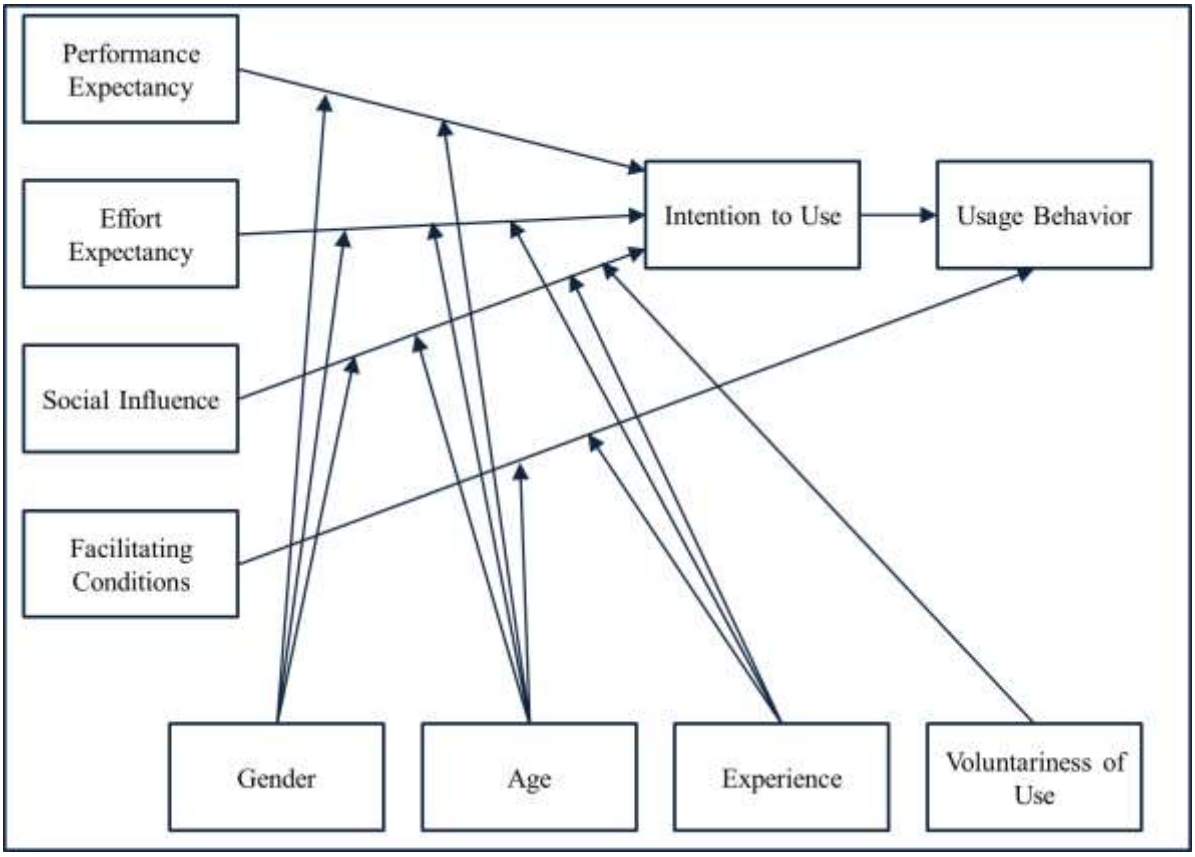


Figure 4.10. The Unified Theory of Acceptance and Use of Technology
Source: Own Illustration based on (Venkatesh et al. 2003)

The UTAUT is one of the first behavioral models examining the influences of moderating variables in use intentions and usage behavior. The model posits that the relationship between performance expectancy, effort expectancy and intention to use is moderated by age, gender and experience. Voluntariness of use is suggested as a moderating variable between social influence and use intentions. Only some of these proposed interactions were found to be significant in the initial study by Venkatesh et al. (2003). For instance, the strength of the relationship between performance expectancy and intention to use was more significant for male and younger individuals (Venkatesh/Morris 2000). The effect of effort expectancy on intention was more significant for female and older people which confirm the results of their previous research (Venkatesh/Morris 2000). Venkatesh et al. (2000) found no moderation effects of gender, age, experience or voluntariness of use on the relationship between social influence and intention. Finally, the relationship between facilitating conditions and usage was found to be more significant for older individuals in later stages of experience (Venkatesh/Morris 2000).

The empirical results of studies employing the UTAUT and the TAM reveal some similarities. Performance expectancy (cf. perceived usefulness of the TAM) was found to be the most important determinant of intention (Karahanna/Limayem 2000; Davis 1993; Davis et al. 1989; Venkatesh et al. 2003; Anderson et al. 2006). Moreover, effort expectancy (cf. perceived ease of use of the TAM) appear to be more significant in the initial stages of use (Davis 1989; Venkatesh et al. 2003).

The UTAUT provides an integrative view of user acceptance explaining adoption in IS fields. However, it has some inherent limitations. Being a combination of eight models and their variations, the measures for the UTAUT should be viewed rather as preliminary measures, which need to be more fully developed and validated by future research (Venkatesh et al. 2003). Although some researchers claim that the UTAUT should be extended with relevant constructs to explain a better understanding of use behavior (e.g., Goodhue 2007), the author of this thesis argues that the UTAUT is already a relatively complex model and adding more variables will create problems with parsimony[25]. Similarly, Bagozzi (2007) criticized the UTAUT for its complexity; in particular for having forty-one variables to predict intentions and eight variables to predict behavior. The cross-cultural applicability of the UTAUT model has also been controversial. The model was originally proposed and tested in a developed country. Some scholars have pointed out that the UTAUT has varying degrees of explanatory power in western and non-western cultures (Al-Qeisi 2009), while others have claimed that it can explain IT use across cultures (Gupta et al. 2008).

Since its inception in 2003, there have been several integrations and replications of the model in various settings. The UTAUT has been extended mainly by using one of three approaches (Venkatesh et al. 2012). The first type of extension examines the UTAUT in *new contexts* such as mobile services (Min et al. 2008; Carlsson et al. 2006), e-government (Gupta et al. 2008), human computer interaction (Oshlyansky et al. 2007), course management software (Marchewka et al. 2007), online banking (Al-Qeisi 2009) and wireless LAN technology (Anderson/Schwager 2004). The second type is concerned with addition of *new constructs* (e.g., Min et al. 2008; Sun et al. 2009). Finally, the third type is the *inclusion of the antecedents* of the UTAUT variables (e.g., by using the variables of the charismatic leadership theory (Neufeld et al. 2007) or the information system user satisfaction theory (Min et al. 2008)).

[25] As discussed previously, the goal of researchers should be to create simple models that have a high explanatory power (Bagozzi 1992). Thus, theories with the smallest number of parameters should be preferred, as each parameter adds some uncertainty to the model.

Construct of the UTAUT	Definition	Root Constructs
Performance Expectancy	Performance Expectancy is defined as "the degree to which an individual believes that using the system will help him or her to attain gains in job performance" (Venkatesh et al. 2003, 447).	- Perceived Usefulness (Davis 1989; Davis et al. 1989) - Extrinsic Motivation (Davis et al. 1992) - Job-fit (Thompson et al. 1991) - Relative Advantage (Moore/Benbasat 1991) - Outcome Expectations (Compeau/Higgins 1995b; Compeau et al. 1999)
Effort Expectancy	Effort Expectancy is defined "as the degree of ease associated with the use of the system" (Venkatesh et al. 2003, 450).	- Perceived Ease of Use (Davis 1989; Davis et al. 1989) - Complexity (Thompson et al. 1991) - Ease of Use (Moore/Benbasat 1991)
Social Influence	Social Influence is defined "as the degree to which an individual perceives that important others believe he or she should use the new systems" (Venkatesh et al. 2003, 451).	- Subjective Norm (Ajzen 1991; Davis et al. 1989; Fishbein/Ajzen 1975; Mathieson 1991; Taylor/Todd 1995b, 1995a) - Social Factors (Thompson et al. 1991) - Image (Moore/Benbasat 1991)
Facilitating Conditions	Facilitating Conditions are defined "as the degree to which an individual believes than an organizational and technical infrastructure exists to support use of the system" (Venkatesh et al. 2003, 453).	- Perceived Behavioral Control (Ajzen 1991; Taylor/Todd 1995c; Taylor/Todd 1995a) - Facilitating Conditions (Thompson et al. 1991) - Compatibility (Moore/Benbasat 1991)

Table 4-2. Definitions and Root Constructs of the Main Variables of the UTAUT Model
Source: Own Illustration based on (Venkatesh et al. 2003)

Venkatesh, Thong and Xu (2012) proposed an extended version of the UTAUT to study adoption and use of technology in a consumer use setting. Named as the UTAUT2, this model integrates the concepts of hedonic motivation, price value, and habit into the UTAUT.

4.2.2.6 The Model of Adoption of Technology in Households (MATH)

Drawing from IS research, marketing, and psychology; Venkatesh and Brown (2001) developed the Model of Adoption of Technology in Households to examine the decision to use technology in private homes. The authors argue that IS research offers models of workplace technology, marketing research address issues of consumer behavior, and research in psychology provides general insights into human behaviors (Venkatesh/Brown 2001). However, the strands of research have not previously been combined to provide insight into behavior relating to technology in a domestic context.

Venkatesh and Brown argue that workplace technology adoption decision of individuals have been typically characterized by a strong productivity orientation. PC adoption in private households is influenced by hedonic outcomes. Thus, the entertainment potential of PCs is expected to have strong influence on the adoption decision.

The authors chose the TPB as the guiding framework and proposed a decomposed belief structure for understanding home PC adoption and usage behavior. The MATH posits that *utilitarian outcomes, hedonic outcomes* and *social outcomes* are drivers of adoption (Venkatesh/Brown 2001). *Utilitarian outcomes*[26] are defined "as the extent to which using a PC enhances the effectiveness of household activities" (Venkatesh/Brown 2001, 74). Applications for personal use and utility for children are examples of utilitarian outcomes (Venkatesh/Brown 2001).

Hedonic outcomes refer to the pleasure aspect of usage, comparable to intrinsic motivations in the Motivational Model (Davis et al. 1992; Vallerand 1997). Using applications for fun is a hedonic outcome. Finally, *social outcomes* refer to the public recognition that would be achieved by adoption (Fisher/Price 1992) such as status gains. Furthermore, normative beliefs and control beliefs are posited to influence behavioral intention to adopt. The *normative belief* structure is composed of the influences of family, friends and other important referents. The *control belief* structure is concerned with the barriers to adoption posed by knowledge and cost.

In their large-scale longitudinal investigation, Venkatesh and Brown (2001) analyzed influence factors of adopters as well as non-adopters. Adopters were influenced by utilitarian, hedonic and social outcomes of adoption. Non-adopters, on the other hand, are found to be influenced by rapid changes in technology and the consequent fear of obsolescence.

Brown and Venkatesh (2005) introduced an extended version of the MATH by integrating it with the household life cycle (see Figure 4.11 below). The original model was developed and tested using qualitative data. Since it accounts for the complex array of issues that are specific to household context and not present in work or educational settings, the extended version provided a richer and more comprehensive understanding of household technology adoption. The results showed that the integrated model performs much better than the baseline MATH model (Brown/Venkatesh 2005). In a later study, Brown, Venkatesh and Bala (2006) demonstrated that attitudinal beliefs have the most significant influence on household PC use behavior.

[26] This construct is comparable to perceived usefulness (Davis 1989; Taylor/Todd 1995c; Venkatesh/Davis 2000), relative advantage (Rogers 1995), performance expectancy (Venkatesh et al. 2003), job-fit (Thompson et al. 1991) and extrinsic motivations (Davis et al. 1992; Vallerand 1997) of the well-known technology adoption models.

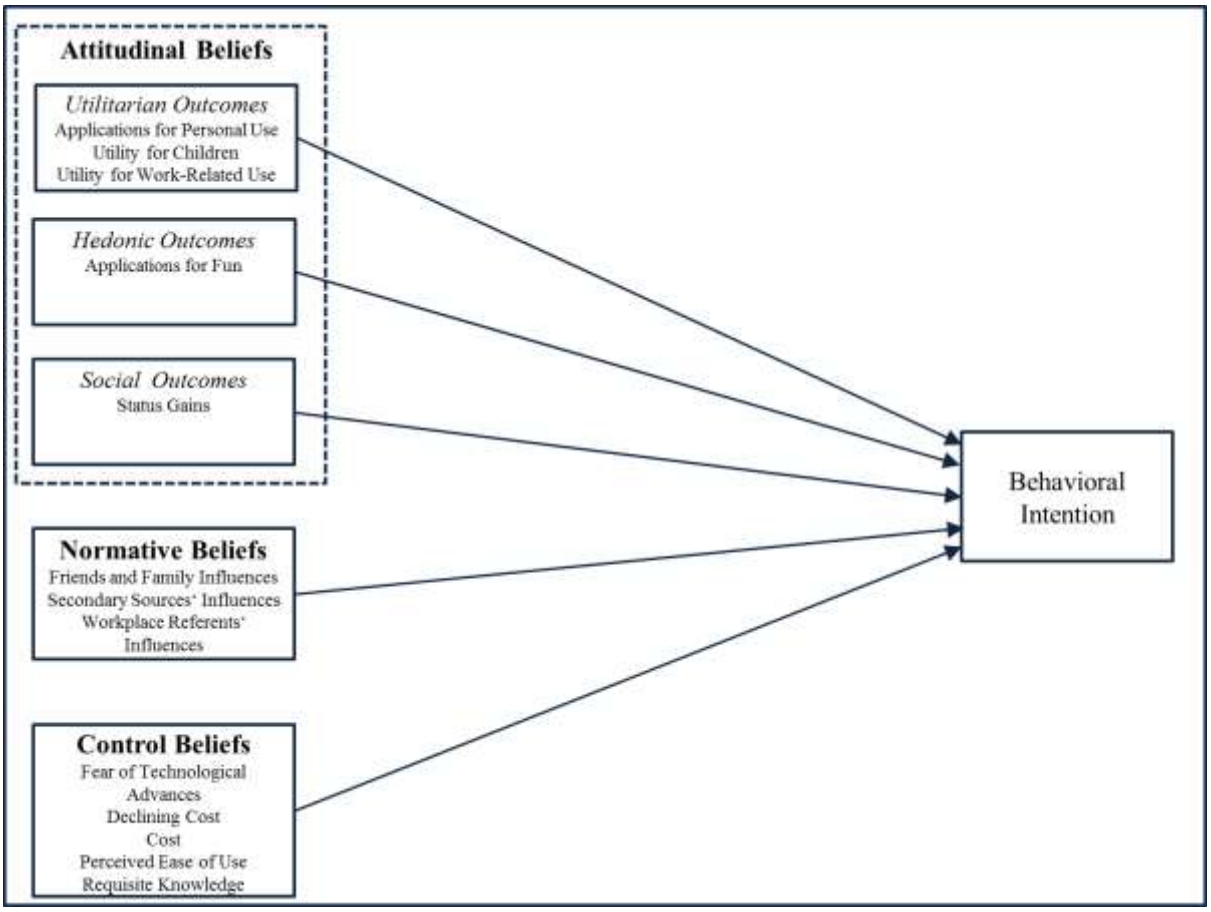


Figure 4.11. Extended Version of the Model of Adoption of Technology in Households (MATH)
Source: Own Illustration based on (Brown/Venkatesh 2005)

The applicability of the MATH model is limited to household PC adoption. It is not suitable for other IS contexts including workplace or educational settings. In order to apply it to other contexts, the model needs to be revised. In addition, the hedonic outcomes may have a strong influence on the adoption of pleasure-oriented behaviors such as using video games (e.g., Nintendo), PC games, and online social networks (e.g., Facebook), but for understanding the adoption of e-government services or e-commerce adoption, pleasure derived from the outcomes would not be relevant even in the household context. Therefore, the MATH model has not gained much popularity.

The next section provides a brief overview of the theories and models discussed in Section 4.2.

4.2.2.7 Overview of Theories and Models in Technology Adoption Research

The theories and models of Technology Adoption, which are discussed in this chapter are summarized in the following table (see Table 4-3 below). It is important to recognize that most of the models were developed in the U.S., therefore conclusions derived from these studies cannot be applied to other cultural settings without sufficient empirical verification. Straub, Keil and Brenner (1997) tested the TAM model in three cultures (the U.S., Switzerland and Japan) having with highly different cultural profiles (Hofstede et al. 1991). The authors

concluded that the TAM model may not hold equally well across cultures, thus results obtained in one nation should be interpreted with caution regarding their generalizability to another nation without sufficient empirical evidence.

Similarly, McCoy, Galletta and King (2005) called for caution regarding the generalizability of models such as the TAM, following their empirical study, comparing about 4000 students in 20 countries by using the TAM, which found that certain cultures were especially sensitive to user perceptions. Consequently, they warned researchers that such technology adoption models "might not be as immediately 'portable' as they might have thought" (McCoy et al. 2007, 89).

Model	Short Explanation	Constructs	References	Examples in IS
Diffusion of Innovations (DOI)	Explores how, why, and at what rate an innovation spreads through certain channels over time within a social system	Relative Advantage Compatibility Complexity Observability Trialability	(Rogers 1962, 2003)	(Tan/Teo 2000)
Theory of Reasoned Action (TRA)	Suggests that human behavior is a determined by attitudes to the behavior and social influences	Attitude Subjective Norm	(Fishbein/Ajzen 1975)	(Hansen et al. 2004)
Theory of Planned Behavior (TPB)	Extends TRA by incorporating perceived control over performance of the behavior to predict intention	Attitude Subjective Norms Perceived Behavioral Control	(Ajzen 1985, 1991, 2005)	(Pavlou/Chai 2002; George 2004)
Decomposed Theory of Planned Behavior (DTPB)	Extends the TPB by breaking down attitudinal, normative and control beliefs into their underlying belief structure to identify the predictors of behavioral intention	Perceived Usefulness Ease of Use Compatibility Peer Influence Superior's Influence Self-efficacy Resource Facilitating Conditions Technology Facilitating Conditions Attitude Subjective Norm	(Taylor/Todd 1995c)	(Shih/Fang 2004; Hsu/Chiu 2004)

to be continued on the next page…

Model	Short Explanation	Constructs	References	Examples in IS
Technology Acceptance Model (TAM)	Suggests that perceived usefulness and perceived ease of use are antecedents of users' attitudes toward using a technology, which influences their behavioral intentions to use the technology	Perceived Usefulness Perceived Ease of Use Attitude	(Davis et al. 1989; Davis Jr 1986)	(Karahanna/Limayem 2000; Gefen/Straub 2000)
Technology Acceptance Model (TAM2)	Extends the TAM with additional constructs related to social influence processes (e.g., subjective norm, voluntariness and image), and cognitive instrumental processes (e.g., job relevance, output quality and result demonstrability)	Perceived Usefulness Perceived Ease of Use Subjective Norm Experience Voluntariness Image Job Relevance Output Quality Result Demonstrability	(Davis et al. 1989; Venkatesh/Davis 2000)	(Yu et al. 2009)
The Motivational Model (MM)	Proposes that extrinsic (perceived performance) and intrinsic motivation (perceived enjoyment) are key drivers of human behavioral intention	Extrinsic Motivation Intrinsic Motivation	(Davis et al. 1992; Vallerand 1997)	(Teo et al. 1999)
The Model of PC Utilization (MPCU)	Developed to predict PC use and identifies factors including long-term consequences, job fit, complexity, affection, social factors and facilitating conditions of PC use	Social Factors Affect Towards Use Job-Fit Complexity Facilitating Conditions Long-term Consequences	(Thompson et al. 1991; Triandis 1977; Triandis 1980)	(Thompson et al. 1994)

to be continued on the next page…

Model	Short Explanation	Constructs	References	Examples in IS
Computer Self-Efficacy Model based on Social Cognitive Theory (CSE)	Posits that behavior, environmental influences, cognition and personal factors are reciprocally determined	Encouragement by Others Others' Use Support Computer Self-Efficacy Outcome Expectations Affect Anxiety	(Bandura 1986; Compeau/Higgins 1995b)	(Compeau/Higgins 1995a)
The Unified Theory of Acceptance and Use of Technology (UTAUT)	Combines theories of TAM, TRA, TPB, DTPB, MM, MPCU, DOI and CSE to present an integrated and comprehensive view of user acceptance	Performance Expectancy Effort Expectancy Social Influence Facilitating Conditions Gender Age Experience	(Venkatesh et al. 2003)	(Min et al. 2008; Neufeld et al. 2007)
The Model of Adoption of Technology in Households (MATH)	Suggests a specific model to study household personal computer adoption, which was then extended to account for the complex array of issues that distinguish the household context	Applications for Personal Use Utility for Children Utility for Work-Related Use Applications for Fun Status Gains Friends and Family Influences Secondary Sources' Influences Workplace Referents' Influences Fear of Technological Advances Declining Cost and Cost Perceived Ease of Use Requisite Knowledge	(Brown/Venkatesh 2005)	(Brown et al. 2006)

Table 4-3. Relevant Theoretical Frameworks and Models in Technology Adoption Research
Source: Own Illustration

It should be noted that the list of theories summarized in this section is not by any means exhaustive. Various frameworks based on different principles to the ones examined above also exist. For instance, the Expectancy-Disconfirmation Paradigm (Oliver 1980) and the Value-Percept Theory (Locke 1969) attempt to explain customer satisfaction in marketing. Value-Percept Theory posits that individuals judge satisfaction in relation to values and desires (Locke 1969), whereas the Expectancy-Disconfirmation Paradigm suggests that satisfaction is based on an implicit comparison of usefulness with prior expectations (Oliver 1980). This thesis is concerned with the factors influencing adoption decisions of individuals regarding online public services, rather than aiming to explain their satisfaction levels therefore theories about satisfaction levels were not considered.

There are also specific research streams that examine pre-adoption and post-adoption behaviors (e.g., Karahanna et al. 1999), identify antecedents of IS success (e.g., Delone 2003; DeLone/McLean 1992) or investigate the diffusion of pleasure-oriented (hedonic) information systems (e.g., Van der Heijden 2004), which do not fall within the scope of this research.

It is important to recognize that adoption theories are not developed considering the individual characteristics of a specific IS domain. Rather, they are employed to explain adoption behaviors of various technologies ranging from e-mail diffusion to adoption of mobile technologies. However, IS is a relatively broad domain encompassing various technologies. Thus, it is essential to adapt technology adoption models considering the special characteristics of the research domain instead of blackboxing information technology (Orlikowski 2000; Dwivedi et al. 2011). *Trust* is one of the widely suggested constructs which is suggested for inclusion in the examination of online technologies such as e-commerce (Hoffman et al. 1999) and e-government (Cabinakova et al. 2013). The next section gives an overview of the importance of trust in technology adoption.

4.3 Theoretical Foundations of Trust

4.3.1 Conceptual Definitions

Trust is a very broad (Williamson 1993) and confusing (Shapiro 1987) concept which spans several disciplinary perspectives; including psychology, philosophy, social science, business and management (Gambetta 1990; Carbo 2007; Bhattacharya et al. 1998). Nonetheless, these different disciplinary areas share some common values about trust. The considerable overlap and synthesis in understanding of trust across disciplines (Rousseau et al. 1998) enables researchers to reuse outcomes in various contexts.

Trust is a central feature of all human relationships. In particular, it has been a critical feature of economic and social interactions where uncertainty and fears of opportunism are present (Luhmann 1973). It is crucial in many relationships and transactions that can involve undesirable opportunistic behavior (Fukuyama 1995; Luhmann et al. 1979). Trust refers to the "belief that the trustee will act cooperatively to fulfill the trustor's expectations without exploiting its vulnerabilities" (Pavlou/Fygenson 2006, 123).

Various definitions of trust have been proposed and some researchers find them contradictory and confusing (Lewis/Weigert 1985; Shapiro 1987). According to McKnight and Chervany (2002), this is caused by the fact that each discipline views the concept of trust from its own

perspective. In particular, "psychologists see trust as a personal trait, sociologists see it as a social structure, and economists see it as an economic-choice mechanism" (McKnight/Chervany 2002, 37). A further reason for the confusion is the vagueness of the trust concept, which has acquired many meanings. Third, trust is such a broad concept, thus "researchers tend to develop narrow conceptualizations of trust that fit the type of research they do" (McKnight/Chervany 2002, 37).

However, in most definitions of trust, *the vulnerability of the trustor to losing something of importance by engaging in a trusting relationship* was emphasized as a key element (Rotter 1971; Zucker 1986; Hosmer 1995; Goffman 1972; Schoorman et al. 2007). Trust is related to trustor's confidence in another party's *intentions* and *motives* (Mellinger 1956). Deutsch (1960) extends this definition by adding individual's confidence in the *capabilities* of a relationship partner as well as intentions and motives. Therefore, for the existence of trust, trustor should have confidence in the intentions, motives and the capabilities of a relationship partner.

Trust in this thesis is defined as "the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party" (Mayer et al. 1995, 712). Risk could include "cooperation, sharing sensitive information and voluntarily allowing the trustee control over issues that are important to the trustor" (Mayer/Davis 1999, 124). Overall, trust is a willingness to engage in risk-taking relationship with the trustee (Zand 1972).

Next, the term distrust (a.k.a mistrust) needs to be conceptually clarified, which has not been subject to research as much as trust. Although some argue that trust and distrust are separate dimensions (Lewicki et al. 1998), most authors view them as the opposite ends of the same continuum (Schoorman et al. 2007; McKnight et al. 2002). It refers to the expectation that others will not act in one's best interest. Therefore, distrusting means that one is unwilling to depend, or intends not to depend, on another party (McKnight/Chervany 2002). Barber (1983) understands it as the expectation that capable and responsible behavior from the other party will not be forthcoming.

Regardless of its context, trust has specific characteristics. First, as explained in Akkaya et al. (2012a), it is closely related to *risk* and the need for trust arises only in the presence of risk (Luhmann 1973; Adams 1995). According to Bhattacharya, Devinney and Pillutla (1998) "trust cannot exist in an environment of certainty; if it did, it would do so trivially" (p. 461). Therefore, trust exists in an uncertain and risky environment (Grabner-Kräuter/Kaluscha 2003). For instance, the risk perceptions may reduce the individual's perception of behavioral control in online transactions, and this might negatively influence willingness to use such systems (Jarvenpaa et al. 2000). As stated by Akkaya, Wolf and Krcmar (2012a) "risk causes uncertainty and insecurities, whereas trust is an effective instrument to deal with them" (p. 2531).

It is important to mention that trust does not eliminate the risk itself. Rather it helps to overcome risk by changing how it is perceived (Akkaya et al. 2012a). This brings us to the second characteristic of trust, namely its *subjectivity*. Trust exists in an environment of mutuality, i.e. trust is situation and person specific (Bhattacharya et al. 1998). There is a difference between actual and perceived risk; perceived risk is the subjective judgment of people about the existence and severity of the actual risk. The necessary level of trust depends on *perceived risk*, hence differs from one individual to another. People judge the risk involved in a specific situation subjectively and may decide to take the risk, if they see higher amount of benefits than

risks. Perception of risk is a complex phenomenon and depends on several factors including past experiences. Too much trust can even increase the existing risk by blocking its perception (Krcmar 2010). Third, trust reflects an aspect of predictability or *expectancy*. Trusting another party reflects a prediction about a behavior. In that sense, trust has a *future-oriented* nature. It is necessary for the risky situations in future and involves expectancy that the trusted partner will not behave opportunistically. Fourth, trust is something *positive*. According to Bhattacherya et al. (1998), "trust is an expectancy of positive or non-negative outcomes that one can receive based on the expected action of another party in an interaction characterized by uncertainty" (p. 462).

Although some researchers have treated trust as a unitary concept (Rotter 1967) in (McKnight et al. 2002), most authors agree that trust has a *multi-dimensional* nature (Gefen et al. 2003; McKnight et al. 2002; Mayer et al. 1995) which is further explained in terms of a number of trust antecedents. However, there is no consensus among scholars regarding the dimensions of trust. Some authors refer to beliefs of trustworthiness as dimensions of trust, whereas others refer to trust in different parties or mediums. To avoid confusion, this thesis adopts the second option, naming the trust in different parties or mediums as dimensions of trust. For instance, trust in a vendor, as a willingness to depend on a vendor to deliver on commitments and ethical use of consumer data is not same as trust as a belief that the Internet is technologically secure (McKnight et al. 2002). Similarly in e-government, trust in the Internet as the transmitting medium is different from trust in government as the service provider (Akkaya et al. 2011).

Drawing from several theoretical streams, research identified a number of trust dimensions[27]: *calculative-based trust, knowledge-based trust, institution-based trust, personality-based trust* and *cognition-based trust* (McKnight et al. 2002). These are broad categorizations and various dimensions of trust are applicable depending on the context. *Calculative-based trust* is built on rationally derived costs and benefits (Coleman 1990; Lewicki/Bunker 1995). *Knowledge-based trust* develops gradually over time based on the knowledge that is accumulated through personal experience with the other party (Lewicki/Bunker 1995). *Institution-based trust* refers to adherence to technical standards, security procedures and protection mechanisms (Pavlou 2002). This antecedent of trust refers to trust stemming from environmental conditions, which is especially relevant for, and has become an essential dimension of, trust in online environments. Consequently, institutional trust has become an essential dimension of trust in online environments. Institutional trust for online environments is known as "trust in the Internet" (Shapiro 1987). This type of trust has been frequently subject to research in the fields of e-commerce and e-government (Akkaya et al. 2011; Bélanger/Carter 2008; Pavlou 2003; Warkentin et al. 2002; McKnight et al. 2002).

Institution-based trust has two sub-dimensions: *situational normality* and *structural assurances* (McKnight et al. 1998). The former refers to perceptions that the transaction will be a success, based on contextual normality (Baier 1986). A person's trust disappears when a situation is not perceived as normal (McKnight et al. 1998). Structural assurances are related to an assessment of protective structures such as third party assurances, guarantees, seals of approval, safety nets, explicit privacy statements and other regulations.

P*ersonality-based trust* or propensity to trust represents the tendency to believe or not to believe in others (Mayer et al. 1995; Rotter 1971). *Cognition-based trust* is developed from first

[27] In trust literature, there is a lack of agreement among researchers in the field. The terms antecedents, dimensions, determinants, or principles of trust are often used interchangeably.

impressions and individual beliefs rather than through experience of personal interactions. Cognition-based trust is formed through categorization and illusions of control (Meyerson et al. 1996; Brewer/Silver 1978). The personality-based trust and cognition-based trust are more relevant for the formation of initial trust[28] (McKnight et al. 1998), which is necessary when parties meet or first interact with each other (McKnight et al. 1998). Researchers exclude these two trust antecedents from studies focusing on "ongoing trust", if subjects have prior experience with the trustee (Gefen et al. 2003; McKnight et al. 2002). While initial trust may be relevant for some e-commerce interactions, it is not likely to be relevant for e-government because every citizen has a relationship with government starting from birth. Thus, individuals' existing relationship with government organizations including their trust beliefs in the capability of the parties, affects their approach to government's online offerings.

The trust literature distinguishes *trustworthiness* from trust. Trustworthiness is a characteristic of the trustee that depends on three core characteristics of the trustee: *ability (or competence), benevolence* and *integrity* (Mayer et al. 1995). They are also referred to as *trustworthiness beliefs* (Gefen 2002), *trusting beliefs* (McKnight et al. 2002). *Ability* is the belief that the trustee is capable of fulfilling promises based on its knowledge, expertise, skills and other relevant characteristics. *Benevolence* is the belief that trustee will hold trustor's interests ahead of its own self-interest and will not act opportunistically with synonyms including loyalty and openness (Mayer et al. 1995). *Integrity* implies that trustee will keep its promises and act in a reliable and honest manner with synonyms including consistency and promise fulfillment (Mayer et al. 1995). Trusting beliefs relate to the attributes of the trustee, therefore they have been commonly used to measure trust at a specific organization or person, not of a technology (Mayer/Davis 1999; Jarvenpaa et al. 1998; Chen/Dhillon 2003; Gefen 2002).

Several scholars have focused on trust as a reducer of risk among online users in the context of the existence of risk and uncertainty (Gefen et al. 2003; Bélanger/Carter 2008; Gefen et al. 2002; Warkentin et al. 2002; Akkaya et al. 2012a; Jarvenpaa et al. 2000). The role of trust in online environments as well as selected models of trust for such environments is discussed next.

4.3.2 Prior Research on Trust in Online Environments

4.3.2.1 The Importance of Trust in Online Environments

The unpredictable and impersonal nature of the Internet and the underlying infrastructure give rise to environmental uncertainties that involve risks, which causes insecurity among potential users of online technologies (Pavlou 2003; Akkaya et al. 2012a). In particular, users are increasingly concerned about online disclosure due to their privacy concerns. Although privacy is highly desirable, it is not fully attainable in online contexts. According to the Privacy Calculus Theory of Dinev and Hart (2006), the cumulative influence of Internet trust and expected benefits can outweigh risks of online environments and the decision to disclose personal information.

[28] An extensive discussion on the difference between initial trust and mature trust can be found in (Jarvenpaa et al. 1999).

In online environments the behavior of the trustee cannot be monitored or guaranteed (Gefen et al. 2003). Trust is essential for the adoption of online technologies (Beldad et al. 2010) as being an effective instrument to deal with risk perceptions (Akkaya et al. 2012a). Consequently, trust in online environments has received a considerable amount of attention. According to this stream of research, trust should be the defining attribute of a relationship, determining its very existence and nature (Fukuyama 1995), even beyond economic factors such as price (Reichheld/Schefter 2000; Gefen et al. 2003). This is especially true for transactions involving social uncertainty and risk (Fukuyama 1995; Luhmann 1973).

Online trust is defined as "an attitude of confident expectation in an online situation of risk that one's vulnerabilities will not be exploited" (Corritore et al. 2003, 740). The absence of feedback and learning capability and the lack of face to face interactions and visual clues are detrimental to building trust in online environments (Nohria/Eccles 1992; Cyr et al. 2007; Ridings et al. 2002). As consumers cannot physically touch, taste or smell products in online shopping, or "fully monitor the safety and security of sending sensitive personal and financial information through the Internet to a party whose behaviors and motives may be hard to predict" (Cheung/Lee 2003, 424), trust in online environments is an issue of critical importance.

The perception of trust in online environments has evolved over time (Shankar et al. 2002). In the emerging phases of e-commerce, trust was mainly used to refer to website security, i.e. whether users feel safe in providing their credit cards and other financial details to a third party online. For example, Liu et al. (2004) posited that six *levels of trust* exist ranging from *compromised* (malicious) to *highest* (an extremely high trust level, considered very reliable). Over the years, the perception of trust in online environments started to include *privacy* issues, i.e. the concerns about providing confidential information.

There are some similarities between trust in the physical world (offline trust) and trust in an online environment. According to Corritore, Kracher and Wiedenbeck (2003, 740) in (Beldad et al. 2010), "a substantial number of studies on trust in offline settings are applicable to trust in online environments" (p. 860). Both settings deal with exchanges hampered by risks and fears. Despite similarities, there are also some major distinctions. In "offline" trust, typically a person or a company is the trustee, while the organization providing the service as well as the technology (mainly the Internet) become the trustee in an online context (Shankar et al. 2002; Beldad et al. 2010).

Aiken and Bousch (2006) showed that individuals assess trustworthiness of an online organization based on privacy and security criteria. A survey of experienced web users around the world pointed to privacy concerns as an essential factor in trusting or distrusting e-vendors in e-commerce (Hoffman et al. 1999). Privacy concerns include being tracked for visited websites, and having confidential information collected and used by third parties. Moreover, the authors found that expectations of privacy differ between online and offline settings. While consumer attitudes toward privacy invasion range from 'tolerance' to 'resigned disgust' in traditional media, consumers state an intense need for control and protection in online media (Hoffman et al. 1999). While almost 20 percent of respondents stated "magazines have a right to sell their demographic data to other firms for direct-marketing purposes, only 12 percent say Web sites and third-party agencies have the same right"[29] (Hoffman et al. 1999, 81).

[29] It should also be noted that these concerns would have been even higher for the case of inexperienced Web users.

Similarly to offline trust, there is no consensus on the specific dimensions of trust in online environments. Most authors, however, differentiate between *trust in an organization* and *trust in the Internet* as a medium. Tan and Sutherland (2004) conceptualize trust in online environments as a multi-dimensional construct. *Institutional trust* refers to trust in the Internet and the concerns related to the medium of online transactions. *Dispositional trust* deals with the psychological disposition or personality trait of an individual. *Interpersonal trust* refers to trust between the two interacting parties. Kim et al. (2001) suggest trust in online environments has six dimensions, namely *information content, product, transaction, technology, institutional,* and *consumer-behavioral* dimensions.

The direct relation between the level of trust and willingness to use online services has been confirmed in various settings, particularly in e-commerce (Jarvenpaa et al. 2000; Gefen 2000; McKnight et al. 2002; Lee/Turban 2001). While winning consumer trust is essential for the success of online enterprises and initiatives, several authors have criticized the fact that the majority of research has been conducted in the context of e-commerce (Beldad et al. 2010; Alsaghier et al. 2009; Akkaya et al. 2010). In their highly cited paper; McKnight, Choudhury and Kacmar (2002) explain why building trust is essential to widespread adoption of e-commerce (p. 334):

> *"Evidence suggests that consumers often hesitate to transact with web-based vendors because of uncertainty about vendor behavior or the perceived risk of having personal information stolen by hackers. Trust plays a central role in helping consumers overcome perceptions of risk and insecurity."*

Due to the importance of trust in online environments, researchers have examined its antecedents to provide a better understanding, and an overview is provided next.

4.3.2.2 Antecedents of Trust in Online Environments

Similarly to "offline" trust, the concept of 'antecedents of trust in online environments' has been used by different scholars for different classifications. Two main approaches dominate in prior literature. In the first approach, antecedents of trust in online environments refer to trustworthiness beliefs in an e-commerce context (Jarvenpaa et al. 1999; Mayer et al. 1995; Butler Jr/Cantrell 1984; Gefen 2002) In this setting, an e-vendor or online merchant becomes the trusted party. In particular, ability refers to the belief about the skills and competence of the e-vendor to provide good quality products and services (Wang/Emurian 2005). Benevolence refers to goodwill of the e-vendor aside from aiming to make legitimate profits (Wang/Emurian 2005). Integrity is concerned with the adherence to a set of sound principles and accepted rules of conduct.

Customer-/client-based trust antecedents	- Propensity to trust - Experience and proficiency in Internet usage
Website-based trust antecedents	- Perceived ease of use of the website - Information quality - Graphical characteristics - Social presence cues - Customization and personalization capacity - Privacy assurances and security features - Third-party guarantees
Organization-based trust antecedents	- Organizational reputation - Perceived size of the organization - Offline presence - Experience and familiarity with the online company

Table 4-4. Antecedents of Trust in E-Commerce
Source: Own Illustration based on (Beldad et al. 2010)

In the second approach, antecedents refer to characteristics of product/service suppliers and online environment, whereas dimensions of trust refer to categories of antecedents. Lee and Turban (2001) posit that consumer trust in online shopping has four main antecedents. In addition to trustworthiness of the organization and Internet as a medium, they recognize infrastructural factors and other factors (e.g., size and reputation of the organization).

Similarly, Beldad, Jong and Steehouder (2010) provide a list of different antecedents of trust in online transactions based on an analysis of empirical studies in e-commerce (see Table 4-4 above). *Customer-based trust antecedents* consist of *propensity to trust* and *experience and proficiency of the user* regarding Internet. Studies testing the impact of propensity to trust on formation of trust in online environments demonstrated conflicting results (Beldad et al. 2010). Experience and proficiency, on the other hand, are found to be positively related to trust perceptions in online shopping. While first-time online users were found to be more concerned about the security and privacy of online transactions than experienced users, proficient users have lower perceptions of risks in Internet and trust online transactions (Beldad et al. 2010). *Website-based trust antecedents* are related to institution-based trust. Prior research has shown that *perceived ease of use* had a positive effect on the formation of trust in e-commerce (Koufaris/Hampton-Sosa 2004; Bart et al. 2005). The *information quality* of an e-commerce website is likely to increase consumers' trust in online transactions (Liao et al. 2006). *Graphical characters*, selected colors and their brightness have been found to impact the perceptions of trustworthiness in a specific study (Kim/Moon 1998) which needs to be tested in other contexts. *Social presence* refers to the resemblance to an interpersonal interaction, even though customers usually interact with an e-commerce website rather than with a salesperson. Efforts to increase social presence by using photographs showed results ranging from suspicion to enthusiasm

(Riegelsberger/Sasse 2002). Although the *customization and personalization capacity* of a website has been found to influence trust in online environments, this effect was minimal (Briggs et al. 2004). *Privacy assurances and security features* are significant factors enabling customers to trust e-commerce. Pan and Zinkhan (2006) demonstrated that existence of a privacy policy increases perceptions regarding the company's trustworthiness. Similarly, *third-party guarantees* such as certifications or seals of approvals from trusted third parties may enhance users' perceptions of trustworthiness, especially during the initial encounter (Koehn 2003).

Organization-based trust antecedents focus on increasing trust in an e-vendor. *Organizational reputation*, positive word-of-mouth referrals and statements about the organization significantly influence clients' trust in online organizations (McKnight et al. 2002; Kuan/Bock 2007). This is comparable to the subjective norm construct of Theory of Reasoned Action (Ajzen/Fishbein 1980). There have been contradictory results on the effect of *perceived size of the organization* on e-vendor's trustworthiness (Beldad et al. 2010). While Jarvenpaa, Tractinsky and Vitale (2000) argue that such perceptions influence trustworthiness of an organization; Teo and Liu (2007) did not find any significant effect. Similarly, retailer's *offline presence* was found by Kuan (2007) to enhance customers' trust in online environments, this was not confirmed in another online survey (Teo/Liu 2007). Finally, prior research has revealed that *experience* and *familiarity* with the e-vendor affect not only trust of customers but also result in increased usage (Yoon 2002).

Next, models of trust in online environments, most of which have been suggested for e-commerce, are reviewed.

4.3.2.3 Models of Trust in Online Environments

Recognizing the importance of perceived risk and the need for trust in online environments, researchers have proposed integrating trust into existing frameworks. Although not specifically designed for online environments, the model of trust suggested by Mayer, Davis and Schoorman (1995), the trust model of McKnight and Chervany (2001) and the model proposed by McKnight, Choudhury and Kacmar (McKnight et al. 2002) have served as a basis to several models of trust in various contexts.

Gefen, Karahanna and Straub (2003) and Salam et al. (2005) suggested integrating trust into the TAM model. Similarly, Pavlou (2003) proposed integrating trust and perceived risk into TAM "given the implicit uncertainty of the e-commerce environment" (p. 101).

For a more thorough analysis of trust, various models have also been suggested. One of the first was proposed by Bhattacharya, Devinney and Pillutla (1998), to include *actions*, *outcomes* and *consequences* in a mathematical schema. A literature analysis reveals various trust models involving explicit constructs, which were developed specifically for the research context. Some authors suggest computational models combining *trust* and *reputation* for e-commerce transactions (Mui et al. 2002; Egger 2000), while Mukherjee and Nath (2003) propose *shared value*, *communication* and *opportunistic behavior* as antecedents of trust, the model provided by Kaplan and Nieschwietz (2003) posits *assurance measures*, *seal type* and *web seal provider attributes* as antecedents of trust.

Tan and Thoen (2002) suggested a generic trust model for e-commerce. This model posits that trust is a multi-dimensional concept. *Trust in the other party*, *trust in control mechanisms*, *potential gain* and *risk* are determinants of transaction trust. Even though trust in control mechanisms was mainly focused on third party guarantees, rather than institution-based trust; it should be recognized as one of the first attempts, to break trust down into its dimensions, *organization-based* (party-based) *trust* and *trust in control mechanisms*.

Another highly cited trust model in literature is the 'Consumer Trust Model in Internet Shopping' proposed by Lee and Turban (2001). This model recognizes the multi-dimensionality of the 'trust in online environments' concept by distinguishing between *trustworthiness of Internet merchant* and *trustworthiness of Internet shopping medium*. Trust propensity is proposed as a moderating variable which reflects individual consumer's tendencies. However the model does not include the construct of risk. The developers of the model have later acknowledged this with their explicit statement "an understanding of trust that does not examine its relationship with risk is incomplete" (Lee/Turban 2001, 86).

Cheung and Lee (2003) proposed *perceived risk*, *perceived trustworthiness of Internet vendor* and *external environment* as antecedents of consumer trust in Internet shopping. This model, however, proposes perceived security control as a sub-dimension of trustworthiness of the vendor rather than the medium. Even though perceived risk was included in this model, institution-based trust was not explicitly stated.

Kong and Hung (2006) proposed a theoretical framework explaining trust formation through peripheral and central routes based on Elaboration Likelihood Model (Petty/Cacioppo 1986). This model incorporates psychological antecedents to understanding of trust attitude formation. In essence, the authors argue that the formation of end-user trust in the initial stage is different than the repeat stages. If users do not have any previous experience with the vendor, they tend to rely more on factors from the peripheral route (Kong/Hung 2006). These factors include external factors such as e-vendor's *reputation*, *structural assurance*, *perceived situational normality of the web site* and the end user's *dispositional trust* and his or her *perceived situational normality* (Kong/Hung 2006). After gaining direct experience with the e-vendor, end users rely more on factors from the central route (Kong/Hung 2006).

The conceptual model of trust developed by Salo and Karjaluoto (2007) examines various factors of influence regarding trusting beliefs in online transactions. Influential factors are categorized under *external* and *internal* factors. Factors in the external category include consumer characteristics, culture and risk perception. Web vendor's trustworthiness, end user's prior experience and reputation are examples of factors in the internal category. The proposed framework classifies five external factors and twelve internal factors, which results in a quite complex trust model.

One of the most highly recognized (Benbasat et al. 2008) trust models in literature was proposed by McKnight and his colleagues (2002). They posit *disposition to trust* and *institution-based trust* as antecedents of trust in web vendor (trusting beliefs); these influence trusting intentions, which in turn determines trust related behaviors. By adapting this model, Bélanger and Carter derived their well-known 'Trust and Risk Model' for e-government adoption, which will be discussed in Section 4.5.1 below in more detail.

Trust models in the specific area of open government are particularly rare. Building on the 'Integrative Model of Trust in Organizational Settings' (Mayer et al. 1995) and the 'Interdisciplinary Model of Trust Constructs' (McKnight/Chervany 2001); Wimmer, Scherer

and Appel (2015) proposed a trust model for e-participation research which is currently among the first trust models in this particular subject area.

The above analysis reveals that studies of trust in online environments have been mostly conducted in the e-commerce context. Furthermore, there is confusion about different concepts and terminologies. Some authors still consider trust as a single construct rather than a multi-dimensional one. Most of the models have included 'trust in an organization' (i.e., web vendor for e-commerce) as a construct. Only a few models included institution-based trust as a separate construct. Perceived risk, which should be an essential component of any trust model (Lee/Turban 2001), was considered only in a few cases. Some models are far from being parsimonious including more than fifteen constructs. To sum up, none of the existing models posit trust in web vendor, institution-based trust, and perceived risk in a parsimonious trust model.

As most research has been conducted in e-commerce, applicability to similar contexts (e.g., e-government and e-health) needs to be empirically tested. Furthermore, results may differ among samples of different national cultures. Special characteristics of nations necessitate consideration of cultural aspects for a better understanding and interpretation of their adoption behaviors; this is discussed next.

4.4 Theoretical Foundations of Espoused Cultural Values in Technology Adoption and Trust Research

4.4.1 Importance of Espoused Cultural Values in Technology Adoption and Trust Research

Various scholars have suggested consideration of *micro*, *meso* and *macro* issues in understanding the adoption of IS in e-commerce (Molla/Licker 2005) and business contexts (Waarts/Van Everdingen 2005). *Micro* factors refer to particular characteristics of the firms and new products, while *meso* factors are related to the characteristics of the industry. At the *macro* level, *national culture* has been suggested (Waarts/Van Everdingen 2005; Srite/Karahanna 2006), as cultural differences between countries influence adoption decisions of individuals in different countries.

Taylor (1889) defines culture as "that complex whole which includes knowledge, belief, art, morals, law, custom, and any other capabilities and habits acquired by man as a member of society" (p. 1). Triandis (1980) argues that national culture shapes the core values and beliefs of individuals, which in turn influence attitudes and behaviors. When faced with the same situation, people from different national cultures behave potentially very differently (Hidding 1998). Triandis (1972) notes that one of the greatest impacts of culture is its direct impact on decision making of individuals. Differences in national cultural values influence decisions about the acceptance of information technology as well. As pointed out by Shyu und Huang (2011), the effect of cultural dimensions on technology adoption is an important but under-addressed subject. Its understanding would help practitioners predict adoption of a particular technology in a culture before introducing the technology (Shyu/Huang 2011).

The main focus of IS adoption literature in its emergency phase has been the various models of technology acceptance, which has been criticized by some authors (Benbasat/Barki 2007). Yet

increased globalization in the business world has led to increasingly diverse markets and multi-cultural collaborations over national boundaries. In a world of globalization and corporate multi-nationalism, connections between cultural effects and information systems cannot be overlooked. This fact heightened awareness of the importance of cultural differences on organizational performance, collaboration and IS adoption. As a result, research regarding the impact of cultural differences on IS adoption has emerged within the last two decades.

Cultural diversity and cross-cultural management becomes particularly relevant for IS practitioners and researchers with the increasing practice of *global information systems development* and *IT off-shore outsourcing*. *Global information systems development* refers to development of information systems in collaboration of two or more organizations, or between organizations and their subsidiaries across national boundaries (Huang/Trauth 2007). Besides being geographically dispersed, global virtual team members are culturally diverse as well. Huang and Trauth (2008) point out to the advantages of arranging software development projects in a distributed mode. As team members in different locations can continue the work "around the clock", it may speed up projects. Taking advantage of the diverse human capital that is available at different locations is another potential benefit of globally distributed projects. However, such projects require a high level of collaboration, which can turn into a major challenge due to geographical separation, lack of face-to-face interaction and cultural diversity. Several studies have shown that culture is a critical influential factor in globally distributed information systems development (Sahay et al. 2003; Walsham 2002).

There is also a growing trend to shift the IT infrastructure and complex software development projects to low cost locations (*IT off-shore outsourcing*), which necessitates an effective collaboration across cultural boundaries. The benefits of outsourcing are quite promising with various economic, technological, strategical and political aspects (Leimeister 2009). Yet, the dynamics of such practices are likely to be influenced by surrounding socio-cultural factors. Cross-cultural challenges may be related to differences in communication styles, language capabilities, work behaviors, perceptions and cultural understanding. Montealgre (1998) demonstrates a situation where a manager, who was educated in the U.S., wished to implement an IS in a less-developed country and faced considerable difficulties due to cultural differences. The study showed that managers from other cultures must first take into account the environmental characteristics of the local country as well as its national culture in order to successfully implement the system.

Social, ethnic or religious differences are important causes of difference among nations. While differences in IS adoption rates across nations are significantly influenced by cultural characteristics (Erumban/De Jong 2006; Straub et al. 1997), it will be an over-simplification to conclude that the differences in culture alone explain the IS adoptions rates of nations. Besides cultural dynamics, a number of other factors including a country's infrastructure, the political and economic situation, the physical environment and availability of services such as wireless technology need to be considered. Countries with highly developed economies have often advanced telecommunications infrastructures, while such investments are more limited in countries having less developed economies (Ford et al. 2003). Yet, the rate of IS adoption across countries diverges considerably regardless of the income levels or e-government readiness indices (Erumban/De Jong 2006), as seen in the difference between developed countries in west and north Europe (United Nations 2012, 2010). In such nations, the remaining factors including physical environment and IT infrastructure are also quite comparable. Therefore, economic factors impact infrastructure and service availability, and political factors and the physical

environment can also have a part to play in explaining the difference in IS adoption between nations. However, when all those factors have been considered, any remaining difference in adoption rates is likely to be explained by difference in *national culture*. This issue was also remarked by Erumban and Jong (2006) as follows (p. 303):

> *"It may be argued that the cross-country variation in technology adoption is not only due to economic conditions, but also to ... a country's national culture."*

Prior literature on trust recognized the important influence of national culture on *trust* (Sia et al. 2009; Gefen/Heart 2006). Trust and culture are two closely related phenomena (Doney et al. 1998). It is widely accepted that the concept of trust should be viewed from the perspective of national culture (Jarvenpaa et al. 2000; Gefen/Heart 2006; Doney et al. 1998; Fukuyama 1995; Hofstede 1980; Pavlou/Chai 2002).

Nations are societies with common values and norms. As discussed in Akkaya, Wolf and Krcmar (2012a) in detail, "the development of trust in a culture depends on the societal norms and values that guide people's behavior and beliefs" (p. 2532). Doney, Cannon and Mullen (1998, 601) state that "each culture's collective programming results in different cultural norms … which directly influence the decision mechanisms used to decide whether and whom to trust" (p. 601). There is also literature suggesting a feedback loop between trust and national culture (Doney et al. 1998; Fukuyama 1995). According to Doney, Cullen und Mullen (1998), "trust may influence the development of cultural norms and values that foster the development of trust" (p. 1998).

Cultural characteristics reveal important aspects that may account for beliefs about situational normality and privacy concerns. As a result, reactions to risk and handling of trust differ from nation to nation (Akkaya et al. 2012a). According to Doney, Cannon and Mullen (1998) establishment of trust depends upon the societal norms and values that guide people's behaviors and beliefs. Consequently, trust and culture should be studied together, as one cannot be understood without considering the other.

It has been illustrated that national culture influences information systems above and beyond political, economic, and physical factors (Ford et al. 2003). Among all the factors that influence the adoption of IS; culture is the most difficult one to isolate, define and understand. It is resistant to change and difficult to measure. There are many dimensions in which national cultures differ. For instance, trust is found to be a more important predictor of usage behavior in countries where *uncertainty avoidance* is higher (Cyr 2008; Pavlou/Chai 2002). Such dimensions are examined in a variety of cultural frameworks, which guide the national level of cultural research and analysis.

4.4.2 Commonly Used Cultural Frameworks in Cross-Cultural Research

The cultural differences between societies are multi-dimensional, and are driven by both values and practices. Various cultural frameworks have been proposed to understand the influence of

culture in various contexts (Schwartz 1994; Hofstede et al. 2010; Trompenaars/Hampden-Turner 1998).

4.4.2.1 Concepts of Edward Hall on Intercultural Communication

The U.S. anthropologist Edward Twitchell Hall has been acknowledged as one of the first researchers who distinguished between several dimensions of national character. His two influential works "The Silent Language" (Hall 1959) and "The Hidden Dimension" (Hall 1966) have inspired many researchers in several fields of intercultural communication. These books were followed by "Beyond Culture" (Hall 1976) where he argues further that communication constitutes the core of culture.

Hall (1959) divided cultures into *high-context* and *low-context* classifications according to their ways of communicating. *High-context cultures* rely heavily on subtle, often nonverbal cues leaving many things unsaid. In such cultures, word choice is crucial since a few words can be used for a complex message. In *low-context cultures*, on the other hand, language expresses thoughts, feelings, and ideas directly and much more explicitly. In such cultures, the value of a single word is not very important and can be clarified in a conversation. Most of the information is implicit in high-context cultures, whereas almost everything is explicit in low-context cultures. According to Hofstede (2011), "this distinction overlaps largely with the traditional versus modern distinction" (p. 11).

Other than the dimensions in communication, Hall has introduced two more concepts by analyzing the implications of cultural differences in various contexts. The first one is related to the impact of proxemics behavior which refers to human use of space within a culture. By developing the theory of "proxemics", Hall (1966) demonstrated how a person's use of *space* can affect his or her attitudes and cross-cultural interactions. He argued that each nation defines an organized space under the influence of their national culture at an unconscious level, which may result in serious communication failures in cross-cultural environments.

The second concept of Hall (1976) was named as *polychromic versus monochromic time orientation*, and deals with how cultures perceive and manage time. Individuals in *monochromic cultures* tend to do one thing at a time. They tend to plan their tasks and activities in detail. Individuals in monochromic cultures move on to another task, only after one task is completed. In contrast, *polychromic cultures* are involved with many things simultaneously. They switch from one activity to another and prefer working flexibly.

By describing how people behave and react in different cultures, Hall aimed to support international business. He believed understanding such cultural differences and hidden signals are crucial to success in international business. Hall argued that many intercultural business relationships suffer because managers from one culture fail to understand the specific characteristics of another culture. To bring more clarification, he published the "Hidden Differences: Doing Business with the Japanese" (1990a), specifically intended to clarify Japanese psychology and behavior for American business executives interacting with the Japanese market.

4.4.2.2 Kluckhohn and Strodtbeck's Value Orientation Theory

One of the first systematic discussions of national value orientations and their influence on organizational systems was developed by the U.S. cultural anthropologists Florence Kluckhohn and Fred Strodtbeck (1961). They identified five areas in which cultural groups differ and named them as *value orientations*:

1. *Relation to broad environment and nature*

   This dimension addresses the beliefs in the society regarding how people value their relationship to nature (i.e. mastery over nature, harmony with nature or subjugation).

2. *Relationships among people*

   This dimension is related to beliefs in the society regarding the social relations (i.e. organization of society around individual goals, collateral interests or around a lineal hierarchy of authority).

3. *Activity*

   This dimension addresses beliefs in the society regarding appropriate human goals (i.e. striving for specific accomplishments, striving for integration or focusing on living in the present moment).

4. *Time*

   This dimension addresses the extent to which a society gives priority to traditional customs, future plans, or present events in their actions and decisions (i.e. making decisions under the influence of future prospects, present circumstances or past events).

5. *Nature of Humans*

   This dimension is related to socially normal beliefs about whether people are born as inherently good, neutral, or evil (i.e. basic human nature is good, neutral or evil).

The value orientations are described on a three-point continuum of *modern* (low context), *mixed* and *traditional* (high context). The framework of Kluckhohn and Strodtbeck was the foundation of several other cultural dimensions systems developed subsequently (e.g., House et al. 2004; Trompenaars/Hampden-Turner 1998).

4.4.2.3 Hofstede's Cultural Dimensions

The most popular cultural dimensions framework based on a systematic collection of cultural data was developed by the Dutch social psychologist Geert Hofstede (1980; 1991). Using Inkeles and Levinson's (1969) work as a theoretical foundation, Hofstede conducted two large-scale studies at IBM around the 1970s which resulted in a new taxonomy for a better understanding of cultural differences. Originally developed as a four dimensional model of national culture, his framework was "later expanded and updated on the basis of an analysis of a wide range of other cross-cultural data" (Minkov/Hofstede 2011, 10).

Hofstede introduced his work to researchers with the publication of his first monograph "Culture's Consequences: International Differences in Work-Related Values" (1980). In 1991, he published his book named "Cultures and Organizations: Software of the Mind" (1991) which interpreted the results of his previous work and extended with more recent findings. Hofstede has caught the attention of the academic world with this book, and it has been translated into 18 languages (Minkov/Hofstede 2011).

Over the years, his framework has become a cornerstone in cross-cultural research (Akkaya et al. 2012a). He constructed the following dimensions of national culture dealing with the challenges of societies: *power distance, uncertainty avoidance, individualism versus collectivism,* and *masculinity versus femininity* (Hofstede 1980).

Power Distance Dimension

The *power distance* dimension, represented by the Power Distance Index (PDI), deals with how a society deals with levels of status and distribution of power, including the relationship with authority (Hofstede et al. 1991). It measures the extent to which the less powerful members of a society expect and accept the unequal distribution of authority (Hofstede et al. 1991).

In high *power distance* societies, less powerful members accept the unequal distribution of social power and are more likely to obey policy-makers. Inequality is expected and accepted as a law of nature rather than a problem. Low *power distance* societies, on the other hand, consider every individual equal despite differences in status, wealth or intellectual capacity (Hofstede et al. 1991).

Individualism versus Collectivism Dimension

The *individualism versus collectivism* dimension, represented by the Individualism versus Collectivism Index (IDV), is concerned with the relationship between the individual and the group (Hofstede et al. 1991). It is the degree to which people in a culture prefers to act as individuals rather than being integrated into groups (families, clans or organizations) (Hofstede et al. 1991).

In a highly individualist society such as the U.S., priority is given to individual interests rather than group interests. Ties between individuals are loose and individual decision-making is valued. Individuals are expected to look after themselves and only the immediate family (Hofstede et al. 1991).

Collectivism, on the other hand, emphasizes being a member of a group rather than acting as an individual. In such societies, people value strong family ties. Extended families (uncles, aunts, grandparents and cousins) are expected to continue to protect and support them throughout their lifetime (Hofstede et al. 1991).

Masculinity versus Femininity Dimension

The *masculinity versus femininity* dimension, represented by the Masculinity versus Femininity Index (MAS), refers to the social and emotional implications of having been born as a female

or a male (Hofstede et al. 1991). This dimension reveals insights about gender role differences or gender inequalities in a society, including their reflections upon work goals.

Cultures with a high masculinity ranking emphasize concerns for material success, career goals, competitiveness and assertiveness, while cultures with feminine values emphasize being modest and tender (Hofstede et al. 1991). Individuals are concerned with the quality of their life as well as conducting warm personal relationships rather than focusing mainly on material goals.

Uncertainty Avoidance Dimension

The *uncertainty avoidance* dimension, represented by the Uncertainty Avoidance Index (UAI), is "the extent to which the members of a culture feel threatened by ambiguous or unknown situations" (Hofstede et al. 1991, 113). Ambiguous situations cause anxiety so individuals seek ways of dealing with uncertainty. Cultures with high UAI scores are associated with high levels of anxiety sensitivity and intolerance for ambiguity. Consequently, they tend to be distrustful of new ideas, behaviors or innovations.

This dimension has been increasingly receiving attention in IS adoption and trust research (Akkaya et al. 2012a; Srite/Karahanna 2006; Zhang/Maruping 2008). It is closely related to *risk*. Risk in online environments is related to perceptions of the *uncertainty* and negative consequences of transacting online (Dowling/Staelin 1994). All reasons which cause uncertainty increase the perceived riskiness of online transactions. Culture has been found to be one of the reasons that affect how people react to risk (Yamagishi/Yamagishi 1994). Being a member of a high UAI culture may itself increase the perceived riskiness of using online services. Jarvenpaa and Tractinsky (1999) argue that "when risk is present, trust is needed to make transactions possible" (p. 2). Therefore, cultures having higher UAI scores are more likely to need higher amounts of trust to make online transactions.

People in cultures with a high score on this dimension try to reduce or avoid uncertainty by establishing formal laws, rules, regulations and control. Low *uncertainty avoidance*, on the other hand, means a greater willingness to take risks (Hofstede 1984). Individuals from societies where *uncertainty avoidance* is low tend to be more tolerant of people from other cultures as well as different ideas. Those people are more open to variety and novelty (Choi/Geistfeld 2004) and are more likely to accept innovations.

The original Hofstede framework (1980) consisted of the four dimensions discussed above. Although his observations and analysis involved much more than the universal dimensions of national culture, Hofstede's work is best known for the deconstruction of culture into four universal dimensions. In the later editions of his book, two new dimensions have been added to this framework: *Confucian work dynamics* (Hofstede et al. 1991) which was later renamed as *long-term versus short-term orientation* (Hofstede 2001a) and *indulgence versus restraint* (Hofstede et al. 2010), which are discussed next.

Long-Term Orientation versus Short-Term Orientation Dimension

A fifth cultural dimension of *Confucian work dynamics* was introduced in 1991 as a distinct cultural dimension. It was based on the results of a study conducted across 23 countries using

the Chinese Value Survey (CVS) (Chinese Culture Collection 1987). This dimension represents values associated with Confucian Dynamism[30] which are prevalent in many Asian countries.

In second edition of his book 'Culture's Consequences', Hofstede (2001a) renamed this dimension as *long-term versus short-term orientation,* represented by the LTO index. This dimension is concerned with the focus of people's efforts: future-oriented life goals, past-oriented life goals or present-oriented life goals. It represents "the extent to which a society exhibits a pragmatic or future-oriented perspective rather than a conventional historic or short-term point of view" (De Mooij/Hofstede 2010, 90). Thrift and perseverance are associated with a long-term orientation, whereas respect for tradition, fulfillment of social obligations and protecting one's "face" are associated with short-term orientations (Hofstede/McCrae 2004).

This dimension was found to be significantly correlated with economic growth and provided a cultural explanation of the East Asian economic miracle (Hofstede/Bond 1988). Even though a few authors found a direct influence of *time orientation* value on technology adoption (Li et al. 2009), this dimension has not been addressed in most of IS cultural studies "due to focus on Asian value systems" which may not be of interest for studies conducted in other regions (Srite/Karahanna 2006).

Initially, scores for the new dimension were only available for twenty-three countries. The countries which were not in the CVS were not analyzed. In 2005, LTO scores for sixteen additional countries based on replications and extrapolations were added. However "they were still too few, and of doubtful quality" (Hofstede et al. 2010, 239). By using Bulgarian linguist and sociologist Michael Minkov's analysis of the World Values Survey (WVS) (2006; Minkov 2007) (see Section 4.4.2.6 below), the database has been extended to ninety-three countries.

Indulgence versus Restraint Dimension

The *indulgence versus restraint* dimension, represented by the Indulgence versus Restraint index (IVR) Index, was added in the most recent version of the Hofstede's framework model (2010). It is related to the extent of gratification of human desires for enjoying life, "perceptions of happiness and life control as well as importance of leisure" (Minkov 2009, 156). As elaborated by Minkov (2009), "it reflects the degree to which it is culturally acceptable to indulge in leisurely and fun-related activities, either with family or friends or alone, and spend one's money, at one's own discretion" (p. 174). *Indulgence* refers to a tendency toward the free gratification of these desires and feelings. Societies with higher indulgence have higher percentages of happy people. *Restraint* refers to a society which "controls such gratification of desires and regulates them by means of strict social norms" (Hofstede 2011, 15). In such societies, severe restrictions are imposed on the enjoyment of life so the percentage of happy people is likely to be lower.

Although the relatively new sixth dimension has been recognized as a new dimension of Hofstede's framework by some scholars (Arenas-Gaitán et al. 2011; Rinne et al. 2012), no empirical research including this dimension has been found.

[30] Confucian Dynamism "deals with a choice from Confucius' ideas and that its positive pole reflects a dynamic, future-oriented mentality, whereas its negative pole reflects a more static, tradition-oriented mentality" (Hofstede/Bond 1988, 16).

Hofstede employed rigorous methods in the development of his multi-dimensional cultural model. His work originated from his analysis of 116,000 survey questionnaires, administered to employees of IBM between 1967 and 1973 in sixty-six countries (Minkov/Hofstede 2011). Subsequently, the survey was validated with an international population of non-IBM managers from a variety of organizations. These people came from different organizations in fifteen countries, and attended courses at a business school in Switzerland, where Hofstede was a visiting lecturer. The results were used in hypothesis development, which were then tested using data from national economic and social indicators and public opinion polls (Ford et al. 2003). By using six major replication studies conducted between 1990 and 2002, the number of countries in the model has been increased. The latest edition of his book (2010) gave scores for the first four dimensions of his cultural framework in 76 countries and regions. The two new dimensions of the LTO and the IVR have been extracted from Minkov's (2007) analysis of results of the World Values Survey (1981; Inglehart 1997). These dimensions are available for 93 countries. Data on all dimensions of Hofstede (2010) for the selected countries is provided in Table 4-5 below.

It is important to note that Hofstede's framework (1991) was developed to assess culture at a *national level*. Therefore "distance scores" in his framework represent the existence of differences between countries. These national level measures are meant to be used for comparing *countries*, rather than comparing groups[31], organizations or individuals. Hofstede (2001a) in Minkov and Hofstede (2011) "indicated that the idea of constructing dimensions at the national level occurred to him after realizing that, analyzed at the individual level, his IBM-based data did not make much sense" (p. 12). Indeed, "his dimensions are *meaningless* as descriptors of individuals or as predictors of individual differences because the variables that define them do not correlate meaningfully across individuals" (Minkov/Hofstede 2011, 12). Although this issue has been underlined several times in prior literature (Ford et al. 2003; McCoy et al. 2005; Straub et al. 2002; Blodgett et al. 2008), articles that attempt to use the dimensions at individual or organizational level appear periodically in various journals (e.g., Taras et al. 2010).

[31] For instance, the Cultural Perspectives Questionnaire (CPQ) developed by Maznevski (1994) would be an appropriate cultural framework to compare groups.

Country	PDI	UAI	IDV	MAS	LTO	IVR
Australia	38	51	90	61	21	71
Austria	11	70	55	79	60	63
Belgium	64	95	75	52	82	57
Brazil	69	76	38	49	44	59
Canada	39	48	80	52	36	68
China	74	30	16	66	87	24
Denmark	18	23	74	16	35	70
Finland	33	59	63	26	38	57
France	68	86	71	43	63	48
Germany	35	65	67	66	83	40
UK	35	35	89	66	51	69
Hong Kong	68	29	25	57	61	17
India	77	40	48	56	51	26
Italy	50	75	76	70	61	30
Netherlands	38	53	80	14	67	68
Norway	31	50	69	8	35	55
Singapore	74	8	20	48	72	46
South Africa	49	49	65	63	34	44
Spain	57	86	51	42	48	44
Sweden	31	29	71	5	53	78
Switzerland	26	63	67	65	74	66
Taiwan	58	69	17	45	93	49
Turkey	66	85	37	45	46	48
USA	40	46	91	62	26	68

Table 4-5. Hofstede's cultural dimensions for the selected countries
Source: Own Illustration based on (Hofstede 2013; Hofstede et al. 1991; Hofstede 1980; Hofstede et al. 2010)

Hofstede's extensive work on cultural dimensions has been applied in various contexts (e.g., studies of advertising (Gregory/Munch 1997), construction (Pheng/Yuquan 2002) and persuasion (Maheswaran/Aaker 1997)). His work has also been received enthusiastically by the IS research community. Some example applications of his framework include examination of cross-cultural influences in adoption of innovations (Singh 2006), perception and use of e-mail (Gefen/Straub 1997), and escalation of commitment behavior in IT projects (Keil et al. 2000).

In the area of trust, Hofstede's framework (1991) has been used to depict how cultural norms and values influence trust-building processes of societies (Doney et al. 1998). Jarvenpaa (1999) examined cultural influences on the antecedents of consumer trust in an Internet store in a cross-cultural validation. In this study, he compared samples from Australia, Finland and Israel, and hypothesized cultural influences based on the *individualism* dimension. The analysis revealed no strong cultural effects in terms of the trust antecedents. This result may, however, be caused by using the *individualism* dimension, which is not necessarily related to trust beliefs.

Especially relevant for IS adoption research and trust in online environments is the *uncertainty avoidance* dimension. This dimension deals with a society's tolerance for uncertainty and ambiguity. Cultures having low UAI have higher risk tolerance (Kale/Barnes 1992; Hofstede et al. 1991), while cultures having high UAI tend to be more concerned about uncertainty and ambiguity. Since such cultures seek stability and predictability, they tend to resist the acceptance of online technologies due to the existence of inherent risks (Akkaya et al. 2012a). In a study comparing the adoption of e-mail and fax in U.S. and Japan, Straub (1994) demonstrated that the high UAI of the Japanese result in less willingness to accept e-mail. Another study discussed in (Akkaya et al. 2012a) found evidence that high *uncertainty avoidance* nations tend to be more risk-averse and adopt e-government much slower than low *uncertainty avoidance* cultures (Arslan 2009).

The uncertainty avoidance index plays a critical role in understanding user behavior in technology by affecting individual's propensity to adopt a technology (Choi/Geistfeld 2004). Its influence has also been examined in other studies concerned with trust in online environments (e.g., El Said/Galal-Edeen 2009) and IS adoption studies (e.g., Straub 1994; Warkentin et al. 2002; Png et al. 2001). In fact, the UAI was found to be *the most influential national culture value* affecting the adoption of IS (Straub et al. 1997; Sundqvist et al. 2005; de Luque/Javidan 2004). Due to its high relevance in adoption of online technologies, it has become the *most frequently used dimension* in studies examining the influence of culture on IS adoption (Leidner/Kayworth 2006).

While Hofstede's work was not the first framework in cross-cultural research (see Kluckhohn/Strodtbeck 1961; Hall 1959), his research has had a remarkable effect on academics and business scholars. His work received enthusiastic reviews by leading sociologists and the robust factor analyses results have demonstrated its high validity and reliability (Shane 1992). According to Fernandez et al. (1997), Hofstede "provided a watershed conceptual foundation for many subsequent cross-national research endeavors" (p.44). Søndergaard (1994) indicated that Hofstede's taxonomy (1991) was based on "a rigorous research design, a systematic data collection and a coherent theory to explain national variations" (p. 449). Sivakumar and Nakata (2001) recognized Hofstede's cultural framework as well established and widely applied in international business research.

Although much of Hofstede's work (especially the first four dimensions) on cross cultural differences has been widely recognized by scholars and practitioners, concerns over his

taxonomy have also been expressed (see Roberts/Boyacigiller 1984; Cooper 1982). As discussed by Fang (2003), his fifth dimension has not been "received enthusiastically by the cross cultural research community since it was launched in 1991" (p. 350). Kalé (1996) stated that "conceptual and empirical support for this dimension is not very exhaustive" (p. 22). Some researchers have intentionally left out the fifth dimension in their research and replications (Søndergaard 1994). Triandis (1982), in his review of the Hofstede's book, has not even mentioned the fifth dimension.

Hofstede remained confident and tolerant regarding mixed reviews of his research. He believed that such a comprehensive study could not escape criticism especially considering the intangible and dynamic nature of culture. Hofstede (2013) considered criticism a normal process in "such a ground-breaking work":

> *"I had made a paradigm shift in cross-cultural studies, and, as Kuhn (1970) has shown, paradigm shifts in any science meet with strong initial resistance."*

The critics of Hofstede's work have focused on a number of aspects. Hofstede (2002) identified five standard categories of criticisms against his approach and has defended himself (p. 1356):

1. *Surveys are not a suitable way of measuring cultural difference*s

   Besides agreeing that surveys should not be the only way of measuring, Hofstede notes that examination of 76 nations would not be possible with other research methodologies. Furthermore, survey methodology has been the most common data collection method used to draw conclusions about culture for various cross-cultural studies, market researchers and sociologists (Hofstede 2002).

2. *Nations are not the best units for studying cultures*

   Hofstede agrees that nations may not be the best units to study culture. However, they are "the only kind of units available for comparison and better than nothing" (Hofstede 2002, 1356).

3. *A study of the subsidiaries of one company cannot provide information about entire national cultures*

   Hofstede used this data to measure differences between national cultures. According to him, although "any set of functionally equivalent samples from national populations" (Hofstede 2002, 1356) can be used to study such differences, "the IBM set consisted of unusually well matched samples for an unusually large number of countries" (Hofstede 2002, 1356).

4. *The IBM data are old and therefore obsolete*

Hofstede argues that "the dimensions found are assumed to have centuries-old roots and only data which remained stable across two subsequent surveys were maintained" (Hofstede 2002, 1356). Moreover, all these data have been "validated against all kinds of external measurements and recent replications show no loss of validity" (Hofstede 2002, 1356).

5. *Four or five dimensions are not enough*

   Hofstede notes that "additional dimensions should be both conceptually and statistically independent from the five dimensions already defined and they should be validated by significant correlations with conceptually related external measures" (Hofstede 2002, 1356). As seen in newer versions of his work (Hofstede et al. 2010), a new dimension satisfying these criteria has been added to his framework.

A literature search reveals two main papers as critiques of Hofstede's model (2010) and his replies to them. Baskerville's (2003) article deals primarily with category two. In his reply to Baskerville, Hofstede (2003) argues that cultural differences based on nation-level data is valid proven by over 400 significant correlations. McSweeney's (2002) article reiterates critiques from categories of one, three and four. He criticizes especially Hofstede's analytical methodology, in particular his approach of drawing conclusions about central tendencies from individual survey analysis. However, his critics have been regarded as insufficient challenges to the Hofstede's model by other scholars (Williamson 2002). Hofstede (2002) replies to McSweeney's critique about his methodology by arguing that this way of interpretation of survey data "applies to all survey and test-based cross-cultural studies, including those of Schwartz, Triandis, market researchers, sociologists and political scientists around the world" (p. 6).

It should be noted that no cultural framework suggested to date has been perfect. Despite some critique, Hofstede's cultural framework continues to be a classic in cross-cultural research and remains as one of the most cited sources in the entire Social Science Citation Index (Hofstede 2013). As remarked upon by Ford, Connelly and Meister (2003, 10):

> *"In spite of criticisms about the validity and generalizability of Hofstede's results, articles published in leading journals have established its usefulness in theory development and testing and have found support for its contributions. Furthermore, in a major citation analysis, Hofstede's work was identified as having one of the most significant impacts, of all research, on the field of international business studies."*

Next, other classifications of national cultures in cross-cultural research are discussed.

4.4.2.4 The Global Leadership and Organizational Behavior Effectiveness (GLOBE) Study

The GLOBE research project was carried out by the U.S. management scholar Robert J. House and his colleagues in 1991 with the aim of measuring practices and values existing at the levels of industry, organization and society. Some findings of the GLOBE project were published in earlier journals (Javidan/House 2001; House et al. 2002), but the complete results were published in 2004 (House et al. 2004).

At first, the major focus of the study was the identification of leadership[32] styles associated with different cultural patterns. In later stages of the study, other aspects of national and organizational cultures were examined. Based on data from 17,300 managers in 951 organizations in the financial services, food processing and telecommunication services industries across 62 nations throughout the world; the GLOBE researchers identified nine quantitative dimensions (House et al. 2014, 12-13; Javidan et al. 2006, 69-70):

1. *Future Orientation*

   This dimension represents "the degree to which individuals engage (and should engage) in future-oriented behaviors such as planning, investing in the future and delaying gratification" (House et al. 2014, 12). In countries high on this attribute, organizations "tend to have longer term horizons and more systematic planning processes" (Javidan et al. 2006, 69). Many people use English as a way to advance in their career. In countries low on this attribute, organizations tend to be less systematic.

2. *Gender Egalitarianism*

   This dimension represents the extent to which organizations and societies minimize (and should minimize) role differences and gender inequality. European countries have generally higher scores. In such countries, a high proportion of women earn an income and have access to resources.

3. *Assertiveness*

   This dimension represents "the degree to which individuals are (and should be) assertive, confrontational, and aggressive in their relationships with others" (House et al. 2014, 12). People in highly assertive countries enjoy competition in work life, while those in less assertive countries prefer harmony in their relationships (Javidan et al. 2006).

4. *Humane Orientation*

   This dimension represents "the degree to which a collective encourages and rewards (and should encourage and reward) individuals for being fair, altruistic, generous, caring, and kind to others" (House et al. 2014, 12).

5. *In-group Collectivism*

   This dimension reflects "the degree to which individuals express (and should express) pride, loyalty and cohesiveness in their organizations or families" (House et al. 2014,

[32] The GLOBE study concentrates on organizational leadership, not on leadership in general.

12). According to Javidan et al. (2006), societies high in this attribute "take pride in their families and also take pride in the organizations that employ them" (p. 70).

6. *Institutional Collectivism*

   This dimension represents "the degree to which organizational and societal institutional practices encourage and reward (and should encourage and reward) collective distribution of resources and collective action" (House et al. 2014, 12). This attribute is especially high in Confucian Asia cultures. Societies high in this attribute "tend to emphasize group performance and rewards, whereas those in more individualistic countries … tend to emphasize individual achievement and rewards" (Javidan et al. 2006, 69).

7. *Performance Orientation*

   This dimension refers to "the degree to which a collective encourages and rewards (and should encourage and reward) group members for performance improvement and excellence" (House et al. 2014, 12). Individuals in societies high in this attribute pursue economic accomplishments, but people in such cultures do not live as long as they do in some other cultures.

8. *Power Distance*

   This dimension refers to "the degree to which members of an organization or society expect (and should expect), and agree that power should be unequally shared" (House et al. 2014, 12). Societies high in this attribute expect that power should be concentrated at higher levels of an organization or government (House et al. 2014, 12).

9. *Uncertainty Avoidance*

   This dimension refers to "the extent to which members of an organization or society strive (and should strive) to avoid uncertainty by reliance on social norms, rituals and bureaucratic practices to alleviate unpredictability of future events" (House et al. 2014, 13).

As explicitly stated by its authors (House et al. 2011), "six culture dimensions have their origins in the dimensions of culture identified by Hofstede (1980)" (p. 13). The scales to measure *uncertainty avoidance, power distance* and *institutional collectivism* are designed to reflect the same constructs as in Hofstede's cultural framework (1980), i.e. UAI, PD and IDV respectively. The dimensions of *gender equalitarianism* and *assertiveness* were developed based on the basis of Hofstede's MAS dimension (1980). The *future orientation* and the *humane orientation* dimensions have been derived from Kluckohn and Strodtbeck's work on values orientation theory (1961) and the *performance orientation* dimension is similar to McClelland's (1961) concept of "need for achievement".

Having roots in Hofstede's (1980) work, the GLOBE study is more appropriate to study influence of national culture on leadership profiles. Examples of research using data from the GLOBE project include analysis of leadership prototypes of different cultural groups (Koopman et al. 1999) and examination of cultural and leadership similarities and variations in different cultures (Nikandrou et al. 2003).

4.4.2.5 Schwartz's Cultural Values Orientations

Another alternative theory to the structure of cultural dimensions by Hofstede (1980) was developed by the Israeli psychologist Shalom H. Schwartz (1992, 1994). He criticized especially the *individualism-collectivism* dichotomy and argued that it is not an adequate typology.

Based on the work of the American psychologist Milton Rokeach (1972); he developed a list of 56 values and labelled his work a "values survey" (Schwartz 1994). He collected data from elementary school teachers and college students in 67 nations. Based on the analysis of this empirical data, Schwartz calculated scores on the seven cultural dimensions: *conservatism* (later called *embeddedness* (Schwartz 2007)), *intellectual autonomy, affective autonomy, hierarchy, egalitarianism, mastery* and *harmony* (Schwartz 1994). These cultural values were summarized in his later studies into three dimensions with two opposing poles: *autonomy versus embeddedness, hierarchy versus egalitarianism, and mastery versus harmony* (Schwartz 1994).

Autonomy versus embeddedness is concerned with the nature of the relationship between the individual and the group. It questions whether the individual's or the group's interests should take precedence and to what extent people are autonomous or embedded in their groups (Schwartz 1999). Autonomy describes cultures in which the people focus on their own interests and are encouraged to express their preferences and feelings, while embeddedness refers to cultures in which the person is embedded in the group and the group interests should take precedence. Schwartz distinguishes further between two conceptual types of autonomy: *intellectual autonomy* and *affective autonomy* (Schwartz 1999, 2007). The former places emphasis on pursuing intellectual ideas and thoughts, whereas the latter places greater emphasis on pleasurable experiences and emotions.

Hierarchy versus egalitarianism deals with behavior which preserves the social fabric (Schwartz 1999). Hierarchy emphasizes unequal power and wealth distribution, whereas egalitarianism stresses social justice and equality. *Mastery versus harmony* is concerned with the relationship between humankind and the natural and social world (Schwartz 1999). Mastery emphasizes concentrating on aspects like ambition and success, while harmony focuses on a concordant environment as well as unity with nature.

After noticing that the same dimensions would not apply to individuals, he developed a classification for the individuals. At the individual level, he distinguished between ten dimensions: *achievement, benevolence, conformity, hedonism, power, security, self-direction, stimulation, tradition* and *universalism* (Schwartz 1994). The discussion of Schwartz's individual dimensions is beyond the scope of this thesis and can be found in (Schwartz 1994).

Country scores for teachers in the work of Schwartz (1994) were found to be significantly correlated with the IBM scores by Hofstede (1991), which is not a surprising result considering the similarities between both frameworks. Schwartz (1994) reported that affective autonomy, intellectual autonomy and egalitarianism were positively correlated with Hofstede's individualism dimension; while conservatism and hierarchy showed a negative correlation with it. As discussed by Ng, Lee and Soutar (2007), Hofstede's power distance dimension "was positively correlated with conservatism … and negatively correlated with his affective autonomy … dimension" (p. 170). Finally, Hofstede's uncertainty avoidance score "was positively correlated with harmony … and Hofstede's masculinity score was positively correlated with mastery" (Ng et al. 2007, 170). Some authors even argue that both frameworks

overlap almost completely although they were developed at different times based on different methods (Smith/Bond 1988).

Schwartz's cultural value orientations have not been subject to much empirical research. In fact, most publications utilizing Schwartz's cultural theory of values were co-authored by Schwartz himself. Research areas using his framework include identification of sources of guidance on which managers rely (Smith et al. 2002), and the examination of gender differences across and within diverse cultures (Struch et al. 2002).

4.4.2.6 Inglehart and associates' World Values Survey

Another major piece of cross-cultural research conducted in the 1990s is the World Values Survey (WVS), which was expanded from the *European Values Survey* of six European universities in the early 1980s. The U.S. sociologist Ronald Inglehart and his associates (1997) expanded it to a periodic survey describing individuals' norms, opinions and attitudes with samples of adult population (age 18 and over) from 65 countries. The studies as well as their results are freely accessible on the web (www.worldvaluesurvey.org).

The WVS has run since 1981. Data has been collected in ten year intervals with an increasing population base, which has exceeded hundred countries worldwide. The questionnaire includes 360 items from the areas "ecology, economy, education, emotions, family, gender and sexuality, government and politics, health, happiness, leisure and friends, morality, religion, society and nation, and work" (Hofstede 2011, 14). A total of ten indicators have been defined to cover these areas, including interpersonal trust, subjective civic competence and national pride. Although the search for cultural dimensions was not the main aim of his research, Inglehart identified two country-level factors based on a statistical analysis of the nation-level data from 43 societies collected in the 1990-1991 World Values Survey (Inglehart/Baker 2000):

1. *Self-expression (well-being) versus Survival*

   This dimension represents the emphasis of happiness and quality of life values with the transition from industrial society to post-industrial society (Inglehart/Baker 2000, 22). Priorities in post-industrial societies have shifted "from an overwhelming emphasis on economic and physical security toward an increasing emphasis on subjective well-being" (Inglehart/Baker 2000, 22), life control and importance of leisure.

2. *Secular-rational versus Traditional authority*

   This dimension is related to the importance of religious beliefs, family life and perception of authority. Traditional societies – mainly pre-industrial societies – are relatively authoritarian and strongly religious. These societies tend to emphasize male dominance in economic and political life and the importance of traditional family values. Societies with highly secular-rational values, in contrast, emphasize less deference to authority and have a lower sense of national pride and religion.

   The analysis of survey results reveals that industrialization promotes a shift of orientation from traditional to secular-rational values, in almost all industrial societies (Inglehart/Baker 2000).

Both dimensions were strongly correlated with the Gross National Product per capita. These two dimensions are able to explain more than 70 percent of cross-country variation (World Values Survey 1981; Inglehart/Baker 2000). The first dimension was found to be highly correlated with individualism and masculinity dimensions of Hofstede (2011) and the latter was found to be negatively correlated with his power distance dimension.

An interesting feature of the WVS is the *interpersonal trust* measure which has been subject to some research (Vishwanath 2004). Inglehart and his associates calculated a trust index for each country based on the question of "Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?" (World Values Survey 1981). It is comparable to *personality-based trust* or *propensity to trust* (Mayer et al. 1995; Rotter 1971); however, by representing only one dimension of the concept, it fails to provide a multi-dimensional measurement scale of trust.

Examples of research using data from the WVS include an analysis of similarities and differences in IS use at an individual level across nations (Bagchi/Kirs 2009), and exploration of micro-level connections between societal levels of interpersonal trust measures and online behavior (Vishwanath 2004).

4.4.2.7 Trompenaars & Hampden-Turner's Cultural Model

Another cultural model is suggested by the Dutch business consultant Fons Trompenaars and British academician Charles Hampden-Turner (1998), and is named after them. The theoretical model developed by Trompenaars and Hampden-Turner aims to explain cultural differences, particularly the fundamental challenges of humans in the organization of social communities. They argue that every culture is distinguished from the others by the selection of solutions to certain dilemmas (Trompenaars/Hampden-Turner 1998).

The cultural model distinguishes seven fundamental dimensions of culture that are generic across national and organizational cultures categorized under three headings: "those which arise from our relationships with other people, those which come from the passage of time, and those which relate to the environment" (Trompenaars/Hampden-Turner 1998, 8):

1. *Universalism versus Particularism*

   This dimension addresses the extent to which people base their solution on rules versus relationship with others (i.e. breaking rules if necessary or applying rules strictly).

2. *Individualism versus Communitarianism*

   This dimension is related to the extent to which individuals act according to their own needs or those of the social group (i.e. emphasis on individual development or on well-being of the group).

3. *Neutral versus Affective (Emotional)*

   This dimension is related to the extent to which feelings can be openly expressed in a culture (i.e. people reveal their feelings or hide them).

4. *Specific versus Diffuse*

This dimension represents the extent to which public/private life and personal spaces are separated (i.e. business and friendships are diffused or separated).

5. *Achievement versus Ascription*

   This dimension addresses the extent to which status stems from personal achievements or an individual's social role (i.e. emphasis of social relations or accomplishments).

6. *Attitudes to Time*

   This dimension represents the extent to which time is perceived as linearly or repetitively (i.e. time follows a linear progression or is it cyclical).

7. *Attitudes to the Environment*

   This dimension represents the extent to which individuals believe that they can control nature and social circumstances, or are controlled by them (i.e. individual determinism or nature determinism).

Since this framework is mainly based on the work of previous sociologists — the first five dimensions from Parsons and Shils (1951) and the latter two from Kluckhohn and Strodtbeck (1961 — doubts about the empirical basis of these dimensions have been expressed {Hofstede, 2010 #1525).

Although their framework has been quite often cited in cross-cultural research, no academic publication reporting on empirical results has been found in the IS context. The available publications in other contexts were mostly co-authored by Trompenaars or Hampden-Turner. The model has been tested to examine the psychometric properties of a life scale in a Dutch sample (Trompenaars et al. 2005), and to investigate the gender differences in term of locus of control and affectivity in organizations (Smith et al. 1997).

4.4.2.8 Comparison of Different Cultural Frameworks

It should be noted that the list of cultural classifications discussed in this thesis is by no means exhaustive. While some other cultural classifications of organizations and nations exist (Triandis 1980; Hall/Hall 1990b), the ones listed above have been used and cited most frequently in prior IS literature[33]. Among all, Hofstede's typology (2010) together with the country rankings has been extensively, almost exclusively adopted by the cross-cultural research community (Harrison/McKinnon 1999; Myers/Tan 2002).

A close analysis of the various cultural frameworks reveals a resemblance among the existing classifications (see Table 4-6 below). It is important to recognize that, although some dimensions overlap, some categories are defined more broadly than the others. For instance, the *secular-rational versus traditional authority* dimension in World Values Survey (Inglehart 1997) measures the extent of religious beliefs in a society as well as perception of authority; while Hofstede's (1980) and GLOBE's *power distance* score (House et al. 2004) do not assess the impact of religion.

[33] A more comprehensive analysis of different cultural frameworks in IS Research can be found in (Myers/Tan 2002).

Hofstede	Hall	Kluckhohn and Strodtbeck	GLOBE	Schwartz	World Values Survey	Trompenaars and Hampden-Turner
Power distance			Power distance	Hierarchy vs. Egalitarianism	Secular-rational vs. Traditional authority	
Individualism vs. Collectivism		Relationships among people	In-group Collectivism Institutional Collectivism	Autonomy vs. Embeddedness		Universalism vs. Particularism Individualism vs. Communitarianism
Masculinity vs. Femininity			Gender Egalitarianism Assertiveness	Mastery		Neutral vs. Emotional
Uncertainty avoidance			Uncertainty avoidance	Harmony		
Long-term orientation	Monochronic vs. Polychronic	Time	Future Orientation			Attitudes to Time
Indulgence vs. Restraint					Well-being vs. Survival	
	Space orientation (proxemics)					Specific vs. Diffuse

to be continued on the next page…

Hofstede	Hall	Kluckhohn and Strodtbeck	GLOBE	Schwartz	World Values Survey	Trompenaars and Hampden-Turner
	High vs. Low context					
		Nature of humans				
			Humane Orientation			
		Activity	Performance Orientation			Achievement vs. Ascription
		Relation to broad environment				Attitudes to the environment

Table 4-6. Correspondence between National Cultural dimensions of various Frameworks
Source: Own Illustration

Moreover, some dimensions overlap with more than one dimension in another framework such as the *mastery versus harmony* dimension of Schwartz (1994). In this case, the first sub-dimension of *mastery* corresponds to *masculinity versus femininity* score of Hofstede (1980), whereas the second sub-dimension of *harmony* is comparable with the *uncertainty avoidance* dimension. Similarly, the *individualism versus collectivism* dimension of Hofstede (1980) is similar to *in-group collectivism* and *institutional collectivism* dimension of GLOBE (House et al. 2004).

Even though some dimensions have similar names they may represent different concepts. For example, Kluckhohn and Strodtbeck's (1961) *nature of humans* is concerned with the basic nature of people beings good/evil and changeable/unchangeable. Even though it sounds similar, the *humane orientation* dimension of GLOBE (House et al. 2004) deals with the fairness and kindness of individuals in organizations and societies.

Finally, one point needs to be highlighted. Although being among the first cultural frameworks, Hofstede's dimensions include most of the concepts included in those that came later. This fact justifies further use of his dimensions and its leading role among numerous cultural frameworks. Next, an overview of prior research on espoused cultural values in technology adoption and trust research is summarized.

4.4.3 Overview of Prior Research on Espoused Cultural Values in Technology Adoption and Trust

The relevance of national culture to the diffusion of information technology has been illustrated by many scholars to date. Srite and Karahanna (2006) used the extended TAM (TAM (Davis 1989) plus social norms) with Hofstede's (1980) cultural dimensions as moderators to study the role of espoused national cultural values on technology acceptance behaviors. Although their data was collected from graduate and undergraduate students at a U.S. university rather than drawn directly from specific countries, it was an important study discussing the importance of national culture in technology adoption behaviors. The results suggest that the *espoused uncertainty avoidance* consistently moderates the relationship between social norms and intention to adopt.

In a research project, Straub (1994) observed that U.S. companies exploited the advantages of IT such as e-mail, whereas Japanese firms preferred utilizing fax. Using Hofstede's national culture indices (1980), Straub hypothesized that culture is a possible explanation for these differences. In particular, he has posited that high *uncertainty avoidance* in Japan influence Japanese knowledge workers against e-mail, but in favor of fax. Empirical results verified many predicted differences between Japanese and American cultures and suggested that these cultural effects were real. Based on the results of his study, Straub (1994) advised researchers "to include culture as a key variable in studies which draw on an international sample base" (p. 39).

Watson, Ho and Raman (1994) compared the U.S. and Singaporean samples for group support system (GSS) adoption. Prior literature has already identified research group size, member proximity and task type as relevant for GSS (Desanctis/Gallupe 1987). However, Watson, Ho and Raman (1994) posited that GSS design often reflects the customs of the particular culture in which it was developed. Therefore, GSS design may need modification in order to adopted in another culture. By using Hofstede's dimensions of national culture (1980), the authors pointed out that Singapore and the U.S. belong to different cultural groups. Empirical findings

showed that espoused *collectivism* dimension of Singapore's culture creates greater shared understanding of a broad set of beliefs in groups, while the espoused *individualism* dimension of the U.S. values that everybody reflects his or her own opinion. The authors concluded that culture needs to be considered alongside previously recognized factors for a successful adoption. In another study comparing the U.S. and Singaporean samples, Tan et al. (1998) found that cultural characteristics moderate the impact of computer-mediated communication.

Grover, Segars and Durand (1994) used Hofstede's dimensions (1980) to study the similarities and differences between IT resource use in the U.S., France and Korea. The main findings were that Koreans, unlike their U.S. and French counterparts, had a more traditional view with little tolerance for risk taking. The results were consistent with their cultural profiles explaining their IT use behaviors.

Straub, Keil and Brenner (1997) compared the TAM model for testing acceptance of e-mail across three different countries: Japan, Switzerland and the U.S. By focusing primarily on the potential impact of the espoused *uncertainty avoidance* dimension from Hofstede's framework (1980), they posited that cultures having higher *uncertainty avoidances* use less computer-mediated communication. The results indicate that TAM explains adoption in U.S. and Switzerland. However, it did not work well with the Japanese sample, which has a relatively higher espoused uncertainty avoidance index compared to other two nations. The authors concluded that "the TAM model may not hold equally well across cultures" (Straub et al. 1997, 9), such as the ones which have relatively high *uncertainty avoidance* indices (Hofstede et al. 1991).

Li, Hess and McNab (2009) also utilized Hofstede's cultural dimensions (2001a) to analyze the influence of national culture values on acceptance of a personal web portal by users in China and the U.S. Based on empirical analysis, the authors concluded that espoused *individualism* and espoused *time orientation* dimensions influence perceived ease of use and perceived usefulness directly (Li et al. 2009).

Another cross-cultural comparative study was conducted by Dinev, Goo and Nam (2009) to test moderating effects of national culture towards user behavior in protective information technologies such as spyware and antivirus software. They examined cross-cultural differences between South Korea and the U.S, which represent two significantly different cultures in Hofstede's framework (2001a). Their findings suggest that the role of cultural factors should be taken into account during "design of effective information security policies, practices and technologies in global networks where multiple cultures coexist" (Dinev et al. 2009, 391).

Jarvenpaa, Tractinsky and Saarinen (1999) examined online book purchasing behavior by undergraduate students from Australia and Israel. Even though their cross-cultural study could not reveal strong cultural differences, the authors called for more research in examining cultural differences in trust antecedents by using culturally representative samples.

With the rising popularity of social networking sites, the moderating effect of culture in this context has also been subject to research. Krcmar, Krcmar and Krcmar (2011a) compared American and German samples on their use of Facebook and found subtle differences between the two samples. Krasnova, Veltri and Günther (2012) investigated the role of culture influencing the motivation of users to create and share content on social networking sites. The researchers selected two nations for comparison – namely the U.S. and Germany – which differ significantly on the UAI dimension of Hofstede's classification (1980). As hypothesized, high level uncertainty avoidance of the German sample resulted in reduced self-disclosure in

response to privacy concerns. Low level of uncertainty avoidance of the U.S. sample, on the other hand, led users to ignore their privacy concerns and trusting beliefs. In another study examining SNS adoption, Krasnova and her colleagues (2011) found significant differences between the German and Russian samples, which "can be largely attributed to the effects of individualism" (p.11).

There are various cross-cultural studies which indicate cultural characteristics should be taken into account to increase trust of users in online contexts. Similar to the impact of national culture on technology adoption, most scholars use cultural dimensions of Hofstede (1991) to analyze the influence of cultural differences in various contexts.

Greenberg (2008) compared samples from Hong Kong and U.S. in terms of consumer trust in online businesses. In particular, security and privacy related risks related to the purchase of products and services were examined (Greenberg et al. 2008). His analysis revealed significant differences between two countries regarding the formation of trust.

Using cross-cultural data collected from students at public universities in the U.S. and Korea, Kim (2005) showed that some determinants of trust were influenced by cultural differences. Based on a research model derived from TPB (Ajzen 1985, 1991); Pavlou and Chai (2002) compared the Chinese and U.S. cultures regarding the drivers of e-commerce. The authors found that cultural differences influenced their proposed research model and moderated its key relationships. Based on their empirical findings, they also proposed integrating trust into the TPB (Ajzen 1985, 1991) to acknowledge the "the fundamental role of trust in e-commerce" (p. 249).

Sia et al. (2009) compared two online bookstores in Australia and Hong Kong in terms of trust-building web strategies and concluded that "adopting a universalistic approach in trust building does not seem appropriate in all cultures" (p. 504). Analyzing the data collected from participants in Canada, Germany and China; Cyr (2008) found that web site design preferences and user interfaces should vary across cultures as they affect trust and satisfaction of users.

The analysis of existing literature reveals some important aspects. First, it is remarkable to see that despite existence of a number of cultural typologies, it is worth emphasizing that Hofstede's framework (1991) has become a cornerstone in cross-cultural research. Second, the samples selected for comparison are not representative of their nations. This fact decreases the validity of the results obtained. Moreover, some studies use students as participants therefore results obtained from these studies cannot be generalized to the rest of the population (Lee et al. 2003b; Legris et al. 2003). Students may have different motivations such as getting grades or attention of their teachers (Legris et al. 2003; Lee et al. 2003b).

Third, prior research examining the role of national culture in IS seems to focus on a few contexts. This is especially apparent for the specific literature which is concerned with trust in online environments. With a few exceptions (e.g., Vance et al. 2008), most of the existing studies examined the impact of culture on trust in the context of e-commerce. Fourth, the majority of the existing research on this subject has been conducted in U.S. Due to the significantly high degree of *individualism* and low degree of *uncertainty avoidance* of the U.S. culture, the question has been raised within the literature of whether these studies can readily be generalized to other cultures (Bagozzi et al. 2000; Benbasat et al. 2008; Akkaya et al. 2012a) without sufficient empirical verification (Udo/Bagchi 2011; Sundqvist et al. 2005;

Srite/Karahanna 2006). This is especially critical for studies which include trust constructs in their research models (Benbasat et al. 2008, 6):

> *"Indeed, research in other realms has questioned whether findings from the United States can be readily generalized to other cultures. This is particularly important in the context of trust, which is at the heart of culture."*

Analyzing the existing literature on trust and national culture as well as the empirical data collected from students in Israel and the U.S., Gefen and Heart (2006) came up with the following conclusion (p. 18):

> *"The central implication of this study is its support on the need to include national culture in e-commerce trust studies. Considering that almost all e-commerce trust is based on studies in the U.S., this should be a wakeup call. If conclusions drawn based on the U.S. cannot be automatically applied to other cultures, researchers should be aware of it."*

Finally, there is also a clear lack of research in terms of cross-cultural analysis. Although a few studies attempt to analyze the impact of national culture on technology adoption and trust in online environments by utilizing samples from a single nation (e.g., Udo/Bagchi 2011; Yoon 2009), cross-national samples should be used to make a meaningful comparison. Indeed, most cultural dimensions and indexes (e.g., Hofstede et al. 2010) are national level measures. Furthermore, most of the existing cross-cultural research on technology adoption and trust in online environments compare the U.S. nation with another culture revealing that comparisons between other nations remain clearly under-researched.

It is suggested that national culture influences the provision and adoption of e-government services as well. Boyer-Wright and Kottemann (2009) argue that national culture may enable or impede the adoption of e-government and its underlying infrastructure. On the basis of empirical investigations in seven countries including the U.S., the UK and Germany, Garfield and Watson (1997) conclude that culture plays a significant role in the development of a national information infrastructure (NII). They found that countries that design NII policies that are appropriate for their culture are likely to be more successful and advised countries to align their national information infrastructure with their national culture.

National culture affects policy-making, relationships of an organization with its environment, relationships among employees (Schneider 1989), decision making and leadership in the public sector (Heales et al. 2004) **which in turn may also influence government's** strategies regarding deployment of e-government services (Khalil 2011). The empirical analysis conducted by Khalil (2011) found that national culture explains a significant amount of the variance in e-government readiness. Other than supply-side barriers, some nations show strong public resistance to government offerings. Prior literature suggests that differences among e-

government adoption behaviors of nations may be attributed to cultural differences, which will be discussed next.

4.5 Overview of Prior Research in Technology Adoption, Trust and Espoused Cultural Values in G2C E-Government Services Context

E-government research is accepted as "a relatively new subject of academic interest in the field of public administration" (Yildiz 2007, 658) and IS research. After the emergence of the e-government concept in the late 1990s, the first decade of academic e-government research was dominated by studies analyzing the contents of government web sites and their best practices, which were mostly descriptive and exploratory (Yildiz 2007). Attempts at *theory testing* or theory building were only a small part of the early research efforts.

In his analysis of e-government literature in terms of rigor and relevance criteria, Grönlund (2004) analyzed 170 papers published in the proceedings of three well-known conferences of e-government, namely DEXA, HICSS and ECEG. His analysis illustrated that e-government literature focuses overwhelmingly on descriptions and little on *theory testing* (Grönlund 2004). For instance, 8 percent of papers had theory testing perspective among the analyzed HICSS publications – an IS conference with a more academic focus – which "may reflect that the field is new and there are not many theories to test" (Grönlund 2004, 182). In a later study with Andersson; Grönlund (2006) confirmed the results of his previous study and underlined that e-government literature is "..still focusing overwhelmingly on descriptions and little on *theory testing*"(Grönlund/Andersson 2006, 1).

Within the last few years, e-government research has become much more diverse (Scholl 2013). Yet, some topics remain relatively under-researched such as "a *better understanding of the factors influencing the adoption of e-government systems"* (Titah/Barki 2006, 1). Governments worldwide have initiated e-government projects since the late 1990s, however the lack of demand by citizens resulted in a specific research need towards understanding e-government from *citizens' perspective* (Williams et al. 2009). As a result, G2C e-government adoption research has increasingly become the focus of research projects (Dwivedi et al. 2011).

Take-up of e-government services by citizens depends upon various criteria including the online service portfolio, existence of diverse delivery mechanisms, provided benefits over the traditional methods of interaction with government, trust and confidence of citizens in the protection of their personal data within an open and accountable government (Titah/Barki 2006; Carter/Bélanger 2004a; Beldad et al. 2010; McDermott 2010; Dwivedi et al. 2011; Weerakkody et al. 2009a). Furthermore, cultural characteristics of nations reveal important espoused values that may account for beliefs about public authorities and privacy concerns (Hofstede 1980; Bélanger/Carter 2008).

4.5.1 Overview of Prior Research in Trust in G2C E-Government Services Context

Trust is an essential element of a relationship in case of uncertainty and risk (Pavlou 2003; Bélanger/Carter 2008). In the context of e-government, *lack of trust* is accepted as one of the main factors impeding the adoption of G2C e-government services (United Nations 2012).

Citizens who perceive the reliability and security of the Internet to be low tend to be more reluctant to adopt e-government services than citizens who perceive government agencies to be more trustworthy (Carter/Bélanger 2005). Due to increasing importance of trust and espoused cultural values in the G2C e-government context, there has been a rise in studies examining adoption from these perspectives. A state-of-the-art review of the literature was conducted in the initial phases on this thesis (Akkaya et al. 2010) in order to locate the specific research gap.

4.5.1.1 State-of-the-Art Review of the Literature

As stated by Hart (1998), it is crucial to conduct a literature review to analyze the research gap before proceeding with any research study. According to Webster and Watson (2002); "a review of prior, relevant research is an essential of any academic project … it facilitates theory development, closes areas where a plethora of research exists, and uncovers areas where research is needed" (p. 13).

In the initial phases of this doctorial research, an extensive literature analysis has been conducted to examine the research gap and determine the exact scope of this thesis (Akkaya et al. 2010). An effective review should involve the leading literature as it is likely to cover the major contributions (Webster/Watson 2002). In this state of the art analysis, all quality IS Literature detailed in (Levy/Ellis 2006) and accessible from Technische Universität München's academic environment has been searched (see Table 4-7 below). The search was implemented on all sources, including journals, conference proceedings, books and magazine articles that were accessible through the electronic databases (Akkaya et al. 2013).

ACM Digital Library	http://portal.acm.org
Business Source Premier (EBSCO)	http://search.ebscohost.com
ISI Web of Science	http://apps.isiknowledge.com
ScienceDirect	http://www.sciencedirect.com
IEEE Xplore	http://ieeexplore.ieee.org
Wiley Interscience	http://www3.interscience.wiley.co
Online Contents Sondersammelgebietsausschnitte (OLC-SSG)	http://gso.gbv.de
Google Scholar	http://scholar.google.de

Table 4-7. Online Databases included in the State-of-the-art Literature Review
Source: Own Illustration based on (Akkaya et al. 2010)

The aim of the literature review was to locate the conceptual and empirical studies analyzing determinants of technology adoption in G2C e-government services context, from a perspective of trust and national culture. First a broad search of abstracts of the publications with the keywords of 'trust', 'citizen', 'adoption', 'diffusion', 'acceptance' and 'e-Government' was performed in all possible permutations and combinations taking into consideration the logical AND and OR as appropriate (Akkaya et al. 2013). Each time, the search was also repeated with

the keyword ‘eGovernment’ to cover different writing styles. Then the irrelevant documents were eliminated manually. Finally, forward and backward screening was conducted by scanning through the references cited in the publications. As shown in the Table 4-8 below, the overall search resulted in a total of 288 documents.

ACM Digital Library	EBSCO	ISI Web of Science	Science-Direct	IEEE Xplore	Wiley Inter-science	OLC-SSG	Google Scholar
13	51	48	28	39	20	12	77

Table 4-8. Total number of hits
Source: Own Illustration based on (Akkaya et al. 2010)

After removing the duplicates and eliminating inaccessible works, the remaining 164 publications were screened thoroughly for their relevance. All documents discussing the dimensions of trust influencing the adoption of G2C e-government services – independent of the discussion of culture and country of analysis – were accepted as relevant. This analysis revealed a total of 23 documents. Each of them was examined further for the aspect of culture and the countries of analysis in the study. The result of this analysis is summarized in Table 4-9 below.

The meta-analysis of the findings confirmed that trust research in the area of G2C e-government was sparse. Only 24 papers out of 164 analyzed dimensions of trust influencing G2C e-government adoption. A few others discussed another aspect of research, namely positive effects of e-government on citizen trust in government. Although also a very interesting research area, these documents were not examined, as they were considered to be out of scope for this research. Some papers integrated trust into the well-known technology adoption theories (Davis 1989; Venkatesh et al. 2003; Ajzen 1991; Fishbein/Ajzen 1975) as an additional construct. The role of national culture and espoused cultural values was, however, mostly left out in the trust literature of G2C e-government. Only four papers tackled this issue. Some authors explicitly stated it as a limitation of their studies.

	Dimensions of Trust	Adoption of G2C E-Government	Cultural Constructs	Country of Analysis
(Alomari et al. 2009)	●	●	○	Jordan
(Alsaghier et al. 2009)	●	●	○	Saudi Arabia
(Bavec 2006)	◑	◑	○	EU member
(Bélanger/Carter 2008)	●	●	○	USA
(Carter/Bélanger 2004a)	●	●	○	USA
(Carter/Bélanger 2004b)	●	●	○	USA
(Carter/Weerakkody 2008)	●	●	●	UK, USA
(Chatfield/Alhujran 2009)	◑	●	○	Arab countries
(Colesca/Dobrica 2009)	●	●	○	Romania
(Cullen/Reilly 2007)	●	◑	○	New Zealand
(Das et al. 2009)	◑	◑	●	140 countries
(Horst et al. 2007)	●	●	○	The Netherlands
(Hung et al. 2006)	●	●	○	Taiwan
(Li et al. 2008)	●	●	○	USA
(McLeod/Pippin 2009)	●	●	○	USA
(Mossberger/Tolbert 2005)	●	●	○	USA
(Riedl 2004)	●	◑	○	Switzerland
(Srivastava/Teo 2009)	●	●	○	Singapore
(Tan et al. 2008)	●	●	○	USA
(Teo et al. 2008b)	●	●	○	Singapore
(Warkentin et al. 2002)	●	●	●	USA, Latin
(Weerakkody et al. 2009b)	◑	◑	◑	Sri Lanka, UK
(Welch et al. 2004)	◑	◑	○	USA

○ not covered ◑ partially covered ● fully covered

Table 4-9. Review of the Literature on Trust in G2C E-Government Adoption Context
Source: Own Illustration based on (Akkaya et al. 2010)

Confirming the previous discussion of the dominant role of the U.S. in research concerned with trust in online environments, approximately 50 percent of the papers on trust in G2C e-government considered solely the U.S. Most of them were empirical studies conducted in the U.S. with various G2C e-government services (e.g., online tax services). As it is the main focus area of this thesis, existing research on G2C e-government in Germany was also examined. However, neither conceptual nor empirical research examining e-government adoption factors including dimensions of trust, were found. Although there were a few collective studies, they were not detailed and their main focus was neither Germany nor the German citizens.

Empirical studies utilizing cross-national samples were found to be quite rare. Only a few studies compared national cultures and reported on differences. This fact also supports the assertation made at the beginning of this thesis, that trust research is a relatively *immature* area of e-government study. The scarcity of research in this topic has been highlighted by previous authors. In their comprehensive review of the literature concerned with trust in online environments; Beldad, Jong and Steehouder (2010, 867) pointed out the apparent imbalance in trust literature between studies on trust in different contexts (p. 867):

> *"While it has been accentuated that trust is crucial in the adoption of e-government services, available studies on trust in that area are still very few compared to the sizeable number of studies in the e-commerce context. Even those trust studies in e-government have not really investigated the determinants of online trust in e-government transactions…This indicates that trust in the aforementioned area is still on its infancy phase."*

The eGovRTD2010, a European Commission co-funded project, has also recognized building citizen trust in e-government as *the top research priority* by both the individual EU member states and the EU as a whole in a study, which investigated the future research needs within e-government, driven by changing circumstances and challenges (Wimmer et al. 2007).

4.5.1.2 Theoretical Frameworks of Trust in G2C E-Government Services Context

Trust becomes even more important with the increasing maturity of G2C e-government services (Chandler/Emanuels 2002) as discussed in Section 3.6 above. *Trust* and security is stated as one of the main goals of Digital Agenda for Europe (European Commission 2016a), which is part of the Europe 2020 Initiative (European Commission 2016b).

Despite the increasing prevalence of trust in G2C e-government services adoption, trust research in this context is still in its infancy. Researchers often utilize the existing theoretical frameworks in trust literature, as discussed previously. However, "the roles of trust in the e-government context are different from organizational/e-commerce contexts" (Lee et al. 2005a, 1953). Therefore, it is essential to adapt theoretical frameworks borrowed from other contexts with e-government specific constructs (Orlikowski 2000; Dwivedi et al. 2011).

As discussed by Akkaya, Wolf and Krcmar (2011) in detail, there is also no consensus on the categorization of sub-factors. Some authors have named them as dimensions, while others

preferred the concepts of constructs, components or determinants of trust (Akkaya et al. 2011). In one of the first G2C e-government research, trust in this context was accepted as a one dimensional concept of *trust in e-government* (Warkentin et al. 2002) or *trust in government* (Welch et al. 2004; Shalini 2009). Despite studies which continue to analyze trust as a one dimensional concept (Sang et al. 2010), most researchers have recognized the need to consider trust as a multi-dimensional concept, despite the different categorizations and naming conventions such as *trust in e-government services* and *trust in government* (Horst et al. 2007; Akkaya et al. 2011). Carter and Bélanger (2005) conceptualized trust in e-government into two different dimensions: *trust of government* and *trust of the Internet*. Srivastava and Teo (2005) extended the *trust of the Internet* to a broader term of *trust on technology* (Akkaya et al. 2011) and suggested it as a dimension in addition to *trust on government* (Teo et al. 2008b). Colesca (2009a) in Akkaya, Wolf and Krcmar (2011) has not called them dimensions, but analyzed *trust in technology* and *propensity to trust* among the factors of increasing trust in e-government. Alsaghiar et al. (2009) argued that prior research into trust has focused mainly on consumer's trust in e-commerce and proposed a conceptual model of citizens' trust in e-government with the dimensions of *disposition to trust* and *institution-based trust*. Akkaya, Wolf and Krcmar (2011) derived the dimensions of *trust in technology*, *trust in government* and *perceived risk* based on the findings of their empirical research.

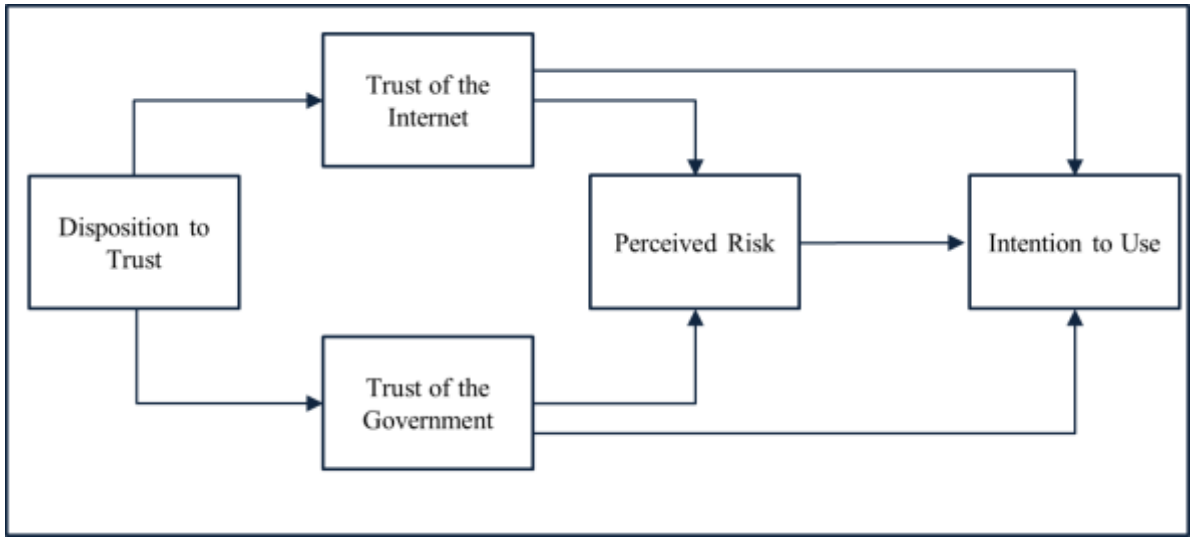


Figure 4.12. The Trust and Risk Model of Bélanger and Carter in G2C E-Government Adoption
Source: Own Illustration based on (Bélanger/Carter 2008)

Besides the widely accepted approach of analyzing trust in terms of its dimensions, some researchers proposed other categorizations as well. Li, Hess and Valacich (2008) suggested the concept of *trusting bases* with components of personality, cognitive, calculative and institutional trust in the context of G2C e-government, which was previously validated in e-commerce settings (Gefen et al. 2003). Dashti, Benbasat and Burton-Jones (2009) have discussed the concept of *felt trust* – which is commonly used to explain perceptions of being trusted in organizational contexts (Salamon/Robinson 2008) – in G2C e-government context. Lee, Braynov and Rao (2003a) introduced the concept of *trust in e-government service agents* referring to "entities that provide or manage any component of e-government services under a

government authority" (p.897). These concepts, however, have not received much recognition from other researchers in the field.

One of the first trust models in G2C e-government services was proposed by Bélanger and Carter (2008), and has become a cornerstone of trust research in the G2C e-government adoption context. It was the first study which concentrated solely on "the role of trust and risk in e-government adoption, rather than observing trust as one of the several antecedents among the others" (Akkaya et al. 2011, 90). Drawing on the well-known 'Web Trust Model' of McKnight, Choudhury and Kacmar in e-commerce literature (2002), Bélanger and Carter (2008) proposed the constructs of *disposition to trust, trust of the Internet and trust of the government* as the dimensions of trust in G2C e-government (see

Figure 4.12 above). Moreover, they proposed adding the factor of *perceived risk* due to the inherent uncertainty of the online services, which have been analyzed in other online contexts such as Internet safety perception (Phang et al. 2006) and transaction security (Rehman et al. 2012).

The 'Trust and Risk Model' (Bélanger/Carter 2008) has a number of strengths. First, it is the first widely recognized trust model developed specifically for the e-government context. The original 'Web Trust Model' (McKnight et al. 2002) was developed for the e-commerce context. Bélanger and Carter adapted it to the e-government domain and extended it with domain specific constructs (Dwivedi et al. 2011; Orlikowski 2000) such as *trust in government*. Second, this trust model recognizes the *multi-dimensional* nature of trust. Third, the trust model of Bélanger and Carter was developed by considering the enhancement suggestions of McKnight, Choudhury and Kacmar for their Web Trust model[34]. Finally, Bélanger and Carter integrated the construct of *perceived risk,* which is accepted as an essential component of any trust model (Lee/Turban 2001).

The next section provides a state-of-the-art review of the literature on technology adoption and espoused cultural values in G2C e-government services field.

4.5.2 Overview of Prior Research in Espoused Cultural Values and Technology Adoption in G2C E-Government Services Context

In addition to the specific role of trust in a G2C e-government services adoption context, a state-of-the-art analysis of the existing research on adoption of e-government with the specific focus on utilized theories and constructs should also be made. A distinction is made between studies using samples from a *single nation* and the ones utilizing *cross-cultural samples*.

4.5.2.1 Overview of Studies Focused on a Single Nation

In order to increase the understanding of commonly used theoretical models and constructs on citizen adoption of G2C e-government services, a state-of-the-art review of the literature has been conducted (Webster/Watson 2002). In particular, all empirical studies focused on

[34] McKnight, Choudhury and Kacmar (2002) proposed *institution-based trust* as an antecedent of *trusting beliefs* (trust in e-vendor), however, the correlation coefficients between *institution-based trust* and *trusting beliefs* were very low and insignificant. Consequently, McKnight and his colleagues (2002) have suggested future researchers posit new relationships among the constructs of the model and test them in future studies.

identifying determinants of G2C e-government adoption underlying a theoretical framework were considered for relevance. Sources that were accessible from Technische Universität München's academic environment (as shown in Table 4-7 above) were included. The search was conducted on abstracts of the publications with the keywords of 'e-government', 'citizen', 'acceptance', 'adoption' and 'diffusion' in all possible permutations and combinations taking into consideration the logical AND and OR as appropriate (Akkaya et al. 2013). Each time, the search was also repeated with the keyword 'eGovernment' to cover different writing styles. Additionally, a forward and backward screening was conducted by scanning through the references cited in the publications. Finally, the E-Government Reference Library version 9.4 (Scholl 2014) was scanned with the selected keywords in order not to miss other relevant documents. As shown in the Table 4-10 below, the overall search resulted in a total of 349 documents.

ACM Digital Library	EBSCO	ISI Web of Science	Science Direct	IEEE Xplore	Wiley Inter-science
95	75	48	82	35	14

Table 4-10. Total number of hits
Source: Own Illustration

After removing the duplicates and eliminating inaccessible works, the remaining 125 publications were screened thoroughly for their relevance. Studies which were not specifically focused on analyzing determinants of e-government services by citizens; such as the examination of broadband adoption (e.g., Dwivedi/Weerakkody 2007), the influence of intermediaries in facilitating e-government adoption (e.g., Weerakkody et al. 2013a), the user acceptance of G2B e-government systems (e.g., Sambasivan et al. 2010) or G2G applications (e.g., Hung et al. 2009) were eliminated. Furthermore, only online services of governments were considered, which excludes other studies such as the adoption of information kiosks (e.g., Wang/Shih 2009) by definition. Papers derived from the same empirical research which were published more than once (as conference and journal articles separately) were considered only once (e.g., Phang et al. 2005; Phang et al. 2006). Conceptual papers were also excluded (e.g., Kumar et al. 2007) as the main focus of research interest was empirical data. Although a number of relevant studies were identified through the search criteria (e.g., Chiang 2009), some had to be excluded due to limited accessibility from the researcher's library as well as from Google Scholar. The remaining 36 documents were analyzed thoroughly. A meta-analysis of the findings is presented in Table 4-11 below.

Authors	Study Context	National Culture	Theoretical Framework	Representative	Significant determinants of G2C e-government services adoption
(AlAwadhi/Morris 2008)	G2C e-government services adoption by students	Kuwait	UTAUT	no	Performance expectancy, effort expectancy, peer influence, facilitating conditions, behavioral intentions
(Al-Hujran et al. 2011)	G2C e-government services adoption	Jordan	TAM	no	Perceived usefulness, perceived ease of use, attitude, power distance, uncertainty avoidance
(Bélanger/Carter 2008)	G2C e-government services adoption by students and community	U.S.	TRA	no	Disposition to trust, trust of Internet, trust of government, perceived risk
(Bélanger/Carter 2010)	G2C e-government services adoption by students using e-voting	U.S.	various demographic variables	no	Age, income
(Carter/Bélanger 2004a)	G2C e-government services adoption by students	U.S.	TAM, DOI	no	Perceived usefulness, relative advantage, compatibility
(Carter/Bélanger 2004b)	G2C e-government services adoption by students	U.S.	DOI	no	Relative advantage, image, compatibility
(Carter/Bélanger 2005)	G2C e-government services using motor vehicles registration and online tax declaration	U.S.	TAM, DOI	no	Perceived ease of use, compatibility, and trustworthiness

to be continued on the next page…

Authors	Study Context	National Culture	Theoretical Framework	Representative	Significant determinants of G2C e-government services adoption
(Carter 2008)	G2C e-government services adoption	U.S.	TAM	no	Perceived usefulness, trust of the Internet, previous experience, perceived ease of use
(Carter et al. 2008)	G2C e-government services adoption by students of online tax filing	U.S.	UTAUT	no	Effort expectancy, performance expectancy, social influence, perceived risk, optimism bias
(Carter/Campbell 2011)	G2C e-government services adoption using internet voting	U.S.	DOI	no	Relative advantage, trust of the Internet, use of e-government information
(Colesca/Dobrica 2009)	G2C e-government services adoption	Romania	TAM	no	Perceived ease of use, perceived usefulness, quality, satisfaction, perceived trust
(Dimitrova/Chen 2006)	G2C e-government services adoption	U.S.	TAM	no	Perceived usefulness, perceived uncertainty, civic-mindedness
(Fu et al. 2006)	G2C e-government services adoption using online tax filing	Singapore	TAM, TPB	no	Perceived usefulness, compatibility, self-efficacy
(Gefen et al. 2002)	G2C e-government services adoption by students	U.S.	TAM	no	Perceived usefulness, perceived ease of use, social influence, trust and risk
(Gilbert et al. 2004)	G2C e-government services adoption	UK	DOI, TAM	no	Time, cost, financial security, trust, information quality

to be continued on the next page…

Authors	Study Context	National Culture	Theoretical Framework	Representative	Significant determinants of G2C e-government services adoption
(Horst et al. 2007)	G2C e-government services adoption	Netherlands	TAM, TPB	no	Risk perception, personal experience, perceived behavioral control, subjective norm
(Huang et al. 2002)	G2C e-government services adoption by students	Australia	TAM	no	None (PU and PEOU were posited as predictors of adoption, which were not found to be significant)
(Hung et al. 2006)	G2C e-government services adoption using online tax filing and payment system	Taiwan	TPB, DTPB	no	Perceived usefulness, ease of use, perceived risk, trust, compatibility, external influences, interpersonal influences, self-efficacy, facilitating conditions
(Hussein et al. 2011)	G2C e-government services adoption	Malaysia	TAM	no	Perceived ease of use, trust
(Israel/Tiwari 2011)	G2C e-government services adoption using online tax filing	India	UTAUT	no	Perceived risk, performance expectancy, effort expectancy
(Kanat/Özkan 2009)	G2C e-government services adoption by students using student loans	Turkey	TPB	no	Trust, perceived behavioral control, attitudes, perceived usefulness, perceived ease of use
(Lean et al. 2009)	G2C e-government services adoption	Malaysia	TAM, DOI	no	Trust, perceived usefulness, perceived relative advantage, perceived image, perceived complexity

to be continued on the next page…

Authors	Study Context	National Culture	Theoretical Framework	Representative	Significant determinants of G2C e-government services adoption
(Lee/Lei 2007)	G2C e-government services adoption	Macau	TAM	no	Trust, compatibility
(Ojha et al. 2009)	G2C e-government services adoption by young professionals using online tax filing	India	TAM, TPB	no	Perceived ease of use, personal innovativeness, relative advantage, performance of e-filing service, compatibility
(Phang et al. 2006)	G2C e-government services adoption by senior citizens of using e-withdrawal	China	TAM	no	Perceived usefulness, perceived ease of use, Internet safety perception
(Rehman et al. 2012)	G2C e-government services adoption	Pakistan	various constructs	no	Awareness, trust in the Internet, trust in the government, information quality, perceived ease of use, service quality, transaction security
(Rokhman 2011)	G2C e-government services adoption	Indonesia	DOI	no	Relative advantage, compatibility
(Schaupp et al. 2010)	G2C e-government services adoption by students using online tax filing	U.S.	various constructs	no	Performance expectancy, social influence, trust of the Internet, trust of the e-filer, perceived risk, optimism bias
(Shafi/Weerakkody 2009)	G2C e-government services adoption	Qatar	UTAUT	no	Performance expectancy, effort expectancy, social influence

to be continued on the next page…

Authors	Study Context	National Culture	Theoretical Framework	Representative	Significant determinants of G2C e-government services adoption
(Taiwo et al. 2012)	G2C e-government services adoption by students	Malaysia	UTAUT	no	Performance expectancy, peer influence, trust, risk
(Treiblmaier et al. 2004)	G2C e-government services adoption using electronic payments	Austria	various constructs	no	Trust in e-payment security, experience with online payment, frictionless use, attitude
(Van Dijk et al. 2008)	G2C e-government services adoption	Netherlands	UTAUT	yes	Effort expectancy, digital media preference, digital media access, digital media experience, knowledge services, supply services
(Voutinioti 2013)	G2C e-government services adoption	Greece	UTAUT	no	Performance expectancy, effort expectancy, trust of intermediary, trust of the government, trust of the Internet, social influence
(Wang 2003)	G2C e-government services adoption using online tax filing	Taiwan	TAM	no	Perceived ease of use, perceived usefulness, perceived credibility, computer self-efficacy
(Weerakkody et al. 2009a)	G2C e-government services adoption	Qatar	UTAUT	yes	Performance expectancy, effort expectancy, social influence
(Wu/Chen 2005)	G2C e-government services adoption using online tax filing	Taiwan	TAM, TPB	yes	Attitude, perceived behavioral control, perceived usefulness, perceived ease of use, trust

Table 4-11. Selected Examples of Existing Research on Technology Adoption in G2C E-Government Services Context
Source: Own Illustration

The table provides an overview of existing studies conducted in a *single nation*, reflecting the majority of studies in prior literature. Yet, it is important to recognize that espoused cultural values play an important role in citizen adoption of e-government services, similarly to other IS contexts. The next section reviews the prior literature examining the impact of espoused cultural values on G2C e-government adoption utilizing *cross-cultural* samples.

4.5.2.2 Overview of Studies using Cross-Cultural Samples

National characteristics shape core values, beliefs and perceptions of individuals, which in turn influence their attitudes and behaviors towards adoption of G2C e-government services. Risk perceptions and privacy concerns differ among nations, which may explain why some nations show a strong resistance towards online government initiatives (Meckel et al. 2011; Teletrust 2010), whereas some others are willing to disclose sensitive data for the sake of more convenience (gemalto 2010). Although there are some conceptual works on understanding the impact of national culture on e-government adoption (see Warkentin et al. 2002), empirical studies comparing G2C e-government adoption across cultures remain relatively rare.

Two main papers were among the first works, in the G2C e-government adoption context, which suggested considering the influence of culture in future studies. In their conceptual paper, Warkentin et al. (2002) posited "culture is likely to contribute to the adoption or resistance to e-government" (p. 161). The authors proposed a research model based on TAM (Davis 1989) and TPB (Ajzen 1985, 1991) to examine G2C e-government services adoption using the specific example of online tax filing. Various constructs including culture, perceived ease of use, perceived usefulness, trust, perceived risk and perceived behavioral control were included in the research model. The cultural dimensions of uncertainty avoidance and power distance were selected from the Hofstede's cultural framework (1980). Although they planned to collect and analyze empirical data in several nations including the U.S., Latin America and Africa, this research has remained conceptual until now.

The second paper has compared the UK and the U.S. samples with respect to their G2C e-government adoption behaviors. Carter and Weerakkody (2008) argued that factors determining adoption may differ between different cultures by using Hofstede's framework (1991). The findings revealed that influents on usage intention may differ according to cultural norms. However, the study had a methodological limitation. Carter and Weerakkody conducted the survey only in the UK and compared the findings to the literature on diffusion in the U.S. Their results indicated that *relative advantage* and *trust* were significant for both samples, while *Internet accessibility* and *skills* were significant only for the U.S. sample. Even though this paper has been widely cited in literature, its methodological approach could have been improved by using samples from both of the populations.

Ali, Weerakkody and El-Haddadeh (2009) have also explored the impact of cultural differences on G2C e-government implementation using empirical data. Based on an analysis of the UK and Sri Lanka, the authors confirmed the potential influence of differences on the development and use of G2C e-government services. The authors identified cultural differences between the two cultures by using Hofstede's cultural framework (1991) and argued that the differences in the implementation of e-government in these two countries could be explained by culture.

Kovacic (2005) conducted a detailed analysis in 95 countries to investigate the impact of national culture on e-government readiness. The focus of this paper was to examine the

influence of cultural aspects on the assessment of e-government readiness globally. E-government readiness of the nations was assessed based on the United Nations E-Government Readiness Survey (2003), while Hofstede's (1991) framework was utilized to assess the cultural differences. A theoretical basis was, however, lacking since the research model was not derived based on a theoretical framework. The correlation and regression analysis conducted, indicated that *worldwide e-government readiness* and *culture* are related.

Cabinakova et al. (2013) examined national cultural factors that may influence citizens adoption of e-government websites in Germany and Slovakia. They examined the G2C e-government adoption factors by using constructs of behavioral beliefs, habitual patterns, trust and culture. The impact of culture was tested by using power distance and uncertainty avoidance dimensions of Hofstede (1980). The authors did not select a specific theoretical model of adoption and preferred to combine constructs from various theories. They found that *uncertainty avoidance* and *trust in the public sector* have a significant impact on citizens' attitude to adopting e-government services.

By using Hofstede's five cultural dimensions (1991); Arslan (2009) examined the influence of culture on G2C e-government use. However, this work used neither a theoretical base model nor questions on adoption. Instead, by using data on e-government use from an external web portal, the author explored the impact of various dimensions of Hofstede's framework on e-government use. While demonstrating the specific influence of national culture on e-government use, this work fails to identify specific factors of G2C e-government adoption such as perceived usefulness and perceived ease of use (Davis 1989).

As part of the research in progress, Akkaya, Wolf and Krcmar (2012b) provided an interesting comparison of factors influencing G2C e-government adoption in Germany and Sweden. The two nations were selected based on their differences regarding the uncertainty avoidance index dimension of Hofstede (1980) as well as their e-government take-up levels. This work has utilized representative samples and integrated constructs from various studies.

As seen above, prior literature on cross-cultural comparison of G2C e-government adoption is quite scarce. It is striking to see that only a few studies have tackled the issue of G2C e-government adoption by using cross-cultural samples. It is important to mention that all of these studies have used Hofstede's dimensions (1991), which indicates the dominance of Hofstede's framework in cross-cultural research. Although some papers had methodological weaknesses, all findings suggested that culture plays a significant role in citizens' e-government adoption behavior. This implies that more empirical research with various national samples is essential for a complete understanding of the specific role of national culture on G2C e-government adoption.

One possible explanation for the lack of research in cross-cultural G2C e-government adoption is the limited availability of multi-national samples willing to participate in research projects. Due to this difficulty, some studies generate conclusions on cross-cultural differences based on studies with *different* designs and samples. But this is not a correct methodological approach. For example, Titah and Barki (2006) compare studies on adoption characteristics (p.26):

> *"Contrary to Phang et al. (2006) and Gilbert, Balestrini and Littleboy (2004), who did not find support for the influence of perceived ease of use*

on adoption, Carter, Schaupp and Evans (2008) found that perceived ease of use had a significant effect on intention to use."

The studies listed above were conducted in China, the UK and the U.S. respectively. Differences in results, however, may not directly be attributed to cultural differences. These studies had different settings, research methods, questionnaires, and samples, which cannot be practically compared. For instance, the study by Phang (2006) was conducted based on a sample of senior citizens; whereas Carter and Bélanger (2005) used a student sample. Gilbert used a research model based on the DOI (Rogers 1995) and the TAM (Davis 1989), whereas Carter, Schaupp and Evans considered UTAUT (Venkatesh et al. 2003). Moreover, none of these studies were representative of their populations. Without using representative samples weighted by central features of gender, age and formal education; it is not realistic to argue about the existence of cultural differences among nations.

4.5.2.3 Analysis of Findings

Combining the findings in Section 4.5 above with the results of other assessments of e-government literature (Grönlund 2005; Löfstedt 2005; Rana et al. 2012; Yildiz 2007; Titah/Barki 2006; Dwivedi et al. 2011; Weerakkody et al. 2013b), six issues should be remarked upon.

First, e-government literature has not reached its maturity. There is a specific need for e-government specific theories, models and constructs (Dwivedi et al. 2011). The analysis in Table 4-11 above reveals that researchers in the field mostly utilize well-known IS adoption theories. TAM is utilized by 50 percent of the studies, followed by the UTAUT with 22 percent, DOI with 19 percent, and TPB with 16 percent. The use of diverse set of constructs and models indicates the "clear lack of some generic e-government adoption research model" (Rana et al. 2012, 9). Numerous authors have underlined the need for e-government specific theories and constructs (Titah/Barki 2006; Löfstedt 2005). As stated by Dwivedi, Weerakkody and Janssen (2011, 15):

"Although the above theories are helpful, they are not developed for the e-government specific conditions and do not explain the actual adoption and diffusion. More specific adoption theories need to account for the context and specific conditions (Orlikowski 2000), instead of blackboxing information technology."

Researchers should customize theories and models borrowed from other contexts by adding specific constructs in order to reflect the particular complexities surrounding e-government. Yet, there is no consensus regarding which constructs are relevant to the e-government domain. Cabinakova et al. (2013) suggested factors related to culture and trust in general. In particular, *trust of government* has been researched by many academicians to account for perceptions regarding the service provider and privacy related concerns regarding the use of information submitted electronically (Bélanger/Carter 2008; Rehman et al. 2012; Voutinioti 2013).

Dimitrova and Chen (2006) included *civic mindedness* in their research model. They argued, citizens who participate in civic affairs and political activities will be more likely to use G2C e-government services. Van Dijk (2008) recognized the existence of the digital divide and found supportive evidence for the influence of *digital media preference* and *digital media access* on intention to use G2C e-government.

Second, most of the IS adoption (e.g., Dwivedi et al. 2008b) and trust literature (e.g., Gefen/Heart 2006; Benbasat et al. 2008) is based on studies conducted in the U.S., which is a stand-alone culture with its exceptionally high degree of *individualism* (Benbasat et al. 2008; Hofstede 1980). Indeed, many scholars called for caution regarding the transferability of the commonly used adoption theories without sufficient validation in new cultural contexts (Straub et al. 1997; McCoy et al. 2005). This is particularly important for trust studies, "which is at the heart of culture" (Benbasat et al. 2008, 6).

Third, more empirical data is necessary to enhance our understanding of G2C e-government adoption. In fact, empirical data can help to derive context specific constructs and theories that e-government research desperately needs (Yildiz 2007, 657):

> *"The empirical data derived from future studies can also contribute to the literature by creating new theoretical arguments and providing new concepts and categories that would enhance our understanding of e-government policy processes and actors."*

Weerakkody et al. (2013b) conducted a systematic analysis of research in the area of e-government. Based on their comprehensive analysis, this analysis has confirmed the ongoing need for *more empirical research* in e-government. In particular, the scholars, who have been publishing studies considering *perceived risk* in the area of e-government research, were examined (p. 3):

> *"A further analysis reveals that Lemuria Carter (#5) is the most profilic author researching in this area followed by Cigdem Akkaya, Helmut Krcmar, Ludwig C. Schaupp, Maddalena Sorrentino, Petra Wolf, and Steve Jones with three papers each."*

As can be clearly seen from this literature analysis, the number of authors who have researched this area is quite low. The fact that the author of this thesis and her colleagues were cited as being "one of the most profilic authors in this research area" (Weerakkody et al. 2013b, 3) further reinforces the validity of the research conducted in this thesis.

There is a clear lack of empirical data analyzing adoption behaviors of various nations. Similar to the dominance of the U.S. nation in IS adoption and trust literature, the largest number of empirical studies have taken place in the U.S. (Weerakkody et al. 2013b), which differs considerably from other cultures (Hofstede et al. 1991). As clearly shown in Table 4-11 above, one out of every three studies in prior G2C e-government services literature has been conducted in the U.S. The lack of research on e-government adoption in Europe is striking considering the

relatively high e-government readiness and advanced infrastructures of several European countries (United Nations 2012). Despite the wide acceptance of the influence of national culture on IS technologies and G2C e-government adoption (Khalil 2011; Ali et al. 2009; Hofstede 2001b; Kovacic 2005; Srite/Karahanna 2006); empirical studies of cross-national research on G2C e-government adoption are very scarce compared to other contexts.

The literature analysis also points to the clear lack of empirical research investigating determinants of G2C e-government adoption based on a theoretical framework in Germany, which is the main focus of this thesis. Although a paper on the impact of socio-demographic variables on G2C e-government adoption has been published (Niehaves et al. 2012), its focus was not on understanding determinants of e-government adoption by using technology adoption frameworks. It was rather an exploratory study examining the influence of socio-demographic factors on the 'e-government divide' in Germany. Finally, that work was based on data collected from three German cities which do not represent other parts of Germany.

Fourth, most of the prior studies suffer in terms of *external validity* caused by *selection bias.* Selection of samples which are not representative of the populations they are drawn from reduces the ability to make generalizations from the sample to the wider population (Campbell 1969; Campbell et al. 1963). Furthermore, generalizability of the findings across populations depends on the *breadth of the characteristics* that are included in the sample. For example, the sample should be stratified to ensure that there is a representative proportion of males and females, people of different ages and standards of formal education. The analysis in Table 4-11 above indicates that only 8 percent of prior G2C e-government literature utilizes *nationwide representative samples*. Moreover, one in every four studies uses *students samples* despite the body of literature suggesting caution when using such subjects (Levitt 1965, 179). Age and education are important factors for technology acceptance therefore using solely student subjects leads to problems in terms of the generalizability of the research findings. Although they are available at low cost and are generally cooperative, there is substantial evidence that the use of student subjects in behavioral research is inappropriate and lessens the external validity of the academic research (Lee et al. 2003b; Legris et al. 2003; Burnett/Dune 1986).

Fifth, although trust in e-government is still in its infancy (Beldad et al. 2010), it is remarkable to see the increased integration of the trust construct in research models. The analysis in Table 4-11 above reveals that about 50 percent of all studies found significant impact of trust on intention to use G2C e-government services. Yet, the majority research in this context has also been conducted in the U.S., so needs to be validated in other cultural contexts.

Finally, it should be noted that 37 percent of the studies in Table 4-11 above examine G2C e-government services adoption based on a specific service. This approach is likely to be more valid, since a general questioning of G2C e-government services could be interpreted by each respondent based on a different service. Among the studies investigating adoption based on a specific service, the *online tax filing* application was the most explored specific e-government application with 64 percent.

Having reviewed the state-of-the-art literature in G2C e-government research, the next section summarizes the shortcomings of the current research, which constitutes the research gap addressed by this thesis.

4.6 Shortcomings of Current Research / Research Gap Addressed by the Thesis

The literature review presented in the Section 4.5 above highlights features of the existing research on G2C e-government with a specific emphasis on technology adoption, trust and national culture. The following shortcomings in prior research have been identified:

1. **Lack of empirical research in G2C E-Government Services adoption**

   In contrast to relatively mature e-commerce adoption literature, G2C e-government research is still in its infancy (Titah/Barki 2006; Löfstedt 2005; Grönlund 2005; Weerakkody et al. 2013b, 3; Rana et al. 2012). Most existing research in e-government consists of case-studies and there is a clear lack of studies on theory testing (Grönlund 2004; Grönlund/Andersson 2006). The author of this thesis was cited as being *one of the most profilic authors* in G2C e-government research on perceived risk (Weerakkody et al. 2013b, 3) which is a further support of the validity of this research theme.

2. **Lack of empirical research analyzing E-Government adoption behavior of citizens in Germany and other countries of Europe**

   Most of the IS adoption (Dwivedi et al. 2008b) and trust literature (Benbasat et al. 2008; Bagozzi et al. 2000) is based on studies conducted in the U.S. However, U.S. represents a stand-alone culture with its exceptionally high degree of *individualism* (Hofstede 1980). It is widely accepted that results derived from studies conducted in one culture cannot be directly transferred to another, due to the differences among cultures (Udo/Bagchi 2011; Sundqvist et al. 2005; Srite/Karahanna 2006). Indeed, many scholars called for caution regarding the transferability of the commonly used adoption theories without sufficient validation in new cultural contexts (McCoy et al. 2005; Straub et al. 1997).

   The literature consisting of empirical studies analyzing determinants of G2C e-government services adoption in *Europe* remains relatively scarce. Furthermore, there is a clear research gap in literature regarding determinants of G2C adoption specifically in *Germany*. The comprehensive literature analysis conducted in Section 4.5 above as well as other literature reviews on G2C e-government literature (Grönlund 2005; Löfstedt 2005; Rana et al. 2012; Yildiz 2007; Titah/Barki 2006; Dwivedi et al. 2011; Weerakkody et al. 2013b) could not point to any empirical study, which investigates determinants of citizen adoption of G2C e-government services in *Germany* on a theoretical basis.

3. **Lack of empirical research investigating trust and its dimensions in e-government research**

   As remarked by Lee, Kim and Rao (2005a) "the roles of trust in the e-government context are different from organizational/e-commerce contexts" (p. 1953). Yet, in contrast to sizeable number of studies in the e-commerce domain, trust in the adoption

of G2C e-government services is still in its infancy, despite the crucial importance of trust in this context (Beldad et al. 2010).

4. **Lack of cross-cultural empirical research on G2C E-Government services adoption**

   The analysis conducted in Section 4.5 above revealed that cross-national research on G2C e-government is sparse in the literature. More empirical data *comparing* adoption behaviors of nations, i.e. cross-cultural empirical data, are necessary in order to understand the specific influence of national culture on G2C e-government adoption.

5. **Lack of empirical studies on G2C E-Government services adoption using representative samples**

   Despite the growth of research into e-government, our knowledge about its adoption is limited. One reason for this is the lack of systematic studies based on representative samples within nations, which limits generalizations to the whole population due to inherent selection bias (Campbell 1969; Campbell et al. 1963). As Table 4-11 reveals, only 6 percent of the prior literature on G2C e-government services use *representative samples*, which confirms the previous findings on e-government adoption research (Rana et al. 2012). None of the samples is stratified to ensure that there is a representative proportion of males and females, people of different ages and levels of formal education, to ensure high external validity.

   Moreover, about 30 percent of these studies were conducted by using students as samples, who are not representative of their populations. Results of such studies are likely to suffer *external validity* problems because students may have different motivations such as getting grades or attention of their teachers (Legris et al. 2003; Lee et al. 2003b).

6. **Lack of empirical research on G2C e-Government services analyzing the adoption behavior of different socio-demographic groups**

   The analysis conducted in Section 4.5 above pointed to lack of empirical studies analyzing the G2C e-government adoption behavior of different socio-demographic groups such as gender, age, formal education, and previous experience.

Given the aforementioned context, the motivation for this research is drawn from the aspiration to contribute to existing literature in G2C e-government and derive practical implications regarding G2C e-government implementations. To tackle the research gap identified above, two quantitative studies have been conducted for a thorough examination of factors influencing adoption of G2C e-government services in a cross-cultural context (see Chapter 5 and Chapter 6).

4.7 Summary

In this chapter, the most important theories and models of technology adoption are discussed. Furthermore, the theoretical foundations of espoused cultural values in technology adoption and trust research are presented.

This chapter intends to provide a thorough overview of the comprehensive theoretical framework underlying this thesis. After an introduction on theory as a concept in Section 4.1, the most important theories and models developed to explain technology adoption at the individual level have been presented and discussed in Section 4.2. In particular, the following adoption models were discussed: The Diffusion of Innovations Theory (Rogers 1962), the Theory of Reasoned Action (Fishbein/Ajzen 1975), the Theory of Planned Behavior (Ajzen 1985, 1991), the Decomposed Theory of Planned Behavior (Taylor/Todd 1995c), the Technology Acceptance Model (Davis 1989), the Motivational Model (Davis et al. 1992), the Model of PC Utilization (Thompson et al. 1991), the Computer Self-Efficacy Model based on Social Cognitive Theory (Compeau/Higgins 1995b), the Unified Theory of Acceptance and Use of Technology (Venkatesh et al. 2003), and the Model of Adoption of Technology in Households (Venkatesh/Brown 2001).

The role of trust in technology adoption, which is imperative to the widespread adoption of online technologies (Jarvenpaa et al. 2000), was discussed in Section 4.3. Since this thesis is concerned with individual level adoption of e-government services in a cross-cultural study, Section 4.4 was dedicated to a detailed understanding of espoused national cultural values. This section has provided a detailed discussion of the existing cultural frameworks introduced by Hall (1959, 1966), Kluckhohn and Strodtbeck (1961), Hofstede (2010), House et al. (2004), Schwartz (1994), Inglehart (World Values Survey 1981), and Trompenaars and Hampden-Turner (1998). Comparison of various frameworks reveals a considerable amount of convergence among different approaches. Among them, Hofstede's framework (2010) continues to be the most widely used cultural framework encompassing most of the dimensions suggested by its rivals.

Section 4.5 gave an overview of prior research on technology adoption, and espoused cultural values and trust in terms of the specific theme of this thesis, namely G2C E-Government context. Finally, Section 4.6 was dedicated to analyzing the research gap addressed by this thesis.

The comprehensive empirical analysis of this thesis is presented in the following three chapters.

5 Empirical Analysis Part I: Descriptive Studies in 2010 and 2011

After having presented the overall methodological framework of this thesis, the details of the empirical research conducted should be provided. Chapter 5 is concerned with the first two descriptive studies (2010-2011), while Chapter 6 provides a detailed analysis of the explanatory research (2011). The empirical analysis is concluded in Chapter 7 by presenting an overall comparison of the four descriptive studies conducted in Germany and in Sweden (2010-2014).

5.1 Research Design

5.1.1 Purpose of Research

As elaborated upon in Section 2.7, this thesis employs a positivist, deductive approach, starting with a theoretical model, and then testing theoretical hypotheses using the empirical data collected. As discussed in Akkaya, Wolf and Krcmar (2012a), research studies have three main purposes: exploratory, descriptive or explanatory. Research projects typically involve one or two of these purposes, or all three. While exploratory and descriptive research are more appropriate to lay the groundwork of research (Dubin 1978), explanatory research is used to understand the cause and effect relationships and derive conclusions (Singleton/Straits 2010). In contrast to explanatory research, a strong theoretical framework is not required for exploratory and descriptive research (Punch 2005).

McNabb (2013) suggests that a descriptive study can be used to define the key variables in a research which is followed by an explanatory study to understand the cause and effect relationships. This thesis follows exactly the suggested methodology. Two descriptive studies with representative samples were conducted using a multiple-snapshot cross-sectional design, in order to test the consistency of results in the time period of 2010-2011. This was done to increase the validity of the findings, as one time cross-sectional designs provide only a *snapshot* at a given point of time (Akkaya et al. 2013).

5.1.2 Country Choice for Empirical Analysis

Various authors have called for caution regarding the transferability of the commonly used adoption theories without sufficient validation in new cultural contexts (McCoy et al. 2005; Straub et al. 1997). Although some widely-recognized technology adoption models such as the TAM (Davis 1989) have been validated in various contexts, technology adoption behaviors and trust beliefs of nations are influenced by espoused cultural values and this needs to be taken into account (Doney et al. 1998). Motivated by the extent literature on espoused cultural values, this thesis investigates the existence of differences between Germany and Sweden.

The first descriptive study was conducted in Germany in 2010, and revealed valuable insights about the perspectives of citizens in adoption of G2C e-government services in the country. The second descriptive study was conducted in 2011 in order to capture possible changes in the German population over the period of 2010-2011. Since adoption behaviors of nations are

hypothesized to be influenced by the underlying espoused cultural values of the nations (Akkaya et al. 2013), the second descriptive study was conducted in Sweden as well.

Germany is the main research interest due to the existing research gap, as discussed previously. Sweden was chosen for comparison with Germany for three main reasons. As discussed previously (see Section 4.4.1 above), economic differences between cultures are the main cause of the digital divide. Countries with highly developed economies have advanced telecommunications infrastructures, which facilitate adoption of IS technologies and online services. On the other hand, countries at similar stages of *economic growth – such as Germany and Sweden* – typically have similar technological infrastructures and systems. Thus, differences in use behaviors between such countries can be attributed to people, and hence the culture rather than the underlying IS infrastructure (Ford et al. 2003).

The second criterion is the *G2C e-government development and take-up levels* of the countries. As discussed in Section 3.9, Sweden is recognized as one of the top performers in transactional and connected e-government globally (United Nations 2010; Cap Gemini 2010; European Commission 2013). Although both countries are well-known for their advanced telecommunication infrastructures (United Nations 2012), Germany still has a long way to go towards becoming one of the leaders according to global e-government benchmarks, therefore Sweden represents a *best practice* country in G2C e-government for comparison with Germany.

Country	PDI	UAI	IDV	MAS	LTO	IVR
Germany	35	65	67	66	83	40
Sweden	31	29	71	5	53	78

Table 5-1. Hofstede's cultural dimensions for the countries of analysis in this thesis
Source: Own Illustration based on (Hofstede 2013; Hofstede et al. 1991)

Finally, these countries have significantly different cultural profiles in terms of UAI, MAS, LTO and IVR dimensions of Hofstede (1991) (see Table 5-1 above). In particular, the *uncertainty avoidance index* has been used as the main distinguishing cultural factor as it was found to be the most influential national cultural value affecting the adoption of IS (Straub et al. 1997; Sundqvist et al. 2005; de Luque/Javidan 2004). As discussed previously in detail, this dimension refers to the extent to which the members of a culture feel uncomfortable with uncertainty and ambiguity (Hofstede et al. 1991); thus tend to be distrustful of innovations.

5.1.3 Data Collection Method

Survey, which is the most frequently used data collection method in the social sciences and in related applied fields (Neumann 2006, 272), was used for data gathering. The survey method can be used for exploratory, descriptive or explanatory research. It is best suited to studies that have individuals as the unit of analysis (Bhattacherjee 2012, 73). The survey method is appropriate for research questions about *self-reported beliefs* or behaviors (Neumann 2006, 273).

The data collection was carried out by a professional marketing research agency by means of computer assisted web interviewing (CAWI). The E-Government Monitor survey included other items such as the familiarity and satisfaction with G2C e-government services in Germany, potential utilization of mobile government and acceptance of open government initiatives, which goes beyond this research[35] (Akkaya et al. 2011). The following three questions constitute the basis of descriptive analysis in this research:

1. How important are the following *factors* for you when you are dealing with the public authorities online?
2. Which of the following *barriers* prevent you from using e-government services (more intensively)?
3. What are your specific *concerns* regarding *data protection and privacy*, which prevent you from using e-government services (more intensively)?

The conceptual framework given in Chapter 3 and the theoretical framework provided in Chapter 4 laid out the basis for the construction of the questionnaire. Factors in the first question were drawn from the well-known studies in IS adoption literature (Gefen/Straub 2004; Schaupp/Carter 2005; Davis 1993). Barriers obstructing the usage of G2C e-government in the second question and the concerns in the third question were derived from prior literature (Gilbert et al. 2004; Ebrahim/Irani 2005)). The data protection and privacy related concerns in the third question were extended from specific concerns discussed in the German national media, such as fear of becoming a *transparent citizen* (German: gläserner Bürger). The questions were formulated as closed questions because they tend to be easier to answer (Bryman 2012, 233). The first two questions were asked to all respondents, while the third question was asked only to respondents, who stated having concerns about data protection and privacy in the previous question.

Overall, quantitative research strategy was selected for the collection and analysis of empirical data. An alpha level of .05 was used for all statistical tests. The importance of factors for using G2C e-government services in the first question was measured on a five-point Likert-scale (1=extremely important to 5=not important) and the barriers to adoption of e-government services in the second question were measured on a four-point Likert-scale (1=strongly agree to 4=strongly disagree) (Akkaya et al. 2011). In both questions, respondents were given the option to answer 'not available'. Third question was addressed only to the respondents who had selected the specific concerns of data protection and privacy. In this question, multiple answers were possible.

5.1.4 Sampling Method and Sample Size

Ensuring high validity of the survey results is a crucial success factor in quantitative research (Boudreau et al. 2001). Bryman and Cramer (1990) argue that "… researchers should strive to create as accurate as possible a representative sample of the general population or case of study, and that such sample if planned precisely will highly increase the external validity of the

[35] The complete questionnaire of 2010 and 2011 can be found in Appendix I and Appendix II respectively.

research" (p. 99). It is important to recognize that "a large sample size alone does not guarantee a representative sample" (Neumann 2006, 241). Lack of simple random sampling places limitation on generalizability of the findings as simple random sampling gives each member of a population an equal probability of being included in the sample.

While this approach ensures collection of unbiased data, the resulting sample may contain *sampling errors*. One way to reduce sampling errors is to draw a stratified random sample. To do this, the population is divided into homogenous subgroups – known as strata – and a random sample is taken from each subgroup. In general, stratified sampling produces samples that are more representative of the population than simple random sampling if the stratum information is accurate (Neumann 2006, 231).

In order to minimize sampling errors, *stratified random sampling* was used in this thesis. Samples were randomly selected to be representative of their populations, to ensure high validity in descriptive research (Singleton/Straits 2010). The data was weighted according to central features of *gender*, *age* and *formal education*, to be representative of the total population. This approach enabled achievement of the desired variance in the selected demographics. Furthermore, survey items related to formal education was adapted to reflect each country's education systems.

The final sample in 2010 comprised of 1,002 adults in Germany, who were older than 18 years old and used the Internet in private households[36]. The final sample in 2011 comprised of 1,000 adults in Germany and Sweden, who were older than 18 years old and used the Internet in private households[37]. The minimum sample size for conducting the analysis with 95 percent confidence level and 5 percent margin of error with the 50 percent response distribution was calculated as n=385 (Raosoft 2004). The selected sample sizes are much larger than the minimum threshold level, which ensures the accuracy of results. Since detailed statistical information about population and Internet use in households was not available for Sweden, the minimum necessary sample size was not calculated for the Swedish samples. However, considering the relatively smaller population size of Sweden, the selected sample size is assumed to be much higher than the minimum threshold level.

5.2 The Descriptive Study in 2010

5.2.1 Data Collection

The study was carried out between 7th and 20th of June 2010 by a private market research company (TNS Infratest).

[36] The number of people in Germany, who were 18 years old or older in 2010 was 68,262,920 (Federal Statistical Office 2013). The research conducted by TNS Infratest revealed that 72,12% of the German population were Internet users in private households. Therefore, the population for this study consisted of 49,231,217 people.

[37] The number of people in Germany, who were 18 years old or older in 2011 was 68,219,632 (Federal Statistical Office 2013). The research conducted by TNS Infratest revealed that 75% of the German population were Internet users in private households. Therefore, the population for this study consisted of 51,164,724 people.

5.2.2 Data Analysis

Data Analysis was conducted using IBM SPSS Statistics 22 software.

5.2.2.1 Sample Descriptions

Descriptive analysis of the research instrument revealed the characteristics of the sample with regard to demographics, frequency of contact with the government and mobile Internet experience.

	Frequency	Percent
Gender		
Female	472	47,1
Male	530	52,9
Age Range		
18-34	328	32,8
35-54	445	44,5
55 and older	229	22,9
Formal education[38]		
low	849	84,9
high	153	15,3
Population		
Less than 2.000	57	5,7
2.000 to 5.000	104	10,4
5.000 to 20.000	196	19,6
20.000 to 50.000	174	17,4
50.000 to 100.000	109	10,9
100.000 to 500.000	172	17,2
More than 500.000	156	15,6
Don‘t know	34	3,4
Number of contacts with the government in a year		
Less than once	134	13,4
Once	151	15,1
2-3 times	327	32,6
4-5 times	146	14,6
More than 5 times	199	19,9
Never	26	2,6
Don’t know	19	1,9
Mobile Internet user		
Yes	539	53,9
No	446	44,6
Don‘t know	15	1,5

Table 5-2. Sample Demographics of the German sample in 2010
Source: Own Illustration based on (TNS Infratest 2010)

[38] All respondents having a university degree or postgraduate degree were categorized under ‘high formal education’.

About 53 percent (52,9%) of the respondents were male, and 47 percent (47,1%) were female. About one third of the subjects (32,8%) were between 18 to 34 years old, 44 percent (44,5%) were between 35 to 54, and 23 percent (22,9%) were over 55 years old. More than 67 percent of the respondents (67,1%) had contact with the government twice or more in a year. More than one every two respondents (53,9%) were mobile Internet users. Detailed description of the sample is shown in Table 5-2 above.

5.2.2.2 Analysis of the Survey Results

The first question investigated the importance of the factors influencing G2C e-government use. The analysis was focused on *top 2 box* scores. In other words, the percentage of respondents rating the first or second most favorable categories were considered because they are regarded as the most predictive measures (Hawkins/Tull 1994). As shown in Figure 5.1 below, various factors were found to affect the use of online public services. Among them, 'data protection and privacy' (82,2%) had the strongest impact on citizen engagement in G2C e-government.

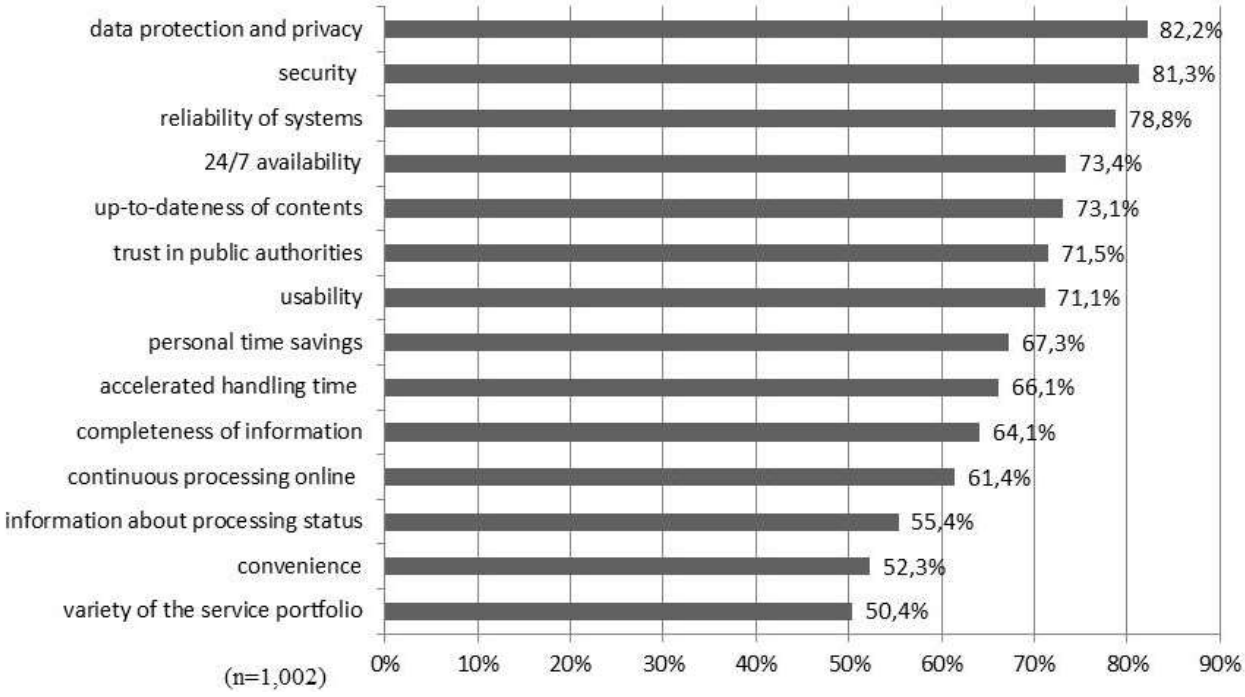


Figure 5.1. Factors influencing adoption of G2C e-government services in Germany in 2010
Source: Own Illustration based on (TNS Infratest 2010; Akkaya et al. 2011)

The next two important factors influencing use of G2C e-government services were stated as 'security' (81,3%) and 'reliability of systems' (78,8%). About four out of every five respondent considered the top three factors as 'extremely important' or 'very important'. These issues are also closely related to trust in technology, including the underlying infrastructure and transmitting medium (Akkaya et al. 2011). For 71,5 percent of citizens, 'trust in the public authority' was stated as an 'extremely important' or 'very important' requirement for engaging

in online public services (Akkaya et al. 2011). Other important factors include '24/7 availability' (73,4%), 'up-to-dateness of contents' (73,1%) and 'usability' (71,1%).

In the second question, the specific barriers to use of G2C e-government services were questioned (Akkaya et al. 2011). As summarized in Table 5-3 below, 'lack of integration' (41,8%) which refers to lack of continuous processing online without any change in media, was stated as the most important barrier. This was followed by the 'unclear structure' (41,5%), which refers to the difficulty in finding G2C e-government services that a citizen is looking for. The 'lack of support and help' was an important concern for more than 40 percent (40,8%) of the respondents. Respondents have possibly referred to their concerns about making mistakes during a transaction, which could have been partially avoided by the provision of hotline support.

The analysis revealed that the barriers differ between gender, age and formal education groups. The 'lack of support and help' was considered as the most important barrier to e-government services adoption by female respondents, by the respondents who were 55 years old or more and the ones who had low formal education. This result for the respondents who were 55 years or more might have been caused by the limited digital literacy skills of the age group. Male respondents and the respondents who were aged between 18 and 34 were most concerned about the 'unclear structure' of the government portals. Surprisingly, this age group, who is likely to be frequent user of social networks, is more concerned about 'lack of data protection and privacy' compared to the other age groups. This may be related to security related risks which will be analyzed in the following question. The participants having high formal education and the respondents who were aged between 35 and 54 considered 'lack of integration' as the most important barrier.

(n=1,002)		gender		age groups			formal education	
	total	female	male	18 -34	35 -54	55+	low	high
lack of data protection and privacy	33,8%	38,1%	30,1%	37,3%	34,8%	27,2%	35,2%	24,8%
lack of integration	41,8%	42,7%	41,1%	42,5%	46,4%	32,5%	40,19%	52,9%
unclear structure	41,5%	40,6%	42,2%	42,9%	41,8%	38,9%	40,4%	48,4%
complexity of services	34,4%	34%	34,7%	33,1%	33,6%	37,5%	33,9%	35,3%
lack of trust in public authorities	26,5%	28,4%	24,9%	26%	29,4%	21,8%	28,2%	21,6%
lack of support and help	40,8%	43,5%	38,5%	41,4%	40,7%	40,3%	41,8%	34,6%
lack of customizability	24%	25,6%	22,7%	22,7%	23%	27,7%	25,2%	16,3%
none of the above	33,8%	39,1%	30,5%	34%	34,4%	33%	3,8%	6,5%

Table 5-3. Barriers to adoption of G2C e-government services in Germany in 2010
Source: Own Illustration based on (TNS Infratest 2010; Akkaya et al. 2011)

Respondents who specified data protection and privacy as a barrier to adoption with 'strongly agree' or 'agree' in the second question were asked to elaborate upon their concerns further in

the next question (n=337) (Akkaya et al. 2011). The aim was to receive insights about the specific concerns underlying data protection and privacy, which were stated in the previous question (Akkaya et al. 2011). The results of the third question (see Table 5-4 below) delivered valuable information about underlying risk perceptions. Besides concerns regarding the security of the transferred data, respondents were found to be considerably worried about data protection and privacy.

In contrast to the previous question, concerns of the respondents did not differ between the gender, age and formal education groups to a considerable extent. The lack of security was the most important concern for both gender and formal education groups and for respondents who were 54 years old or less. About 64 percent (64,5%) of the respondents who were 55 years old or more and about 73 percent (72,7%) of the respondents who had high formal education were worried about becoming a "transparent citizen".

As a follow-up to previous question, the younger respondents were found to be more concerned about the security whereas the relatively older respondents considered privacy related aspects as more important. It should also be mentioned that the respondents having high formal education were more concerned about all security and privacy related issues, but especially their privacy related concerns were much higher than the other formal education group.

(n=337)		gender		age groups			formal education	
	total	female	male	18 -34	35 -54	55+	low	high
inadequate security of transferred data	70,5%	68,5%	72,8%	75%	69,4%	64,8%	69,5%	72,7%
fear of becoming a "transparent citizen"	60,8%	61%	60,5%	52,8%	65,3%	65,1%	61%	72,7%
lack of confidential handling of sensitive data	57,9%	55,7%	60,3%	50,2%	61,8%	63,2%	61,4%	75,8%
none of the above	6,7%	4,4%	9,2%	5,9%	6,8%	7,9%	8,1%	6,1%
don't know	2,2%	3,2%	1,2%	2,8%	1,6%	2,4%	1,0%	0%

Table 5-4. Concerns regarding data protection and privacy in Germany in 2010
Source: Own Illustration based on (TNS Infratest 2010; Akkaya et al. 2011)

Although the results of the descriptive study in 2010 provided valuable insights into determinants and barriers to G2C e-government adoption in Germany, the data was collected at a single point in time. In order to capture social change in the German population over time, data needs to be collected at more than one point in time, which is known as multiple-snapshot cross-sectional research design (see Section 2.5.1). Moreover, cross-cultural empirical data is necessary in order to form conclusions about differences based on espoused cultural values (see Section 4.4.1). For these reasons the second descriptive study was conducted in 2011 in Germany and in Sweden.

5.3 The Descriptive Study in 2011

5.3.1 Data Collection

The second descriptive study was carried out between 8th and 31th of August 2011 by a private market research company (TNS Infratest). Participants answered questions about the importance of G2C e-government services, barriers to adoption of e-government services, and concerns about data security and privacy (Akkaya et al. 2011).

5.3.2 Data Analysis

Data Analysis was conducted using IBM SPSS Statistics 22 software.

5.3.2.1 Sample Descriptions

Demographic data about the German and Swedish respondents are presented in Table 5-5 below. About 52 percent (51,8%) of the German respondents were male, and 48 percent (48,2%) were female. Exactly 35 percent of the subjects were aged between 18 and 34, 46 percent (46,1%) were between 35 and 54 years old and 19 percent (18,9%) were 55 years old or more. About 40 percent (40,3%) of the respondents had previous experience with e-government services. Four every five respondents (80,1%) were extremely satisfied, very satisfied or satisfied with the available G2C e-government offerings. Almost one in every two respondents (49,2 %) was a mobile Internet user. Slightly less than 84 percent (83,5%) of the subjects used Internet several times a day and more than 96 percent (96,3%) of them had at least two years of Internet experience.

Around 54 percent (53,5%) of the Swedish respondents were female and 46 percent (46,5%) were male. More than one third of the subjects (35%) were between 18 to 34 years old, 46 percent (46,1%) were between 35 and 54 and about 19 percent (18,9%) were above 54 years old. About 69 percent (69,4%) of the respondents had previous experience with e-government services. Almost four every five respondents (77,6%) reported that they were extremely satisfied, very satisfied or satisfied with the available G2C e-government offerings. Exactly 40 percent of the sample was mobile Internet users. Almost 85 percent (84,7%) of the respondents used Internet several times a day and nearly 60 percent (59,6%) of the sample had more than 10 years of Internet experience.

	GERMANY		SWEDEN	
	Frequency	Percent	Frequency	Percent
Gender				
female	518	51,8	535	53,5
male	482	48,2	465	46,5
Age Range				
18-34	350	35	310	31
35-54	461	46,1	435	43,5
55 and older	189	18,9	255	25,5
Formal education				
low	824	82,4	613	61,3
high	176	17,6	387	38,7
Population				
less than 2.000	77	7,7	22	2,2
2.000 to 5.000	76	7,6	37	3,7
5.000 to 20.000	226	22,6	168	16,8
20.000 to 50.000	167	16,7	205	20,5
50.000 to 100.000	99	9,9	216	21,6
100.000 to 500.000	146	14,6	174	17,4
more than 500.000	181	18,1	121	12,1
don‘t know	28	2,8	57	5,7
Previous e-government experience				
yes	403	40,3	694	69,4
no	572	57,2	245	24,5
don’t know	25	2,5	61	6,1
Satisfaction with the e-government offerings in the overall				
extremely satisfied	76	7,6	42	4,2
very satisfied	228	22,8	210	21
satisfied	497	49,7	524	52,4
somewhat satisfied	77	7,7	70	7
not satisfied	14	1,4	7	0,7
don‘t know	108	10,8	147	14,7
Mobile Internet user				
yes	500	50,0	580	58
no	492	49,2	400	40
don‘t know	8	0,8	20	2
Frequency of Internet use				
several times a day	835	83,5	847	84,7
once a day	114	11,4	99	9,9
several times a week	46	4,6	45	4,5
several times a month	3	0,3	3	0,3
once a month or less	1	0,1	5	0,5
don‘t know	1	0,1	1	0,1
Internet Experience				
<6 months	3	0,3	7	0,7
6 to 12 months	8	0,8	3	0,3
1 to 2 years	19	1,9	5	0,5
2 to 5 years	117	11,7	61	6,1
5 to 10 years	348	34,8	315	31,5
more than 10 years	498	49,8	595	59,6
don’t know	6	0,6	13	1,3

Table 5-5. Sample demographics of the German and Swedish samples in 2011
Source: Own Illustration based on (Krcmar et al. 2011b)

5.3.2.2 Analysis of the Survey Results

Results of the German Sample

Figure 5.2 presents the results of the first question, and Table 5-6 and Table 5-7 correspond to second and third questions respectively. The analysis in the first question was focused on *top 2 box* scores.

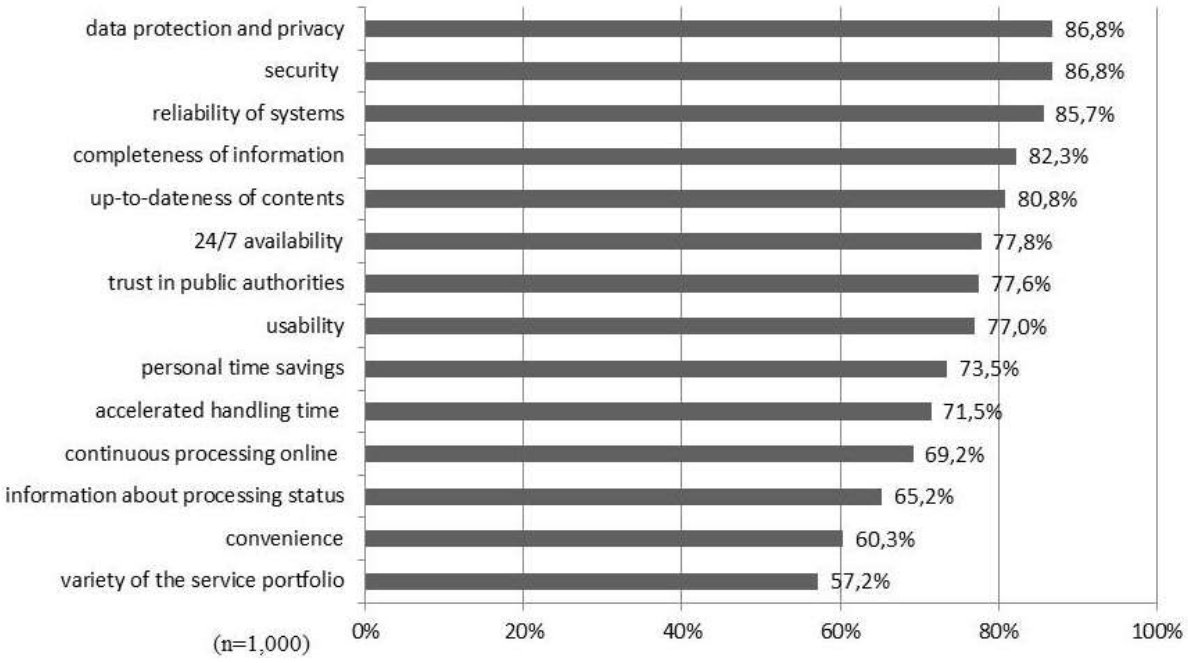


Figure 5.2. Factors influencing adoption of G2C e-government services in Germany in 2011
Source: Own Illustration based on (Krcmar et al. 2011b)

The top three factors in the first question did not change compared to the previous year. As shown in Figure 5.2 above, 'data protection and privacy' and 'security' had the strongest impact (86,8%) on citizens' engagement in e-government, followed by the 'reliability of systems' (85,7%). While trust in government is mentioned implicitly in the item of 'data protection and privacy', the item 'trust in public authorities' (77,6%) captured the importance of trust in government explicitly. Other important factors included 'completeness of information' (82,3%), 'up-to-dateness of contents' (80,8%) and '24/7 availability' (77,8%).

The second question investigated the barriers obstructing the use of G2C e-government services. Similar to 2010, the top barrier was the 'lack of integration' (55,7%) which refers to lack of continuous processing online without any change in media. In 2011, the 'lack of data protection and privacy' became the second major deterrent (52%) to G2C e-government adoption in Germany. The third important barrier was the 'unclear structure' (51,1%), which was followed by the 'lack of support and help' (48,3%).

The findings indicated that the barriers differ between gender, age and formal education groups. The 'lack of integration' became the most important barrier for both gender and formal education groups as well as all respondents who were 54 years old or less. The age group of

55+ considered ‘lack of data protection and privacy’ as the most important barrier to G2C e-government use.

(n=1,000)		gender		age groups			formal education	
	total	female	male	18 -34	35 -54	55+	low	high
lack of data protection and privacy	52%	53,3%	50,6%	55,7%	49,7%	50,8%	52,8%	48,3%
lack of integration	55,7%	54,4%	57,1%	59,4%	55,1%	50,3%	54,9%	59,7%
unclear structure	51,1%	49%	53,3%	54%	49,2%	50,3%	51%	51,7%
complexity of services	40,7%	40,2%	41,3%	40,6%	39,5%	43,9%	42,5%	32,4%
lack of trust in public authorities	39,3%	39,8%	38,8%	41,1%	36,9%	41,8%	40,8%	32,4%
lack of support and help	48,3%	47,1%	49,6%	48,3%	47,7%	49,7%	50,1%	39,8%
lack of customizability	26,7%	25,5%	28%	27,4%	25,4%	28,6%	28,3%	19,3%
none of the above	38,3%	42,6%	34,4%	50%	35,2%	32,3%	36,8%	45%

Table 5-6. Barriers to adoption of G2C e-government services in Germany in 2011
Source: Own Illustration based on (Krcmar et al. 2011b)

The third question investigated the concerns of citizens with regard to data protection and privacy. In this question, only the respondents who had selected data protection and privacy as a barrier to adoption in the second question (n=520), were asked to specify their concerns further (Akkaya et al. 2011).

(n=520)		gender		age groups			formal education	
	total	female	male	18 -34	35 -54	55+	low	high
inadequate security of transferred data	74%	77,5%	70,1%	78%	71,2%	72,9%	74,3%	72,9%
lack of confidential handling of data	57,1%	55,4%	59%	53,3%	53,7%	72,9%	56,8%	58,8%
fear of becoming a “transparent citizen”	58,7%	58,7%	58,6%	53,3%	57,2%	72,9%	56,1%	71,8%
fear of data theft	61,2%	64,5%	57,4%	63,1%	56,8%	67,7%	62,1%	56,5%
none of the above	2,9%	3,3%	2,5%	2,6%	4,4%	0%	3,2%	1,2%
don’t know	1,7%	1,8%	1,6%	1,5%	2,2%	1%	1,8%	1,2%

Table 5-7. Concerns regarding data protection and privacy in Germany in 2011
Source: Own Illustration based on (Krcmar et al. 2011b)

Table 5-7 above depicts the concerns of citizens regarding data protection and privacy. The biggest concern was the 'inadequate security of transferred data' (74%). This confirms the necessity of *trust in the Internet*. The item 'fear of data theft' (61,2%) incorporates both technology and privacy related concerns, which refers to having personal information stolen by hackers during transmission of data as well as during its storage by government.

It can be clearly seen that citizens perceive risks not only regarding technology but also about the privacy of the data after transmission. The 'lack of confidential handling of sensitive data' (57,1%) and 'fear of becoming a transparent citizen' (58,7%) refer to privacy, which confirms the importance of *trust in government*.

Comparable to the previous question, concerns of the respondents did not differ between the gender, age and formal education groups to a considerable extent. The 'inadequate security of transferred data' was the major deterrent to G2C e-government adoption for all groups independent of gender, age and formal education. The age group of 55+ was concerned about privacy related issues as much as the lack of security.

As in the previous year, the younger respondents were found to be more concerned about the security while the relatively older respondents considered privacy related issues as more critical. About two every three respondent from the age group 55+ were worried about the 'lack of confidential handling of data' and 'fear of becoming a transparent citizen', while it was considered about one every two respondent in the other age groups.

Similar to the previous year, the respondents having high formal education were more concerned about privacy related risks. More than 71 percent (71,8%) of this education group has concerns regarding ''fear of becoming a transparent citizen', while it was considered important by 56 percent (56,1%) of the respondents having a low formal education.

Results of the Swedish Sample

Figure 5.3 presents the results of the first question, and Table 5-8 and Table 5-9 correspond to second and third questions respectively. The analysis in the first question was focused on *top 2 box* scores.

As shown in Figure 5.3 below, 'security' had the strongest impact (82,7%) on citizens' engagement in e-government for the Swedish respondents, followed by the 'data protection and privacy' (80,8%) and 'reliability of systems' (79,2%). While trust in government is mentioned implicitly in the item of 'data protection and privacy', the item 'trust in public authorities' (71,1%) captured the importance of trust in government explicitly. Other important factors included 'usability' (73,2%), 'completeness of information' (69,5%) and ''24/7 availability' (67,6%).

Noticeable are the lower importance of factors in Sweden compared to Germany. Despite differences in rankings, the top three factors were the same as in Germany. The rankings and the importance of most of the items differed considerably between the countries of analysis. The 'usability' of the services was ranked as fourth in Sweden, while it was ranked as eighth in Germany. The 'convenience' of the services was an important factor for about 67 percent (66,7%) of the Swedish respondents, while it was at the bottom of the list with 60 percent (60,3%) in Germany.

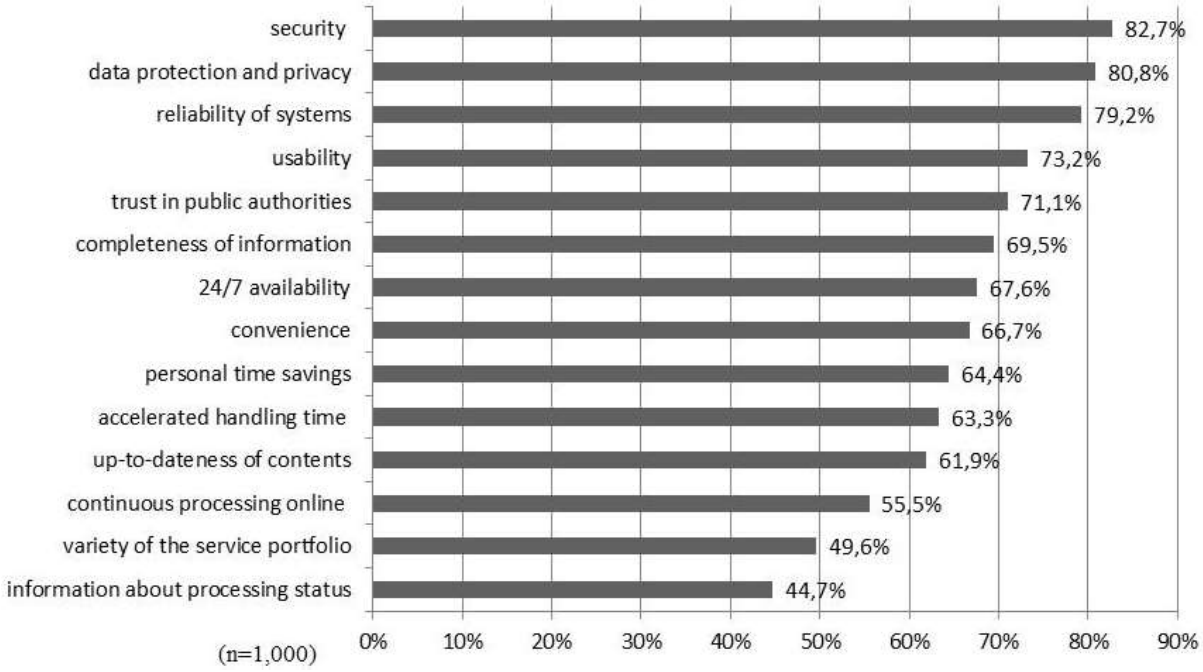


Figure 5.3. Factors influencing adoption of G2C e-government services in Sweden in 2011
Source: Own Illustration based on (Krcmar et al. 2011b)

The second question investigated the barriers obstructing the use of G2C e-government services. Overall, the Swedish respondents were less skeptical compared to the German respondents, which resulted in lower levels of agreement in all barriers. Similar to Germany, the top barrier was the 'lack of integration' (45,8%). In contrast to Germany, which had the 'lack of data protection and privacy' as the second major deterrent (52%), this barrier was perceived as significantly less important by the Swedish respondents. The findings revealed that 'unclear structure' (45,2%) and 'lack of support and help' (43,3%) were important barriers in this nation.

The findings indicated that the 'lack of integration' was the major barrier for females, respondents who were 54 years old or less and respondents having low formal education. The survey participants having high formal education and the male respondents considered 'unclear structure' as the major deterrent. The age group of 55+ was most concerned about the 'complexity of services' which may be partly explained by digital literacy.

The third question investigated the concerns of citizens with regard to data protection and privacy. In this question, only the respondents who had selected data protection and privacy as a barrier to adoption in the second question (n=383), were asked to specify their concerns further (Akkaya et al. 2011). Similar to Germany, the top concern was the 'inadequate security of transferred data' (64,5%), followed by the 'fear of data theft' (46,2%). As in the case of the remaining two questions, all concerns were perceived as less important in Sweden than in Germany, confirming the higher uncertainty avoidance of the German nation (Hofstede et al. 1991).

(n=1,000)		gender		age groups			formal education	
	total	female	male	18 -34	35 -54	55+	low	high
lack of data protection and privacy	38,3%	40%	36,3%	33,9%	42,1%	37,3%	35,9%	42,1%
lack of integration	45,8%	46,2%	45,4%	44,8%	48%	43,1%	43,1%	50,1%
unclear structure	45,2%	44,9%	45,6%	42,6%	48%	43,5%	41,4%	51,2%
complexity of services	42,3%	43,9%	40,4%	35,5%	44,8%	46,3%	41,4%	43,7%
lack of trust in public authorities	34,9%	35,9%	33,8%	29,7%	36,8%	38%	33,3%	37,5%
lack of support and help	43,3%	45,6%	40,6%	38,1%	46,4%	44,3%	42,7%	44,2%
lack of customizability	32%	32%	32%	24,5%	34,3%	37,3%	34,3%	28,4%
none of the above	25,4%	29,2%	21%	26,2%	25%	25%	21,5%	33,3%

Table 5-8. Barriers to adoption of G2C e-government services in Sweden in 2011
Source: Own Illustration based on (Krcmar et al. 2011b)

Table 5-9 below depicts the concerns of citizens regarding data protection and privacy. The biggest concern was the 'inadequate security of transferred data' (64,5%). It can be clearly seen that Swedish citizens perceive less risks regarding the privacy of the data after transmission. The 'lack of confidential handling of sensitive data' (40,7%) – 57,1% in Germany – and 'fear of becoming a transparent citizen' (35%) – 58,7% in Germany – were considered as important by only one third of the population compared to one every two citizens in Germany.

(n=383)		gender		age groups			formal education	
	total	female	male	18 -34	35 -54	55+	low	high
inadequate security of transferred data	64,5%	67,8%	60,4%	70,5%	60,7%	65,3%	63,6%	65,6%
lack of confidential handling of data	40,7%	39,3%	42,6%	41,9%	40,4%	40%	42,3%	38,7%
fear of becoming a "transparent citizen"	35%	35,5%	34,3%	26,7%	37,7%	38,9%	35,5%	34,4%
fear of data theft	46,2%	51,9%	39,1%	48,6%	44,8%	46,3%	45,5%	47,2%
none of the above	12,5%	11,2%	14,2%	7,6%	15,3%	12,6%	11,4%	14,1%
don't know	3,4%	4,7%	1,8%	2,9%	3,8%	3,2%	3,6%	3,1%

Table 5-9. Concerns regarding data protection and privacy in Sweden in 2011
Source: Own Illustration based on (Krcmar et al. 2011b)

Similarly to Germany, concerns of the respondents did not differ between the gender, age and formal education groups to a considerable extent. The ‘inadequate security of transferred data’ was the major deterrent to G2C e-government adoption for all groups independent of gender, age and formal education.

5.4 Comparison of the Results

In order to derive conclusions about the consistency of the factors, barriers and concerns of the German population over the two years, findings were compared. Furthermore, the survey results of both the German and Swedish respondents were also compared to test whether two nations differed significantly. All tests were conducted with a confidence level of 95 percent and margin of error of 5 percent.

It is important to note that the value one in the Likert scale corresponds to ‘extremely important’ in the first question and to ‘strongly agree’ in the second question, therefore the lower mean values imply higher level of agreement.

5.4.1 Comparison of the Results of the Descriptive Studies in 2010 and 2011 in Germany

In order to observe possible changes in the perceptions of German citizens over time, three questions were compared separately. As mentioned previously, the item ‘fear of data theft’ was added in 2011, thus it could not be included in the comparison of the third question.

An independent samples t-test was used to compare the means of the two years. The analysis presented in Table 5-10 below suggests that, twelve out of fourteen factors in 2010 did not change in 2011. Only a significant decrease by the factor ‘24/7 availability’ ($p<0.05$) and a significant increase by the factor ‘completeness of information ($p<0.05$) were observed. A closer analysis of the mean values reveals that these two changes were relatively minor. Therefore, it can be concluded that the factors influencing use of G2C e-government services remained the same in the years of 2010 and 2011 in Germany.

		N	Mean	Std. Deviation	Std. Error Mean	t	Sig. (p)	Difference
security	1) 2010	726	1,46	0,763	0,028	-0,940	.347	No
	2) 2011	1000	1,50	0,863	0,027			
convenience	1) 2010	726	2,30	1,048	0,039	1,291	.197	No
	2) 2011	1000	2,24	1,033	0,033			
usability	1) 2010	726	1,83	0,828	0,031	-0,649	.516	No
	2) 2011	1000	1,86	0,933	0,029			
personal time savings	1) 2010	726	1,90	0,905	0,034	-1,753	.080	No
	2) 2011	1000	1,98	0,945	0,030			
reliability of systems	1) 2010	726	1,59	0,806	0,030	-0,089	.929	No
	2) 2011	1000	1,60	0,884	0,028			
data protection and privacy	1) 2010	726	1,41	0,761	0,028	-1,466	.143	No
	2) 2011	1000	1,47	0,876	0,028			
trust in public authorities	1) 2010	726	1,83	0,913	0,034	0,438	.661	No
	2) 2011	1000	1,81	0,968	0,031			
variety of the service portfolio	1) 2010	726	2,29	0,919	0,034	-0,216	.829	No
	2) 2011	1000	2,30	0,990	0,031			
continuous processing online	1) 2010	726	2,07	0,944	0,035	-0,136	.892	No
	2) 2011	1000	2,07	1,008	0,031			
completeness of information	1) 2010	726	1,98	0,813	0,035	5,947	**.000**	Yes
	2) 2011	1000	1,73	0,906	0,032			
up-to-dateness of contents	1) 2010	726	1,78	0,797	0,030	-0,474	.635	No
	2) 2011	1000	1,80	0,911	0,029			
24/7 availability	1) 2010	726	1,73	0,835	0,031	-2,465	**.014**	Yes
	2) 2011	1000	1,84	0,967	0,031			
information about processing status	1) 2010	726	2,20	0,947	0,035	1,016	.310	No
	2) 2011	1000	2,15	0,983	0,031			
accelerated handling time	1) 2010	726	1,92	0,907	0,034	-1,950	.051	No
	2) 2011	1000	2,01	0,970	0,031			

Table 5-10. Comparison of the German samples in 2010-2011 with regard to the factors influencing adoption of G2C e-government services
Source: Own Illustration based on (Krcmar et al. 2011b; TNS Infratest 2010)

Next, the possible changes in the importance of barriers to G2C e-government adoption between the two consequent years were examined by conducting an independent samples t-test. Seven out of eight barriers in 2010 significantly changed in 2011 ($p<0.05$). As seen in the mean values presented in the Table 5-11 below, all changes implied an *increase* in the *importance* of the items. Therefore, the barriers of previous year continued to be valid in 2011, even with increased levels of importance.

		N	Mean	Std. Deviation	Std. Error Mean	t	Sig. (p)	Difference
lack of data protection and privacy	1) 2010	726	2,65	0,887	0,033	8,084	**.000**	Yes
	2) 2011	1000	2,29	0,922	0,029			
lack of integration	1) 2010	726	2,45	0,843	0,031	5,057	**.000**	Yes
	2) 2011	1000	2,24	0,842	0,027			
unclear structure	1) 2010	726	2,55	0,827	0,031	4,018	**.000**	Yes
	2) 2011	1000	2,38	0,860	0,027			
complexity of services	1) 2010	726	2,74	0,828	0,031	3,711	**.000**	Yes
	2) 2011	1000	2,58	0,890	1,028			
lack of trust in public authorities	1) 2010	726	2,89	0,843	0,031	6,218	**.000**	Yes
	2) 2011	1000	2,62	0,935	0,030			
lack of support and help	1) 2010	726	2,62	0,811	0,030	4,171	**.000**	Yes
	2) 2011	1000	2,45	0,868	0,027			
lack of customizability	1) 2010	726	3,16	0,890	0,033	2,702	**.007**	Yes
	2) 2011	1000	3,03	0,970	0,031			
none of the above	1) 2010	726	3,24	1,824	0,010	-0,332	.740	No
	2) 2011	1000	3,33	1,750	0,008			

Table 5-11. Comparison of the German samples in 2010-2011 with regard to the barriers impeding adoption of G2C e-government services
Source: Own Illustration based on (Krcmar et al. 2011b; TNS Infratest 2010)

Next, the possible changes in concerns regarding data protection and privacy over the two years in Germany were investigated. To test the existence of statistically significant differences between the two samples, a Pearson Chi-Square test was conducted. The analysis presented in Table 5-12 to Table 5-14 below revealed no significant changes in the importance of these concerns ($p>0.05$). While 70 percent of the respondents were worried about the 'inadequate security of transferred data' in 2010, the increase to 74 percent in 2011 did not result in a statistically significant difference.

			Years		Total
			2010	2011	
inadequate security of transferred data	no	Count	73	135	208
		%	30	26	27,3
	yes	Count	170	385	555
		%	70	74	72,7
Total		Count	243	520	763
		%	100	100	100
			Value	df	Sig. (p)
Pearson Chi-Square			1,390	1	.238

Table 5-12. Comparison of the German samples in 2010-2011 with regard to the concern 'inadequate security of transferred data'
Source: Own Illustration based on (Krcmar et al. 2011b; TNS Infratest 2010)

No significant change was observed between the survey results in 2010 and 2011 in terms of the concern 'lack of confidential handling of sensitive data' ($p>0.05$). This item was important for 63 percent of the respondents (63,4%) in 2010 and 57 percent of the respondents (57,1%) in 2011, which did not result in a statistically significant difference.

			Years		Total
			2010	2011	
lack of confidential handling of sensitive data	no	Count	89	223	312
		%	36,6	42,9	40,9
	yes	Count	154	297	451
		%	63,4	57,1	59,1
Total		Count	243	520	763
		%	100	100	100
			Value	df	Sig. (p)
Pearson Chi-Square			2,684	1	.101

Table 5-13. Comparison of the German samples in 2010-2011 with regard to the concern 'lack of confidential handling of sensitive data'
Source: Own Illustration based on (Krcmar et al. 2011b; TNS Infratest 2010)

Similarly, no significant change was observed between the survey results in 2010 and 2011 in terms of the concern 'fear of becoming a transparent citizen' ($p>0.05$). This item was important for 63 percent (62,6%) of the respondents in 2010 and 59 percent (58,7%) of the respondents in 2011, which did not result in a statistically significant difference.

			Years		Total
			2010	2011	
fear of becoming a "transparent citizen"	no	Count	91	215	306
		%	37,4	41,3	40,1
	yes	Count	152	305	457
		%	62,6	58,7	59,9
Total		Count	243	520	763
		%	100	100	100
			Value	df	Sig. (p)
Pearson Chi-Square			1,047	1	.306

Table 5-14. Comparison of the German samples in 2010-2011 with regard to the concern 'fear of becoming a transparent citizen'
Source: Own Illustration based on (Krcmar et al. 2011b; TNS Infratest 2010)

Next, the factors influencing use of G2C e-government services, barriers impeding use, and concerns with regard to data protection and privacy were compared between the countries of analysis in 2011.

5.4.2 Comparison of the Results of the Descriptive Studies between Germany and Sweden in 2011

In order to observe possible differences in perceptions of German and Swedish citizens, the findings for the two nations were compared.

		N	Mean	Std. Deviation	Std. Error Mean	t	Sig. (p)	Difference
security	1) DE	1000	1,50	0,863	0,027	-3,101	**.002**	Yes
	2) SWE	1000	1,62	0,938	0,030			
convenience	1) DE	1000	2,24	1,033	0,033	2,432	**.015**	Yes
	2) SWE	1000	2,13	0,932	0,029			
usability	1) DE	1000	1,86	0,933	0,029	-2,855	**.004**	Yes
	2) SWE	1000	1,98	0,931	0,029			
personal time savings	1) DE	1000	1,98	0,945	0,030	-3,989	**.000**	Yes
	2) SWE	1000	2,15	0,961	0,030			
reliability of systems	1) DE	1000	1,60	0,884	0,028	-3,739	**.000**	Yes
	2) SWE	1000	1,75	0,945	0,030			
data protection and privacy	1) DE	1000	1,47	0,876	0,028	-4,126	**.000**	Yes
	2) SWE	1000	1,64	0,964	0,030			
trust in public authorities	1) DE	1000	1,81	0,968	0,031	-4,202	**.000**	Yes
	2) SWE	1000	1,99	0,979	0,031			
variety of the service portfolio	1) DE	1000	2,30	0,990	0,031	-4,160	**.000**	Yes
	2) SWE	1000	2,48	0,945	0,030			
continuous processing online	1) DE	1000	2,07	1,008	0,032	-6,402	**.000**	Yes
	2) SWE	1000	2,35	0,947	0,030			
completeness of information	1) DE	1000	1,73	0,906	0,029	-7,327	**.000**	Yes
	2) SWE	1000	2,03	0,943	0,030			
up-to-dateness of contents	1) DE	1000	1,80	0,911	0,029	-9,830	**.000**	Yes
	2) SWE	1000	2,21	0,958	0,030			
24/7 availability	1) DE	1000	1,84	0,967	0,031	-5,559	**.000**	Yes
	2) SWE	1000	2,09	0,972	0,031			
information about processing status	1) DE	1000	2,15	0,983	0,031	-9,398	**.000**	Yes
	2) SWE	1000	2,57	1,006	0,032			
accelerated handling time	1) DE	1000	2,01	0,970	0,031	-3,811	**.000**	Yes
	2) SWE	1000	2,18	0,978	0,031			

Table 5-15. Comparison of Germany and Sweden in 2011 with regard to the factors influencing adoption of G2C e-government services
Source: Own Illustration based on (Krcmar et al. 2011b)

First, the factors influencing use of e-government services were compared between the two samples. An independent samples t-test was used to compare the means between the German and Swedish samples. The analysis in Table 5-15 above indicates significant differences ($p<0.05$) between the two nations regarding all fourteen factors. Except the item of 'convenience', all factors were perceived as significantly more important by the German sample.

Next, the barriers impeding use of G2C e-government services were compared between the German and Swedish samples. An independent samples t-test was used to compare the means of the two samples. As presented in the Table 5-16 below, four out of eight barriers – 'lack of data protection and privacy', 'lack of integration', 'lack of customizability', 'none of the above' – were found to differ between the two nations ($p<0.05$). Except the item of 'lack of customizability', all the others were perceived to be more important by the German respondents than the Swedish ones.

		N	Mean	Std. Deviation	Std. Error Mean	t	Sig. (p)	Difference
lack of data protection and privacy	1) DE	1000	2,29	0,921	0,029	-3,910	**.000**	Yes
	2) SWE	1000	2,45	0,926	0,029			
lack of integration	1) DE	1000	2,24	0,842	0,027	-2,425	**.015**	Yes
	2) SWE	1000	2,33	0,827	0,026			
unclear structure	1) DE	1000	2,38	0,860	0,027	-0,874	.382	No
	2) SWE	1000	2,41	0,852	0,027			
complexity of services	1) DE	1000	2,57	0,890	0,028	1,749	.081	No
	2) SWE	1000	2,50	0,883	0,028			
lack of trust in public authorities	1) DE	1000	2,61	0,935	0,030	-1,478	.140	No
	2) SWE	1000	2,68	0,911	0,029			
lack of support and help	1) DE	1000	2,44	0,868	0,027	-0,368	.713	No
	2) SWE	1000	2,45	0,819	0,026			
lack of customizability	1) DE	1000	3,02	0,970	0,031	4,721	**.000**	Yes
	2) SWE	1000	2,83	0,859	0,027			
none of the above	1) DE	1000	2,08	0,263	0,008	-2,113	**.035**	Yes
	2) SWE	1000	2,11	0,322	0,010			

Table 5-16. Comparison of Germany and Sweden in 2011 with regard to the barriers impeding adoption of G2C e-government services
Source: Own Illustration based on (Krcmar et al. 2011b)

Concerns regarding data protection and privacy were then compared between the two nations. To test the existence of statistically significant differences between the two samples, a Pearson Chi-Square test was conducted. The differences between the two nations were observed to be much more significant compared to the previous two questions. In Sweden, about one in every three respondents (n=383) were asked this question, whereas in Germany, roughly one out of every two (n=520) was subject to it. This alone indicates that the reservations about data protection and privacy were greater for the German sample.

As illustrated in Table 5-17 below, there were significant differences ($p<0.05$) between the two nations regarding the uncertainty about 'inadequate security of transferred data' ($\chi^2(1)=9{,}572$, $p=0.002$). About 61 percent (60,9%) of all German and Swedish respondents who answered 'yes' to this question were German, while only 39 percent (39.1%) of them were Swedish. Therefore, it was concluded that respondents in Germany had higher levels of concern the Swedish ones regarding this issue.

			Countries		Total
			DE	SWE	
inadequate security of transferred data	no	Count	135	136	271
		%	49,8	50,2	100
	yes	Count	385	247	632
		%	60,9	39,1	100
Total		Count	520	383	903
		%	57,6	42,4	100
			Value	df	Sig. (p)
Pearson Chi-Square			9,572	1	**.002**

Table 5-17. Comparison of Germany and Sweden in 2011 with regard to the concern 'inadequate security of transferred data'
Source: Own Illustration based on (Krcmar et al. 2011b)

The analysis in Table 5-18 below revealed significant differences ($p<0.05$) between the two samples regarding anxieties about 'lack of confidential handling of sensitive data' ($\chi^2(1)=23{,}683$, $p=0.000$). About 66 percent (65,6%) of all German and Swedish respondents who were worried about this item were German, while only 34 percent (34,4%) of them were Swedish. Therefore, it can be concluded that respondents in Germany were considerably more concerned than the Swedish ones with regards to this issue.

			Countries		Total
			DE	SWE	
lack of confidential handling of sensitive data	no	Count	223	227	450
		%	49,6	50,4	100
	yes	Count	297	156	453
		%	65,6	34,4	100
Total		Count	520	383	903
		%	57,6	42,4	100
			Value	df	Sig. (p)
Pearson Chi-Square			23,683	1	**.000**

Table 5-18. Comparison of Germany and Sweden in 2011 with regard to the concern 'lack of confidential handling of sensitive data'
Source: Own Illustration based on (Krcmar et al. 2011b)

As presented in the Table 5-19 below, the analysis revealed significant differences ($p<0.05$) regarding 'fear of becoming a transparent citizen' ($\chi^2(1)=49,543$, $p=0.000$). About 69 percent (69,4%) of all German and Swedish respondents who had misgivings about this item were German, while only 31 percent (30,6%) of them were Swedish. Therefore, it was concluded that the respondents in Germany were also considerably more concerned than the Swedish respondents with regard to this issue.

			Countries		Total
			DE	SWE	
fear of becoming a "transparent citizen"	no	Count	215	249	464
		%	46,3	53,7	100
	yes	Count	305	134	439
		%	69,4	30,6	100
Total		Count	520	383	903
		%	57,6	42,4	100
			Value	df	Sig. (p)
Pearson Chi-Square			49,543	1	**.000**

Table 5-19. Comparison of Germany and Sweden in 2011 with regard to the concern 'fear of becoming a transparent citizen'
Source: Own Illustration based on (Krcmar et al. 2011b)

As presented in the Table 5-20 below, the analysis revealed significant differences ($p<0.05$) regarding 'fear of data theft' ($\chi^2(1)=19,875$, $p=0.000$). About 64 percent (64,2%) of all German and Swedish respondents who were apprehensive about this item were German, while only 36 percent (35,8%) of them were Swedish. Therefore, it was concluded that, again the respondents in Germany were considerably more concerned compared to the Swedish ones regarding this issue.

			Countries		Total
			DE	SWE	
fear of data theft	no	Count	202	206	408
		%	49,6	50,4	100
	yes	Count	318	177	495
		%	64,2	35,8	100
Total		Count	520	383	903
		%	57,6	42,4	100
			Value	df	Sig. (p)
Pearson Chi-Square			19,875	1	**.000**

Table 5-20. Comparison of Germany and Sweden in 2011 with regard to the concern 'fear of data theft'
Source: Own Illustration based on (Krcmar et al. 2011b)

In the next section, the findings of the surveys as well as the comparison of the results in 2010 and 2011 are interpreted.

5.5 Interpretation of the Results

The surveys conducted in 2010 and in 2011 questioned the factors influencing the adoption of G2C e-government services, and examined barriers and concerns with a specific focus on data protection and privacy (Akkaya et al. 2011).

The first question investigated the factors influencing use of G2C e-government services. The top three barriers were 'data protection and privacy', 'security' and 'reliability of systems' in both countries. Besides confirming the importance of security, data protection and privacy; the surveys provided valuable insights into G2C e-government adoption behaviors of citizens. The well-known technology adoption constructs of 'perceived ease of use' (Davis 1989) – which corresponds to 'usability' in the surveys – and 'perceived usefulness' (Davis 1989) – which corresponds to '24/7 availability', 'personal time savings', 'accelerated handling time', and 'information about processing status' in the surveys – were confirmed to be among the important determinants of G2C e-government adoption in Germany.

The second question in the surveys revealed that the most important barrier to G2C e-government use was 'lack of integration' in Germany in the time period of 2010-2011, which was closely followed by 'unclear structure' in 2010 and 'lack of data protection and privacy' in 2011. The third question investigated the barrier of 'lack of data protection and privacy' further by differentiating between security related and privacy related concerns. The analysis revealed that German citizens were not only concerned about the security of the transmission in e-government, and had specific concerns about the confidential handling and use of the collected data by the government.

To examine the differences over time, results of the surveys between 2010 and 2011 were compared for the German respondents. Overall, it can be said that the results of the two years did not differ considerably. Other than the two factors influencing adoption, only the importance of barriers have changed significantly. All barriers that have changed were observed to become much more important, implying that the barriers in 2010 continued to hamper adoption of e-government in Germany in 2011 with an increased level of importance. The items related to the necessity of trust in technology and government continued to be among the major factors, barriers and concerns influencing citizens' intention to use e-government. A significant increase in the barriers of 'lack of data protection and privacy' (33,8% in 2010 vs. 52% in 2011) and 'lack of trust in public authorities' (26,5% in 2010 vs. 39,3% in 2011) was observed in 2011 compared to 2010. Furthermore, it is important to underline that the third question was asked only to respondents who specified data protection and privacy as a barrier to adoption in the previous question. In 2010, one in every three respondents (n=337) had been asked this question, whereas in 2011, one in every two respondents (n=520) was subject to it. This alone indicated that the concerns of data protection and privacy in Germany have increased in 2011 compared to previous year.

The findings of the survey in 2011 were compared to examine differences between Germany and Sweden. Even though the factors related to data protection, privacy and security were rated as top priority by both samples in the first question; several statistically significant differences between the two nations were observable. In the second question, the German sample perceived 'lack of integration', 'lack of data protection and privacy' as more important barriers than the Swedish sample, while 'lack of customization' was considered more crucial in Sweden. More clear differences between the two nations were observable in the third question. All concerns regarding data protection and privacy were found to be considerably higher in Germany than in Sweden. About 66 percent (65,6%) of all respondents who were worried about 'lack of confidential handling of sensitive data' were German, while only 34 percent (34,4%) were Swedish. This finding confirms the literature-based arguments regarding the high risk-averseness of the German nation (Krasnova et al. 2009; Münchner Kreis 2013; Hofstede et al. 1991; The Lauder Institute 2009).

Based on the analysis, it was concluded that two nations have differed considerably regarding concerns related to data protection and privacy. Therefore, it is further argued that citizens' perceptions of the risk of online technologies can hamper their adoption significantly in Germany. An effective instrument to deal with the perceived risk and uncertainty in G2C e-government could be trust, similar to other contexts (e.g., Jarvenpaa et al. 1999), which will be considered in the selection of the research model in Section 6.1.1.

In the next chapter, the research model of the exploratory study will be synthesized from the findings of the descriptive studies and the theoretical foundations which were elaborated in Chapter 4. Although some differences between Germany and Sweden remained subtle in the descriptive studies, this may be caused by the limitations of descriptive analysis. Prior literature in other contexts has shown the necessity of analyzing adoption behaviors of nations individually (Hofstede 2001b; Pavlou/Chai 2002; Srite/Karahanna 2006) therefore it is further argued that the differences between the nations could be much more significant. The adoption behaviors of the two nations will be compared in a detailed causal analysis, which may be more successful in pointing to differences between the adoption behaviors of the two nations.

5.6 Summary

The empirical analysis of this thesis combines descriptive and explanatory studies, in order to provide a broad analysis of the determinants of G2C e-government adoption in a cross-cultural context. In this chapter, the descriptive analysis of the empirical data of the thesis, which was used in the development of the research model, was presented. Section 5.1 provided information on the purpose of this research, selection of the countries for analysis, data collection method, and the selected sampling approach. In Section 5.2, the first descriptive study of the thesis, which was conducted in 2010 only in Germany, was presented. Three main questions were asked in order to gain insights about the factors influencing G2C e-government use behavior, barriers hindering adoption and concerns with respect to data protection and privacy. The empirical findings revealed that data protection and privacy was the main factor influencing use of G2C e-government in Germany, followed by security and reliability of the systems.

In order to observe the change of factors, barriers and concerns over time, a multiple-shot cross-sectional research design was chosen. Accordingly, the second descriptive study was conducted in 2011 with the same three questions, and this was presented in Section 5.3. Since this thesis argues that espoused cultural values could influence adoption behavior of nations, the study was conducted in Sweden as well as Germany. Similarly to 2010, the samples were selected as being representative of their populations. Sweden was selected for comparison with Germany based on the similarities of the two nations with regard to their economic growth and differences in their e-government development levels and their national cultural indices (Hofstede et al. 1991).

Similarly to 2010, the top three determinants of G2C e-government use in Germany were found to be data protection and privacy, security and reliability in 2011. The third question revealed that citizens not only have technology related concerns but are also worried about privacy of their sensitive data. One out of every three citizens stated apprehensions about data protection and privacy as a barrier to use of G2C e-government in 2010, and this increased to one every two respondents in 2011. Although improper security of the transaction medium is perceived as a major deterrent to G2C e-government, concerns regarding the ethical use of the collected data were also found to hinder adoption considerably in Germany. The younger age groups were found to be more concerned about the security while the respondents aged over 55 considered privacy related issues as more critical. The findings of the two studies were compared in Section 5.4.1, which showed that the factors, barriers and concerns remained either stable or became much more important in 2011 in Germany.

The descriptive results of Germany and Sweden were compared in Section 5.4.2. The independent samples t-tests revealed that the disparity between the two nations in terms of factors and barriers were mostly significantly different although some distinctions remained subtle. In contrast, all concerns regarding data protection and privacy were perceived as considerably more important by the German sample than the Swedish sample. By showing the existence of variations between the two countries, the descriptive analysis confirmed the existence of cultural differences. However, some differences were lower than expected, which requires a further explanatory analysis utilizing a strong theoretical model, which will be conducted in the next chapter.

6 Empirical Analysis Part II: Explanatory Study in 2011

The empirical results of the descriptive study provided insights regarding the factors underlying behavior of citizens towards using e-government services. Although descriptive research provided some insights, it was followed by explanatory research in order to explain individual behaviors and derive conclusions by comparing a theory-based model with empirical data as suggested in literature (Singleton/Straits 2010).

6.1 Research Design

The survey which was conducted in 2011 constitutes the empirical basis of the explanatory analysis. This data was used for two main purposes in this thesis: 1) descriptive analysis and 2) explanatory analysis.

Since the methods of analyses are completely different from each other, they were presented in separate chapters for ease of understanding. The descriptive analysis was discussed in the previous chapter. Explanatory analysis was used to determine the relationships among the constructs and test the hypotheses in the proposed research model (Akkaya et al. 2012a), which will be discussed in this chapter. Since they are based on the same empirical data, the sections explaining the 'data collection method' (see Section 5.1.3), 'sampling method' (see Section 5.1.4) and 'sample descriptions' (see Section 5.3.2.1) for the descriptive research apply also to the explanatory research, and will not be repeated here.

6.1.1 Development of the Research Model

Insights gained from the first descriptive study and theoretical basis discussed in Chapter 4, formed the basis on which the research model of the study was derived.

The analysis of findings from descriptive studies confirmed the importance of trust and perceived risk for the decision making of citizens in relation to online public services in Germany (see Table 6-1 below). The categorization was made based on top ten factors, all barriers and all concerns in the descriptive studies. It was seen that technology related concerns, data protection and privacy related concerns, complexity of services and their relative advantages are important determinants of G2C e-government in Germany.

	Factors	Barriers	Concerns
Technology related factors, barriers and concerns	• Data protection and privacy • Security • Reliability of systems	• Lack of data protection and privacy	• Inadequate security of transferred data • Fear of data theft
Data protection and privacy related factors, barriers and concerns	• Data protection and privacy • Trust in public authorities	• Lack of data protection and privacy • Lack of trust in public authorities	• Lack of confidential handling of sensitive data • Fear of becoming a "transparent citizen"
Complexity related factors, barriers and concerns	• Usability	• Complexity of services • Unclear structure • Lack of support and help • Lack of customizability	
Relative advantage related factors, barriers and concerns	• 24/7 availability • Convenience • Personal time savings • Accelerated handling time	• Lack of integration • Lack of customizability	
Information quality related factors, barriers and concerns	• Completeness of information	• Lack of customizability	

Table 6-1. Categorization of Factors, Barriers and Concerns of the Descriptive Studies
Source: Own Illustration based on (Krcmar et al. 2011b; TNS Infratest 2010)

Considering the selection of survey as the research method, prior literature suggests that the questionnaire should be designed as clearly as possible (Bryman 2012). For the sake of clarity, e-government adoption was investigated using the specific example of *online tax filing* adoption, which is discussed next.

6.1.1.1 Online Tax Filing

The example of online tax filing was chosen for several reasons, as explained in Akkaya, Wolf and Krcmar (2012a) in detail. First, e-government in Germany is still in its infancy and every individual may not be familiar with the e-government concept and related terminology (Akkaya et al. 2012a). If the concept of e-government services were not concretized, respondents may think of diverse services and answer the questions accordingly, decreasing the validity of the study. Since tax filing is a requirement by law (Akkaya et al. 2012a), its reflection as an e-government service is relatively easy to understand (Akkaya et al. 2012a). Second, as the respondents of the study live in different federal states, a federal level e-government service was necessary. Third, basing questioning on this particular example would also deliver the reasons hindering ELSTER's nationwide acceptance in Germany (Akkaya et al. 2012a).

Fourth, the selected example needs to be available in both nations, since this study includes a cross-national analysis. According to the Eurostat (2013c), the income tax declaration is the most popular e-government service in Europe. About 44 percent of e-government users in the EU reported declaration of income tax as the major reason for using online public services (eurostat 2013c). Finally, prior literature reveals a number of studies on G2C e-government adoption based on the specific example of tax declaration (Akkaya et al. 2012a). As presented in Table 4-11 in Chapter 4, *online tax filing* was the most explored specific e-government application among the studies investigating adoption based on a specific service.

6.1.1.2 Research Model and Hypotheses

Research Model and Definitions

The available technology adoption and trust theories in Chapter 4 were scanned for their applicability in explaining G2C e-government adoption in Germany based on the results of the descriptive analysis. Two main theories were selected: *The Diffusion of Innovations Theory* of Rogers (1995) and the *Trust and Risk Model* of Bélanger and Carter (2008).

There are a number of reasons for selecting these theories. First, the selected method of analysis, i.e. covariance-based SEM technique (see Section 6.3.1), requires a strong theoretical base (Hair et al. 2010, 638). The DOI is one of the earliest models of adoption, and as such its constructs have been used in many of the theoretical models which followed. The key diffusion concepts of the DOI were developed based on a thorough analysis of 508 diffusion studies in 1962 (Rogers 1962). It is one of the most widely used theories in information technology diffusion-related research (Prescott/Conger 1995). The 'Trust and Risk Model' of Bélanger and Carter (2008) is the earliest and most widely trust and risk model in literature, which was adapted to e-government context. Having its base in the 'Web Trust Model' (McKnight et al. 2002), it was adopted with additional constructs, which are specifically relevant for the G2C e-government adoption.

Second, the constructs of these theories cover the most important determinants that were found by the descriptive studies within this research. Third, one out of every two prior research studies into G2C e-government adoption have utilized the TAM (see Section 4.5.2), while the DOI has been utilized by 19 percent of the studies. Moreover, the combination of these two theories was

not subject to confirmation in any previous research, therefore a theoretical contribution to prior literature is intended.

As discussed in Section 4.2.1.1, Rogers' theory states that the perceptions regarding the following five attributes affect the adoption rate of an innovation (1995): (1) relative advantage, (2) complexity, (3) compatibility, (4) observability and (5) trialability. Based on a meta-analysis of studies, Tornatzky and Klein (1982) found the first three characteristics — *relative advantage, complexity* and *compatibility* — as the most significant predictors of innovation adoption. These three attributes are consistently identified as critical adoption factors in IS research (Kwon/Zmud 1987b), therefore these factors were selected for inclusion within the proposed research model of this thesis.

Furthermore, the research model integrates 'trust of the Internet', 'trust of the government' and 'perceived risk' from the model of Bélanger and Carter (2008), which are included given the implicit uncertainty of the e-government environment. Finally, the research model was extended with the construct of 'subjective norm' based on the prior literature (Malhotra/Galletta 1999; Taylor/Todd 1995c; Venkatesh/Davis 2000; Fishbein/Ajzen 1975; Ajzen 1985, 1991, 2005; Venkatesh et al. 2003) indicating that social influences play an important role in determining the acceptance and usage behavior of innovations (Akkaya et al. 2012a). Overall, the derived research model includes the following constructs (Akkaya et al. 2012a):

- **Trust of Internet (TOI)**: The results of the surveys showed that citizens are concerned about system robustness and security of transferred data, which necessitates trust of the Internet, as the medium of transaction (Akkaya et al. 2012a).
- **Trust of Government (TOG)**: Trust in public authorities constitutes the second dimension of trust (Akkaya et al. 2012a). Concerns about data protection and privacy including 'fear of becoming a transparent citizen' and 'lack of confidential handling of sensitive data' are covered by this construct.
- **Perceived risk (PR)**: The findings reveal that society perceives various risks of using G2C e-government services. Moreover, as discussed in Akkaya, Wolf and Krcmar (2012a) trust is closely related to the risk in question and the need for it arises only in the presence of risk (Adams 1995).
- **Relative advantage (RA):** Relative advantage is the degree to which an innovation is perceived to be better than the one it supersedes or competes with (Rogers 1995). The relative advantage of e-government services over traditional means of interacting with government such as 24/7 availability, convenience, personal time savings and accelerated handling time are covered with this construct.
- **Complexity (CLX)**: Complexity refers to the perceptions of difficulty associated with an innovation (Rogers 1995, 16). Respondents stated barriers such as complexity of services and unclear structure in the descriptive studies of this research.
- **Compatibility (CMP):** Compatibility is the degree to which an innovation is perceived to be consistent with the practices, habits, sociocultural values, beliefs and previous experiences (Rogers 1995, 15; Plouffe et al. 2001). Individuals will be more likely to adopt a new technology if it is consistent with his or her existing practices, habits, beliefs and customs.

- **Subjective Norm (SN):** Subjective norm is defined as "the person's perception that most people who are important to him think he should or should not perform the behavior in question" (Fishbein/Ajzen 1975, 302).
- **Intention to Use (USE):** The dependent variable to measure adoption intention of citizens is selected as *intention to use e-government services*[39], which is suggested as the most appropriate predictor of actual use (Ajzen/Fishbein 1980; Davis 1989).

Based on the extensive literature review provided in Chapter 4, twelve research hypotheses were formulated. The first nine hypotheses have been proposed to test the impact of constructs derived from their base theories, while the last three will test the effect of espoused cultural values.

Hypotheses in Research Model

The first five hypotheses proposed were derived from the Trust and Risk Model (Bélanger/Carter 2008). Previous studies show that users are concerned with the reliability and security of online transactions (Hoffman et al. 1999). The unpredictable nature of the Internet as a transaction medium causes uncertainties and risk (Pavlou 2003), while trust plays a central role in helping individuals overcome perceptions of risk and uncertainty (McKnight et al. 2002). Besides the technology related concerns, users are increasingly concerned about online disclosure to due loss of privacy. Thus, citizens must also trust their governments (Carter 2008) in addition to trust of the Internet.

Previous research which incorporated trust into technology adoption studies found a significant influence of trust on behavioral intention (Gefen et al. 2003; Pavlou 2003; Colesca/Dobrica 2009; Kanat/Özkan 2009; Doney/Cannon 1997; Jarvenpaa et al. 2000; Jarvenpaa et al. 1999). In the specific context of online tax filing; higher levels of perceived risk decreased intention to use by individual tax payers, where trust was found to decrease users' perceived risk of using online tax filing (Schaupp et al. 2010). Perceived risk was found to be a significant determinant of online tax filing in a previous study (Schaupp et al. 2010). In another study, perceived risk and trust were identified as significant determinants of attitude towards using online tax filing (Hung et al. 2006). Therefore, this research posits the following hypotheses (Akkaya et al. 2013):

H1: Trust of Internet will positively influence a citizen's intention to use online tax filing

H2: Trust of Internet will negatively influence a citizen's risk perceptions toward using online tax filing

H3: Trust of government will positively influence a citizen's intentions to use online tax filing

H4: Trust of government will negatively influence a citizen's risk perceptions toward using online tax filing

[39] Since G2C e-government adoption was questioned on the specific example of online tax filing, the dependent variable was adapted as 'intention to use online tax filing'.

H5: Perceived risk will negatively influence a citizen's intentions to use online tax filing

The next three hypotheses were derived from the Diffusion of Innovations Theory (Rogers 1995). The prior literature showed that relative advantage, complexity and compatibility are among the most relevant constructs to technology adoption research (Tornatzky/Klein 1982). These three constructs were found to significantly influence the attitude towards using online tax filing systems (Hung et al. 2006). In particular, relative advantage is recognized as one of the most significant determinants of technology adoption (see Taylor/Todd 1995c; Davis et al. 1989; Venkatesh/Davis 2000; Venkatesh et al. 2003), also in online e-filing adoption context (Schaupp et al. 2010; Fu et al. 2006). Indeed, the cumulative influence of trust and expected benefits can outweigh risk perceptions in the decision to use online technologies (Dinev/Hart 2006). Complexity (Carter 2008; Colesca/Dobrica 2009; Gefen et al. 2002; Phang et al. 2006) and compatibility were found to be among significant determinants of G2C e-government services adoption in numerous studies (Carter/Bélanger 2004b, 2005; Fu et al. 2006; Hung et al. 2006; Lee/Lei 2007; Rokhman 2011). Following this foundation, the following hypotheses were proposed (Akkaya et al. 2013):

H6: Relative advantage will positively influence a citizen's intentions to use online tax filing

H7: Complexity will negatively influence a citizen's intentions to use online tax filing

H8: Compatibility will positively influence a citizen's intentions to use online tax filing

Subjective norm is another key driver of intention in well-known technology adoption models (Fishbein/Ajzen 1975; Ajzen 1985, 1991, 2005; Taylor/Todd 1995c; Davis et al. 1989; Venkatesh/Davis 2000). Due to the importance of the social norm component in technology adoption studies, the "extended TAM" was suggested combining TAM with the social norms (Srite/Karahanna 2006). The significant influence of social norms on G2C e-government adoption was shown in several studies (Carter et al. 2008; Gefen et al. 2002; Shafi/Weerakkody 2009; Voutinioti 2013; Weerakkody et al. 2009a), also in the particular context of online tax filing adoption by individuals (Schaupp et al. 2010; Hung et al. 2006). Thus, the following hypothesis was posited (Akkaya et al. 2013):

H9: Subjective norm will positively influence a citizen's intentions to use online tax filing

The hypotheses H1-H9 will be tested both for German and Swedish samples in order to validate the research model in both cultures. Furthermore, they will be tested for different gender, age and formal education groups in order to validate the model across different demographics. Finally, H1-H9 will be tested to compare whether the determinants of G2C e-government adoption differ between the respondents who use online tax filing and the ones who do not use this service.

The final three hypotheses are related to espoused cultural values. In particular, the *uncertainty avoidance* dimension of Hofstede (1991) was selected as the distinguishing cultural dimension; this is associated with levels of intolerance for ambiguity and uncertainty in cultures. The UAI

was found to be *the most influential* national cultural value affecting the adoption of IS (Straub et al. 1997; Sundqvist et al. 2005; de Luque/Javidan 2004) and has become the most frequently used dimension in studies examining the influence of culture on IS adoption (Leidner/Kayworth 2006). Low uncertainty avoidance means a greater willingness to take risks (Hofstede 1984). Members of high uncertainty avoidance cultures, on the other hand, perceive higher risks and are less likely to trust to innovations due to the existence of inherent risks and threats (Akkaya et al. 2012a). This research posits the following hypotheses (Akkaya et al. 2013):

H10: German citizens will exhibit a higher perception of risk than Swedish citizens

H11: German citizens will exhibit a lower trust of Internet than Swedish citizens

H12: German citizens will exhibit a lower trust of Government than Swedish citizens

Because of the difficulty in measuring actual behavior, behavioral intentions were measured in this study, as common in technology acceptance studies (Agarwal/Prasad 1998; Karahanna et al. 1999; Venkatesh/Davis 2000; McKnight et al. 2002). A strong correlation between behavioral intentions and actual behavior was confirmed in previous research (Venkatesh/Davis 2000; Sheppard et al. 1988).

The research model and the hypotheses are presented in Figure 6.1 below. The three cultural hypotheses were not explicitly indicated on the research model for simplification purposes.

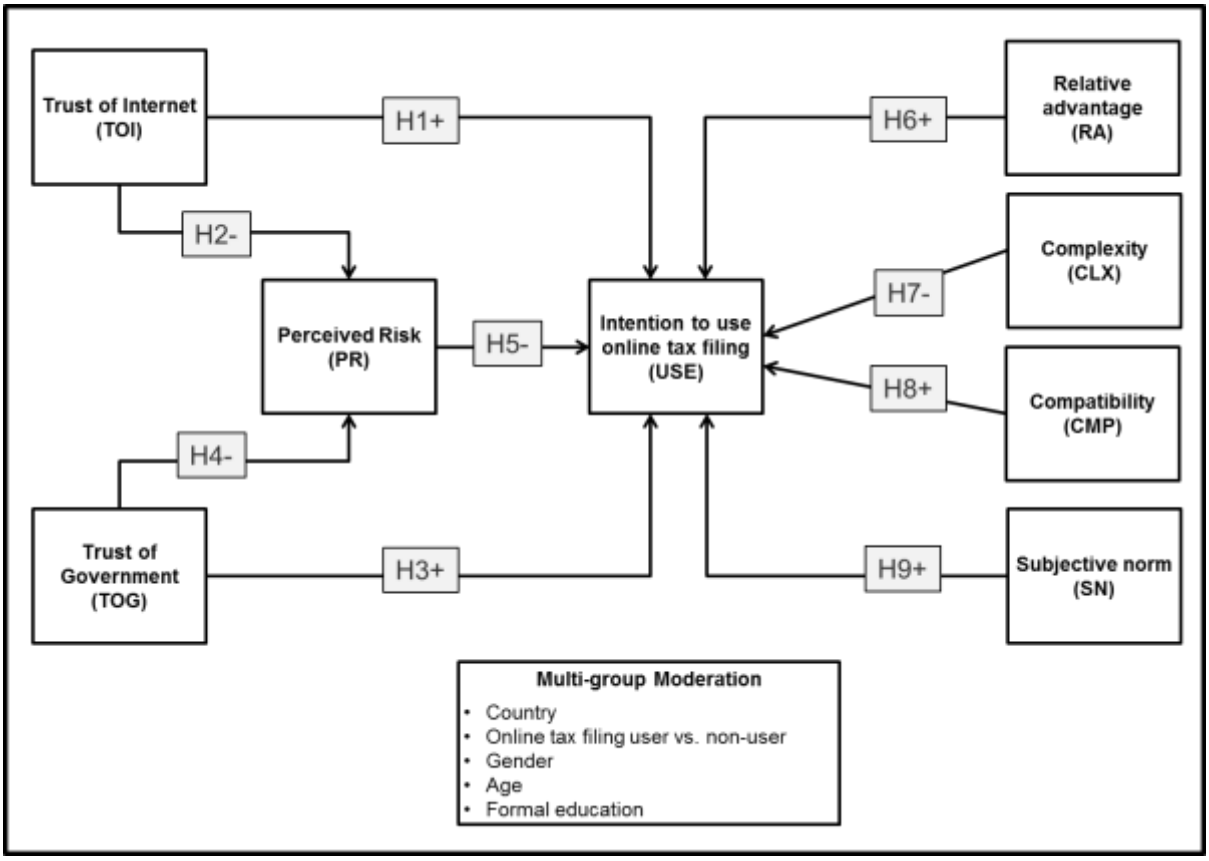


Figure 6.1. Research Model and Hypotheses
Source: Own Illustration based on (Fishbein/Ajzen 1975; Bélanger/Carter 2008; Rogers 1995)

After completing the conceptualization, the constructs need to be operationalized. This is done by developing *indicators* for measuring these constructs. Operationalization links a conceptual definition to a precise set of indicators, which will be tested on an empirical level (Neumann 2006, 185). According to Bhattacherjee (2012, 22), it is "a major problem in social research" given that many constructs are hard to define and measure accurately.

6.1.2 Development of the Instrument

6.1.2.1 Conceptual Definitions

Bhattacherjee (2012, 11) distinguishes between dictionary definitions and operational definitions of constructs, which is especially crucial in survey research. *Dictionary definitions* help to bring clarification to a construct; however they are not particularly useful in scientific research. *Operational definitions* are required in scientific research to describe constructs in terms of how they will be empirically measured. As defined by Bhattacherjee (2012), "…in scientific research, a variable is a measurable representation of an abstract construct" (p. 11), which is adopted or invented for a special scientific purpose. For example, a person's intelligence is often measured with the intelligence quotient.

There are however some variables, which cannot be measured directly. These variables are called *latent variables*, and are commonly used in psychology and social science research. For example, a person's trust beliefs or attitudes cannot be measured with a concrete variable. Latent variables are hypothetical variables for the purpose of understanding a research construct and generally there exists no operational method for directly measuring these constructs (Bollen 2002). Instead, a latent variable is measured *indirectly* by examining consistency among multiple measured variables, sometimes referred to as manifest variables, or indicators, which are gathered through various data collection methods (e.g., surveys) (Hair et al. 2010, 638). Considering the high level of subjectivity and imprecision of constructs (Bhattacherjee 2012), variables in social sciences are often measured using multiple indicators. This approach has several advantages such as enabling finer distinctions and capturing a wider range of aspects of the underlying concept (Bryman 2012, 164) as well as increasing the reliability of research (Bhattacherjee 2012, 44).

Although some authors distinguish between indicator and measure (Bryman 2012, 164), where the former refers to measuring of latent variables, they are mostly used interchangeably (Bhattacherjee 2012). Similarly, it is not possible to make a clear-cut-distinction between variables and constructs. The analysis of latent variables (a.k.a latent constructs) requires the use of a specific multivariate technique *Structural Equation Modeling (SEM)*, which will be discussed in Section 6.3.1 in more detail.

An indicator may have several *attributes*. For example, a gender variable has two attributes: male and female. Values of attributes are either quantitative or qualitative, and can be defined depending on the nature of the indicator and the selected method of data analysis. In social research, some qualitative variables may be represented in a quantitative manner, in order to be able to use sophisticated statistical tools for quantitative data analysis (Bhattacherjee 2012). For example, an indicator for 'satisfaction with e-government services' could be created with five

attributes ranging from ‘extremely satisfied’ to ‘not at all satisfied’. One of the most popular rating scales for measuring ordinal data in social research is the Likert scale (Bhattacherjee 2012), which was named after psychologist Rensis Likert (1932). The goal of the Likert scale is to measure respondents’ level of agreement with at statement. The “point” of the Likert scale represents the number of attributes, i.e. five, seven or ten point Likert scales. According to Lehmann and Hulbert (1972), five to seven point scales are appropriate to predict individual behavior. Although it is associated with higher costs, the analysis of Cummins and Gullone (2000) showed that using seven-point scales increases scale sensitivity over five-point scales, without damaging scale reliability. It should be kept in mind that the underlying variable is still qualitative even though it can be represented in a quantitative manner by using Likert scales (Bhattacherjee 2012).

One important conceptual differentiation needs to be made between reflective and formative indicators. A *reflective* indicator represents manifestations of the underlying construct (Edwards/Bagozzi 2000). A *formative* indicator is a measure that refers to specific components of the underlying construct, representing different dimensions of it. A well-known example is the socioeconomic status defined in terms of occupation, education and income (Hauser/Goldberger 1971).

Development of the questionnaire is one of the most critical steps in survey research. As stated by Neumann (2006, 277), good survey questions give researchers valid and reliable measures, and help respondents feel that their answers are meaningful. Question writing takes skill, practice, creativity and experience (Neumann 2006, 277). The use of previously validated instruments wherever possible is suggested, in order to enhance validity (Stone 1978; Straub et al. 2004c; Straub 1989) and efficiency (Boudreau et al. 2001).

6.1.3 Operationalization of Constructs

The research instrument in this thesis was designed considering the survey question writing pitfalls highlighted in literature (see Neumann 2006, 282). Slang words, vagueness, emotional language, double-barreled questions, leading questions and double negatives were avoided. The instrument drew on existing measures in literature for the sake of validity and efficiency. Only some measurement items were slightly adapted to the context of the study, without altering the instrument in significant ways as suggested by Straub (1989).

One possible flaw in self-report instruments is the possibility of *response bias*, which is the “tendency to respond in a particular way or style to items on a test that yields systematic, construct-irrelevant error in test scores” (American Educational Research Association 1999, 181). In order to avoid response bias, in particular affirmation or *agreement bias*, both positively and negatively worded items were included within the instrument as suggested in prior literature (Nunnally 1978).

Open-ended questions are particularly useful in early stages of research (Schuman/Presser 1979), while closed-ended questions are more appropriate for drawing conclusions (Neumann 2006, 288). In line with this suggestion; structured, close-ended questions were asked in which respondents must choose from a fixed set of answers. Neutral positions and a ‘not applicable (N/A)’ option were provided in selected questions in order to identify the respondents having middle positions or those without opinions. Seven-point scale was used ranging from ‘strongly agree’ to ‘strongly disagree’ as suggested in prior literature (Cummins/Gullone 2000;

Lehmann/Hulbert 1972). Constructs, indicators, and measurement items as well as their sources are provided in Table 6-2 below.

Constructs	Indicators	Measurement Items	Sources
Trust of Internet	TOI1	The Internet has not enough safeguards to make me feel comfortable using it*	(McKnight et al. 2002; Teo et al. 2008b)
	TOI2	I feel assured that legal and technological structures adequately protect me from problems on the Internet	(McKnight et al. 2002; Teo et al. 2008b)
	TOI3	I feel confident that encryption and other technological advances on the Internet make it safe for me to transact here	(McKnight et al. 2002; Teo et al. 2008b)
	TOI4	In general, the Internet is a robust and safe environment	(McKnight et al. 2002; Teo et al. 2008b)
Trust of Government	TOG1	I feel that government acts in citizens' best interest	(McKnight et al. 2002; Teo et al. 2008b)
	TOG2	I feel fine interacting with government agencies since they generally fulfill their duties	(McKnight et al. 2002; Teo et al. 2008b)
	TOG3	I always feel confident that I can rely on government agencies to do their part when I interact with them	(McKnight et al. 2002; Teo et al. 2008b)
	TOG4	I am not comfortable relying on government agencies to meet their obligations*	(McKnight et al. 2002; Teo et al. 2008b)
Perceived Risk	PR1	I would hesitate to enter information about my income tax on the web	(McKnight et al. 2002)
	PR2	The decision of whether to use ELSTER/online tax filing is risky	(Bélanger/Carter 2008)
	PR3	Using online tax filing would lead to a loss of privacy for me because my personal information could be used without my knowledge	(Featherman/Pavlou 2003)
	PR4	Using online tax filing would cause me to lose control over the privacy of my income tax filing	(Featherman/Pavlou 2003)

to be continued on the next page…

Constructs	Indicators	Measurement Items	Sources
Relative Advantage	RA1	Using online tax filing would enable me to accomplish income tax filing more quickly	(Moore/Benbasat 1991)
	RA2	Using online tax filing would enable me to reduce the potential errors in tax filing process	(Moore/Benbasat 1991; Chang et al. 2005)
	RA3	Using online tax filing would increase my effectiveness in filing income tax	(Moore/Benbasat 1991; Chang et al. 2005)
	RA4	Using online tax filing would enable me to accomplish tax filing in lower cost	(Moore/Benbasat 1991; Chang et al. 2005)
Complexity	CLX1	Learning to use online tax filing would be easy for me	(Davis 1989)
	CLX2	It would be easy to get online tax filing to do what I want it to do	(Venkatesh/Davis 1996, 2000)
	CLX3	I believe using online tax filing would be clear and understandable	(Venkatesh/Davis 1996, 2000)
	CLX4	It would be easy for me to become skillful at using online tax filing	(Davis 1989)
Compatibility	CMP1	Using online tax filing would fit well with the way I file my income tax	(Taylor/Todd 1995c; Moore/Benbasat 1991)
	CMP2	Using online tax filing would fit into my lifestyle	(Taylor/Todd 1995c; Moore/Benbasat 1991)
	CMP3	Using online tax filing would be compatible with the way I work	(Taylor/Todd 1995c; Moore/Benbasat 1991)
	CMP4	Using online tax filing would be incompatible with how I like to do things*	(Taylor/Todd 1995c; Moore/Benbasat 1991)

to be continued on the next page…

Constructs	Indicators	Measurement Items	Sources
Subjective Norm	SN1	People who are important to me think that I should use online tax filing	(Taylor/Todd 1995c; Ajzen 1991; Bhattacherjee 2000)
	SN2	People who influence my behavior think that I should use online tax filing	(Taylor/Todd 1995c; Ajzen 1991; Bhattacherjee 2000)
	SN3	People whose opinions are valued to me prefer that I use online tax filing	(Taylor/Todd 1995c; Ajzen 1991; Bhattacherjee 2000)
	SN4	I would use online tax filing because of the number of people around me do also	(Schaupp et al. 2010; Thompson et al. 1991)
Intention to use	USE1	I do not intend to use online tax filing in the future*	(Taylor/Todd 1995c; Pavlou 2003)
	USE2	It is likely that I will use online tax filing	(Taylor/Todd 1995c; Pavlou 2003)
	USE3	My intention is to use online tax filing rather than use traditional paper-based methods	(Teo et al. 2008b; Bhattacherjee 2000)
	USE4	To the extent possible, I will try to file my income tax using online tax filing in the next tax return season	(Taylor/Todd 1995c)

Table 6-2. Operationalization of the Constructs
Source: Own Illustration based on the sources listed in the table

* reverse coded item

In most technology adoption studies, researchers have not randomized questions related to the constructs of perceived usefulness, perceived ease of use and system usage (Straub et al. 2004a). Straub, Gefen and Boudreau (2004a) argue that this methodological artifact results in a threat to both discriminant and convergent validity, as respondents may sense underlying constructs in the ordering of questionnaire items and respond accordingly. Thus, randomization was applied to minimize mono-methods or common methods variance. Although randomizing measurement items may reduce common methods variance, this bias can exist. Therefore, the collected data was tested for common methods variance using three approaches, which will be discussed in Section 6.3.5 below in more detail.

The research includes various categorical variables that are hypothesized to impact the intention of citizens' to use e-government services. The next section discusses moderators of the study.

6.1.3.1 Moderators

Five categorical variables are proposed as moderators, which can indirectly affect the relationships between independent and dependent variables of the research model (Bhattacherjee 2012, 12). The first one is the *country of analysis* as previous literature in other online contexts revealed differences among cultures (Jarvenpaa et al. 1999). Two countries will be compared with each other in terms of the determinants of online tax filing adoption. The study is designed to deliver the comparison of adoption factors between the respondents who have already used online tax filing previously and the others. Previous research on e-government has indicated differences in preferences between users and non-users of e-government (European Commission 2013). Therefore, the second moderator is related to being an *online tax filing user and non-user*.

Age and gender were added to the UTAUT model by Venkatesh et al. (2003) as moderator variables due to their significance in other studies. Demographics are also frequently employed by researchers in various studies (Köbler 2014) including the ones in G2C e-government contexts (Kumar et al. 2011; Davey et al. 2011; Akman et al. 2005; Bélanger/Carter 2010), technology adoption studies (Srite/Karahanna 2006) and digital divide research (Agarwal et al. 2009). In their analysis, Niehaves, Gorbacheva and Plattfaut (2012) found a significant influence of gender and formal education on G2C e-government adoption. Davey, Parker and Lukaitis (2011) demonstrated the importance of customization of e-government services for the elderly, due to their specific needs. Therefore, the demographical variables of *gender*, *age* and *formal education* are proposed as moderators. These variables were also used in descriptive studies to gain insights about the factors influencing G2C e-government adoption, as well as barriers and concerns related to it, which will be tested in confirmatory research. After the collection of empirical data, a *multi-group moderation analysis* in SEM will be conducted to observe the effect of moderating variables, i.e. data will be split into separate groups for analysis based on variable values and tested for statistical difference.

6.1.4 Instrument Testing

Instrument testing is one of the essential steps in quantitative research (Straub 1989; Boudreau et al. 2001; Straub et al. 2004a; Neumann 2006, 312; Moore/Benbasat 1991). The initially developed instrument was pretested by a group of market research experts and faculty members

to reveal problems with question wording, lack of clarity and ambiguity. After making slight modifications to correct some complex wording, a pilot study was conducted with a sample consisting of online tax filing users and non-users. According to Cooper and Schindler (2003), the size of the sample for the pilot test may range from 25 to 100, and statistical selection of the respondents is not necessary. The sample included 27 respondents including tax liable citizens and faculty members of a technical university. The respondents were asked to comment on the length of the questionnaire, wording and the instructions provided.

Other than some minor difficulties in understanding or answering of the questionnaire, pretest did not reveal any major problems. The instrument was finalized after making minor changes based on feedbacks from the pretest and pilot study. The questionnaire was originally designed in English, and then translated into German and Swedish. The back translation method (Brislin 1980) was used, whereby the translated versions were translated back to English by another bilingual person. The translation accuracy was then refined and verified by professional linguists.

The final research instrument included thirty-two questions rated on a seven point Likert scale ranging from ‘strongly disagree’ to ‘strongly agree’ (Akkaya et al. 2012a) (see Appendix II).

6.2 Data Collection

Data collection was already discussed in Section 5.3.1, therefore it will not be repeated here.

6.3 Data Analysis

Data Analysis was conducted using IBM SPSS Statistics 22 software. The negatively worded items were reverse coded. The sample descriptions of the data was already discussed in Section 5.3.2.1, thus they will not be repeated here. For multivariate data analysis, covariance based structural equation modeling (CB-SEM) was used, which is discussed next.

6.3.1 Data Analysis Methodology: Covariance-based Structural Equation Modeling (CB-SEM)

6.3.1.1 Introduction to Structural Equation Modeling Technique

Structural Equation Modeling is a very powerful multivariate analysis technique that seeks to test and explain causal relationships among multiple variables simultaneously by using statistical data**.** The theoretical relationships among variables are “expressed in a series of multiple regression equations” (Hair et al. 2006, 711). The methodological foundation of SEM lies in “factor analysis and multiple regression analysis” (Hair et al. 2010, 634). SEM has a number of synonyms including covariance structure analysis, latent variable analysis, and is even referred to by the name of specialized software package used (e.g., LISREL or AMOS model).

SEM has several advantages over the older generation of multivariate approaches (Hair et al. 2010; Byrne 1998):

1. ability to enable *hypothesis testing* while most of the older generation of multivariate approaches are descriptive;
2. ability to provide assessment and correction of *measurement errors*, whereas the older generation of multivariate approaches are incapable of either of them;
3. ability to estimate a set of interdependent multiple regression equations *simultaneously* to test the entire set of relationships in a model, while such a simultaneous analysis is not possible in other multivariate procedures;
4. ability to incorporate *unobserved* (i.e. latent) *variables* into the analysis by representing them via observable or measurable variables, whereas data analyses in former methods is based on only observed measurements.

SEM has gained enormous popularity across many disciplines within the last years in the past three decades due to its generality, flexibility and its usefulness to applied researchers (Hershberger 2003). Due to its ability to incorporate both observed and latent variables, it has been increasingly used to analyze *behaviors*, beliefs and motivations of subjects. It is difficult to look through an issue of any research journal in behavioral sciences, sociology, education and information systems, and do not find at least one article that concerns SEM. According to Kline (2011, 14), it is not hard to understand this growing interest, because SEM addresses the questions that researchers want answered and it "thinks" about research the way researchers do.

It is important to note that, *sample size* is an important issue in SEM analysis. It requires *large* sample sizes, otherwise some kinds of statistical estimates in SEM such as standard errors may not be accurate and the likelihood of technical problems in the analysis increases significantly (Kline 2011, 11). A complex model requires a larger sample size and vice versa therefore rules of thumb are provided in literature for calculating the minimum sample size based on the number of model parameters (Jackson 2003).

Since SEM is generally used to predict latent constructs with other latent constructs, a different terminology is used to distinguish between dependent and independent variables (Hair et al. 2010): *exogenous* versus *endogenous* latent constructs. *Exogenous constructs* are the independent variables, while *endogenous constructs* represent the dependent variables. Exogenous constructs are determined by factors outside of the model, while endogenous constructs are dependent on endogenous or exogenous constructs that are specified in the model.

A SEM model is composed of two sub-modules, known as a *measurement model* and a *structural model* (Byrne 1998, 7). *Measurement model* represents how a set of observed indicator variables represent an unobserved latent variable, while the structural model shows how unobserved latent variables are associated with each other through a series of dependence relationships. The evaluation of the measurement model in SEM is conducted by using *confirmatory factor analysis (CFA)* (Lei/Wu 2007) which links factors and measured variables. If the measurement model is valid, it should be converted into structural model. After assessing the validity of the structural model, substantive conclusions can be drawn.

The difference between two basic types of factor analysis is an important concept in SEM. Lei und Wu (2007, 34) discuss that "EFA often allows all indicators to load on all factors and does

not permit correlated residuals" (p. 34) because "links between the observed and latent variables are unknown or uncertain" (Byrne 1998, 5). As further explained by Lei und Wu (2007), "CFA differs from EFA in that factor structures are hypothesized a priori and verified empirically rather than derived from the data" (p. 34). In EFA, the researcher does not know how many factors there are but "in contrast, the number of factors in CFA is assumed to be *known*" (Lei/Wu 2007, 34).

6.3.1.2 SEM Techniques and Available Software

Although SEM mostly "takes a confirmatory (i.e., hypothesis-testing) approach to the multivariate analysis of a structural theory" (Byrne 1998, 3) based on causal relations among multiple variables, it is necessary to distinguish between two SEM techniques: *covariance based SEM* (CB-SEM) and *component based SEM* (PLS).

The goal of *covariance based SEM* is to test whether a hypothesized theoretical model is consistent with the empirical data (Lei/Wu 2007). Theory is specified a priori in covariance based SEM and a theoretical covariance matrix based on a specified set of structural equations is developed. The main objective is CB-SEM is "… reproducing the theoretical covariance matrix, without focusing on explained variance" (Hair et al. 2011, 139). A set of assumptions, such as the multivariate normality and the minimum sample size, need to be tested prior to conducting CB-SEM analysis.

The *component based SEM* takes a contrary approach to SEM. It does not use covariance based matrix. The main aim of PLS is to maximize the explained variance of the dependent latent constructs (Hair et al. 2011). PLS-SEM is viewed as "less rigorous and therefore less suitable for examining relationships between latent variables" (Hair et al. 2011, 139) therefore it remains "far less popular than CB-SEM" (Hair et al. 2011, 139). Parameter estimates obtained from CB-SEM are unbiased, while PLS path modeling parameter estimates are known to be biased (Chin 1998). There is a persistent belief in publications and research that PLS-SEM has special abilities when analyzing small sample sizes. Although Chin (1998) suggests the minimum sample size to be 10 times the number of paths leading into the construct, this can result in low statistical validity. Indeed, prior findings suggest that PLS-SEM does not have an advantage with respect to statistical validity using small sample sizes (Goodhue et al. 2006). Although it can run with a small sample size, the researcher would still have reliability issues.

Several statistical programs performing SEM are available. The Linear Structural Relationships (LISREL) is one of the earliest software in CB-SEM (Hair et al. 2010, 663). Indeed, it was used as the prototype for all subsequently developed programs (Byrne 1998, 9). Being distributed with SPSS, the Analysis of Moment Structure (AMOS) software (Airbuckle 2007) has gained popularity within the last few years. It is one of the first SEM programs to use a graphical interface for all functions eliminating the necessity of using syntax commands. Other frequently used software includes Equations (EQS) and Mplus. Researchers utilizing the PLS-SEM approach commonly use PLS-GRAPH or SmartPLS in conducting their analysis. The selection of SEM software is based on the selected SEM approach, researcher's preference and availability of the software.

Gefen, Rigdon and Staub (2011) provide criteria for selecting which SEM technique to use. They suggest researchers select the appropriate SEM technique based on various criteria including their research objectives (exploratory vs. confirmatory), availability of a strong theory

base, the objective of avoiding bias in the estimations and the type of constructs (formative vs. reflective). Formative constructs have been increasingly used in IS research in order to cover the various aspects of concepts in question. As discussed in Section 6.1.3, reflective constructs "are caused by" the latent constructs whereas formative measures "cause" the latent construct. Jarvis, Mackenzie and Podsakoff (2003) provide guidelines on determining whether a construct is formative or reflective.

Despite the erroneous impression that only PLS-SEM can handle formative constructs (Chin 1998), the use of CB-SEM analysis (e.g., LISREL) has been increasingly encouraged in research endeavors involving formative constructs (Diamantopoulos 2011). Indeed, CB-SEM enables a much more rigorous assessment of formative measurement models than is possible with PLS due to its various advantages (Diamantopoulos 2011): the ability to incorporate a construct-level error term in the formative specification, the provision of overall fit statistics, the generation of diagnostic information pointing to misspecification, and the ability to test specific hypotheses and undertake nested model comparisons. Therefore, researchers are advised not to stick with the familiar PLS-SEM approach when dealing with formatively measured constructs.

There are several different methods of estimation. For example, LISREL provides seven different methods of estimation (Jöreskog/Sörbom 1993). Among them, the maximum likelihood (ML), generalized least squares (GLS) and weighted least squares (WLS) are the most commonly used estimation methods. By default, CB-SEM software relies mainly on maximum likelihood estimation. It is the most efficient and widely used estimation method in CB-SEM. GLS estimation can produce counter-intuitive results in highly constrained models, and there is not a compelling reason to prefer GLS over ML (Gefen et al. 2011). Although the WLS method of estimation is suggested when there is a lack of multivariate normality, the WLS method reaches stability at very large sample sizes (usually more than 2000). As Micceri (1989) suggested, a considerable amount of social and behavioral science data fail to satisfy the multivariate normality assumption. In fact, numerous studies of the robustness of the multivariate assumption (Amemiya/Anderson 1990; Satorra/Bentler 1994; Browne/Shapiro 1988) have shown that parameter estimates remain valid even when the data are non-normal (Browne 1984; McDonald/Ho 2002). In particular, ML is accepted to be quite consistent at producing efficient estimation and is "rather robust against moderate violations of the normality assumption, provided that the sample comprises 100 or more observations" (Diamantopoulos et al. 2000; Anderson/Gerbing 1988) in (Vieira 2011, 10). Therefore it is not uncommon for researchers to select the ML method despite the lack of multivariate normality assumption.

6.3.1.3 Selection of the Data Analysis Technique in this Thesis

In this thesis, the analysis of data was conducted by using SEM. Considering the various latent variables in the research model; SEM is the most appropriate analysis method. The guidelines provided by Gefen, Rigdon and Staub (2011) were used to decide on the specific SEM technique. Since the primary purpose of this research is confirmatory, a strong theoretical base is used for theory and hypothesis testing. Furthermore, unbiased parameter estimates are desired. Seven out of eight latent constructs of the study were found to be reflective[40]. Although

[40]Although some researchers argue that the construct of trust should be measured as formative rather than reflective (see Söllner/Leimeister 2010), this approach has not received much recognition from other researchers in the field.

the construct of 'relative advantage' may be considered as a formative construct, there is also a strong literature suggesting the utilization of CB-SEM by models involving formative constructs (Diamantopoulos 2011). Consequently, CB-SEM was selected as all criteria for this analysis approach were fulfilled.

The analysis was conducted by using IBM SPSS AMOS 22 software (Airbuckle 2007), which will be referred to as AMOS from this point on. The most widely used method of ML was employed to estimate the parameters of the model in this research.

6.3.2 Data Screening

6.3.2.1 Analyzing the Extent and Impact of Missing Values

Missing data can be a serious problem in quantitative studies, which may threaten reliability and validity (Neumann, p. 204). Therefore, it is important for researchers to examine the data in order to determine the extent of the missing data.

In this survey, the data was collected online by using market research software for CAWI. In the descriptive study, every case which had any missing data for any of the three questions was simply excluded from the analysis as suggested in literature (Allison 2009). This approach has resulted in listweise deletion of 276 cases in the study of 2010, resulting in 726 cases. Although this may have increased the risk of response bias and reduced the sample size of the data, it was considered to be the most suitable solution considering the large dataset. Furthermore, listwise deletion was considered as a more appropriate alternative to pairwise deletion or data imputation, since most of the respondents that missed out one of the three questions in descriptive analysis missed out a large portion of the remaining questions as well. In the explanatory study, the missing variables were replaced by the series mean.

6.3.2.2 Analyzing for Normality

An important requirement of multivariate techniques is checking that the normality assumption is not severely violated. To assess normality, skewness and kurtosis values of the variables in the study were analyzed (see Appendix III). Kline (2011) suggests that skewness values over 3 and kurtosis values over 10 indicate severe non-normality. The skewness index ranges from 0.020 to 1.312 in absolute value and kurtosis index ranges from 0.047 to 2.065 in absolute value. As the values fall well within the guidelines, the data is accepted as fairly normal for further analysis.

6.3.3 Data Analysis Approach

As commonly applied in various IS settings (e.g., Gefen 2002; Schaupp et al. 2010), the research model was evaluated following the two-step methodology (Anderson/Gerbing 1988),

Due to importance of using previously validated measures and being careful not to make significant changes to the validated instruments (Boudreau et al. 2001), the widely-recognized trust scale of McKnight, Choudhury and Kacmar (2002) was used to measure trust in this research.

where “the measurement model first is developed and evaluated separately from the full structural equation model” (p. 191). In the first step a confirmatory factor analysis (CFA) was performed to determine the factor structure of a set of observed variables. In the second step, a series of path models were tested to determine the overall adequacy of the research model in explaining online tax filing usage intention.

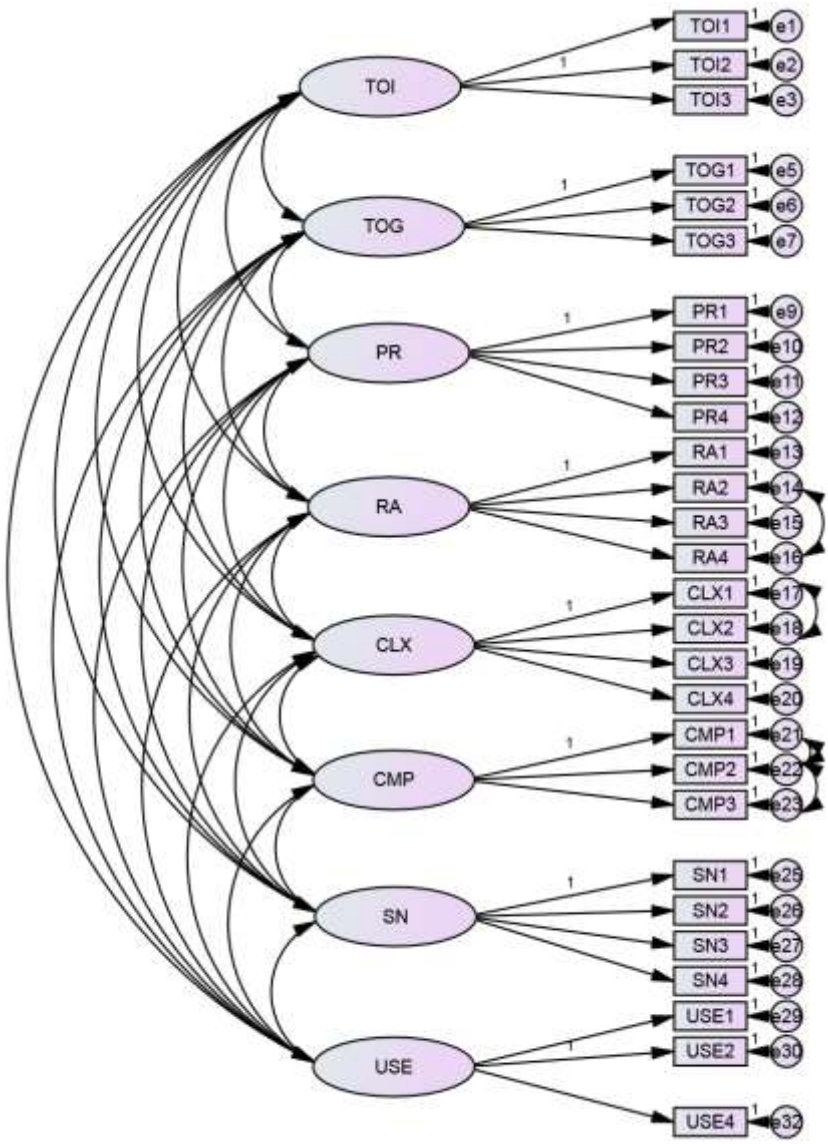
The two-step approach has a number of strengths compared with a one-step approach, where the measurement and structural models are estimated simultaneously (Anderson/Gerbing 1988). Besides its simplicity, a two-step approach allows testing the significance of all pattern coefficients. Furthermore, the analysis is exclusively confirmatory since the theoretical model and the measurement model are tested independently, and “the inclusion of measurement items is much less dependent on characteristics of the data that has been used for estimation and respecification” (Gefen 2002) in (Verhagen et al. 2006, 548).

6.3.4 Confirmatory Factor Analysis (CFA)

The measurement model specifies the relationships that suggest how measured variables represent a construct that cannot be measured directly (Hair et al. 2010). Model fit indicates how well the proposed model accounts for the correlations between variables in the data set. Since the first iteration of the CFA did not result in acceptable goodness of fit values, the measurement model in the CFA was revised by dropping items. Modification indices[41] were considered carefully which suggested remedies to discrepancies between the proposed model and the estimated model in a CFA. Items with large standardized residuals were dropped. After removing TOI4, TOG4, CMP4 and USE3 items due to low estimate values, large modification indices suggested that the fit would improve if some error terms were allowed to covary. As the error terms that are part of the same factor are allowed to covary[42], a very good model fit was achieved by connecting e14-e16, e17-e18, e22-e23 and e21-e211.

[41] Although it may be tempting to obtain a well-fitting model by implementing all suggested remedies, such moves should be supported by a theoretical justification (Hooper et al. 2008).

[42] If there is a causal relationship between the two items, it would not be allowed to covary these error terms (Kenny 2011).



	Standardized Item Loadings
TOI1	0,207
TOI2	0,825
TOI3	0,831
TOG1	0,826
TOG2	0,850
TOG3	0,873
PR1	0,710
PR2	0,864
PR3	0,879
PR4	0,889
RA1	0,879
RA2	0,743
RA3	0,919
RA4	0,527
CLX1	0,936
CLX2	0,820
CLX3	0,904
CLX4	0,909
CMP1	0,895
CMP2	0,894
CMP3	0,916
SN1	0,905
SN2	0,917
SN3	0,899
SN4	0,706
USE1	0,719
USE2	0,918
USE4	0,944

Figure 6.2. Confirmatory Factor Analysis
Source: Own Illustration

The final model is given in Figure 6.2 above. Ovals represent latent variables, squares signify the manifest, observed variables and circles are used to mark the error terms. Lines are used to indicate the relationships between the variables. Single-headed arrows represent causal influences, while double-headed arrows demonstrate covariance between two latent variables.

6.3.4.1 Analysis of the Measurement Model

GFI Indices

In structural equation modeling, the match between a given model and the empirical data is assessed by using several GFI indices. Yet, there is no single measure of fit that can ensure high quality in SEM research (Marsh et al. 2004). Prior literature suggests use of at least three fit indices (Jaccard/Wan 1996). Indeed, it is almost impossible to present excellent fit values in all indices. SEM models, including those published in leading IS journals, seldom show excellent fit values in all indices (Gefen et al. 2003; Boudreau et al. 2001). Therefore, researchers pick and report indices that produce acceptable fit values for their research.

Following the recommendations of Hu and Bentler (1999) and Hair et al. (2010) regarding to appropriate fit indices, a set of fit indices were used to assess the adequacy of the model. Overall, a very good fit was achieved. Although the $\chi 2$ to degrees of freedom ratio was slightly higher than the recommended cut-off value, it has been reported that this statistic is often very sensitive to a large sample size (Byrne 1998). In fact, this fit index has been shown to be flawed in previous research (Gefen et al. 2011; Carmines/McIver 1981). According to Bollen (1989), the statistical rationale for using this ratio as a fit index has never been clear. Therefore, the slightly higher value than the recommended threshold was reported but not considered a problem in this research.

GFI Index	Model Value	Recommendation
$\chi 2$	2018	N/A
df	318	N/A
$\chi 2$/df	5.09	< 3.00
p	0.00	non-significant
Goodness of Fit Index (GFI)	0.94	> 0.90
Adjusted Goodness of Fit Index (AGFI)	0.93	> 0.80
Comparative Fit Index (CFI)	0.97	> 0.90
Root mean square error of approximation (RMSEA)	0.04	< 0.08
Standardized Root Mean Square Residual (SRMR)	0.04	≤ 0.10

Table 6-3. Confirmatory Factor Analysis Goodness of Fit Indices
Source: Own Illustration

All other fit indices indicated an adequate model fit. The non-significant p-value indicates the absolute fit of the model is not less than desirable. It is important to report the comparative fit index (CFI), which is identified as one of the most *stable* and *robust* fit indices (Gerbing/Anderson 1992). The CFI indicates a very good fit if it is above 0.9 (Marsh et al. 2009; Bagozzi/Yi 1988), and a CFI above 0.95 is considered to be an exceptional fit (Bentler/Bonett 1980; Hoyle 1995). The goodness of fit index (GFI) should be above 0.90

(Hoyle 1995) and well-fitting models have the adjusted goodness of fit index (AGFI) above 0.8 (Gefen et al. 2011). The root mean square error of approximation (RMSEA) values should be below 0.08, and a RMSEA value of 0.05 or less indicates a very good fit (Browne/Cudeck 1993). The value of standardized root mean square residual (SRMR) below 0.08 are acceptable (Hu and Bentler, 1999), and values below 0.05 indicate a very good fit (Gefen et al. 2011).

Overall, the GFI at 0.943, AGFI at 0.928, CFI at 0.970, RMSEA at 0.045 and SRMR at 0.044 indicate a good fit of the measurement model (Hair et al. 2010; Gefen et al. 2011). Next, the results of reliability and validity analyses are reported.

6.3.4.2 Analysis of Reliability and Validity

Analysis of Reliability

As suggested in guidelines offered by Straub (1989) and Boudreau (2001), validity and reliability assessments of the instrument is an essential part of quantitative research.

The reliability of the items was evaluated using Cronbach's α (1970). The detailed analysis is provided in Appendix III. Four items having lower reliability were removed. Two of them were reverse coded items, which were initially added to avoid the acquiescence bias; however the reliability analysis suggests that the direction of the wording may have caused the problem.

As shown in Table 6-4 below, the reliability of seven out of eight measures surpassed the 0.70 cut-off value (Hair et al. 2010) demonstrating a high level of internal consistency. Only the Cronbach's alpha reliability estimate for the TOI measure was 0.60, caused by the TOI1 indicator. Although this reliability estimate is lower than the commonly accepted threshold value of 0.7 (Nunnally 1978), it was decided to keep this construct as a three-item scale for two main reasons. First, although 0.70 is the commonly used threshold value for Cronbach's Alpha, prior literature suggests other acceptable values. Nunally (1967), who is one of the most commonly cited authors for Cronbach's Alpha, argues that reliabilities of 0.50 to 0.60 suffice. According to other researchers (Robinson et al. 1991; Hair et al. 2010, 125), the values from 0.6 to 0.7 are deemed to the lower limit of acceptability and such values are regarded as barely acceptable (see Van Dijk et al. 2008). Although such marginal values may weaken relations between these measures and other variables, such concerns are offset to some degree by the exceptionally large sample size used in this study. Third, it is highly advisable that latent constructs are measured with at least *three indicators* in order to avoid model identification problems (James et al. 1982; Bollen 1989; Byrne 1998), reduce bias and achieve convergence (Anderson/Gerbing 1984) therefore the TOI1 indicator was not removed from the analysis.

Construct	Number of Items	Reliability (Cronbach's Alpha)
Trust of Internet (TOI)	3	0.60
Trust of Government (TOG)	3	0.88
Perceived Risk (PR)	4	0.90
Relative Advantage (RA)	4	0.85
Complexity (CLX)	4	0.94
Compatibility (CMP)	3	0.93
Subjective Norm (SN)	4	0.92
Intention to Use (USE)	4	0.89

Table 6-4. Cronbach's Alpha Values
Source: Own Illustration

Reliability is a necessary but not sufficient condition for validity (Hair et al. 2010, 637). The next section summarizes various validation steps taken in this research including convergent and discriminant validity.

Analysis of Validity

Face validity and *content validity* of the instrument were evaluated by a group of professors, faculty members and market research experts. Next, construct validity, specifically *convergent and discriminant validity*, was assessed. As defined by Bhattacherjee (2012, 37), "*construct validity* examines how well a given measurement scale is measuring the theoretical construct that it is expected to measure" (p. 37). *Convergent validity* signifies the extent to which a set of indicators correlate with each other, particularly when compared to the convergence of the remaining constructs (Straub et al. 2004a). *Discriminant validity* refers to the extent to which a given construct differs from another construct, which are supposed to be unrelated (Teo et al. 2008b).

Construct validity of the scale was tested with CFA. Convergent validity was assessed using ad hoc tests recommended in prior literature (Anderson/Gerbing 1988). As illustrated in Table 6-5 below, seven out of eight constructs demonstrated sufficient convergent validity. The standardized factor loadings were highly significant. Composite reliabilities (CR), similar to Cronbach's alpha, exceed the minimum limit of 0.7 (Fornell/Larcker 1981). Composite reliabilities were greater than the average variance extracted (AVE). The AVE estimates were all above the recommended threshold value of 0.5 (Kline 2011), supporting the convergent validity of the scales.

	CR	AVE	MSV	ASV
CMP	0.912	0.777	0.615	0.315
TOI	0.570	0.471	0.252	0.065
TOG	0.886	0.722	0.252	0.070
PR	0.900	0.694	0.323	0.147
RA	0.857	0.609	0.604	0.255
CLX	0.942	0.802	0.582	0.232
SN	0.920	0.743	0.043	0.024
USE	0.899	0.750	0.615	0.256

Table 6-5. Reliability and Validity Analysis
Source: Own Illustration

Composite reliability and the AVE for the TOI construct were slightly below the threshold values of 0.7 and 0.5 respectively. As discussed above, the prior literature suggests including at least three indicators for each construct in order to avoid identification problems therefore it was decided to keep the TOI1 indicator. In order to test the discriminant validity, the maximum shared squared variances between factors (MSV) and average shared squared variance (ASV) were compared with the AVE. Since all constructs surpassed this test, the discriminant validity was established (Jöreskog/Sörbom 1993).

	CMP	TOI	TOG	PR	RA	CLX	SN	USE
CMP	0.881							
TOI	0.191	0.687						
TOG	0.210	0.502	0.850					
PR	-0.533	-0.187	-0.173	0.833				
RA	0.777	0.202	0.218	-0.424	0.780			
CLX	0.763	0.214	0.232	-0.420	0.653	0.895		
SN	0.208	0.116	0.162	0.047	0.206	0.124	0.862	
USE	0.784	0.170	0.192	-0.568	0.666	0.567	0.165	0.866

Table 6-6. Factor Correlation Matrix
Source: Own Illustration

As an additional test to ensure discriminant validity, the square root of the AVE for each construct was compared against its correlations with other constructs (Fornell/Larcker 1981). In Table 6-6 above, the square root of AVE is given as diagonal elements. The literature

suggests that the AVE of each construct should exceed its square correlation with other constructs (Fornell/Larcker 1981). This assessment has also revealed adequate discriminant validity of all factors.

Item loadings of the latent constructs indicate the degree of association between scale items and a single latent variable. The Figure 6.2 above presents the item loadings for these constructs, indicating high degree of association of the indicators. Except the TOI1 indicator, the item loadings ranges from 0.527 to 0.944, construct reliabilities range from 0.857 to 0.942, and average variance extracted range from 0.609 to 0.802.

	Mean	Std. dev	TOI	TOG	PR	RA	CLX	CMP	SN	USE
TOI	2,95	0,991	1							
TOG	3,47	1,036	0,571	1						
PR	3,60	0,900	-0,213	-0,191	1					
RA	2,74	0,960	0,23	0,24	-0,461	1				
CLX	2,71	0,905	0,24	0,25	-0,447	0,693	1			
CMP	2,67	0,979	0,219	0,232	-0,575	0,832	0,804	1		
SN	4,45	1,136	0,131	0,176	0,049	0,221	0,131	0,221	1	
USE	2,07	1,023	0,193	0,209	-0,607	0,713	0,597	0,831	0,175	1

Table 6-7. Correlations for CFA
Source: Own Illustration

A correlation table with means and standard deviations is shown in Table 6-7 above. Appendix V also reports the covariance matrix generated by AMOS. Overall, the conducted tests did not reveal any issues of convergent and discriminant validity regarding the measurement model. Next, common methods variance was examined.

6.3.5 Assessment of Common Methods Variance (CMV)

Prior literature suggest that studies using a single source, self-reported data for both independent and dependent variables should be tested for the possible effect of the common methods variance (a.k.a Common Methods Bias (CMB)) (Podsakoff et al. 2003). Two statistical tests were conducted to check for common method bias.

Harman's single-factor test (1976) is the most commonly used approach for addressing the issue of common methods variance (Malhotra et al. 2006). If a single factor emerges from the factor analysis, the test indicates the presence of the bias (Pavlou/Gefen 2005). Furthermore, data is accepted to suffer from the CMV if one general factor accounts for more than 50% of the covariance (Luo et al. 2010).

A principal components factor of all the items included in the study has been performed (see Appendix VI). No dominant factor emerged to account for the majority of the variance, while the first factor accounted for 34,66% of the variance. In order to confirm the results with another test, CFA based Common Latent Factor analysis was conducted in AMOS. A latent factor was added to the AMOS CFA model and was connected to all observed variables. This test also could not provide any evidence for the existence of common method bias in this research (see Appendix VII).

6.3.6 Test of Measurement Invariance

Measurement invariance is an important prerequisite in multiple group structural equation modeling to ensure that the items used in the survey instrument mean the same things to members of different groups (Cheung/Rensvold 2002). In cross-national research this becomes especially critical as the respondents from the two cultures may interpret and attribute different meanings to scale items (Steenkamp/Baumgartner 1998; Van de Vijver/Leung 1997; Bagozzi/Yi 1988). In such a case, the comparisons are not valid and differences/similarities between groups cannot be meaningfully interpreted (Milfont/Fischer 2010).

Although the literature distinguishes between different levels of equivalence (Van de Vijver/Leung 1997), the most commonly used approach is testing for *configural* and *metric invariance* (Vandenberg/Lance 2000). Configural invariance refers to the equality of factor structures, which can be demonstrated by good fit indices in the multi-group CFA (Tsui et al. 2007). Testing was conducted to see whether the same CFA is valid in each group of analysis. As can be seen from Table 6-8 below, the results indicated an adequate fit[43]. Therefore, it was concluded that the measurement model is configurally invariant.

	χ^2	df	χ^2/df	GFI	AGFI	CFI	RMSEA	SRMR
recommendation	n/a	n/a	<3	>,90	>,80	>,90	<,08	<,10
country	2322,211**	636	3,651	0,922	0,900	0,961	0,036	0,049
gender	2123,65**	636	3,339	0,928	0,908	0,966	0,034	0,039
formal education	2163,544**	636	3,402	0,927	0,906	0,965	0,035	0,043
age	2639,029**	954	2,766	0,913	0,888	0,962	0,03	0,053
tax user	1716,237**	636	2,698	0,913	0,889	0,959	0,036	0,049

**p<0.01

Table 6-8. Configural Invariance
Source: Own Illustration

Having assured the existence of configural invariance, a further test of measurement invariance was conducted. Metric invariance is achieved "when all factor-loading parameters are equal across groups using a multi-group CFA and comparing changes in fit indices between the constrained and unconstrained models" (Tsui et al. 2007, 456). Traditionally, the $\Delta\chi 2$ has been used to assess the index of difference in fit, although it was previously demonstrated that this

[43] As discussed previously, the fit index of χ^2 has been shown to be flawed in previous research (Gefen et al. 2011; Carmines/McIver 1981). According to Bollen (1989), the statistical rationale for using this ratio as a fit index has never been clear. Therefore, the slightly higher value than the recommended threshold for some groups was reported for the sake of completeness but not considered a problem in this research.

value depends on sample size (Brannick 1995; Kelloway 1995). Cheung and Rensvold (2002) provided evidence that ΔCFI is a much more reliable fit index. Based on an extensive simulation work examining the changes in twenty GFIs, Cheung and Rensvold (2002) concluded that a difference of larger than 0,01 in CFI is indicative of a meaningful change in model fit for testing measurement invariance. This recommendation was followed in this thesis. As shown in the Table 6-9 below, all ΔCFI values were lower than the cut-off value, indicating metric invariance across groups.

	χ^2	Df	CFI	χ^2	df	CFI	ΔCFI
recommendation	n/a	n/a	>0,90	n/a	n/a	>0,90	<0,01
country	2322,211**	636	0,961	2416,134	664	0,960	-0,001
gender	2123,65**	636	0,966	2178,856	664	0,965	-0,001
age	2639,029**	954	0,962	2820,162	1010	0,959	-0,003
formal education	2163,544**	636	0,965	2290,636	664	0,963	-0,002
tax user	1716,237**	636	0,959	1821,189	664	0,956	-0,003

**p<0.01

Table 6-9. Metric Invariance
Source: Own Illustration

After establishing measurement invariance across groups, the analysis of structural models is conducted next.

6.3.7 Analysis of Structural Models

Given that the measurement fit statistics and measurement equivalence were satisfactory, the structural model was assessed in the second step as put forward by Anderson and Gerbing (1988). The aim of structural model evaluation is twofold. The first purpose was to test whether the proposed research model is valid to explain behavioral intentions of the German and Swedish citizens toward adoption of online tax filing. The second test was of whether the research model has cross-cultural validity across the two cultures in this study.

6.3.7.1 GFI Indices

For the sake of consistency, the model fit of the structural model was examined using the same set of indices which were used in the assessment of the measurement model. The initial structural model with GFI at 0.82, AGFI at 0.78, CFI at 0.88, RMSEA at 0.08, SRMR at 0.22 failed to achieve an acceptable model fit. To examine the possible areas of misfit, the modification indices provided by AMOS were examined carefully. Literature suggests that models should not be modified solely on the basis of modification indices and the modifications should be justified from a theoretical point of view (MacCallum 1986).

Inspection of modification indices revealed that the largest modification index of 957,281 suggested a path from CMP to RA. Such a relationship would be expected to exist as high compatibility of an innovation would lead to a higher perception of relative advantage. In fact, research in other contexts found that compatibility had a direct effect on behavioral intention to

use adoption through perceived usefulness (Wu/Wang 2005). With this modification, the structural model resulted in the following GFI indices: GFI at 0.87, AGFI at 0.84, CFI at 0.91, RMSEA at 0.07 and SRMR at 0.22. Although this modification resulted in a relatively better model fit, the value of GFI was slightly lower than the threshold value while the value of SRMR was higher than its cut-off value.

Inspection of modification indices suggested that with the modification index of 997,818 the model fit could be improved if a path from CMP to CLX was defined. Compatibility is a subjective judgment of an innovation in the context of an adopter's experience, customs and needs (Rogers 1995). This implies that if a potential user has quite a lot of experience of IS, he or she would be less likely to perceive high complexity. With this modification, the structural model resulted in a much better model fit: GFI at 0.91, AGFI at 0.89, CFI at 0.94, RMSEA at 0.06 and SRMR at 0.15. Except the slightly higher value of the SRMR, the model resulted in an acceptable model fit.

Modification indices were further inspected. The modification index of 407,322 for the path of CMP to PR suggested a path between these latent constructs. From a theoretical perspective, it seemed reasonable that higher compatibility will lead to lower risk perceptions. This modification resulted in an acceptable model fit (see Table 6-10 below). All indices except the $\chi 2$/df were found to be in acceptable ranges[44]. The structural model with the GFI at 0.92, CFI at 0.96, RMSEA at 0.05 indicate a good model fit.

GFI Index	Model Value	Recommendation
$\chi 2$	2355	N/A
df	334	N/A
$\chi 2$/df	7.05	< 3
p	0.00	non-significant
Goodness of Fit Index (GFI)	0.92	> 0.90
Adjusted Goodness of Fit Index (AGFI)	0.90	> 0.80
Comparative Fit Index (CFI)	0.96	> 0.90
Root mean square error of approximation (RMSEA)	0.05	< 0.08
Standardized Root Mean Square Residual (SRMR)	0.10	≤ 0.10

Table 6-10. Structural Equation Model Goodness of Fit Indices
Source: Own Illustration

In addition to the fit measurements, the R-square statistic (R^2) was calculated, similar to the multiple regression analysis. It is especially notable that the variance explained for intention to use online tax filing was particularly high with R^2 of 0,61 for the German sample and R^2 of 0,67 for the Swedish sample, well above the values found by other researchers in technology adoption (Gardner/Amoroso 2004), and trust and risk studies (Pavlou 2003). The high values

[44] A rule of thumb is that an SRMR value over 0.10 suggests a problem with fit (Hair et al. 2010, 668).

of R^2 suggest that the proposed model was successful in capturing many of the significant variables that influence online tax filing adoption in Germany and in Sweden. By accounting for a relatively large proportion of variance in dependent variables, this research provides a powerful model for predicting use intentions toward online tax filing.

	Germany	Sweden
CLX	0,605	0,587
RA	0,601	0,605
PR	0,232	0,284
USE	0,607	0,666

Table 6-11. Variance Explained
Source: Own Illustration

Given the adequacy of the structural model fit above, individual path coefficients corresponding to hypotheses were be examined. The essential prerequisite of testing hypotheses across various groups is the establishment of invariance across these groups and this was already conducted in 6.3.6 above.

6.3.8 Hypotheses Testing and Multi-Group Comparison

In addition to the examination of individual path coefficients, various multi-group comparisons were performed using AMOS. As discussed previously, the establishment of measurement invariance for a meaningful comparison across groups is an important prerequisite in cross-cultural research (Steenkamp/Baumgartner 1998).

6.3.8.1 Hypothesis Testing of the Whole Sample

The path coefficient analysis reveals the significance of relationships hypothesized in this research. The analysis showed that (see Table 6-12 below) six of the nine hypotheses are supported for the whole sample. Intention to use online tax filing was jointly predicted by compatibility (β = 0,665), perceived risk (β = -0,213), relative advantage (β = 0,126), complexity (β = -0,123) and subjective norm (β = 0,04). Among these relationships, compatibility, followed by perceived risk, relative advantage and complexity are the major influencers on individuals' behavioral intention to use online tax filing. The relatively weak effect of trust of Internet on perceived risk (β = -0,07) suggest that trust beliefs do not play a major role in citizen transaction intentions. Similarly, the insignificant effect of trust of government on use intentions (β = 0,012) and trust of government on perceived risk (β = -0,037) confirm this finding.

		Whole sample			
		Estimate	Standard Error	t-value	Sig.
H1	TOI → USE	-0,002	0,019	-0,099	0,921
H2	TOI → PR	-0,064	0,023	-2,796	**0,005****
H3	TOG → USE	0,012	0,017	0,684	0,494
H4	TOG → PR	-0,031	0,021	-1,521	0,128
H5	PR → USE	-0,239	0,023	-10,308	**0,000****
H6	RA → USE	0,131	0,032	4,108	**0,000****
H7	CLX → USE	-0,139	0,032	-4,293	**0,000****
H8	CMP → USE	0,689	0,045	15,277	**0,000****
H9	SN → USE	0,036	0,015	2,455	**0,014***

* p<0.05; ** p<0.01

Table 6-12. Hypothesis Testing (whole sample)
Source: Own Illustration

Next, a hypothesis testing was conducted for each country separately and the group differences were analyzed.

6.3.8.2 Hypothesis Testing and Analysis of Differences between Countries

The analysis showed that (see Table 6-13 below) seven of the nine hypotheses are supported for the German sample. Intention to use online tax filing was jointly predicted by compatibility (β = 0,587), perceived risk (β = -0,252), relative advantage (β = 0,188), complexity (β = -0,162) and subjective norm (β = 0,057). Among these relationships, compatibility, followed by relative advantage and complexity are the major influencers on individuals' behavioral intention to use online tax filing. The relatively weak effect of trust of Internet on perceived risk (β = -0,085) and on intention to use online tax filing (β = 0,018) suggest that trust beliefs do not play a major role in citizen transaction intentions. Similarly, the insignificant effect of trust of government on use intentions (β = 0,02) and barely significant effect of trust of government on perceived risk (β = 0,072) confirm this finding.

The analysis of the Swedish sample showed that four of the nine hypotheses were supported for this sample. Intention to use online tax filing was jointly predicted by compatibility (β = 0,713) and perceived risk (β = -0,161). Similarly to Germany, compatibility was found to be the major influencer on individual's behavioral intention to use online tax filing. In contrast to the German sample, trust of Internet (β = -0,121) and trust of government (β = -0,124) were found to significantly affect perceived risk. Both constructs failed to have a direct influence on intention to use. Furthermore, relative advantage (β = 0,072), complexity (β = -0,065), and subjective norm (β = 0,027) did not predict use intentions, which were significant antecedents of intention to use for the German sample.

		Germany				Sweden			
		Estimate	Standard Error	t-value	Sig.	Estimate	Standard Error	t-value	Sig.
H1	TOI → USE	0,020	0,026	0,758	0,449	0,003	0,023	0,117	0,907
H2	TOI → PR	-0,079	0,029	-2,685	**0,007****	-0,108	0,029	-3,685	**0,000****
H3	TOG → USE	0,019	0,022	0,824	0,410	-0,003	0,021	-0,122	0,903
H4	TOG → PR	0,058	0,025	2,336	**0,019***	-0,105	0,027	-3,881	**0,000****
H5	PR → USE	-0,296	0,034	-8,726	**0,000****	-0,172	0,031	-5,558	**0,000****
H6	RA → USE	0,202	0,047	4,344	**0,000****	0,072	0,042	1,691	0,091
H7	CLX → USE	-0,195	0,051	-3,82	**0,000****	-0,066	0,04	-1,642	0,101
H8	CMP → USE	0,649	0,071	9,18	**0,000****	0,687	0,061	11,332	**0,000****
H9	SN → USE	0,054	0,022	2,445	**0,014***	0,021	0,017	1,213	0,225

* p<0.05; ** p<0.01

Table 6-13. Hypothesis Testing (country of analysis)
Source: Own Illustration

A multiple-group comparison was conducted to identify potential differences in path estimates of the structural models across the groups. In SEM, multi-group comparison consists of three steps. First, the structural model is tested across each group simultaneously, which is known as *unconstrained model*. Then, the structural model is tested across each group by constraining the path coefficients to be equal to each other, which is known as *constrained model*. Finally, the model fit of the unconstrained model is compared to the model fit of the constrained model in terms of differences in $\chi 2$ values.

		Unconstrained		Constrained		Difference		Sig.
		χ^2	df	χ^2	df	χ^2	df	
H1	TOI → USE	3218,633	668	3218,809	669	0,176	1	0,675
H2	TOI → PR	3218,633	668	3219,020	669	0,387	1	0,534
H3	TOG → USE	3218,633	668	3218,995	669	0,362	1	0,547
H4	TOG → PR	3218,633	668	3234,547	669	15,914	1	**0,000****
H5	PR → USE	3218,633	668	3225,352	669	6,719	1	**0,010***
H6	RA → USE	3218,633	668	3222,871	669	4,238	1	**0,040***
H7	CLX → USE	3218,633	668	3222,412	669	3,779	1	0,052
H8	CMP → USE	3218,633	668	3218,796	669	0,163	1	0,686
H9	SN → USE	3218,633	668	3219,822	669	1,189	1	0,276

* p<0.05; ** p<0.01

Table 6-14. Multi-group Comparison (country of analysis)
Source: Own Illustration

The analysis showed that the German and Swedish samples differed on three paths. First, the relationship between trust of government and perceived risk was significantly higher for Sweden (β = -0,124) than for Germany (β = 0,072). On the other hand, the influence of perceived risk on use intentions was much stronger for the German sample (β = -0,252) than the Swedish sample (β = -0,161). Similarly, relative advantage had a stronger effect on intentions to use online tax filing for the German sample (β = 0,188) than the Swedish sample (β = 0,072).

6.3.8.3 Hypothesis Testing and Analysis of Differences between Gender Groups

The analysis showed that (see Table 6-15 below) six of the nine hypotheses were supported for the females. Intention to use online tax filing was jointly predicted by compatibility (β = 0,737), perceived risk (β = -0,179), complexity (β = -0,128) and subjective norm (β = 0,065). Among these relationships, compatibility, followed by perceived risk and complexity were the major influencers on female respondents' behavioral intention to use online tax filing. Furthermore, the trust of Internet was found to be a significant determinant of perceived risk (β = -0,106) and trust of government played a role in risk perceptions (β = -0,057).

The analysis of the males showed that four of the nine hypotheses were supported for this sample. Intention to use online tax filing was jointly predicted by compatibility (β = 0,606), perceived risk (β = -0,249), relative advantage (β = 0,188) and complexity (β = -0,109). Similarly to females, compatibility was found to be the major influencer on male respondents' behavioral intention to use online tax filing. In contrast to the female sample, subjective norm was not a significant antecedent of intention to use online tax filing (β = 0,024) and trust of Internet did not have a significant effect on risk perceptions (β = -0,035).

		Female				Male			
		Estimate	Standard Error	t-value	Sig.	Estimate	Standard Error	t-value	Sig.
H1	TOI → USE	-0,024	0,026	-0,933	0,351	0,012	0,023	0,535	0,592
H2	TOI → PR	-0,099	0,028	-3,53	**0,000****	-0,032	0,03	-1,057	0,291
H3	TOG → USE	0,019	0,023	0,812	0,417	0,014	0,02	0,735	0,462
H4	TOG → PR	-0,05	0,026	-1,96	**0,050***	-0,017	0,026	-0,628	0,530
H5	PR → USE	-0,205	0,035	-5,93	**0,000****	-0,273	0,03	-9,159	**0,000****
H6	RA → USE	0,051	0,054	0,945	0,345	0,196	0,038	5,1	**0,000****
H7	CLX → USE	-0,143	0,05	-2,832	**0,005****	-0,124	0,04	-3,124	**0,002****
H8	CMP → USE	0,764	0,079	9,669	**0,000****	0,624	0,054	11,491	**0,000****
H9	SN → USE	0,06	0,021	2,869	**0,004****	0,02	0,018	1,102	0,270

* p<0.05; ** p<0.01

Table 6-15. Hypothesis Testing (gender)
Source: Own Illustration

The multiple-group comparison analysis showed that the female and male samples differed on a single path. Relative advantage was found to be a significant antecedent of intention to use online tax filing for the male sample (β = 0,188), while this path was not found to be significant for the female sample (β = 0,049).

		Unconstrained		Constrained		Difference		Sig.
		χ^2	df	χ^2	df	χ^2	df	
H1	TOI → USE	2868,819	668	2869,714	669	0,895	1	0,344
H2	TOI → PR	2868,819	668	2870,911	669	2,092	1	0,148
H3	TOG → USE	2868,819	668	2868,837	669	0,018	1	0,893
H4	TOG → PR	2868,819	668	2869,485	669	0,666	1	0,414
H5	PR → USE	2868,819	668	2870,924	669	2,105	1	0,147
H6	RA → USE	2868,819	668	2873,615	669	4,796	1	**0,029***
H7	CLX → USE	2868,819	668	2868,899	669	0,08	1	0,777
H8	CMP → USE	2868,819	668	2871,017	669	2,198	1	0,138
H9	SN → USE	2868,819	668	2870,700	669	1,881	1	0,170

* p<0.05; ** p<0.01

Table 6-16. Multi-group Comparison (gender)
Source: Own Illustration

Overall, except the difference of the path between relative advantage and use intentions, no significant difference was found between female and male samples.

6.3.8.4 Hypothesis Testing and Analysis of Differences between Age Groups

The analysis showed that (see Table 6-17 below) four of the nine hypotheses were supported for the age group of 18-34. Intention to use online tax filing was jointly predicted by compatibility (β = 0,712), perceived risk (β = -0,252), complexity (β = -0,119) and subjective norm (β = 0,071). Among these relationships, compatibility, followed by perceived risk and complexity are the major influencers on respondents' behavioral intention to use online tax filing. Trust beliefs did not have any significant influence on risk perceptions or use intentions.

The analysis of the respondents in age group 35-54 showed that seven of the nine hypotheses were supported for this sample. Intention to use online tax filing was jointly predicted by compatibility (β = 0,737), perceived risk (β = -0,225), complexity (β = -0,204) and relative advantage (β = 0,121). In contrast to the relatively younger age group, trust of Internet (β = -0,146) and trust of government (β = -0,078) had a significant negative influence on perceived risk. Furthermore, relative advantage was directly related to use intentions (β = 0,121) for this age group.

Three of the nine hypotheses were supported for the age group of 55 and above. Intention to use online tax filing was jointly predicted by compatibility (β = 0,550), perceived risk (β = -0,135) and relative advantage (β = 0,173). In contrast to other two age groups, complexity (β = 0,015) and subjective norm (β = -0,039) were not found to be significant determinants of use intentions for this group.

		18-34				35-54				55+			
		Est.	S.E.	t	p	Est.	S.E.	t	p	Est.	S.E.	t	p
H1	TOI → USE	-0,003	0,02	-0,156	0,876	-0,039	0,027	-1,417	0,156	0,055	0,04	1,38	0,168
H2	TOI → PR	0,003	0,017	0,154	0,877	-0,136	0,032	-4,299	**0,000****	-0,023	0,047	-0,501	0,616
H3	TOG → USE	0,033	0,02	1,631	0,103	0,016	0,024	0,654	0,513	-0,033	0,041	-0,805	0,421
H4	TOG → PR	0,015	0,027	0,567	0,571	-0,066	0,028	-2,399	**0,016****	-0,042	0,048	-0,883	0,377
H5	PR → USE	-0,268	0,039	-6,966	**0,000****	-0,266	0,035	-7,593	**0,000****	-0,149	0,048	-3,113	**0,002****
H6	RA → USE	0,046	0,057	0,797	0,426	0,127	0,045	2,823	**0,005****	0,192	0,07	2,746	**0,006****
H7	CLX → USE	-0,122	0,047	-2,588	**0,010***	-0,231	0,049	-4,677	**0,000****	0,018	0,074	0,247	0,805
H8	CMP → USE	0,702	0,081	8,676	**0,000****	0,751	0,068	11,1	**0,000****	0,616	0,104	5,913	**0,000****
H9	SN → USE	0,056	0,021	2,622	**0,009****	0,059	0,021	2,748	**0,006****	-0,037	0,031	-1,179	0,238

* p<0.05; ** p<0.01

Table 6-17. Hypothesis Testing (age)
Source: Own Illustration

The multiple-group comparison analysis showed that the three age group samples differed on three paths. Trust of Internet had a significant effect on risk perceptions only for the age group of 35-54 (β = -0,146). In contrast to expectations, complexity was not found to be a determinant of use intentions for the age group of 55+ (β = 0,015), while the two constructs were related to each other for the remaining age groups. Similarly, subjective norm was not found to be a significant antecedent of use intentions for the age group of 55+ (β = -0,039) in contrast to other two groups.

		Unconstrained		Constrained		Difference		Sig.
		χ^2	df	χ^2	df	χ^2	df	
H1	TOI → USE	3442,862	1002	3445,812	1004	2,950	2	0,229
H2	TOI → PR	3442,862	1002	3451,312	1004	8,450	2	**0,015***
H3	TOG → USE	3442,862	1002	3442,412	1004	0,450	2	0,799
H4	TOG → PR	3442,862	1002	3446,843	1004	3,981	2	0,137
H5	PR → USE	3442,862	1002	3447,267	1004	4,405	2	0,111
H6	RA → USE	3442,862	1002	3445,487	1004	2,625	2	0,269
H7	CLX → USE	3442,862	1002	3448,989	1004	6,127	2	**0,047***
H8	CMP → USE	3442,862	1002	3442,498	1004	0,364	2	0,834
H9	SN → USE	3442,862	1002	3449,475	1004	6,613	2	**0,037***

* p<0.05; ** p<0.01

Table 6-18. Multi-group Comparison (age)
Source: Own Illustration

Overall, significant differences in the paths from trust of Internet to perceived risk, complexity to use intentions and subjective norm to use intentions were found between three age groups.

6.3.8.5 Hypothesis Testing and Analysis of Differences between Formal Education Groups

The analysis showed that (see Table 6-19 below) six of the nine hypotheses were supported for the sample with the lower level of formal education. Intention to use online tax filing was jointly predicted by compatibility (β = 0,681), perceived risk (β = -0,227), complexity (β = -0,095) and subjective norm (β = 0,056). Among these relationships, compatibility followed by perceived risk were the major influencers on respondents' behavioral intention to use online tax filing.

Furthermore, trust of Internet was found to be a significant determinant of perceived risk (β = -0,052) in the group with the lower level of education.

The analysis of the highly educated group showed that five of the nine hypotheses were supported for this sample. Intention to use online tax filing was jointly predicted by compatibility (β = 0,606), perceived risk (β = -0,177), relative advantage (β = 0,251) and complexity (β = -0,184). Similarly to the group with the lower level of education, trust of Internet had a significant effect on risk perceptions (β = -0,126).

		Low education				High education			
		Estimate	Standard Error	t-value	Sig.	Estimate	Standard Error	t-value	Sig.
H1	TOI → USE	-0,026	0,02	-1,345	0,179	0,051	0,034	1,526	0,127
H2	TOI → PR	-0,049	0,024	-2,042	**0,041***	-0,119	0,042	-2,872	**0,004****
H3	TOG → USE	0,003	0,017	0,147	0,883	0,033	0,031	1,062	0,288
H4	TOG → PR	-0,029	0,021	-1,362	0,173	-0,017	0,038	-0,444	0,657
H5	PR → USE	-0,26	0,027	-9,712	**0,000****	-0,191	0,042	-4,562	**0,000****
H6	RA → USE	0,089	0,037	2,397	**0,017****	0,233	0,06	3,879	**0,000****
H7	CLX → USE	-0,111	0,041	-2,722	**0,006****	-0,198	0,053	-3,758	**0,000****
H8	CMP → USE	0,73	0,056	13,03	**0,000****	0,584	0,084	6,972	**0,000****
H9	SN → USE	0,052	0,017	3,075	**0,002****	-0,001	0,025	-0,055	0,956

* p<0.05; ** p<0.01

Table 6-19. Hypothesis Testing (formal education)
Source: Own Illustration

The multiple-group comparison analysis showed that the two formal education groups differed on a single path. Similar to differences in gender groups, relative advantage was found to be the differentiating path between the two groups. Although the path was significant for both samples, the effect was found to be much stronger for the sample with higher formal education (β = 0,251) than the sample with the lower formal education (β = 0,08).

		Unconstrained		Constrained		Difference		Sig.
		χ^2	df	χ^2	df	χ^2	df	
H1	TOI → USE	2905,227	668	2908,415	669	3,188	1	0,074
H2	TOI → PR	2905,227	668	2907,033	669	1,806	1	0,179
H3	TOG → USE	2905,227	668	2905,789	669	0,562	1	0,453
H4	TOG → PR	2905,227	668	2905,281	669	0,054	1	0,816
H5	PR → USE	2905,227	668	2906,978	669	1,751	1	0,186
H6	RA → USE	2905,227	668	2909,327	669	4,100	1	**0,043***
H7	CLX → USE	2905,227	668	2906,942	669	1,715	1	0,190
H8	CMP → USE	2905,227	668	2907,453	669	2,226	1	0,136
H9	SN → USE	2905,227	668	2908,09	669	2,863	1	0,091

* p<0.05; ** p<0.01

Table 6-20. Multi-group Comparison (formal education)
Source: Own Illustration

Overall, except the difference of the path between relative advantage and use intentions, no significant difference was found between different formal education samples.

6.3.8.6 Hypothesis Testing and Analysis of Differences between Online Tax User and Non-User Groups

The analysis showed that (see Table 6-21 below) five of the nine hypotheses were supported for the online tax filing users. Intention to use online tax filing was jointly predicted by compatibility (β = 0,616), perceived risk (β = -0,144) and trust of government (β = 0,068). Furthermore, trust of Internet was found to be a significant determinant of perceived risk (β = -0,165) and trust of government played a role in risk perceptions (β = -0,068).

The analysis of the non-users showed that three of the nine hypotheses were supported for this sample. Intention to use online tax filing was jointly predicted by compatibility (β = 0,624), and subjective norm (β = 0,243). In contrast to users, trust beliefs did not have any significant influence on risk perceptions or use intentions.

		Online Tax User				Non-User			
		Estimate	Standard Error	t-value	Sig.	Estimate	Standard Error	t-value	Sig.
H1	TOI → USE	0,009	0,032	0,27	0,787	-0,03	0,046	-0,644	0,519
H2	TOI → PR	-0,161	0,035	-4,54	**0,000****	-0,037	0,073	-0,512	0,609
H3	TOG → USE	0,065	0,027	2,438	**0,015***	0,025	0,041	0,601	0,548
H4	TOG → PR	-0,06	0,029	-2,043	**0,041***	-0,09	0,064	-1,395	0,163
H5	PR → USE	-0,157	0,037	-4,274	**0,000****	-0,21	0,038	-5,541	**0,000****
H6	RA → USE	0,08	0,048	1,667	0,095	0,098	0,055	1,782	0,075
H7	CLX → USE	-0,089	0,048	-1,836	0,066	-0,08	0,058	-1,392	0,164
H8	CMP → USE	0,631	0,075	8,36	**0,000****	0,567	0,082	6,922	**0,000****
H9	SN → USE	-0,008	0,019	-0,393	0,694	0,187	0,032	5,759	**0,000****

* p<0.05; ** p<0.01

Table 6-21. Hypothesis Testing (online tax user vs. non-user)
Source: Own Illustration

The multiple-group comparison analysis showed that the two samples differed on a single path. Subjective norm was found to have a significant effect on use intentions only for the non-users of online tax filing (β = 0,243). This result is in line with expectations since the users with previous experience of online tax filing would not be likely to be affected by other people's opinions on whether he or she should adopt online tax filing.

		Unconstrained		Constrained		Difference		Sig.
		χ^2	df	χ^2	df	χ^2	df	
H1	TOI → USE	2327,794	668	2328,164	669	0,370	1	0,543
H2	TOI → PR	2327,794	668	2329,560	669	1,766	1	0,184
H3	TOG → USE	2327,794	668	2328,332	669	0,538	1	0,463
H4	TOG → PR	2327,794	668	2327,939	669	0,145	1	0,703
H5	PR → USE	2327,794	668	2328,734	669	0,940	1	0,332
H6	RA → USE	2327,794	668	2327,855	669	0,061	1	0,805
H7	CLX → USE	2327,794	668	2327,807	669	0,013	1	0,909
H8	CMP → USE	2327,794	668	2328,140	669	0,346	1	0,556
H9	SN → USE	2327,794	668	2349,331	669	21,537	1	**0,000****

* p<0.05; ** p<0.01

Table 6-22. Multi-group Comparison (online tax user vs. non-user)
Source: Own Illustration

Overall, except the difference of the path between subjective norm and use intentions, no significant difference was found between online tax filing users and non-users.

Next, the results of statistical tests on the effects of national culture on risk perceptions and trust beliefs were tested.

6.3.8.7 Testing for Cultural Effects

Following the approach suggested in Jarvenpaa, Tractinsky and Saarinen (1999), three hypotheses were defined in order to test the effects of national culture on PR, TOI and TOG. An independent samples t-test was conducted to test whether German citizens exhibit lower trust of Internet, lower trust of government and higher perception of risk than Swedish citizens. It is important to note that the value one in the Likert scale corresponds to "strongly agree" in all three questions. The reversed coded items in TOI and TOG scales were reversed before conducting the analysis. The lower scores in TOI and TOG scales indicate higher amounts of felt trust, while lower score in PR implies higher perception of risk.

		N	Mean	Std. Deviation	Std. Error Mean	t	Sig. (p)
TOI	1) DE	1000	0,82	0,262	0,008	-2,175	**0,030***
	2) SWE	1000	0,85	0,256	0,008		
TOG	1) DE	1000	3,57	1,061	0,034	3,966	**0,000****
	2) SWE	1000	3,39	1,003	0,032		
PR	1) DE	1000	3,20	0,839	0,027	-17,745	**0,000****
	2) SWE	1000	3,88	0,874	0,028		

* p<0.05; ** p<0.01

Table 6-23. Comparison of Cultural Effects
Source: Own Illustration

As illustrated in Table 6-23 above, the German sample was found to exhibit slightly higher trust of Internet, lower trust of government and higher perception of risk than the Swedish sample. The difference was not strongly significant for the TOI construct but was much stronger for the TOG and PR constructs.

6.4 Summary

This chapter presented empirical evidence on the existence of difference determinants influencing G2C e-government adoption in Germany and Sweden. After developing the research model, the instrument was finalized which was followed by the operationalization of the constructs in Section 6.1. Data analysis was conducted by using covariance-based Structural Equation Modeling, following the two-step methodology suggested by Anderson and Gerbing (1988). The Confirmatory Factor Analysis indicated a good model fit as well as appropriate levels of convergent and discriminant validity, which were elaborated in Section 6.3.4. Due to use of self-report surveys as a single method for data collection, which could have potentially biased the results of the study, the common method variance was analyzed. The two tests conducted revealed no significant influence of common method bias in Section 6.3.5.

Measurement invariance, which is a logical prerequisite to conducting cross-group comparisons, was assessed in Section 6.3.6 to ensure that the items used in the survey instrument mean the same things to members of different groups.

The relative fit of the data to the proposed research model was assessed based on the commonly utilized fit statistics, which indicated a good model fit. The findings indicated that the intention to use online tax filing is jointly predicted by compatibility, perceived risk, relative advantage, complexity and subjective norm in Germany while compatibility and perceived risk were the main determinants in Sweden. The analysis of different groups revealed that compatibility is the most significant antecedent of intention to use online tax filing, commonly followed by perceived risk. The remaining determinants were observed to differ among groups. The statistical test of the cultural hypotheses illustrated that the German sample perceived a higher amount of risk and a lower amount of trust in government.

In Chapter 5, the results of the descriptive studies which were conducted in 2010 and 2011 were compared with each other. Chapter 7 analyzes the changes in perceptions of the German and Swedish citizens in the time period from 2010 to 2013, based on the three questions in the descriptive studies. After presenting all the statistical analysis, the findings of the thesis will be interpreted in Chapter 8.

7 Empirical Analysis Part III: Comparison of the Descriptive Studies during the Time Period from 2010 to 2013

The main analysis in this thesis was based on the surveys that were conducted in 2010 and 2011. However, the survey was also conducted in 2012 and 2013, which enables the comparison of descriptive studies in all four years. The questions related to the research model were only asked in 2011; therefore it was not possible to test the change in terms of the constructs in the research model over the years.

Since a four-point Likert scale was used in the first question and a five-point scale was used in the second question in 2010 and 2011, these were converted to seven-point scales in order to enable comparison of all four years. The reader of this thesis should bear in mind that this conversion resulted in some minor differences between the results presented in this chapter and the ones discussed in Chapter 5, which utilized the original scales. It is important to note that the value one in the Likert scale corresponds to "extremely important" in the first question and to "strongly agree" in the second question, therefore the lower mean values imply higher level of agreement.

7.1 Comparison of the Results of the Descriptive Studies between 2010 and 2013 in Germany

An ANOVA test was used to assess the existence of differences in factors influencing adoption of G2C e-government services in Germany over the years (see Table 7-1 below). All significant changes ($p<0.05$) are marked in bold. Post hoc Tukey-HSD tests showed which samples differed significantly from the others.

The importance of four out of fourteen items – 'security', 'reliability of systems', 'trust in public authorities' and 'up-to-dateness of contents' – has not changed significantly between the years of 2010 and 2013. There were significant differences in the remaining ten factors, however some of them remained barely significant. The factors of 'usability', 'personal time savings', '24/7 availability' and 'accelerated handling time' have gained a small amount of importance over the years despite some fluctuations. All four factors were perceived as being more important in the surveys conducted in 2012 and 2013 compared to the surveys conducted in 2011. The issue of 'data protection and privacy' has become slightly less important in 2013 compared to 2010. Other than this minor change, the importance of top three factors – 'security', 'reliability of systems', and 'data protection and privacy' – remained stable over the four years in Germany. Although the importance of 'trust in public authorities' increased every year of the time period from 2010 to 2013, the changes were not statistically significant. The 'convenience' showed a clear upwards trend between 2010 and 2013. Similarly, the issues of 'variety of the service portfolio, 'continuous processing online', 'completeness of information' and 'information about status' have become significantly more important in this time period despite some fluctuations. The importance of 'variety of the service portfolio', 'continuous processing online 'and 'information about processing status' increased in 2012 and 2013 compared to 2010 and 2011. Finally, the 'completeness of information' became significantly more important in 2013 compared to 2010.

		N	Mean	Std. Deviation	Standard Error Mean	F	Sig. (p)	Difference
security	1) 2010	726	1,69	1,145	0,042	1,143	.330	-
	2) 2011	1000	1,74	1,294	0,041			
	3) 2012	1001	1,77	1,139	0,036			
	4) 2013	1000	1,79	1,211	0,038			
convenience	1) 2010	726	2,96	1,571	0,058	33,679	**.000**	1,2-3,4 3-4
	2) 2011	1000	2,86	1,549	0,049			
	3) 2012	1001	2,57	1,192	0,038			
	4) 2013	1000	2,37	1,286	0,041			
usability	1) 2010	726	2,24	1,243	0,046	5,630	**.001**	2-3,4
	2) 2011	1000	2,28	1,399	0,044			
	3) 2012	1001	2,12	1,122	0,035			
	4) 2013	1000	2,09	1,146	0,036			
personal time savings	1) 2010	726	2,35	1,357	0,050	6,952	**.000**	2-3,4
	2) 2011	1000	2,46	1,417	0,045			
	3) 2012	1001	2,21	1,164	0,037			
	4) 2013	1000	2,28	1,207	0,038			
reliability of systems	1) 2010	726	1,89	1,209	0,045	,478	.698	-
	2) 2011	1000	1,89	1,326	0,042			
	3) 2012	1001	1,92	1,109	0,035			
	4) 2013	1000	1,95	1,197	0,038			
data protection and privacy	1) 2010	726	1,61	1,141	0,042	3,283	**.020**	1-4
	2) 2011	1000	1,70	1,314	0,042			
	3) 2012	1001	1,75	1,153	0,036			
	4) 2013	1000	1,79	1,211	0,038			
trust in public authorities	1) 2010	726	2,24	1,370	0,051	1,179	.316	-
	2) 2011	1000	2,21	1,452	0,046			
	3) 2012	1001	2,16	1,189	0,038			
	4) 2013	1000	2,14	1,213	0,038			
variety of services	1) 2010	726	2,93	1,379	0,051	32,910	**.000**	1,2-3,4
	2) 2011	1000	2,95	1,485	0,047			
	3) 2012	1001	2,54	1,166	0,037			
	4) 2013	1000	2,49	1,165	0,037			

to be continued on the next page…

		N	Mean	Std. Deviation	Standard Error Mean	F	Sig. (p)	Difference
continuous processing online	1) 2010	726	2,60	1,416	0,053	12,715	**.000**	1,2-3,4
	2) 2011	1000	2,61	1,512	0,048			
	3) 2012	1001	2,33	1,161	0,037			
	4) 2013	1000	2,34	1,237	0,039			
completeness of information	1) 2010	726	2,47	1,220	0,045	20,592	**.000**	1-2,3,4
	2) 2011	1000	2,09	1,359	0,043			
	3) 2012	1001	2,08	1,143	0,036			
	4) 2013	1000	2,05	1,159	0,037			
up-to-dateness of contents	1) 2010	726	2,17	1,195	0,044	1,776	.150	-
	2) 2011	1000	2,20	1,367	0,043			
	3) 2012	1001	2,10	1,116	0,035			
	4) 2013	1000	2,10	1,189	0,038			
24/7 availability	1) 2010	726	2,10	1,253	0,046	6,153	**.000**	2-3,4
	2) 2011	1000	2,27	1,450	0,046			
	3) 2012	1001	2,06	1,151	0,036			
	4) 2013	1000	2,05	1,202	0,038			
information about processing status	1) 2010	726	2,80	1,421	0,053	21,832	**.000**	1,2-3,4
	2) 2011	1000	2,72	1,474	0,047			
	3) 2012	1001	2,45	1,149	0,036			
	4) 2013	1000	2,38	1,209	0,038			
accelerated handling time	1) 2010	726	2,39	1,361	0,051	8,458	**.000**	2-3,4
	2) 2011	1000	2,52	1,455	0,046			
	3) 2012	1001	2,26	1,150	0,036			
	4) 2013	1000	2,28	1,207	0,038			

Table 7-1. Comparison of the German samples in 2010-2013 with regard to the factors influencing adoption of G2C e-government services
Source: Own Illustration based on (Krcmar et al. 2011b, 2012; Krcmar et al. 2013; TNS Infratest 2010)

After analyzing the change in the factors, the barriers hindering G2C e-government adoption were compared over the four years in Germany. An ANOVA test was used to assess any differences in factors during time period from 2010 to 2013 (see Table 7-2 below). All significant changes ($p<0.05$) are marked in bold. Post hoc Tukey-HSD tests showed which samples differed significantly from the others.

The importance of all barriers changed significantly in Germany between the years 2010 and 2013. In contrast to the change in the factors of the first question, *all* of the obstacles became notably more important over the years with the exception of the year 2012. In this year, all obstacles except the 'lack of integration' lost some importance compared to the previous year.

There has been an upward trend in the importance of the deterrent 'lack of data protection and privacy' and 'lack of trust in public authorities' over the four years, with a minor decrease in 2012. It should be recognized that both barriers had the highest values in 2013.

		N	Mean	Std. Deviation	Std. Error Mean	F	Sig. (p)	Difference
lack of data protection and privacy	1) 2010	726	4,07	1,830	0,068	55,417	**.000**	1-2,3,4 2-3,4 3-4
	2) 2011	1000	3,31	1,844	0,058			
	3) 2012	1001	3,55	1,544	0,049			
	4) 2013	1000	3,05	1,494	0,047			
lack of integration	1) 2010	726	3,69	1,791	0,066	36,471	**.000**	1-2,3,4 4-2,3
	2) 2011	1000	3,33	1,834	0,058			
	3) 2012	1001	3,31	1,369	0,043			
	4) 2013	1000	2,89	1,335	0,042			
unclear structure	1) 2010	726	3,61	1,575	0,058	32,308	**.000**	1,3-2,4 2-4
	2) 2011	1000	3,39	1,678	0,053			
	3) 2012	1001	3,60	1,424	0,045			
	4) 2013	1000	3,01	1,346	0,043			
complexity of services	1) 2010	726	3,90	1,557	0,058	48,331	**.000**	1-2,4 4-2,3
	2) 2011	1000	3,65	1,660	0,053			
	3) 2012	1001	3,74	1,477	0,047			
	4) 2013	1000	3,10	1,423	0,045			
lack of trust in public authorities	1) 2010	726	4,10	1,512	0,056	36,373	**.000**	1,3-2,4 2-4
	2) 2011	1000	3,68	1,684	0,053			
	3) 2012	1001	3,90	1,548	0,049			
	4) 2013	1000	3,36	1,471	0,047			
lack of support and help	1) 2010	726	3,73	1,562	0,058	42,879	**.000**	1-2,4 4-2,3
	2) 2011	1000	3,47	1,668	0,053			
	3) 2012	1001	3,62	1,419	0,045			
	4) 2013	1000	3,00	1,346	0,043			
lack of customizability	1) 2010	726	4,38	1,467	0,054	20,393	**.000**	4-1,2,3
	2) 2011	1000	4,23	1,623	0,051			
	3) 2012	1001	4,37	1,651	0,052			
	4) 2013	1000	3,88	1,574	0,050			
none of the above	1) 2010	78	4,37	2,737	0,310	8,370	**.000**	2-3,4 1-4
	2) 2011	115	4,50	2,626	0,245			
	3) 2012	106	3,50	1,646	0,160			
	4) 2013	139	3,31	1,837	0,156			

Table 7-2. Comparison of the German samples in 2010-2013 with regard to the barriers impeding adoption of G2C e-government services
Source: Own Illustration based on (Krcmar et al. 2011b, 2012; Krcmar et al. 2013; TNS Infratest 2010)

After observing that the barrier of 'lack of data protection and privacy' showed *an upward trend* over the four years, a Pearson Chi-Square test was conducted to test the existence of differences in the data protection and privacy specific concerns.

As presented in Table 7-3 below, significant differences ($p<0.05$) between the four samples were observed ($\chi^2(3)=9{,}305$, $p=0.025$). In particular, the importance of this concern *decreased* in 2012 and 2013 compared to the previous years. In 2011, 74 percent of respondents stated concerns about the 'inadequate security of transferred data', decreasing to 66 percent in 2012 and to about 67 percent (66,9%) in 2013.

			Years				Total
			2010	2011	2012	2013	
inadequate security of transferred data	no	Count	73	135	147	189	544
		%	30	26	34	33,1	30,8
	yes	Count	170	385	285	382	1222
		%	70	74	66	66,9	69,2
Total		Count	243	520	432	571	1766
		%	100	100	100	100	100
					Value	df	Sig. (p)
Pearson Chi-Square					9,305	3	**.025**

Table 7-3. Comparison of the German samples in 2010-2013 with regard to the concern 'inadequate security of transferred data'
Source: Own Illustration based on (Krcmar et al. 2011b, 2012; Krcmar et al. 2013; TNS Infratest 2010)

Next, the changes regarding the concern of 'lack of confidential handling of sensitive data' were analyzed. The Pearson Chi-Square test shown in Table 7-4 below revealed *no significant differences* ($p>0.05$) regarding this item over the years between 2010 and 2013 ($\chi^2(3)=2{,}979$, $p=0.395$). About 63 percent (63,4%) of respondents stated concerns about this item in 2010, which decreased to 57 percent (57,1%) in 2011, increased to 60 percent (60,6%) in 2012, and decreased to 59 percent (59,4%) in 2013, which did not result in a statistically significant difference overall. The high percentages in the 'yes' rows indicate the persistent importance of this concern within the German population over the years.

			Years				Total
			2010	2011	2012	2013	
Lack of confidential handling of sensitive data	no	Count	89	223	170	232	714
		%	36,6	42,9	39,4	40,6	40,4
	yes	Count	154	297	262	339	1052
		%	63,4	57,1	60,6	59,4	59,6
Total		Count	243	520	432	571	1766
		%	100	100	100	100	100
					Value	df	Sig. (p)
Pearson Chi-Square					2,979	3	.395

Table 7-4. Comparison of the German samples in 2010-2013 with regard to the concern 'lack of confidential handling of sensitive data'
Source: Own Illustration based on (Krcmar et al. 2011b, 2012; Krcmar et al. 2013; TNS Infratest 2010)

Next, the changes in the concern of 'fear of becoming a transparent citizen' were analyzed. Similarly, the Pearson Chi-Square test presented in Table 7-5 below revealed *no significant differences* ($p>0.05$) regarding this item over the four years in Germany ($\chi^2(3)=1,825$, $p=0.610$). About 63 percent (62,6%) of respondents stated concerns about this item in 2010, which decreased to 59 percent in 2011 and 2012, and increased to 62 percent (61,6%) in 2013, which did not result in a statistically significant change overall. The high percentages in the 'yes' rows indicate the persistent importance of this concern within the German population over the years.

			Years				Total
			2010	2011	2012	2013	
fear of becoming a "transparent citizen"	no	Count	91	215	177	219	702
		%	37,4	41,3	41	38,4	39,8
	yes	Count	152	305	255	352	1064
		%	62,6	58,7	59	61,6	60,2
Total		Count	243	520	432	571	1766
		%	100	100	100	100	100
					Value	df	Sig. (p)
Pearson Chi-Square					1,825	3	.610

Table 7-5. Comparison of the German samples in 2010-2013 with regard to the concern 'fear of becoming a transparent citizen'
Source: Own Illustration based on (Krcmar et al. 2011b, 2012; Krcmar et al. 2013; TNS Infratest 2010)

Next, the changes regarding the concern of 'fear of data theft' were analyzed. A significant change ($p<0.05$) was observed in this item ($\chi^2(2)=406,884$, $p=0.000$). As presented in Table 7-6

below, the importance of this concern was dramatically *lower* in 2012 compared to 2011 and 2013. About 61 percent of the respondents stated concerns about this item in 2011 and 2013, which changed abruptly to 4 percent (3,9%) in 2012. Nevertheless, the high percentages in 'yes' rows in the remaining years indicate the importance of this concern within the German population.

			Years			Total
			2011	2012	2013	
fear of data theft	no	Count	202	415	224	841
		%	38,8	96,1	39,2	55,2
	yes	Count	318	17	347	682
		%	61,2	3,9	60,8	44,8
Total		Count	520	432	571	1523
		%	100	100	100	100
				Value	df	Sig. (p)
Pearson Chi-Square				406,884	2	**.000**

Table 7-6. Comparison of the German samples in 2010-2013 with regard to the concern 'fear of data theft'
Source: Own Illustration based on (Krcmar et al. 2011b, 2012; Krcmar et al. 2013; TNS Infratest 2010)

Overall, it can be concluded that the items related to security decreased over the years, while the barriers and concerns related to data protection, privacy and trust have increased or remained stable in Germany over the years. A clear *upward trend* was observed in the barriers 'lack of data protection and privacy' and the 'lack of trust in public authorities' in the time period of 2010 to 2013, with a minor decrease in 2012 and reaching to their peak values in 2013. Concerns about the security of the transferred data *decreased* in the last two years of the study, similarly to the findings of the first question. The data protection and privacy related concerns in the third question preserved their importance over the years, while the 'fear of data theft' was dramatically lower in 2012 (3,9%) compared to the other years.

In addition to the increased importance of data protection, privacy and trust over the years, there was an upward trend in the importance of issues related to the usefulness of online public services. It can be seen that that the importance of items '24/7 availability', 'personal time savings', 'accelerated handling time' and 'information about status' increased over the years despite some fluctuations. This finding signals that citizens expect to see clear benefits from e-government services over traditional methods of interaction with government. The substantial increase in the barrier of 'lack of customizability' suggests that citizens expect more customizable services that are easy to access including tablets and mobile devices.

The noteworthy rise of the barriers of 'unclear structure' and 'complexity of services' indicates the low usability of the current e-government portfolio. Furthermore, the remarkable increase in the deterrent of 'lack of support and help' imply that citizens are worried about making a mistake during a transaction therefore need assistance.

The item of ‘lack of integration’ remains as the top barrier over the four years. The increased importance attached to this item identifies the necessity of eliminating change of media and increasing level of integration between the administrative departments in the back office for a seamless delivery of e-government services in Germany.

7.2 Comparison of the Results of the Descriptive Studies between 2011 and 2013 in Sweden

An ANOVA test was used to assess any differences in factors influencing adoption of G2C e-government services in Sweden over the years (see Table 7-7 below). All significant changes ($p<0.05$) are marked in bold. Post hoc Tukey-HSD tests showed which samples differed significantly from the others.

The importance of all the factors has changed significantly in Sweden over the four years. The importance of ‘security’ has *decreased* significantly every year in the time period from 2011 to 2013. Similarly, the ‘reliability of systems’, ‘data protection and privacy’, and ‘trust in public authorities’ became *less* important in 2013.

Except the minor increase in the factors of ‘variety of the service portfolio’ and ‘information about processing status’; most of the other changes remained barely significant. The factors of ‘24/7 availability’, ‘up-to-dateness of contents’, ‘completeness of information’, ‘continuous processing online’, ‘personal time savings’, ‘convenience’ and ‘accelerated handling time’ increased slightly while a small decrease was observed in the factor of ‘usability’. Overall, the amount of changes was relatively *lower* than the ones in Germany.

		N	Mean	Std. Deviation	Std. Error Mean	F	Sig. (p)	Difference
security	1) 2011	1000	1,93	1,408	0,045	13,097	**.000**	1-2,3 2-3
	2) 2012	1000	2,08	1,246	0,039			
	3) 2013	1023	2,24	1,382	0,043			
convenience	1) 2011	1000	2,70	1,399	0,044	7,043	**.001**	2-1,3
	2) 2012	1000	2,48	1,180	0,037			
	3) 2013	1023	2,62	1,302	0,041			
usability	1) 2011	1000	2,46	1,397	0,044	6,666	**.001**	2-1,3
	2) 2012	1000	2,32	1,136	0,036			
	3) 2013	1023	2,52	1,288	0,040			
personal time savings	1) 2011	1000	2,72	1,442	0,046	5,433	**.004**	1-2,3
	2) 2012	1000	2,55	1,173	0,037			
	3) 2013	1023	2,56	1,271	0,040			
reliability of systems	1) 2011	1000	2,12	1,417	0,045	7,004	**.001**	3-1,2
	2) 2012	1000	2,19	1,226	0,039			
	3) 2013	1023	2,34	1,342	0,042			
data protection and privacy	1) 2011	1000	1,96	1,447	0,046	10,948	**.000**	1-2,3
	2) 2012	1000	2,14	1,285	0,041			
	3) 2013	1023	2,24	1,382	0,043			
trust in public authorities	1) 2011	1000	2,49	1,469	0,046	4,048	**.018**	2-3
	2) 2012	1000	2,38	1,227	0,039			
	3) 2013	1023	2,54	1,302	0,041			
variety of the service portfolio	1) 2011	1000	3,22	1,417	0,045	29,412	**.000**	1-2,3
	2) 2012	1000	2,80	1,124	0,036			
	3) 2013	1023	2,92	1,219	0,038			
continuous processing online	1) 2011	1000	3,03	1,421	0,045	15,946	**.000**	1-2,3 2-3
	2) 2012	1000	2,71	1,131	0,036			
	3) 2013	1023	2,88	1,236	0,039			
completeness of information	1) 2011	1000	2,55	1,415	0,045	5,818	**.003**	2-1,3
	2) 2012	1000	2,36	1,173	0,037			
	3) 2013	1023	2,49	1,274	0,040			

to be continued on the next page…

		N	Mean	Std. Deviation	Std. Error Mean	F	Sig. (p)	Difference
up-to-dateness of contents	1) 2011	1000	2,82	1,437	0,045	17,125	**.000**	1-2,3 2-3
	2) 2012	1000	2,48	1,167	0,037			
	3) 2013	1023	2,63	1,290	0,040			
24/7 availability	1) 2011	1000	2,63	1,458	0,046	5,986	**.003**	2-1,3
	2) 2012	1000	2,44	1,162	0,037			
	3) 2013	1023	2,59	1,305	0,041			
information about processing status	1) 2011	1000	3,35	1,509	0,048	29,124	**.000**	1-2,3
	2) 2012	1000	2,92	1,159	0,037			
	3) 2013	1023	3,04	1,238	0,039			
accelerated handling time	1) 2011	1000	2,77	1,467	0,046	8,231	**.000**	1-2,3
	2) 2012	1000	2,57	1,187	0,038			
	3) 2013	1023	2,56	1,271	0,040			

Table 7-7. Comparison of the Swedish samples in 2011-2013 with regard to the factors influencing adoption of G2C e-government services
Source: Own Illustration based on (Krcmar et al. 2011b, 2012; Krcmar et al. 2013)

After analyzing the change in the factors, an ANOVA test was conducted to assess differences in the barriers hindering G2C e-government adoption in Sweden over the three years (see Table 7-8 below). All significant changes ($p<0.05$) are marked in bold. Post hoc Tukey-HSD tests showed which samples differed significantly from the others.

The analysis revealed that the importance of four out of seven barriers changed significantly in Sweden between the years of 2011 and 2013. Analogous to the first question, the amount of changes were relatively small compared to Germany. Although 'lack of data protection and privacy' and 'lack of trust in public authorities' were perceived significantly higher in 2013 than in 2011, the differences were minor. Another significant increase was observed was the deterrent of 'lack of customizability'. In contrast to Germany, the barrier of 'lack of integration' became less important in Sweden in 2013.

		N	Mean	Std. Deviation	Std. Error Mean	F	Sig. (p)	Difference
lack of data protection and privacy	1) 2011	1000	3,95	2,064	0,065	8,427	**.000**	1-3
	2) 2012	1000	3,79	1,405	0,044			
	3) 2013	1023	3,65	1,411	0,044			
lack of integration	1) 2011	1000	3,81	2,030	0,064	8,028	**.000**	1-2,3
	2) 2012	1000	3,57	1,252	0,040			
	3) 2013	1023	3,57	1,276	0,040			
unclear structure	1) 2011	1000	3,72	1,894	0,060	,393	.675	-
	2) 2012	1000	3,74	1,355	0,043			
	3) 2013	1023	3,68	1,322	0,041			
complexity of services	1) 2011	1000	3,81	1,886	0,060	,519	.595	-
	2) 2012	1000	3,74	1,388	0,044			
	3) 2013	1023	3,74	1,368	0,043			
lack of trust in public authorities	1) 2011	1000	4,01	1,829	0,058	3,830	**.022**	1-3
	2) 2012	1000	3,88	1,365	0,043			
	3) 2013	1023	3,83	1,360	0,043			
lack of support and help	1) 2011	1000	3,80	1,866	0,059	1,750	.174	-
	2) 2012	1000	3,67	1,280	0,040			
	3) 2013	1023	3,71	1,297	0,041			
lack of customizability	1) 2011	1000	4,23	1,757	0,056	10,684	**.000**	1-2,3
	2) 2012	1000	3,94	1,310	0,041			
	3) 2013	1023	3,99	1,331	0,042			
none of the above	1) 2011	213	5,37	2,272	0,156	68,820	**.000**	1-2,3
	2) 2012	210	3,69	1,314	0,091			
	3) 2013	215	3,66	1,421	0,097			

Table 7-8. Comparison of the Swedish samples in 2011-2013 with regard to the barriers impeding adoption of G2C e-government services
Source: Own Illustration based on (Krcmar et al. 2011b, 2012; Krcmar et al. 2013)

Next, a Pearson Chi-Square analysis was conducted to assess the existence of differences regarding the concerns of the Swedish citizens over the three years.

As shown in Table 7-9 below, significant differences ($p<0.05$) between the three samples regarding the concern of 'inadequate security of transferred data' were observed ($\chi^2(2)=11,860$, $p=0.003$). Similar to Germany, the importance of this item *decreased* in 2012 and 2013 compared to 2011. About 65 percent of the respondents (64,5%) stated concerns about this issue in 2011, which decreased to 57 percent (56,8%) in 2012 and to 52 percent in 2013.

			Years			Total
			2011	2012	2013	
inadequate security of transferred data	no	Count	136	126	166	428
		%	35,5	43,2	48	41,9
	yes	Count	247	166	180	593
		%	64,5	56,8	52	58,1
Total		Count	383	292	346	1021
		%	100	100	100	100
				Value	df	Sig. (p)
Pearson Chi-Square				11,860	2	**.003**

Table 7-9. Comparison of the Swedish samples in 2011-2013 with regard to the concern 'inadequate security of transferred data'
Source: Own Illustration based on (Krcmar et al. 2011b, 2012; Krcmar et al. 2013)

Next, the changes regarding the concern of 'lack of confidential handling of sensitive data' were analyzed. Similarly to Germany, the Pearson Chi-Square test presented in Table 7-10 below revealed *no significant differences* ($p>0.05$) regarding this item over the years in Sweden ($\chi^2(2)=4,237$, $p=0.120$).

About 41 percent (40,7%) of respondents stated concerns about this issue in 2011, which increased to 42 percent (42,1%) in 2012 and to 48 percent in 2013, which did not result in a statistically significant change overall. The percentages in the 'yes' rows were remarkably lower than the ones in Germany, pointing out to the relatively *less* importance of this issue among the Swedish respondents.

			Years			Total
			2011	2012	2013	
lack of confidential handling of sensitive data	no	Count	227	169	180	576
		%	59,3	57,9	52	56,4
	yes	Count	156	123	166	445
		%	40,7	42,1	48	43,6
Total		Count	383	292	346	1021
		%	100	100	100	100
				Value	df	Sig. (p)
Pearson Chi-Square				4,237	2	.120

Table 7-10. Comparison of the Swedish samples in 2011-2013 with regard to the concern 'lack of confidential handling of sensitive data'
Source: Own Illustration based on (Krcmar et al. 2011b, 2012; Krcmar et al. 2013)

Next, the changes in the concern of 'fear of becoming a transparent citizen' were analyzed. Analogous to Germany, the Pearson Chi-Square test presented in Table 7-11 below revealed no significant differences ($p>0.05$) regarding this item over the years in Sweden ($\chi^2(2)=2,132$, $p=0.344$). About 35 percent of respondents stated concerns about this issue in 2011, which decreased to approximately 32 percent (31,5%) in 2012 and increased to 37 percent in 2013, which did not result in a statistically significant change overall. Similar to the previous concern, the percentages in the 'yes' rows were remarkably *lower* than the ones in Germany, implying the relatively less importance of this issue among the Swedish respondents.

			Years			Total
			2011	2012	2013	
fear of becoming a "transparent citizen"	no	Count	249	200	218	667
		%	65	68,5	63	65,3
	yes	Count	134	92	128	354
		%	35	31,5	37	34,7
Total		Count	383	292	346	1021
		%	100	100	100	100
				Value	df	Sig. (p)
Pearson Chi-Square				2,132	2	.344

Table 7-11. Comparison of the Swedish samples in 2011-2013 with regard to the concern 'fear of becoming a transparent citizen'
Source: Own Illustration based on (Krcmar et al. 2011b, 2012; Krcmar et al. 2013)

Next, the changes regarding the concern of 'fear of data theft' were analyzed. The importance of this item ($\chi^2(2)=89,664$, $p=0.000$) has not remained stable over the years in Sweden as in the

case of Germany. As presented in Table 7-12 below, the importance attached to this concern was dramatically lower in 2012 compared to 2011 and 2013.

About 46 percent of the respondents (46,2%) stated concerns about this issue in 2011 and 40 percent (40,2%) in 2013, which contrasts sharply with the 13 percent (12,7%) in 2012. Although this fluctuation was not as dramatic as the one in Germany over the same time period (61,2% in 2011, 3,9% in 2012 and 60,8% in 2013), it is a notable finding. Although the percentages in the 'yes' rows were remarkably lower than the ones in Germany, the differences were not as high as the concerns related to privacy of the e-government services.

			Years			Total
			2011	2012	2013	
fear of data theft	no	Count	206	255	207	668
		%	53,8	87,3	59,8	65,4
	yes	Count	177	37	139	353
		%	46,2	12,7	40,2	34,6
Total		Count	383	292	346	1021
		%	100	100	100	100
Chi-Square Test						
				Value	df	Sig. (p)
Pearson Chi-Square				89,664	2	**.000**

Table 7-12. Comparison of the Swedish samples in 2011-2013 with regard to the concern 'fear of data theft'
Source: Own Illustration based on (Krcmar et al. 2011b, 2012; Krcmar et al. 2013)

Overall, the issues related to security, reliability of the systems, data protection and privacy have lost importance within the last years in Sweden. Yet, the items related to security, reliability of the systems, data protection and privacy remained as the top three factors influencing adoption of G2C e-government services over the three years in this nation. Some of the factors related to usefulness of the e-government services showed an upward trend over the last two years of study in Sweden. Citizens consider 'personal time savings', 'variety of the service portfolio', 'information about processing status' and 'accelerated handling time' increasingly more important. In contrast to increased importance of the barriers related usability, and existence of help and support in Germany, these items remained stable in Sweden.

The analysis in the second question regarding the barriers revealed that the importance of 'lack of integration' and 'lack of customizability' have not changed significantly within the last two years in contrast to Germany. Although the barriers of 'lack of data protection and privacy' and 'lack of trust in public authorities' have slightly increased within the last two years, the amount of change in these items remained subtle.

The trends in the two countries over the years show a few resemblances. In both countries, the importance of security has decreased within the last two years. There was a dramatic decrease regarding the perception of the item 'fear of theft' in 2012. The barriers of 'lack of data

protection and privacy' and 'lack of trust in public authorities' gained importance over the years in both countries, although the effect was much more significant in Germany than in Sweden. The remarkable increase in the factors of 'variety of the service portfolio' and 'information about processing status' in both nations was notable.

Furthermore, the factors of 'personal time savings' and 'accelerated handling time' increased slightly in in both countries implying that citizens expect clear incentives for using online services rather than more traditional means of communicating with the government. Finally, the factor of 'convenience' showed a clear upward trend in Germany, while it has only slightly increased in Sweden.

A closer look at the findings of the two countries reveals some important differences as well. Items related to data protection and privacy has slightly increased in Germany while most of them have decreased in Sweden. Furthermore, items related to 'reliability of systems', 'data protection and privacy' and 'trust in public authorities' have also decreased in Sweden within the last two years, but either remained stable or slightly increased in Germany.

Enjoying highly integrated, advanced services, the barriers related to integration and customizability of services have not changed significantly within the last two years in Sweden. In contrast, these items have become much more important for the German respondents within the same time period. These two differences could be partly explained by the differences in the maturity levels of the online government offerings in Germany and Sweden. Overall, all barriers were perceived as much more important by the German sample than the Swedish sample. The comparison of the concerns in the third question showed similar results to German sample. The most notable finding was the abrupt decrease in the importance of 'fear of data theft' in 2012. No significant change in the concerns of 'lack of confidential handling of sensitive data' and 'fear of becoming a transparent citizen' was observed.

One important point needs to be remarked upon. Although the trends in the concerns over the years are broadly comparable within the two countries, this only indicates the similarities in the relative amounts of changes within each country. To illustrate; perceptions regarding the concern of becoming a "transparent citizen" have not changed significantly over the years in either country. However, the percentage values in the two countries are quite different from each other. About 40 percent of the Swedish citizens were concerned about 'lack of confidential handling of sensitive data' in 2011, increasing to 42 percent in 2012 and to 48 percent in 2013. On the other hand, it was identified as important by 63 percent of the German respondents in 2010, 57 percent in 2011, 61 percent in 2012 and 59 percent in 2013. Therefore, although the relative amount of changes is comparable in both countries, the levels of perceptions remain quite different.

7.3 Summary

Chapter 7 provided a comparison of the factors, barriers and data protection and privacy specific concerns of the citizens over the years from 2010 to 2013 in Germany and Sweden. The analysis in Section 7.1 presented an analysis of the change in Germany, while a similar analysis was conducted in Section 7.2 for Sweden.

The analysis of the survey results for the German population revealed that the importance of barriers to adoption related to perceived security risks has decreased continuously over the

years. There has been a slight increase in the items related to data protection and privacy. The barriers of 'lack of data protection and privacy' and 'lack of trust in public authorities' increased almost continuously over the years, reaching to their peak values in 2013. Furthermore, the remarkable increase in the importance of the barrier 'lack of integration', points to the necessity of increasing maturity of online services in Germany. Finally, the items related to usefulness and usability of online public services became much more important over the last two years of the study.

In contrast, the analysis of the findings for the Swedish population reflected the excellence of services in this nation. Although a few factors related to usefulness have become more important within the last two years of the analysis, items related to usability, and availability of help and support remained relatively stable. It is true that the barriers related to data protection, privacy and trust have increased slightly in 2013, but the changes were barely significant. The importance of the security of services showed a clear downward trend over the three years of analysis, while the factors related to privacy remained relatively stable over time.

The analysis of two countries reveals a few similarities. In addition to the decrease in the importance of security as a barrier over the years, the perceptions regarding the concern of 'fear of data theft' had decreased sharply in 2012 in both nations. Although the increased values in 2013 may be partly attributed to the NSA scandal (Poitras et al. 2013), which occurred two weeks before the data collection in 2013; the comparable values in previous years indicate that the dip was rather a specific occurrence in the year of 2012. Furthermore, 'lack of data protection and privacy' and 'lack of trust in public authorities' hindered citizens in both countries with increased importance over time, although the effect was much more significant in Germany than Sweden. In addition to the greater emphasis on the relative advantages of online public services over the traditional ones, the importance of items 'variety of the service portfolio' and 'information about processing status' increased notably in both nations.

The differences between the two nations were much more significant than their similarities. Especially the differences in perception regarding the barriers and concerns confirmed the relatively higher amount of skepticism in the German nation. All barriers were perceived as being much more important by the German sample compared to the Swedish sample. Despite some fluctuations, the items related to data protection and privacy slightly increased in Germany while they mostly decreased in Sweden. Although the changes in the concerns over the years are quite comparable within the two countries, the levels of perceptions were considerably different. For example, 35 percent of the Swedish citizens were worried about becoming a "transparent citizen" in 2011, while 58 percent (58,7%) of the German citizens stated the same concern.

The stability of the factors and barriers related to usability of the services in Sweden within the last two years of the study may be attributed to the excellence of e-government services in this country, while these items have become much more important in Germany. Finally, the increased importance of the item related to existence of support and help in Germany should be carefully analyzed by the Federal Government, whilst this barrier remained stable in Sweden. The next chapter concludes the thesis with a discussion of findings, contributions, some possible issues and topics for future research endeavors.

8 Discussion and Conclusion

This doctoral thesis was motivated by the need to improve understanding of e-government adoption in different cultural contexts. Four descriptive studies and an explanatory study were conducted in a cross-cultural context. This chapter presents the interpretation of all empirical research and concludes with a discussion of the contributions made. Furthermore, some possible issues are highlighted and topics for future research endeavors are identified.

8.1 Interpretation of the Findings

8.1.1 Interpretation of the Findings for Different Groups

The study reveals that compatibility is the major antecedent affecting the online tax filing use intentions of all groups. Although it is missing in TAM, this construct has been consistently identified as highly significant in other empirical IS studies predicting technology acceptance outcomes (Agarwal/Prasad 1997; Karahanna et al. 2006; Taylor/Todd 1995c; Tornatzky/Klein 1982). Furthermore, perceived risk was found to be a significant determinant of intention to use online tax filing, and was stronger for the German sample than the Swedish sample. The test of cultural hypotheses indicated that the German sample perceived a greater amount of risk which is in line with the high risk-aversion of the German nation (Krasnova et al. 2009; Münchner Kreis 2013; Hofstede et al. 1991; The Lauder Institute 2009). This implies that high risk perceptions of the German respondents cause higher levels of anxiety and uncertainty, which results in less willingness to adopt innovations such as online tax filing. Although trust of Internet has a positive effect on reducing risk perceptions in the German sample, higher levels of trust in government do not result in a similar effect.

In contrast to the German sample, relative advantage and complexity were not found to significantly influence use intentions of the Swedish sample. Instead, compatibility and perceived risk were identified as the main determinants of use intentions in this culture, where the latter was negatively influenced by stronger trust beliefs in Internet and the government. Similarly, trust beliefs were found to reduce risk perceptions significantly for females and the respondents from the age group of 35 to 54 while they had no significant effect on the remaining groups. This effect was also observable for both formal education groups but its effect was much stronger for the ones having higher levels of formal education.

Similar to the German sample, relative advantage was found to be a significant determinant of use intentions for men and for the respondents with a high level of formal education. Previous research has shown that relative advantage becomes much more important with increasing age (Phang et al. 2005), which was also confirmed by this research. Similarly, complexity was an antecedent of online tax filing for the German sample and the age group of 18-34 and 35-55. Contrary to expectations, complexity had no significant impact on users' adoption behaviors for the age group of 55 and older.

Finally, subjective norm was another significant determinant of adoption intentions for the German participants, females, and for the age groups of 18-34 and 35-55. In accordance with expectations, this construct was also seen to be significant for the users having no previous

experience with online tax filing. In other words, lack of prior experience with online tax filing would be expected to intensify the importance of social influence in adoption decisions.

8.1.2 Interpretation of the Findings for the German Sample

The descriptive studies revealed that the items related to security *decreased* over the years, while the barriers and concerns related to data protection, privacy and trust have increased or remained stable in Germany. A clear *upward trend* was observed in the barriers 'lack of data protection and privacy' and 'lack of trust in public authorities' in the time period of 2010 to 2013, with a minor decrease in 2012 and reaching their peak values in 2013. Concerns about the security of the transferred data *decreased* in the last two years of the study, confirming the findings of the first question. The data protection and privacy related concerns in the third question preserved their importance over the years, while the 'fear of data theft' dramatically decreased in 2012 compared to the other years.

The comparison of the demographical groups in 2011 indicated that security was an important concern for the age group of 18-34, while the age group of 55+ had considerable fears regarding data protection and privacy issues. Higher levels of trust in Internet were found to result in lower risk perceptions for the age group of 18-34, which needs to be considered by the Government when dealing with the security concerns of this group. No clear trend was observed in gender groups in the descriptive studies, while higher levels of trust beliefs in females resulted in lower risk perceptions. Respondents having *high levels of formal education* were also found to be more concerned about *data protection and privacy* related aspects than the others. The explanatory study revealed that risk perceptions of this group could be effectively reduced by increasing their trust in Internet.

In addition to the increased importance of data protection, privacy and trust over the years, there was an upward trend in the importance of issues related to the *relative advantage* of online public services. It can be seen that the importance of the items '24/7 availability', 'personal time savings', 'accelerated handling time' and 'information about status' increased over the years despite some fluctuations. This finding signals that citizens expect to see *clear benefits* from G2C e-government services over traditional methods of interaction with government. The results of the explanatory research confirmed this finding by revealing that relative advantage is a significant antecedent of online tax filing adoption in the German sample in contrast to the Swedish sample. Citizens expect to see clear benefits from e-government services in order to change their traditional methods of interaction with the government. Considering the low tolerance towards new methods, unwillingness to change and to adjust in high uncertainty avoidance cultures, the German nation expect to see clear benefits from e-government services in order to overcome their resistance to change.

The noteworthy rise of the barriers 'unclear structure' and 'complexity of services', which is in line with the increasing importance of 'usability' in the first question, points to the *low usability* of the current e-government portals. The significant determinant of complexity in the explanatory study on use intentions confirmed this finding. Furthermore, the substantial increase in the factor of 'convenience' and the barrier of 'lack of customizability' suggest that citizens increasingly expect and demand *customizable* e-government services that are accessible using their mobile or tablet devices. Furthermore, the studies reveal that finding specific G2C e-government services becomes much more cumbersome considering the

complex hierarchical structure in Germany. It is also notable that the information quality is an important determinant for using e-government services in this culture.

The remarkable increase in the deterrent 'lack of support and help' implies that citizens are worried about making a mistake during a transaction therefore need assistance. In fact, this is understandable considering that e-government services are offered to *all* citizens. Even if some citizens do have access to modern information technologies, they may well lack the skills, knowledge and experience to use the Internet and other technologies; therefore providing technical support is essential for a more widespread adoption of e-government services. Interactions with government are inherently complex transactions involving various documents, which are perceived as being much more complicated considering the unpredictable nature of the Internet as a transaction medium.

Although the single government service telephone number (115) was introduced a few years ago (Federal Ministry of the Interior 2016), the findings of this research indicate that this service has not yet reached its goal. A survey revealed that not every German citizen is willing to use telephone-support in case of any problems (Palka et al. 2014). Therefore, citizens should be given the opportunity of contacting the government by email, phone or live chat. Furthermore, a detailed Frequently Asked Questions (FAQ) section addressing most of citizens' concerns should also be provided and regularly updated.

The item 'lack of integration' remains as the top barrier over the four years, which corresponds with the significant change of the factor 'continuous processing online' in the first question. The increased importance attached to these items underlines the necessity of eliminating change of media and increasing level of integration between the administrative departments in the back office for a seamless delivery of e-government services. Next, the results of empirical studies are synthesized to develop recommendations for increasing uptake of e-government services in Germany.

Compatibility was found as the most important determinant influencing online tax filing adoption behavior of the German sample. It is one of the main constructs of the DOI Theory and its importance in predicting technology adoption outcomes has been consistently demonstrated in other empirical IS studies (Taylor/Todd 1995c; Agarwal/Prasad 1997; Karahanna et al. 1999; Tornatzky/Klein 1982). Rogers (1995) defined compatibility as the degree to which using an innovation is perceived as *consistent* with the existing sociocultural values, beliefs and experiences[45]. Plouffe, Hulland and Vandenbosch (2001) suggest that the adopter's current *habits* and *practices* play a key role in his or her technology adoption decisions. In other words, to the extent that an innovation is compatible with the individual's existing practices and habits, it is likely to be adopted by him or her.

In fact, compatibility is expected to be an important determinant in cultures having high uncertainty avoidance indices (Hofstede et al. 1991). Such cultures tend to be threatened by uncertain and unknown situations, therefore search for stability and predictability. The anxiety level towards unknown and unfamiliar can be expressed as "what is different, is dangerous" (Hofstede 2011). They tend to have lower tolerance to new ideas as they seek stability and certainty. This tolerance is even lower for online environments, as the technological unpredictability of the Internet reduces citizen perceptions of control over their online

[45] Rogers' definition also includes consistency with the existing needs of the potential adopters, which overlaps with the aspect of relative advantage therefore it is not included in the definition of compatibility in line with prior literature (Karahanna et al. 2006).

transactions (Pavlou 2001). Innovations involving their current habits and practices, therefore, are likely to reduce the discomfort of unknown situations by providing greater predictability. This implies that filing taxes online will be a welcomed option for citizens who use the Internet for other purposes including online banking, online shopping, other e-government services, and social networks. Furthermore, citizens would be more willing to adopt e-government services if they are given the possibility of contacting government through their commonly used interaction platforms including social networks and mobile platforms in addition to a web portal.

Although its significance was relatively lower, subjective norm was found to be an antecedent of e-government adoption in Germany. This effect was especially stronger in the users who had no previous experience with online tax filing.

Contrary to predictions, neither trust of Internet nor trust of government were significant predictors of online tax filing adoption. In fact, the test of cultural hypotheses revealed that German respondents perceived less trust of government than the Swedish respondents. Both the explanatory study and the descriptive studies have clearly pointed to high risk perceptions of the German respondents which need to be analyzed carefully. Despite strong literature (McKnight/Chervany 2002; Bélanger/Carter 2008), trust beliefs may have failed to reduce the risk perceptions of the respondents. It is suggested that future research distinguishes between privacy related concerns and security related risks, which may represent a more direct relationship between perceived risk and inherent concerns.

8.1.2.1 Suggestions for the Future of G2C E-Government Services in Germany

Risk perceptions were found to be an important barrier to the adoption decisions of individuals regarding online public services. This effect becomes even stronger in Germany, considering the high risk averseness of the nation (Hofstede 1980). The German government should continue to improve the security of services to foster e-government adoption in this nation (Klein 2012) since trust in Internet could be effectively used to decrease the risk perceptions of the German respondents.

In contrast, the high usage rates of other online services such as online banking, as well as the findings of this research reveal that it is not all about security. Skepticism increases when the services are provided by government (Akkaya et al. 2011). The study revealed that German respondents exhibit lower trust in government than the Swedish respondents. Citizens want to know how is the collected data used by the public administration (Akkaya et al. 2011). In addition to increased sensitivity due to *past experiences* of surveillance by the state in the history, recurring news in the global media about phishing cases, data scandals, selling customer data and revealing employee records intensify concerns of citizens about protecting their privacy and personal data. Therefore, it is critical that the government in Germany should consistently work on fostering trust of citizens in government. Clear data privacy declaration statements are required, to inform citizens about the purposes that the personal data collected will be used for, as well as making it clear which public authorities will have access to them. Citizens must be assured that governmental agencies handle the gathered data confidentially (Akkaya et al. 2011). Successful e-government initiatives can yield positive payoffs in terms of trust creation in government (Tolbert/Mossberger 2006) which in turn promotes e-government

adoption, producing a "virtuous cycle". At the same time, failure of public initiatives would be likely to cause loss of credibility in government forming a "vicious cycle", and this needs to be avoided.

Embracing transparency is an important step towards increasing citizens' trust in government and its online services. Welch and Hinnant (2003) state that when governments utilize information technology to disclose information, it leads to establishment of citizen trust. Experiences in other countries show that greater social media usage enhances transparency (United Nations 2012). In fact, a Forsa survey indicated that a higher level of transparency would enhance public trust in government in Germany (SAS Deutschland 2010). It is striking to see that 92 percent of the public in Germany demand the sharing and publishing of data for public benefit such as projects and public measures (German: Staatliche Maßnahmen) (SAS Deutschland 2013a). The Federal Government has already taken important steps towards increasing transparency. Besides making government laws, regulations and policies available online to the public (http://www.gesetze-im-internet.de), the Federal Ministry of the Interior (German: Bundesministerium des Innern) has initiated a pilot project on open data to provide citizens a single point of access to a wide range of data held by national, regional and local governmental organizations in Germany (https://www.govdata.de). Furthermore, the Federal Ministry of Finance (German: Bundesministerium der Finanzen) has opened up the socially relevant data regarding federal budget allocations (http://www.bundeshaushalt-info.de). However, compared with the open government initiatives in other countries, there is still much work to be done. Especially missing in Germany is the *clear declaration of support* by government leaders and politicians for open government and transparency[46].

One of the ongoing barriers to effective implementation of e-government is providing *continuous processing online* by eliminating the necessity of changes in media (Krcmar et al. 2015). Citizens can download some forms and fill them out at home; most procedures cannot be completed fully online (Akkaya et al. 2012a). Enabling secure and reliable access to online public services is a critical success factor for the acceptance of this technology. The secure e-mail communication service De-Mail and especially the new personal ID cards with the e-ID functionality should be better integrated into e-government transactions. Some studies also point to the fact that government officials do not possess the necessary knowledge and information about the applicability of these services (Krcmar et al. 2014), which needs to be targeted by Government. Authentication of citizen identities through biometrics, smart cards or other security devices would enhance end-user convenience; however, such initiatives should be very carefully planned considering the high sensitivity of the German nation regarding data protection and privacy.

The empirical analysis conducted in this thesis indicates that the hierarchical complexity of government structure, as well as the distributed division of authority, is an immense challenge in Germany. Internal administrative processes should be handled in the back-office without reflecting their complexity to the citizens. The Federal Government should take concrete steps to simplify government operations from the citizen perspective. The critical benefits of G2C e-government services are promised at the advanced stages of e-government through horizontal and vertical integration (Akkaya et al. 2012a; Layne/Lee 2001). A key prerequisite to achieving these goals is the seamless integration of front-end applications and back-end systems. There

[46] President Barack Obama has declared *transparency* as a major part of his agenda and signed a Memorandum on "Transparency and Open Government" on his very first day in the White House (The White House 2009).

are three main challenges involved. First, the existing processes within public organizations are quite complex, and should be optimized with regards to cost, quality, service and speed. Second, seamless delivery of services to the public requires effective collaboration and cooperation between different administrative levels across organizational boundaries. These two challenges require changes in organizational culture as behavioral habits, communication strategies, and working styles are affected. In addition to effective change management strategies, Business Process Reengineering (BPR) principles from the private sector[47] could be used for transforming government operations towards value creation (Hammer/Champy 1993).

Third, integration requires secure file sharing of legal electronic documents about citizens across organizational boundaries. Besides careful definition of guidelines on handling secure storage, encryption and authentication, changes in current laws may be necessary, as most sensitive documents are archived by each government agency *separately* due to data protection regulations. Previous experiences in similar public modernization efforts such as the 'single point of contact' (German: Einheitlicher Ansprechspartner) showed that such changes are fundamentally difficult because they require structural reforms within the Federal Government (BITKOM 2007). In other words, such reforms could only be achieved with the *involvement and determination* of the politicians from the highest administrative levels in Germany. The 'E-Government Monitor' study of 2014 revealed that the 'digital citizen accounts' (German: Das digitale Bürgerkonto) could only be accepted by ensuring high security (Krcmar et al. 2014).

As discussed previously, people are inherently resistant to change. The empirical findings confirmed the literature based arguments that the German nation is *highly risk-averse* (Krasnova et al. 2009; Münchner Kreis 2013; Hofstede et al. 1991; The Lauder Institute 2009). The risk perceptions of the German respondents were found to be much stronger than the Swedish respondents. This implies that changing the traditional ways of communicating with government is likely to be much more challenging in Germany and would not be possible without providing clear benefits to the public. Previous experiences in this nation reveal that incentives such as lotteries to win a brand-new sports car and expensive hotel vouchers did not result in a significant increase in the adoption of the online tax filing service (Bavarian State Ministry of Finance 2011). Relative advantages may include flexibility afforded to the individuals, personal time savings, reduced fees, shorter handling time, 24/7 availability, convenience, and information about processing status of the applications. The Federal Government should direct its efforts and funds towards a detailed understanding of the *citizen perspective of e-government* in order to provide functional incentives for using online services rather than more traditional means of communicating with the government.

Empirical findings have emphasized the importance of *convenience* in e-government. Prior research showed that convenience can be a stronger incentive than cost-savings (United Nations 2012) and privacy (Beldad et al. 2009). Eliminating the need to show up in person, offering government services with no closing times and no waiting in line, and providing access to government through various channels, all make life easier for citizens. However, a point of caution is necessary. Although greater convenience results in higher satisfaction with services, this can be a double-edged sword. Convenience is argued to be the greatest threat to security and may result in higher vulnerability to serious sources of online danger (Caloyannides 2004). The security measures put forth by the government may seem frustrating and inconvenient

[47] BPR principles has the potential to reform both front- and back-office service delivery, improve inter-organizational communication, and enhance usability for public officials and citizens (Jurisch et al. 2012).

however lowering them for the sake of greater convenience may result in data breaches and identity thefts. Considering the high sensitivity of the data transferred in e-government and the importance of these issues to the public, potential benefits of the options should be carefully weighed against the potential risks.

The increasing importance of *usability* should be considered in the design of the services, as not all citizens can be expected to possess basic IT knowledge and relevant experience. Citizens should be supported with service hotlines (telephone, e-mail, live chat) which are available during the entire week including weekends and national holidays. Government should design portals which enables citizens to maintain their personal profiles. The contents should be customizable to different languages and content levels. Citizens should be able to display only the relevant services for them by hiding the others. Notifications about public procedures (for example, email and/or SMS notifications when the passport is ready) as well as information about current processing status of an application would enhance convenience. Similar to Sweden (United Nations 2012), the German Government should also make efforts to boost accessibility features such as reading content aloud via a speaker, adding video in sign language for people with hearing problems, providing the option of configuring font size, font type and background color for visually challenged and elderly users. Closely related is the information quality of the services. If the information provided on the public web sites is complete and up-to-date, citizens would be more willing to adopt these services.

Based on the findings, it can be argued that German citizens would be more likely to adopt G2C e-government services if they are *consistent* with their existing practices, habits and experiences. Since German citizens are frequent users of social networks (Krcmar et al. 2011b; Federal Statistical Office 2014), the Federal Government should use social media proactively for effective public engagement. The frequently used channels such as Twitter and YouTube should be used by government officials to provide regular information updates, engage citizens in public debate and solicit citizen feedback on public services. Citizens should be given the opportunity of expressing their ideas through discussion platforms and opinion polls. In a previous survey, 63 percent of the German citizens stated that increasing opportunities for public engagement and citizens' participation in government decision-making would result in stronger public confidence and trust (SAS Deutschland 2013b). It is important to regularly review the collected feedback and respond directly to citizen concerns, demonstrating to citizens that the government takes their input seriously when they participate.

The Federal Government should enhance its e-government service portfolio. It should continuously develop new service offerings to meet the needs of the public. However, offering services is not enough; *promotion and awareness campaigns* should be utilized to convince the target groups[48] about the overall benefits of e-government and disseminate successful practices. The descriptive study revealed that 42 percent of the households surveyed were not aware of ELSTER, which is the most advanced e-government service in Germany (Krcmar et al. 2015). It is striking to see that, 77 percent of the respondents were not aware of the available information which facilitates handling of official procedures. Citizens cannot be expected to adopt services that they are not aware of. It is imperative for the Federal Government to launch media campaigns to spread *awareness* of e-government services. Citizens should be informed

[48] For instance, the age group 55+ and citizens having a high level of formal education have higher privacy concerns, while the younger age groups and citizens having a lower levels of education consider security as an important obstacle to using e-government.

about various aspects of e-government such as the service portfolio and relative advantages of using e-government, as well as the data protection and privacy policies of the government.

Finally, it is important to recognize the fact that widespread adoption of G2C e-government is also hindered by the *digital divide* in Germany. Governments are responsible for making their online services equally accessible and beneficial to the whole population. Despite the availability of the advanced telecommunications infrastructure, one in every four citizen does not have access to the Internet in Germany (Initiative D21 2015). About 50 percent of the non-users state security and data protection concerns for not using the Internet (Initiative D21 2015). The Federal Government should identify which demographic and economic groups are excluded due to the digital divide and implement policies to encourage their inclusion. Economically disadvantaged people may lack the necessary financial resources, resulting in a lack of access to online services. Although the term digital divide is commonly used to refer to Internet access, it is also important to distinguish between the access divide and the skills divide (Bélanger/Carter 2009). Citizens should be provided with free opportunities to learn the skills necessary for effective use of computers and the Internet which would also increase the awareness of citizens toward online public initiatives.

8.1.3 Interpretation of the Findings for the Swedish Sample

The explanatory study indicated that perceived risk is an antecedent of online tax filing adoption in Sweden, even though its significance is much lower than the German sample. The descriptive studies revealed that the importance of the security of e-government services showed a clear downward trend in Sweden from 2011 to 2013. Despite some fluctuations; factors related to data protection and privacy have also lost some importance over time. The data protection and privacy related concerns remained stable, while the 'fear of data theft' experienced a rapid decrease in 2012, similarly to Germany.

The fear of becoming a "transparent citizen" was an important concern for 58 percent (58,7%) of the citizens in Germany in 2011, increasing to 59 percent in 2012 and to 61 percent (61,6%) in 2013. On the other hand, only 35% of the Swedish citizens were worried about the same item in 2011, which has decreased to 31 percent (31,5%) in 2012 and slightly increased to 37 percent in 2013. In accordance with expectations, Swedish respondents were found to perceive lower amount of risk than the German respondents, therefore risk perceptions do not play a major role in their adoption behaviors in contrast to Germany. The studies have also revealed that trust of Internet and trust of government can be effectively used to decrease risk perceptions in the society even more.

In Sweden, the items of 'personal time savings', 'variety of the service portfolio', 'information about processing status', 'completeness of information' and 'accelerated handling time' have gained importance over time. Although relative advantage was not found to be an antecedent of citizens' intentions to use e-government services, it may be attributed to the success of 'The 24/7 Agency' initiative (The Swedish Cabinet Office 2013). Furthermore, compatibility was found to be the major determinant of online tax filing adoption in the explanatory study, which confirms the importance of convenience shown in the descriptive studies.

Barriers of 'lack of integration' and 'lack of customizability' have become slightly more important. Noticeable are the relatively *lower* importance of all barriers and concerns in Sweden than in Germany. For instance, the 'lack of integration' was considered as an important barrier

by 64 percent of the German respondents, while it was stated as an obstacle only by 38 percent of the Swedish respondents. Similarly, complexity, which was a significant barrier to adoption for the German sample, was not a valid determinant in Sweden. Although the difference in perceptions of barriers may be caused by the maturity of services between the two nations, the clear difference in the perceptions of concerns confirms the higher risk tolerance of the Swedish nation (Hofstede et al. 1991).

8.1.3.1 Suggestions for the Future of G2C E-Government Services in Sweden

The high ranking of Sweden in various e-government benchmarks, and the realization of the Swedish vision of e-government, lies in the high level of determination among politicians. In 2002, the Minister for International Economic Affairs and Financial Markets Gunnar Lund declared the Swedish vision of "a public administration using ICT to be able to deliver 24 hours a day, seven days a week" to be a priority (CAIMED 2003, 5). Decision makers in government have shown a great effort and determination to implement e-government although some public officers tend to be reluctant to change and could resist e-government (Grundén 2009). Due to increased computer related competencies, public sector employees participated in courses to facilitate the transformation process (Grundén 2009). Increasing communication and collaboration within and among public organizations was not only a technology-oriented requirement, and would not have been possible without a clear support of the government leaders and politicians.

The majority of the ambitious goals set by 'The 24/7 Agency' have been achieved. "No citizen left behind" was one of the main aims this initiative (The Swedish Cabinet Office 2013). Currently, the vast majority of the population uses the Internet. With about 94 percent of Internet users (United Nations 2014), the digital divide is no longer a reality in Sweden. According to the Mid-Term Evaluation of the eGovernment Action Plan of the European Commission (2014), a range of agencies have developed personalized services based on the Swedish eID solution, all of which can be reached via multiple channels including mobile applications. In terms of accessibility for disabled and elderly citizens, Sweden remains as a role model, offering the opportunity to hear the text aloud, and enabling customizability of the text size, spacing and coloring.

Sweden is known as one of the most open and equal societies in the world. This openness was also clearly visible in its public services. One of the objectives of 'The 24/7 Agency' was "to provide easy access to public information online and indeed electronic channels whereby the public can participate in policy-making and decision-making" (CAIMED 2003, 5). Furthermore, the Swedish government considers participation by the public in policy and decision-making as a fundamental value of democracy. Citizen dialogues have been conducted on municipal level in areas including service development and citizen budgeting (http://www.skl.se) while social media has become the accepted means of communication involving stakeholders among several ministries (European Commission 2014). This transparency and openness ensures public trust.

Future initiatives in Sweden should ensure data protection, privacy, security and reliability of systems. These three factors were the top priorities in all three years among the fourteen factors of G2C e-government adoption. Although risk perceptions in the Swedish sample were much lower than the German sample, increasing trust of Internet and trust of government would

decrease risk perceptions further. Although Sweden has become one of the leaders in e-government, some work still needs to be done. The eGovernment Benchmark report indicates that Sweden needs to increase transparency in the process of service delivery (European Commission 2016c), which would be expected to result in higher trust of the public towards the Government and the Internet. The importance of these aspects was closely followed by usability of e-government services, which should be taken into account by the Government in its future initiatives.

Although the barriers were not as strong as the ones in Germany, the Swedish Government should be aware that lack of integration is still considered as the most important barrier in Sweden. Therefore, the Swedish Government should continue its efforts to facilitate seamless integration and easy information flow among front-end and back-end systems, in addition to providing online authentication and online payment services. In 2013, about one in every three Swedish respondents stated 'unclear structure' and 'complexity of services' as barriers to G2C e-government adoption in the descriptive study, although 'complexity of services' was not found to be a significant determinant in the explanatory study. The fact that these barriers were much lower in Sweden than in Germany – 35 percent vs. 64 percent and 59 percent vs. 33 percent – can be explained by the determination of the Government to have simple usability as its main objective in the E-Government Action Plan[49]. All the following initiatives were obligated to have simple usability as one of their major aims. For instance, 'The 24/7 Agency' (The Swedish Cabinet Office 2013) provides a single point of access to citizens regardless of how responsibility is distributed among different public authorities. The Swedish Government could seek additional methods for increasing the simplicity of G2C e-government services even further.

Finally, completeness of information was found to be among top influence factors in 2012 and 2013 in Sweden, which confirms the importance of information quality for the adoption of online tax filing service in this nation (Saha 2008).

8.2 Theoretical Implications

This dissertation makes contributions to G2C e-government literature, trust research and cross-cultural research at several levels. In analogy to Dibbern, Winkler and Heinzl (2008), one can distinguish between several kinds of theoretical contributions in IS research.

The first contribution is regarding *theory integration and extension*. Drawing from two theories found in IS technology adoption and e-government literature, a theoretical model of G2C e-government adoption was developed by integrating trust beliefs and risk perceptions into Rogers' widely-recognized DOI theory. The research model was further extended by the construct of subjective norm due to various studies that showed its significant influence in human behavior towards IS adoption. This theoretical model was validated in two different country settings in the context of G2C e-government, which is widely accepted to be in its infancy (Titah/Barki 2006; Löfstedt 2005; Grönlund 2005; Weerakkody et al. 2013b, 3; Rana et al. 2012). Considering the lack of studies on theory testing in e-government literature

[49] The main objective of the Swedish E-Government Action Plan was formulated as "as simple as possible for as many as possible" (The Swedish Cabinet Office 2008, 3) in (Giritli Nygren 2009).

(Grönlund 2004; Grönlund/Andersson 2006), this dissertation provides a significant contribution to e-government literature.

Second, this work recognizes the *multidimensional nature of trust* and investigates dimensions of it in an e-government context. Considering the lack of empirical research addressing the role of trust in this domain (Beldad et al. 2010), this signifies an important contribution to e-government literature. Since most of the IS adoption and trust literature is based on studies conducted in the U.S., the third contribution of this thesis lies in providing a *European perspective*. There have been explicit calls for more empirical research in the e-government domain, for a better understanding of the context (Yildiz 2007). As one of its main distinguishing factors, this thesis is the *first* theory-based empirical study that investigates the determinants of G2C e-government adoption in *Germany*. Although the success factors for G2C e-government adoption in Sweden were subject to some previous research (e.g., Saha 2008), it is the *first* study which tests the constructs of the DOI in Sweden.

By comparing two nations in detail, this work contributes to *cross-cultural research* which has not received much empirical attention in the G2C e-government context. The findings confirmed the theoretical argument that the citizens of the two nations perceive different levels of risk and trust (Hofstede et al. 1991). Several differences in the comprehensive empirical analysis confirmed the contrasts in adoption behaviors of these nations (Srite/Karahanna 2006; Chai/Pavlou 2004). This research confirms that the consideration of cultural characteristics in e-government adoption is crucial just as it is in other contexts.

Furthermore, this study has some valuable contributions to the German-speaking IS community. Considering the dominance of the design science paradigm (Hevner et al. 2004) in WI, this thesis provides a behavioral science research addition to the literature, which is relatively under-represented (Wilde/Hess 2007). Empirical quantitative studies in WI are also quite rare, in contrast to IS research in the Anglo-American context (Wilde/Hess 2007). By focusing on high relevance, WI has been criticized for having poor rigor by IS scholars (Heinrich 2005). The methodological and empirical complexity of this research, employing *representative* samples, weighted by central features of *gender*, *age* and *formal education* combined with the utilization of *multiple-snapshot cross-sectional design* distinguishes it from other studies in the field. *Multi-group SEM* was conducted for the data analysis, which is a highly recognized and very reliable method for cross-national research (Gefen et al. 2011). Until now, very few papers were published using multi-group SEM analysis in major IS journals (Kim 2008; Qureshi/Compeau 2009). In addition to cross-validation of the research model across Germany and Sweden, adoption behaviors of various demographical groups were also compared to each other. To the best of my knowledge, studies analyzing adoption factors across various demographical groups in e-government context are extremely scarce in prior literature.

As previous research has only compared adoption intentions of online tax filing users with non-users in Taiwan (Fu et al. 2004), this study contributes to G2C e-government literature by comparing determinants of intention to use G2C e-government services between online tax filing users and non-users in Germany and in Sweden.

8.3 Practical Implications

Lack of relevance in positivist IS research has been criticized by several scholars (Benbasat/Zmud 1999; Lee 1999; Dubé/Paré 2003). This research provides an in-depth understanding of the citizen perspective with regards to G2C e-government adoption in Germany and in Sweden, which results in various practical implications.

Overall, the findings of the study are expected to improve the understanding of G2C e-government adoption across nations in Europe, where little empirical work has been done to date. The study pointed to a set of determinants which influence G2C e-government adoption in Sweden. These factors should increase the Swedish government's understanding of its citizens' decision-making, in order to further enhance the adoption of G2C e-government services. It is important to recognize that compatibility has a significant impact on the adoption of e-government in Sweden. Trust was found to be a powerful mechanism for reducing risk perceptions in Swedish society, which should be utilized in practice.

The most important practical contribution is provided for the Federal Government in Germany. As this is the first study which provides a thorough investigation of factors that influences the acceptance of G2C e-government services based on a theoretical model, the findings of this dissertation should be carefully examined to foster e-government adoption of the current public services as well the development of future e-government initiatives. Fifty-seven percent of the respondents stated data protection as a barrier to using of e-government (Krcmar et al. 2013); the Federal Government should therefore recognize that an advanced technical infrastructure is not enough for a nationwide adoption of online public initiatives. Government is responsible for protection and careful handling of the data transmitted. Without a comprehensive analysis of data protection and privacy concerns, risk perceptions and their role in the decision making of citizens, the promised potential of G2C e-government cannot be reached in Germany. Approaches to foster citizen trust towards government need to be closely examined. Trust-building mechanisms used in online banking, e-commerce and Web 2.0 applications should be analyzed for adaptability to e-government (Akkaya et al. 2011). Other cross-cultural studies indicate that the German population is relatively more difficult to satisfy in other contexts (Krcmar et al. 2014), therefore more empirical studies are necessary, in order to understand their exact requirements and expectations.

In both nations, the policy makers should focus on promoting perceived usefulness and compatibility of their services. Accessibility should be enhanced, providing easy online access to all public information and services round the clock, seven days a week. No citizen should be excluded from the advantages provided by e-government. Citizens should be provided with the opportunity of choosing between different service channels. E-government services should be designed in a way to promote access for all user groups. Easy access to public information online and opportunities to participate in policy-making would enhance transparency and foster trust. Citizens should always be able to use single points of access, regardless of the division of responsibility within the government. Other important aspects such as preferences of different demographical groups should also be addressed in efforts to encourage e-government usage.

8.4 Research Limitations

Similar to all research endeavors, this thesis has also some areas of possible concern. First, conducting the explanatory study based on the results of the two separate descriptive studies in 2010 and 2011 would have enabled monitoring of the factors over time. However, the analysis revealed only subtle differences between the two years, therefore it was concluded that the chosen research approach has not influenced the results considerably.

Second, Hofstede's cultural dimensions (2010) – similar to all other popular cross-national dimensions (Schwartz 1994; Inglehart 1997; Trompenaars/Hampden-Turner 1998; House et al. 2004) – assume the existence of cultural homogeneity within a given nation. The assumption of cultural uniformity may not hold and individuals' values may vary across subcultures. Although cultural norms influence individual behaviors within a culture, not every member of a particular culture behaves in the same way (Akkaya et al. 2012a). As a result, individuals may have varying risk propensity levels atypical within their national cultures (Akkaya et al. 2012a). However, the design of representative studies requires clear assumptions regarding the population of the study and the most commonly used cultural framework was utilized in this research.

Third, only households having a PC and those with an Internet access were considered in this research due to the selected data collection method. Yet, about 22 percent of the population in Germany has not yet adopted the Internet in the household (Initiative D21 2015). Nevertheless, this does not decrease the validity of this research since having a PC and Internet access are basic prerequisites for G2C e-government use. Fourth, the problems related to construct validity and reliability of the construct TOI indicates that the study would have benefited from intensive pilot tests of the preliminary instrument in both nations.

A number of conceptual limitations should also be mentioned. Since governments increasingly aim for "one-face" government, no matter through which authority the service is provided, 'trust of government' in this research was assumed to be a reflection of trust in various public authorities, as consistent with the prior literature (Bélanger/Carter 2008; Teo et al. 2008b). Yet, citizens may have different levels of trust in various public authorities depending on their previous experiences. However, considering all individual public authorities would not be feasible, even if possible. Moreover, citizens may not have previous experience with all public authorities, so trust in a specific public authority is likely to be assessed based on the general image of government.

Although Sweden and Germany are both highly developed countries with advanced telecommunications infrastructure and economic welfare, culture may not be the only reason for the differences between the nations. Other differences between the nations, such as the ones in political or physical factors, may have influenced the findings of the research.

Finally, quantitative research assumes that all phenomena can be reduced to empirical indicators (Al-Qeisi 2009), which may be especially difficult in examining complex phenomena such as human behavior. The analysis of people's behavioral intentions, however, may involve deeper psychological considerations that even the respondent may not be aware of.

8.5 Recommendations for Future Research

The suggestions for future research directions by the wider scientific and academic communities arise out of the research limitations, which were laid out in the previous section.

Even though the importance of data protection and security related factors were clearly shown in the multiple-snapshot cross-sectional descriptive studies, trust beliefs were not found to be among the significant determinants of G2C e-government adoption in the causal study. There are two plausible explanations, which suggest two different research directions.

Firstly, trust constructs may have failed to capture the data protection and security concerns of the respondents, although these constructs were integrated into the research model based on their validity in prior literature (McKnight/Chervany 2002; Bélanger/Carter 2008). Extending the research model with new constructs based on prior literature could result in a more clear picture in terms of risk perceptions (Akkaya et al. 2011). Future research could also test direct impacts of data protection and security concerns on e-government adoption, rather than the indirect effect of trust. Yet, it is essential to distinguish between transaction-based security and privacy concerns. The concerns of data protection can be captured by the construct 'privacy concerns'[50], which was found to be a significant determinant of self-disclosure decisions in online social networks (Krasnova et al. 2009).

A second reason for low significance of the trust constructs may be the relative weakness of quantitative research on capturing beliefs, desires and intentions in comparison to the strength of qualitative research. Future research should address G2C e-government adoption by mixing qualitative and quantitative methods as suggested by various authors (e.g., Jick 1979) and (Webb et al. 1966)).

With such an approach, follow-up qualitative research can help to interpret previously obtained quantitative results to provide a deeper understanding of e-government adoption or to explain unanticipated results from quantitative data. Extending data collection by in-depth interviewing could help understanding the remaining enablers of and barriers to e-government adoption that were not included in the questionnaire. A further research may focus on the behavioral intentions of citizens in particular states and municipalities in Germany.

It is recommended that future research pretests and pilot tests the preliminary instrument by utilizing samples from each nation of analysis. The measures that do not contribute to the constructs in a factor analysis can be dropped from the analysis. The "purification" of the measures should be done by following procedures recommended by Churchill (1979). If one follows these steps, the likelihood that there will be no problems of construct validity to begin with is much higher (Straub et al. 2004c). Before the testing of the instrument, the conceptual distinction of constructs should be ensured following the card sorting methodology suggested by Moore and Benbasat (1991) [51].

[50] The items for operationalization of the 'privacy concerns' can be found in (Dinev/Hart 2006) and in (Krasnova et al. 2009).

[51] Card sorting was conducted in two rounds with twelve items of the three constructs of RA, CLX and CMP which tend to be frequently perceived as overlapping (Moore/Benbasat 1991; Compeau et al. 2007). In both sorting rounds, a different set of five Ph.D. students and academic professionals was used. In the first round, no category names were provided and judges were asked to group all items into different categories based on the similarities and differences in the meanings. All judges created three categories however some items were misplaced. The inter-judge raw agreement scores averaged 0.85 while Cohen's Kappa (1968) averaged 0.80, which was higher than the suggested minimum inter-rater reliability (Bowers/Courtright 1984; Miles/Huberman 1994; Landis/Koch

Through this research, gaps in e-government adoption literature were identified that would benefit from additional research. Since theory testing is relatively scarce in the G2C e-government adoption context, research studies which take into account e-government specific aspects such as accountability, transparency, digital divide and citizens' needs (Dwivedi et al. 2011) must be carried out to test theories. Furthermore, it is suggested that future research validates the findings of this thesis by using other G2C e-government services.

This thesis provided initial insights on the importance of risk perceptions affecting usage decisions of citizens. The next step should be focusing on how to design trustworthy online services. The principles of "trust by design" from e-commerce could provide useful insights (Scherer/Wimmer 2015). In their recent publication, Venkatesh et al. (2016) analyzed increasing trust and transparency in order to increase trust based on the uncertainty reduction theory (Berger/Calabrese 1975), which could be tested in broader contexts.

Furthermore, future research should deepen our understanding of trust in government as well as derive concrete strategies for building citizens' trust in government. In particular, more research is required into understanding how effective open government is to ensure public trust in government by establishing a system of transparency, participation and collaboration. In future studies, scholars might consider how individual personality influences the formation of trust, which is known as 'personality trusting base' (Rotter 1967, 1971) or 'disposition to trust' (McKnight et al. 2002; McKnight et al. 1998), which was beyond the scope of this research.

Research should also be intensified to investigate the actual G2C e-government adoption rate in the German nation, by considering the individuals who do not use the Internet at home. Such research should take into account demographics including poor, senior and minority groups, and address any other fears that stand in the way of individuals' adopting PCs and technology. For instance, such research could also investigate factors influencing household PC adoption by using models such as MATH (Venkatesh/Brown 2001) or the model of PC utilization (Triandis 1977; Thompson et al. 1991), which has different dynamics than household adoption of online services.

In this thesis, only native-born German citizens were considered due to cultural arguments. It may be argued that the foreign nationals living in Germany – 7,6 million people (Federal Statistical Office 2014) – should also be analyzed. The study of Krasnova, Kolesnikova and Gunther (2010a) found only marginal differences between the trust and privacy concerns of German citizens and the foreigners living in Germany in the context of online social networks. It would be an interesting area for future research to investigate how success factors of e-government differ between the native-born citizens, and the residents with immigration backgrounds.

Much empirical research also remains to be done to understand the influence of national culture in a global environment. This study could be replicated in other nations to further understand the influence of national culture on e-government adoption. Since ethnic and cultural groups, who may not fit into the national culture, can exist within nations; future researchers should consider the cultural variation within a country. For such research, it is suggested that, appropriate frameworks such as the Cultural Perspectives Questionnaire (Maznevski 1994) are utilized.

1977). In the second round, providing category names resulted in a raw agreement of 0.96 and a Cohen's average of 0.91. Since this was accepted as a satisfactory level of inter-reliability (Moore/Benbasat 1991), a third round of card-sorting was not conducted.

9 Appendices

Appendix I Survey Questions 2010

Filter: ALL

Question X01: Are you male or female?

- ○ Female
- ○ Male

Filter: ALL

Question X02: Which of the following age groups do you belong to?

- ○ 18 to 24
- ○ 25 to 34
- ○ 35 to 44
- ○ 45 to 54
- ○ 55 to 64
- ○ 65 to 74
- ○ 75 and over
- ○ N/A

Filter: ALL

Question X03: How many inhabitants live in your town?

- ○ Fewer than 2,000 inhabitants
- ○ 2,000 to 5,000 inhabitants
- ○ 5,000 to 20,000 inhabitants
- ○ 20,000 to 50,000 inhabitants
- ○ 50,000 to 100,000 inhabitants
- ○ 100,000 to 500,000 inhabitants
- ○ More than 500,000 inhabitants
- ○ N/A

Filter: ALL

Question X04: Please select your highest educational qualification.

- ○ No formal education
- ○ Primary education completed (German: Volks-/Hauptschulabschluss)

- ○ Completed secondary education (German: Realschulabschluss/Mittlere Reife)
- ○ High school education completed (German: Abitur/Fachabitur)
- ○ University degree (German: abgeschlossenes Fach-/Hochschulstudium)
- ○ N/A

Filter: ALL

Question Q01: How often do you have contact with the public authorities in a year?

- ○ Once
- ○ 2 to 3 times
- ○ 4 to 5 times
- ○ More than 5 times
- ○ Never
- ○ N/A

Filter: ALL

Question Q02: Which of the following e-government services would promise a personal added value for you?

By e-government we mean official services which can be carried out via the Internet, such as submitting your tax return electronically (ELSTER) or applying for your driving license online.

- ○ Application of a new identity card
- ○ Application for electronic health card
- ○ The single government service telephone number
- ○ Online tax filing (ELSTER)
- ○ One stop government portal
- ○ Information about the processing status of an application (Track & Trace)
- ○ Information about the social insurance
- ○ Information about medical institutions in Germany
- ○ Online Voting

Filter: ALL

Question Q03: Which of the following e-government services are you aware of?

Instruction to programmer: Please randomize items

- ○ General information about online offerings on my town's or local authority's Internet site
- ○ Information about areas of responsibility on my town's or local authority's Internet site
- ○ Information about working hours on my town's or local authority's Internet site
- ○ Information about events on my town's or local authority's Internet site
- ○ Information about preparing for / dealing with the authorities (e.g., checklists)
- ○ Forms for preparing for / dealing with the authorities
- ○ Dealing with the authorities online, namely submitting your tax return electronically (ELSTER).
- ○ Dealing with the authorities online, namely ordering your vehicle "particle emissions sticker" electronically or reserving a personalized car number plate
- ○ Dealing with the authorities online, namely applying for your new ID card electronically
- ○ None of the above
- ○ N/A

Filter: show all options ticked in Q03

Question Q04: Which of the following e-government services have you already used?

Instruction to programmer: Please randomize items

- ○ General information about online offerings on my town's or local authority's Internet site
- ○ Information about areas of responsibility on my town's or local authority's Internet site
- ○ Information about working hours on my town's or local authority's Internet site
- ○ Information about events on my town's or local authority's Internet site
- ○ Information about preparing for / dealing with the authorities (e.g., checklists)

- ○ Forms for preparing for / dealing with the authorities
- ○ Dealing with the authorities online, namely submitting your tax return electronically (ELSTER)
- ○ Dealing with the authorities online, namely ordering your vehicle "particle emissions sticker" electronically or reserving a personalized car number plate
- ○ Dealing with the authorities online, namely applying for your new ID card electronically
- ○ None of the above
- ○ N/A

Filter: show all options ticked in Q03

Question Q05: Which of the following e-government services are you planning to use in the following 12 months?

Instruction to programmer: Please randomize items

- ○ General information about online offerings on my town's or local authority's Internet site
- ○ Information about areas of responsibility on my town's or local authority's Internet site
- ○ Information about working hours on my town's or local authority's Internet site
- ○ Information about events on my town's or local authority's Internet site
- ○ Information about preparing for / dealing with the authorities (e.g., checklists)
- ○ Forms for preparing for / dealing with the authorities
- ○ Dealing with the authorities online, namely submitting your tax return electronically (ELSTER)
- ○ Dealing with the authorities online, namely ordering your vehicle "particle emissions sticker" electronically or reserving a personalized car number plate
- ○ Dealing with the authorities online, namely applying for your new ID card electronically
- ○ None of the above
- ○ N/A

Filter: respondents, who stated that they use e-government services in Q01

Question Q06: How satisfied are you with the available e-government services overall?

- ○ Extremely satisfied
- ○ Very satisfied
- ○ Satisfied
- ○ Somewhat satisfied
- ○ Not satisfied
- ○ N/A

Filter: show all options ticked in Q03

Question Q07: How satisfied are you with the following e-government services?

Instruction to programmer: Please randomize items

- ○ General information about online offerings on my town's or local authority's Internet site
- ○ Information about areas of responsibility on my town's or local authority's Internet site
- ○ Information about working hours on my town's or local authority's Internet site
- ○ Information about events on my town's or local authority's Internet site
- ○ Information about preparing for / dealing with the authorities (e.g., checklists)
- ○ Forms for preparing for / dealing with the authorities
- ○ Dealing with the authorities online, namely submitting your tax return electronically (ELSTER)
- ○ Dealing with the authorities online, namely ordering your vehicle "particle emissions sticker" electronically or reserving a personalized car number plate
- ○ Dealing with the authorities online, namely applying for your new ID card electronically
- ○ None of the above
- ○ N/A

Filter: ALL

Question Q08: How important are the following factors for you when you are dealing with the authorities online?

Instruction to programmer: Please randomize items

	extremely important	very important	important	somewhat important	not important
Security	❍	❍	❍	❍	❍
Convenience	❍	❍	❍	❍	❍
Usability	❍	❍	❍	❍	❍
Personal time savings	❍	❍	❍	❍	❍
Reliability of the systems	❍	❍	❍	❍	❍
Data protection and privacy	❍	❍	❍	❍	❍
Trust in public authorities	❍	❍	❍	❍	❍
Variety of the service portfolio	❍	❍	❍	❍	❍
Continuous processing online	❍	❍	❍	❍	❍
Completeness of information	❍	❍	❍	❍	❍
Up-to-dateness of the contents	❍	❍	❍	❍	❍
24/7 availability	❍	❍	❍	❍	❍
Information about processing status	❍	❍	❍	❍	❍
Accelerated handling time	❍	❍	❍	❍	❍

Filter: ALL

Question Q09: How would you assess the current e-government services in the following aspects?

Instruction to programmer: Please randomize items

	extremely important	very important	important	somewhat important	not important
Security	❍	❍	❍	❍	❍
Convenience	❍	❍	❍	❍	❍
Usability	❍	❍	❍	❍	❍
Personal time savings	❍	❍	❍	❍	❍
Reliability of the systems	❍	❍	❍	❍	❍
Data protection and privacy	❍	❍	❍	❍	❍
Trust in public authorities	❍	❍	❍	❍	❍
Variety of the service portfolio	❍	❍	❍	❍	❍
Continuous processing online	❍	❍	❍	❍	❍
Completeness of information	❍	❍	❍	❍	❍
Up-to-dateness of the contents	❍	❍	❍	❍	❍
24/7 availability	❍	❍	❍	❍	❍
Information about processing status	❍	❍	❍	❍	❍
Accelerated handling time	❍	❍	❍	❍	❍

Filter: ALL

Question Q10: Which of the following barriers prevent you from using e-government services (more intensively)?

Instruction to programmer: Please randomize items – „other, namely " always at the end

	strongly agree	agree	disagree	strongly disagree	N/A
Lack of data protection and privacy	❍	❍	❍	❍	❍
Lack of integration	❍	❍	❍	❍	❍

Unclear structure	❍	❍	❍	❍	❍
Complexity of services	❍	❍	❍	❍	❍
Lack of trust in public authorities	❍	❍	❍	❍	❍
Lack of support / help	❍	❍	❍	❍	❍
Lack of customizability	❍	❍	❍	❍	❍
Other, namely: _____	❍	❍	❍	❍	❍

Filter: respondents, who stated lack of data protection and privacy as a barrier in Q09

Question Q11: What are your specific concerns regarding data protection and privacy, which prevent you from using e-government services (more intensively)?

(multiple answers possible)

- ○ Inadequate security of transferred data
- ○ Lack of confidential handling of data
- ○ Fears of becoming a "transparent citizen" (all your details being merged in a central database)
- ○ None of the above
- ○ N/A

Filter: ALL

Question Q12: Which of the following functions of the new identity cards (nPA) are you planning to use?

- ○ E-ID function
- ○ Biometrical functionalities (two finger prints)
- ○ Digital signature
- ○ None of the above
- ○ N/A

Filter: ALL

Question Q13: Are you aware of the single government service telephone number (115) and/or the D115 web portal (www.d115.de)?

- ○ Yes, I am aware of the D115 telephone service
- ○ Yes, I am aware of the D115 web portal
- ○ No, I am not aware of these services
- ○ N/A

Filter: ALL

Question Q14: Have you already used the single government service telephone number (115) and/or the D115 web portal (www.d115.de)?

- ○ Yes, I have used the D115 telephone service
- ○ Yes, I have used the D115 web portal
- ○ No, I have not used these services
- ○ N/A

Filter: ALL

Question Q15: Are you also a mobile Internet user, e.g., using an Internet enabled mobile phone or a laptop / netbook when you are travelling via WLAN or UMTS?

- ○ Yes, with a laptop/notebook via WLAN
- ○ Yes, with a laptop/notebook via UMTS
- ○ None of the above
- ○ N/A

Filter: ALL

Question Q16: How important do you think your mobile phone or other mobile end devices will be for you in the future for dealing with the authorities?

- ○ Extremely important
- ○ Very important
- ○ Important
- ○ Somewhat important
- ○ Not important
- ○ N/A

Appendix II Survey Questions 2011

This survey has been conducted in Germany and Sweden. Terms for local services such as online tax filing, and names of educational qualifications, were adapted in the survey as appropriate for each country. The English version, translated from the German version, is included in this appendix.

Filter: ALL

Question X01: Are you male or female?

- ○ Female
- ○ Male

Filter: ALL

Question X02: Which of the following age groups do you belong to?

- ○ 18 to 24
- ○ 25 to 34
- ○ 35 to 44
- ○ 45 to 54
- ○ 55 to 64
- ○ 65 to 74
- ○ 75 and over
- ○ N/A

Filter: ALL

Question X03: Please select your highest educational qualification.

- ○ No formal education
- ○ Primary education completed (German: Volks-/Hauptschulabschluss)
- ○ Completed secondary education (German: Realschulabschluss/Mittlere Reife)
- ○ High school education completed (German: Matura)
- ○ University degree (German: abgeschlossenes Fach-/Hochschulstudium)

Filter: ALL

Question Q01: How often do you use the Internet on average?

- ○ Several times a day
- ○ Once a day

- ○ Several times a week
- ○ Once a week
- ○ Several times a month
- ○ Once a month or less
- ○ Never
- ○ N/A

Filter: Internet user according to Q01

Question Q02: How long have you been using the Internet?

- ○ Less than 6 months
- ○ 6 to 12 months
- ○ 1 to 2 years
- ○ 2 to 5 years
- ○ 5 to 10 years
- ○ More than 10 years
- ○ N/A

Filter: ALL

Question Q03: Have you ever used e-government services?

By e-government we mean official services which can be carried out via the Internet, such as submitting your tax return electronically (ELSTER), applying for your driving license online, or using a Self-Assessment (tax return) service.

- ○ Yes
- ○ No
- ○ Don't know
- ○ N/A

Filter: E-government user according to Q03

Question Q04: How often do you use e-government services in a year?

- ○ Once
- ○ 2 to 3 times
- ○ 4 to 5 times
- ○ More than 5 times
- ○ Never
- ○ N/A

Filter: E-government user according to Q03

Question Q05: How long have you been using e-government services for?

- ○ Less than 6 months
- ○ 6 to 12 months
- ○ 1 to 2 years
- ○ 2 to 5 years
- ○ 5 to 10 years
- ○ N/A

Filter: ALL

Question Q06: How important do you think your mobile phone or other mobile end user devices will be for you in the future, when dealing with the authorities?

- ○ Extremely important
- ○ Very important
- ○ Important
- ○ Somewhat important
- ○ Not important
- ○ N/A

Filter: ALL

Question Q07: Which of the following e-government services are you aware of?

Instruction to programmer: Please randomize items

- ○ General information about online offerings on my town's or local authority's Internet site
- ○ Information about areas of responsibility on my town's or local authority's Internet site
- ○ Information about working hours on my town's or local authority's Internet site
- ○ Information about events on my town's or local authority's Internet site
- ○ Information about preparing for / dealing with the authorities (e.g., checklists)
- ○ Forms for preparing for / dealing with the authorities
- ○ Dealing with the authorities online, namely submitting your tax return electronically (ELSTER)

- ○ Dealing with the authorities online, namely ordering your vehicle "particle emissions sticker" electronically or reserving a personalized car number plate
- ○ Dealing with the authorities online, namely applying for your new ID card electronically
- ○ None of the above
- ○ N/A

Filter: show all options ticked in Q07

Question Q08: Which of the following e-government services have you already used?

Instruction to programmer: Please randomize items

- ○ General information about online offerings on my town's or local authority's Internet site
- ○ Information about areas of responsibility on my town's or local authority's Internet site
- ○ Information about working hours on my town's or local authority's Internet site
- ○ Information about events on my town's or local authority's Internet site
- ○ Information about preparing for / dealing with the authorities (e.g., checklists)
- ○ Forms for preparing for / dealing with the authorities
- ○ Dealing with the authorities online, namely submitting your tax return electronically (ELSTER)
- ○ Dealing with the authorities online, namely ordering your vehicle "particle emissions sticker" electronically or reserving a personalized car number plate
- ○ Dealing with the authorities online, namely applying for your new ID card electronically
- ○ None of the above
- ○ N/A

Filter: ALL

Question Q09: How satisfied are you with the available e-government services overall?

- ○ Extremely satisfied

- ○ Very satisfied
- ○ Satisfied
- ○ Somewhat satisfied
- ○ Not satisfied
- ○ N/A

Filter: ALL

Question Q10: How important are the following factors for you when you are dealing with the authorities online?

Instruction to programmer: Please randomize items

	extremely important	very important	important	somewhat important	not important
Security	❍	❍	❍	❍	❍
Convenience	❍	❍	❍	❍	❍
Usability	❍	❍	❍	❍	❍
Personal time savings	❍	❍	❍	❍	❍
Reliability of the systems	❍	❍	❍	❍	❍
Data protection and privacy	❍	❍	❍	❍	❍
Trust in public authorities	❍	❍	❍	❍	❍
Variety of the service portfolio	❍	❍	❍	❍	❍
Continuous processing online	❍	❍	❍	❍	❍
Completeness of information	❍	❍	❍	❍	❍
Up-to-dateness of the contents	❍	❍	❍	❍	❍
24/7 availability	❍	❍	❍	❍	❍
Information about processing status	❍	❍	❍	❍	❍
Accelerated handling time	❍	❍	❍	❍	❍

Filter: ALL

Question Q11: Which of the following barriers prevent you from using e-government services (more intensively)?

Instruction to programmer: Please randomize items – „other, namely " always at the end

	strongly agree	agree	disagree	strongly disagree	don't know
Lack of data protection and privacy	❍	❍	❍	❍	❍
Lack of integration	❍	❍	❍	❍	❍
Unclear structure	❍	❍	❍	❍	❍
Complexity of services	❍	❍	❍	❍	❍
Lack of trust in public authorities	❍	❍	❍	❍	❍
Lack of support / help	❍	❍	❍	❍	❍
Lack of customizability	❍	❍	❍	❍	❍
Other, namely: _____	❍	❍	❍	❍	❍

Filter: Respondents who stated that they have concerns about data protection and privacy in question Q11.1

Question Q12: What are your specific concerns regarding data protection and privacy, which prevent you from using e-government services (more intensively)?

(multiple answers possible)

- ○ Inadequate security of transferred data
- ○ Lack of confidential handling of data
- ○ Fear of becoming a "transparent citizen" (all your details being merged in a central database)
- ○ Fear of data theft
- ○ None of the above
- ○ N/A

Filter: ALL

Question Q13: If you think about the Internet and your experiences with it, how do you rate the security of this medium? Please state to what extent you agree with the following statements.

Instruction to programmer: Please randomize items

	strongly agree	agree	some-what agree	neutral	some-what disagree	disagree	strongly disagree
The Internet has not enough safeguards to make me feel comfortable using it	❍	❍	❍	❍	❍	❍	❍
I feel assured that legal and technological structures adequately protect me from problems on the Internet	❍	❍	❍	❍	❍	❍	❍
I feel confident that encryption and other technological advances on the Internet make it safe for me to make transactions here	❍	❍	❍	❍	❍	❍	❍
In general, the Internet is a robust and safe environment	❍	❍	❍	❍	❍	❍	❍

Filter: ALL

Question Q14: Now if you think of your experiences with the authorities generally, to what extent do you agree with the following statements?

Instruction to programmer: Please randomize items

	strongly agree	agree	some-what agree	neutral	some-what disagree	disagree	strongly disagree
I feel that government acts in citizens' best interest	❍	❍	❍	❍	❍	❍	❍
I feel fine interacting with government agencies since they generally fulfill their duties	❍	❍	❍	❍	❍	❍	❍
I always feel confident that I can rely on government agencies to do their part when I interact with them	❍	❍	❍	❍	❍	❍	❍
I am not comfortable relying on government agencies to meet their obligations	❍	❍	❍	❍	❍	❍	❍

Filter: Respondents who stated that they use online tax filing in Q8

Question Q15: You have said that you already submit your tax return online (ELSTER). How often in total have you used this e-government service?

- ○ Once
- ○ Twice
- ○ Three times
- ○ Four times
- ○ Five or more times
- ○ Don't know
- ○ N/A

Question Q16: Below we would like to look in more detail at submitting your tax return online (ELSTER).

If you think about submitting your tax return online (ELSTER), to what extent do you agree with the following statements?

Instruction to programmer: Please randomize items

Filter: Respondents who stated that they use online tax filing in Q8

	strongly agree	agree	some-what agree	neutral	some-what disagree	disagree	strongly disagree
I would hesitate to enter information about my income tax on the web	❍	❍	❍	❍	❍	❍	❍
The decision of whether to use ELSTER is risky	❍	❍	❍	❍	❍	❍	❍
Using ELSTER would lead to a loss of privacy for me because my personal information could be used without my knowledge	❍	❍	❍	❍	❍	❍	❍
Using ELSTER would cause me to lose control over the privacy of my income tax filing	❍	❍	❍	❍	❍	❍	❍

Filter: Respondents who stated that they know about online tax filing in Q8

	strongly agree	agree	some-what agree	neutral	some-what disagree	disagree	strongly disagree
I would hesitate to enter information about my income tax on the web	❍	❍	❍	❍	❍	❍	❍
The decision of whether to use ELSTER is risky	❍	❍	❍	❍	❍	❍	❍
Using ELSTER leads to a loss of privacy for me because my personal information can be used without my knowledge	❍	❍	❍	❍	❍	❍	❍
Using ELSTER causes me to lose control over the privacy of my income tax filing	❍	❍	❍	❍	❍	❍	❍

Question Q17: If you think about submitting your tax return online (ELSTER) to what extent do you agree with the following statements?

Filter: Respondents who stated that they use online tax filing in Q8

	strongly agree	agree	some-what agree	neutral	some-what disagree	disagree	strongly disagree
Using ELSTER would enable me to accomplish income tax filing more quickly	❍	❍	❍	❍	❍	❍	❍
Using ELSTER would enable me to reduce the potential errors in the tax filing process	❍	❍	❍	❍	❍	❍	❍
Using ELSTER would increase my effectiveness in filing income tax	❍	❍	❍	❍	❍	❍	❍
Using ELSTER would enable me to accomplish tax filing at lower cost	❍	❍	❍	❍	❍	❍	❍

Filter: Respondents who stated that they or use online tax filing in Q8

	strongly agree	agree	some-what agree	neutral	some-what disagree	disagree	strongly disagree
Using ELSTER enables me to accomplish income tax filing more quickly	❍	❍	❍	❍	❍	❍	❍
Using ELSTER enables me to reduce the potential errors in the tax filing process	❍	❍	❍	❍	❍	❍	❍
Using ELSTER increases my effectiveness in filing income tax	❍	❍	❍	❍	❍	❍	❍
Using ELSTER enables me to accomplish tax filing at lower cost	❍	❍	❍	❍	❍	❍	❍

Question Q18: If you think about submitting your tax return online (ELSTER), to what extent do you agree with the following statements?

Filter: Respondents who stated that they know about online tax filing in Q8

	strongly agree	agree	some-what agree	neutral	some-what disagree	disagree	strongly disagree
Learning to use ELSTER would be easy for me	❍	❍	❍	❍	❍	❍	❍
It would be easy to get ELSTER to do what I wanted it to do	❍	❍	❍	❍	❍	❍	❍
I believe using ELSTER would be clear and understandable	❍	❍	❍	❍	❍	❍	❍
It would be easy for me to become skillful at using ELSTER	❍	❍	❍	❍	❍	❍	❍

Filter: Respondents who stated that they use online tax filing in Q8

	strongly agree	agree	some-what agree	neutral	some-what disagree	disagree	strongly disagree
Learning to use ELSTER was easy for me	❍	❍	❍	❍	❍	❍	❍
It was easy to get ELSTER to do what I want it to do	❍	❍	❍	❍	❍	❍	❍
Using ELSTER was clear and understandable for me	❍	❍	❍	❍	❍	❍	❍
It was easy for me to become skillful at using ELSTER	❍	❍	❍	❍	❍	❍	❍

Question Q19: If you think of submitting your tax return online (ELSTER), to what extent do you agree with the following statements?

Filter: Respondents who stated that they know online tax filing in Q8

	strongly agree	agree	some-what agree	neutral	some-what disagree	disagree	strongly disagree
Using ELSTER would fit well with the way I file my income tax	❍	❍	❍	❍	❍	❍	❍
Using ELSTER would fit into my lifestyle	❍	❍	❍	❍	❍	❍	❍
Using ELSTER would be compatible with the way I work	❍	❍	❍	❍	❍	❍	❍
Using ELSTER would be incompatible with how I like to do things	❍	❍	❍	❍	❍	❍	❍

Filter: Respondents who stated that they use online tax filing in Q8

	strongly agree	agree	some-what agree	neutral	some-what disagree	disagree	strongly disagree
Using ELSTER fits well with the way I file my income tax	❍	❍	❍	❍	❍	❍	❍
Using ELSTER fits into my lifestyle	❍	❍	❍	❍	❍	❍	❍
Using ELSTER is compatible with the way I work	❍	❍	❍	❍	❍	❍	❍
Using ELSTER is incompatible with how I like to do things	❍	❍	❍	❍	❍	❍	❍

Question Q20: If you think of submitting your tax return online (ELSTER), to what extent do you agree with the following statements?

Filter: Respondents who stated that they know online tax filing in Q8

	strongly agree	agree	some-what agree	neutral	some-what disagree	disagree	strongly disagree
People who are important to me would think that I should use ELSTER	❍	❍	❍	❍	❍	❍	❍
People who influence my behavior would think that I should use ELSTER	❍	❍	❍	❍	❍	❍	❍
People whose opinions are valuable to me would prefer that I use ELSTER	❍	❍	❍	❍	❍	❍	❍
I would use ELSTER because of the number of people around me who do so	❍	❍	❍	❍	❍	❍	❍

Filter: Respondents who stated that they use online tax filing in Q8

	strongly agree	agree	some-what agree	neutral	some-what disagree	disagree	strongly disagree
People who are important to me would think that I should use ELSTER	❍	❍	❍	❍	❍	❍	❍
People who influence my behavior would think that I should use ELSTER	❍	❍	❍	❍	❍	❍	❍
People whose opinions are valuable to me would prefer that I use ELSTER	❍	❍	❍	❍	❍	❍	❍
I use ELSTER because of the number of people around me who do so	❍	❍	❍	❍	❍	❍	❍

Question Q21: If you think of submitting your tax return online (ELSTER), to what extent do you agree with the following statements?

Filter: Respondents who stated that they know online tax filing in Q8

	strongly agree	agree	some-what agree	neutral	some-what disagree	disagree	strongly disagree
I do not intend to use ELSTER in the future	❍	❍	❍	❍	❍	❍	❍
It is likely that I will use ELSTER	❍	❍	❍	❍	❍	❍	❍
My intention is to use ELSTER rather than use any alternative means	❍	❍	❍	❍	❍	❍	❍
If possible, I will try to file my income tax using ELSTER in the next tax return season	❍	❍	❍	❍	❍	❍	❍

Filter: Respondents who stated that they use online tax filing in Q8

	strongly agree	agree	some-what agree	neutral	some-what disagree	disagree	strongly disagree
I do not intend to continue to use ELSTER in the future	❍	❍	❍	❍	❍	❍	❍
It is likely that I will use ELSTER again	❍	❍	❍	❍	❍	❍	❍
I will use ELSTER rather than use any alternative means	❍	❍	❍	❍	❍	❍	❍
I will file my income tax using ELSTER in the next tax return season	❍	❍	❍	❍	❍	❍	❍

Filter: ALL

In Germany, there are already several opportunities for citizens to become actively involved online. Which of the following online public participation initiatives are you aware of?

(Multiple answers possible)

- ❍ Online petitions
- ❍ Online participatory budgets (e.g., Köln, Berlin, Hamburg)
- ❍ Participation platforms where you can report damage such as damaged roads, broken street lights or rubbish dumps on public land (e.g., Märker Brandenburg)
- ❍ Online consultation on urban development issues or controversial infrastructure plans (e.g., "Essen soll leiser werden", "Nachnutzung Flughafen Tempelhof", "Domplatz Hamburg")
- ❍ Cities' Facebook pages (e.g., Berlin, Hamburg, Munich, Frankfurt)
- ❍ Twitter accounts of cities, local authorities, etc.
- ❍ None of above
- ❍ N/A

Filter: Respondents who did not state „none of the above " OR „N/A" in Q22.

Question Q22: Have you already used one of these online public participation initiatives or are you planning to use these processes in the future?

- ○ Yes, I have already used these processes and will also continue to use them
- ○ Yes, I have already used these processes, but I am not going to use them any more
- ○ No, I haven't used them yet but I am planning to use them
- ○ No, I haven't used them yet and don’t intend to use them
- ○ N/A

Filter: Respondents who stated that they are not planning to use open government in Q23

Question Q23: Why do you prefer not use open government services?
(Multiple answers possible)

- ○ There has not been any opportunity yet
- ○ It is too complicated for me
- ○ I don’t understand these processes
- ○ I can’t see any added value in them for me
- ○ They don’t interest me
- ○ N/A

Filter: ALL

Question Q24: In your view what are the major benefits of online citizen participation?
(Multiple answers possible)

- ○ Citizens and society can find out about current projects quickly, easily and from anywhere
- ○ Citizens can participate in decisions on current projects from anywhere
- ○ Political and administrative decisions become easier to understand and clearer/more transparent (e.g., participatory budgets)
- ○ In the case of controversial projects a broad exchange of opinions can take place among the various groups in good time (e.g., extending an airport)
- ○ Other benefits
- ○ I can’t see any benefits
- ○ N/A

Filter: ALL

Question X04: How many inhabitants live in your town?

- ○ Fewer than 2,000 inhabitants
- ○ 2,000 to 5,000 inhabitants
- ○ 5,000 to 20,000 inhabitants
- ○ 20,000 to 50,000 inhabitants
- ○ 50,000 to 100,000 inhabitants
- ○ 100,000 to 500,000 inhabitants
- ○ More than 500,000 inhabitants
- ○ N/A

Filter: ALL

Question X05: Are you currently liable to pay income tax?

- ○ Yes
- ○ No
- ○ Don’t know
- ○ N/A

Filter: ALL

Question X06: Are you also a mobile Internet user, e.g., using an Internet enabled mobile phone or a laptop / netbook when you are travelling via WLAN or UMTS?

- ○ Yes
- ○ No
- ○ N/A

Filter: ALL

Question X07: Which of these best describes your annual household income before tax?

- ○ Up to 1,500 Euro
- ○ 1,500 to 2,250 Euro
- ○ 2,251 to 3,000 Euro
- ○ 3,001 to 3500 Euro
- ○ 3,501 to 4,000 Euro
- ○ Over 4,000 Euro
- ○ Don't know
- ○ N/A

Appendix III Measures of Skewness and Kurtosis

	N	St. Dev.	Skew-ness	St. Err. Skew-ness (SES)	Kurto-sis	St. Err. Kurto-sis (SEK)	Mini-mum	Maxi-mum	Skew-ness/ SES	Kurto-sis/ SEK
TOI1	2000	1,380	0,027	0,055	-0,167	0,109	1	7	0,491	-1,532
TOI2	2000	1,324	0,289	0,055	0,047	0,109	1	7	5,255	0,431
TOI3	2000	1,259	0,327	0,055	0,238	0,109	1	7	5,945	2,183
TOI4	2000	1,415	0,145	0,055	-0,140	0,109	1	7	2,636	-1,284
TOG1	2000	1,328	0,411	0,055	0,209	0,109	1	7	7,473	1,917
TOG2	2000	1,221	0,246	0,055	0,573	0,109	1	7	4,473	5,257
TOG3	2000	1,271	0,273	0,055	0,380	0,109	1	7	4,964	3,486
TOG4	2000	1,361	-0,020	0,055	0,092	0,109	1	7	-0,364	0,844
PR1	2000	1,338	-0,222	0,055	0,638	0,109	1	7	-4,036	5,853
PR2	2000	1,175	-0,326	0,055	1,223	0,109	1	7	-5,927	11,220
PR3	2000	1,174	-0,288	0,055	1,284	0,109	1	7	-5,236	11,780
PR4	2000	1,158	-0,478	0,055	1,252	0,109	1	7	-8,691	11,486
RA1	2000	1,141	1,019	0,055	1,986	0,109	1	7	18,527	18,220
RA2	2000	1,105	0,425	0,055	1,320	0,109	1	7	7,727	12,110
RA3	2000	1,119	0,616	0,055	1,280	0,109	1	7	11,200	11,743
RA4	2000	1,267	0,458	0,055	0,987	0,109	1	7	8,327	9,055
CLX1	2000	0,978	0,509	0,055	1,370	0,109	1	7	9,255	12,569
CLX2	2000	1,076	0,349	0,055	1,343	0,109	1	7	6,345	12,321
CLX3	2000	1,002	0,497	0,055	1,489	0,109	1	7	9,036	13,661
CLX4	2000	0,996	0,475	0,055	1,436	0,109	1	7	8,636	13,174
CMP1	2000	1,126	0,885	0,055	1,983	0,109	1	7	16,091	18,193

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	N	St. Dev.	Skew-ness	St. Err. Skew-ness (SES)	Kurto-sis	St. Err. Kurto-sis (SEK)	Mini-mum	Maxi-mum	Skew-ness /SES	Kurto-sis/ SEK
CMP2	2000	1,065	0,587	0,055	1,564	0,109	1	7	10,673	14,349
CMP3	2000	1,028	0,598	0,055	1,616	0,109	1	7	10,873	14,826
CMP4	2000	1,264	0,364	0,055	0,930	0,109	1	7	6,618	8,532
SN1	2000	1,295	0,068	0,055	0,922	0,109	1	7	1,236	8,459
SN2	2000	1,254	0,077	0,055	1,048	0,109	1	7	1,400	9,615
SN3	2000	1,258	0,082	0,055	1,048	0,109	1	7	1,491	9,615
SN4	2000	1,325	-0,049	0,055	0,562	0,109	1	7	-0,891	5,156
USE1	2000	1,416	1,108	0,055	1,352	0,109	1	7	20,145	12,404
USE2	2000	1,148	1,312	0,055	2,933	0,109	1	7	23,855	26,908
USE3	2000	1,580	0,756	0,055	0,425	0,109	1	7	13,745	3,899
USE4	2000	1,296	1,219	0,055	2,065	0,109	1	7	22,164	18,945

Appendix IV Reliability Analysis

Trust of Internet

Item-Total Statistics				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
TOI1	10.622	8.850	0.073	0.595
TOI2	11.223	6.085	0.538	0.146
TOI3	11.371	6.253	0.558	0.143
TOI4	11.119	8.762	0.070	0.602
Cronbach's Alpha				**0.482**

Due to low Item-Total Correlation, it was decided to remove TOI4 from the scale. After removing this item, the reliability of the scale has increased to 0.602.

Item-Total Statistics				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
TOI1	6.960	5.621	0.189	0.812
TOI2	7.560	4.163	0.527	0.323
TOI3	7.710	4.221	0.571	0.267
Cronbach's Alpha				**0.602**

Trust of Government

Item-Total Statistics				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
TOG1	11.727	8.981	0.716	0.672
TOG2	11.533	9.579	0.711	0.681
TOG3	11.544	9.161	0.736	0.664
TOG4	11.014	11.892	0.288	0.885
Cronbach's Alpha				**0.788**

Due to low Item-Total Correlation, it was decided to remove TOG4 from the scale. After removing this item, the reliability of the scale has increased to 0.885.

Item-Total Statistics				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
TOG1	7.470	5.407	0.764	0.850
TOG2	7.270	5.822	0.777	0.839
TOG3	7.290	5.535	0.792	0.824
Cronbach's Alpha				**0.885**

Perceived Risk

Item-Total Statistics				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
PR1	13.819	10.818	0.681	0.909
PR2	13.640	10.895	0.807	0.858
PR3	13.568	10.866	0.818	0.855
PR4	13.324	10.916	0.811	0.857
Cronbach's Alpha				**0.899**

Since all items had high Item-Total Correlations, no changes were necessary.

Relative Advantage

Item-Total Statistics				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
RA1	8.995	8.661	0.744	0.785
RA2	8.543	9.091	0.713	0.800
RA3	8.779	8.535	0.791	0.766
RA4	8.402	9.352	0.532	0.880
Cronbach's Alpha			**0.850**	

Since all items had high Item-Total Correlations, no changes were necessary. Although the Item-Total Correlation for RA4 was lower than the others, it was decided to keep the indicator as its removal would not result in a considerable increase in the Cronbach’s Alpha value.

Complexity

Item-Total Statistics				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
CLX1	8.620	8.177	0.890	0.908
CLX2	8.284	8.084	0.792	0.940
CLX3	8.502	8.117	0.868	0.914
CLX4	8.540	8.197	0.868	0.914
Cronbach's Alpha				**0.938**

Since all items had high Item-Total Correlations, no changes were necessary.

Compatibility

Item-Total Statistics				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
CMP1	8.963	7.811	0.777	0.744
CMP2	8.933	8.078	0.789	0.743
CMP3	9.013	8.222	0.805	0.739
CMP4	8.218	9.368	0.387	0.927
Cronbach's Alpha				**0.837**

Due to low Item-Total Correlation, it was decided to remove CMP4 from the scale. After removing this item, the reliability of the scale has increased to 0,927.

Item-Total Statistics				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
CMP1	5.472	4.144	0.836	0.910
CMP2	5.442	4.334	0.855	0.892
CMP3	5.522	4.466	0.867	0.884
Cronbach's Alpha				**0.927**

Subjective Norm

Item-Total Statistics				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
SN1	13.401	11.817	0.844	0.876
SN2	13.294	11.992	0.858	0.872
SN3	13.334	12.005	0.849	0.875
SN4	13.269	12.799	0.681	0.933
Cronbach's Alpha				**0.915**

Since all items had high Item-Total Correlations, no changes were necessary.

Intention to Use

Item-Total Statistics				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
USE1	8.134	12.553	0.646	0.810
USE2	8.392	13.041	0.809	0.753
USE3	7.605	12.773	0.498	0.890
USE4	8.236	11.961	0.822	0.734
Cronbach's Alpha				**0.840**

Due to low Item-Total Correlation, it was decided to remove USE3 from the scale. After removing this item, the reliability of the scale has increased to 0,885.

Item-Total Statistics				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
USE1	4.839	5.584	0.689	0.926
USE2	5.087	6.148	0.831	0.801
USE4	4.942	5.474	0.832	0.785
Cronbach's Alpha				**0.885**

Appendix V Covariance Matrix

	USE4	USE2	USE1	SN4	SN3	SN2	SN1	CMP3	CMP2	CMP1	CLX4	CLX3	CLX2	CLX1	RA4	RA3	RA2	RA1	PR4	PR3	PR2	PR1	TOG3	TOG2	TOG1	TO13	TOI2	TOI1
USE4	1,751																											
USE2	1,35	1,366																										
USE1	1,303	1,133	2,077																									
SN4	0,246	0,154	-0,025	1,754																								
SN3	0,266	0,172	-0,007	1,082	1,587																							
SN2	0,238	0,151	-0,043	1,068	1,299	1,571																						
SN1	0,315	0,21	0,061	1,076	1,326	1,354	1,677																					
CMP3	0,894	0,749	0,734	0,124	0,168	0,16	0,257	1,084																				
CMP2	0,918	0,782	0,776	0,170	0,200	0,217	0,287	0,942	1,174																			
CMP1	1,081	0,902	0,900	0,188	0,232	0,222	0,317	0,966	0,987	1,317																		
CLX4	0,606	0,546	0,516	0,113	0,078	0,09	0,15	0,672	0,622	0,673	1,004																	
CLX3	0,703	0,619	0,585	0,127	0,125	0,134	0,19	0,714	0,675	0,747	0,824	1,035																
CLX2	0,777	0,651	0,607	0,177	0,175	0,173	0,232	0,711	0,703	0,775	0,806	0,842	1,189															
CLX1	0,633	0,569	0,541	0,076	0,081	0,082	0,154	0,691	0,643	0,691	0,859	0,848	0,807	0,976														
RA4	0,402	0,34	0,258	0,318	0,28	0,24	0,281	0,414	0,411	0,446	0,393	0,382	0,394	0,376	1,606													
RA3	0,875	0,763	0,717	0,255	0,211	0,215	0,279	0,753	0,78	0,854	0,6	0,641	0,675	0,605	0,698	1,292												
RA2	0,686	0,572	0,53	0,271	0,238	0,204	0,28	0,573	0,572	0,64	0,491	0,505	0,557	0,476	0,705	0,863	1,227											
RA1	0,918	0,766	0,774	0,239	0,174	0,173	0,241	0,746	0,755	0,868	0,614	0,672	0,689	0,644	0,659	1,065	0,814	1,344										
PR4	-0,82	-0,704	-0,961	0,143	0,132	0,135	0,048	-0,604	-0,607	-0,644	-0,44	-0,519	-0,504	-0,464	-0,112	-0,519	-0,366	-0,553	1,414									
PR3	-0,706	-0,648	-0,838	0,05	0,045	0,035	-0,025	-0,513	-0,536	-0,557	-0,365	-0,43	-0,456	-0,367	-0,104	-0,448	-0,352	-0,46	1,101	1,415								
PR2	-0,69	-0,616	-0,814	0,042	0,08	0,058	-0,003	-0,508	-0,535	-0,576	-0,382	-0,465	-0,484	-0,397	-0,146	-0,498	-0,366	-0,492	1,079	1,096	1,431							
PR1	-0,646	-0,568	-0,791	0,092	0,032	0,008	0,013	-0,44	-0,523	-0,514	-0,296	-0,367	-0,379	-0,302	-0,139	-0,464	-0,345	-0,448	1,003	1,011	1,011	1,828						
TOG3	0,318	0,288	0,127	0,208	0,215	0,224	0,217	0,261	0,292	0,247	0,241	0,277	0,293	0,264	0,135	0,282	0,224	0,246	-0,212	-0,228	-0,271	-0,204	1,616					
TOG2	0,273	0,214	0,065	0,197	0,188	0,201	0,184	0,226	0,22	0,207	0,188	0,224	0,248	0,214	0,152	0,243	0,242	0,217	-0,139	-0,192	-0,234	-0,16	1,149	1,491				

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TOG1	0,268	0,236	0,134	0,141	0,145	0,196	0,179	0,247	0,247	0,187	0,202	0,247	0,276	0,232	0,084	0,279	0,19	0,242	-0,189	-0,212	-0,247	-0,176	1,22	1,139	1,763			
TOI3	0,221	0,198	0,097	0,096	0,137	0,114	0,117	0,183	0,179	0,196	0,194	0,186	0,232	0,208	0,19	0,189	0,187	0,168	-0,144	-0,18	-0,255	-0,167	0,585	0,558	0,549	1,585		
TOI2	0,218	0,188	0,053	0,208	0,18	0,163	0,152	0,184	0,173	0,201	0,187	0,201	0,239	0,194	0,237	0,243	0,251	0,215	-0,156	-0,173	-0,243	-0,13	0,598	0,609	0,608	1,141	1,751	
TOI1	0,261	0,233	0,345	-0,079	-0,031	-0,05	-0,032	0,193	0,196	0,203	0,148	0,162	0,197	0,157	0,001	0,13	0,143	0,127	-0,45	-0,486	-0,535	-0,454	0,043	0,033	-0,001	0,336	0,282	1,904

Appendix VI Assessment of CMV: Harman's Single Factor Test

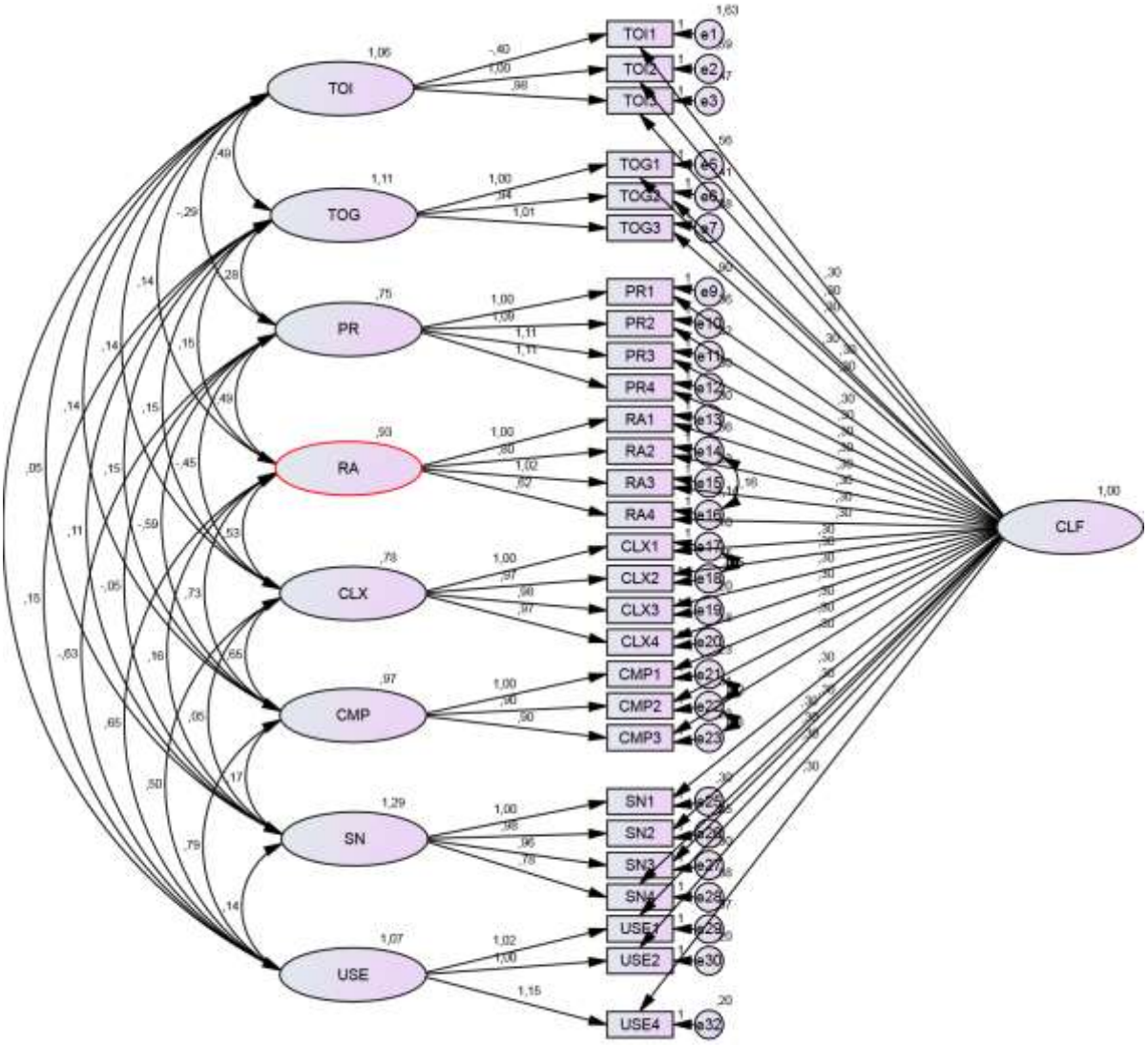
Component	Total	% of Variance	Cumulative %
1	9,704	34,656	34,656
2	3,513	12,548	47,204
3	2,680	9,571	56,776
4	2,088	7,458	64,234
5	1,273	4,547	68,781
6	1,256	4,484	73,265
7	1,032	3,686	76,952
8	0,762	2,722	79,674
9	0,643	2,295	81,968
10	0,517	1,848	83,816
11	0,457	1,631	85,448
12	0,417	1,491	86,938
13	0,386	1,379	88,317
14	0,353	1,261	89,578
15	0,315	1,125	90,703
16	0,304	1,085	91,788
17	0,286	1,021	92,810
18	0,255	0,911	93,720
19	0,239	0,855	94,575
20	0,222	0,794	95,369
21	0,205	0,730	96,099
22	0,188	0,671	96,770

to be continued on the next page…

23	0,182	0,651	97,421
24	0,176	0,628	98,049
25	0,160	0,572	98,622
26	0,148	0,528	99,150
27	0,123	0,439	99,588
28	0,115	0,412	100,000

Extraction Method: Principal Component Analysis

Appendix VII Assessment of CMV: Common Latent Factor Test



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