IOWA STATE UNIVERSITY
Digital Repository

2019

Factors influencing e-government adoption in Indonesia

Muhammad Noor Fakhruzzaman
Iowa State University

Follow this and additional works at: https://lib.dr.iastate.edu/etd

Part of the Mass Communication Commons

Factors influencing e-government adoption in Indonesia

by

Muhammad Noor Fakhruzzaman

A thesis submitted to the graduate faculty

in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

Co-majors: Human-Computer Interaction;
Journalism and Mass Communication

Program of Study Committee:
Daniela V. Dimitrova, Major Professor
Jonathan Kelly
Jan Lauren Boyles

The student author, whose presentation of the scholarship herein was approved by the program of study committee, is solely responsible for the content of this thesis. The Graduate College will ensure this thesis is globally accessible and will not permit alterations after a degree is conferred.

Iowa State University

Ames, Iowa

2019

DEDICATION

I would like to dedicate this Thesis to my Father, who now rests in peace, for without his discipline, I would not be who I am today.

I would also like to dedicate this Thesis to my Mother, who inspires me to learn endlessly and always supports me in every way.

TABLE OF CONTENTS

Page

iv

LIST OF TABLES

Page

LIST OF FIGURES

ACKNOWLEDGEMENTS

ABSTRACT

The global diffusion of Information and Communication Technologies (ICTs) has facilitated the development of e-government services in all world regions. E-government refers to the use of online tools to deliver public services to citizens with the intent of increasing government efficiency and transparency as well as public participation. As one of the largest countries in Asia, Indonesia has made the deployment of e-government services a priority. However, developing and supporting the country's governance through an online integrated system within such a vast country has been a challenge. The purpose of this research is to investigate what factors affect the rate of adoption of e-government services among Indonesians. The study is based on the Technology Acceptance Model (TAM), a classic model of technology diffusion that incorporates perceived usefulness and perceived ease of use as the key conceptual factors that affect adoption. Extending the TAM model, the study introduces several other factors to understand e-government adoption, namely perceived risk, social influence, and trust. The study is based on an online survey of students enrolled in several universities in Indonesia (N=472). Structural Equation Modeling (SEM) technique is applied to test the extended conceptual model. The findings of this study support the original TAM model, but also identify perceived risk as an important predictor. Perceived risk affects intention to use directly, and also acts as a mediating variable between perceived ease of use and intention to use. The study has important implications for policy makers and government officials who aim to increase e-government use in the country. From a human-computer interaction perspective, it becomes clear that designers need to take user perception of risk into account when trying to promote any new online system.

CHAPTER 1.   OVERVIEW

Indonesia is an archipelagic country with five big islands and more than 13,000 smaller islands. It had a population of over 258 million people in 2016 and still an economically developing country (Badan Pusat Statistik, 2017). Unequal development of structure and infrastructure across the country has been a hindrance to the nation's success. This unequally developed infrastructure has also contributed to a digital divide in Indonesia. Digital divide is a social gap in information and communication technology that occurred due to unequal access to the technology infrastructure among the society (Puspitasari & Ishii, 2016). To manage such a vast country with such a large population, Indonesia needs an information system that can facilitate government related services (Howard, 2001; Ndou, 2004).

Despite the existing digital divide, information technology development in Indonesia has been growing. The Indonesian National Statistics Body uses the ICT Development index as a tool for measuring the progress of information technology development in Indonesia. In 2015, the index score averaged 3.88 out of 10 and grew to 4.34 out of 10 in 2016 (Badan Pusat Statistik, 2017). This index includes several indicators set by the National Statistics Body including access to infrastructure communication, usage of information and communication technologies (ICT), and proficiency in ICTs.

The index has shown a gap of development in ICT among the country's areas, with Jakarta as the special capital provincial-city scoring 7.41 out of 10 while the province of Papua scored only 2.41 (Badan Pusat Statistik, 2017). While this digital divide may be a hindrance to national development, possibly affecting the governance as a whole, the development of Indonesia's outer areas has continued to grow over the years, largely due to its President's decision to improve infrastructure, such as roads, ports, electrical grid, and communication lines and beacons. A good infrastructure will lead to better technological use and ultimately narrow the gap.

Meanwhile, the number of Internet users in Indonesia has been steadily growing. In 2011, 12.28 percent of Indonesians reported accessing the Internet regularly, a number that grew to 21.98 percent in 2015 (Badan Pusat Statistik, 2017). In 2017, the Internet World Stats revealed that the percentage of Internet users in Indonesia had reached 50.4 percent (Internet World Stats, 2017).

The adoption of Internet technology has also increased computer self-efficacy, indicating that users have achieved a capability for obtaining and retain information from their use of Internet. The availability of physical access to information technology is regarded as the first stage in narrowing the digital divide and, considering positive trends in Indonesian Internet use, the current government should concern itself with the implementation of e-government services. With potential increasing development of such services, the future of e-government deployment in Indonesia seems bright.

Currently, government services are mostly accessed traditionally, i.e., citizens requiring government-related administrative services come to the office and conduct their transactions manually. Because the time and resources needed to complete transactions in this way can be rather large, this can lead to unwillingness of citizens to deal with such a cumbersome process.

From my personal experience, traditional government transactions are usually accompanied by confusing bureaucracy and unclear guidance. Even if help desks and flyers are provided, average citizens are likely to still be frustrated. Sadly, such frustration leads to the existence of illegal brokers who are able to smooth the process by bypassing confusing bureaucracy steps in exchange for extra money, often quite a lot more. They are also sometimes found to bribe officials through special connections, further decreasing the trust in government among citizens.

The availability of a better alternative in dealing with government services will surely help citizens and the government itself in achieving good governance, and just a more perception toward dealing with government-related administration would represent a change for the better (Dwiyanto, 2013).

E-government is a term defined as the usage of the latest communication technology to enhance the quality of public services, bringing benefit to both citizens and the government (Fang, 2002).

Accordingly, the main purpose of e-government is to facilitate convenient delivery of public services to citizens. If e-government services are implemented effectively, the nation will receive benefits that may affect other areas, because the governance process is expected to be more generally enhanced through e-government usage.

Information systems should constitute a form of technology for assisting humans in managing resources and data with respect to specific purposes such as customer relationship management, accounting, and especially more complex purposes such as government service. E-government service represents one of the many forms of information systems specifically aimed at managing government-related work.

Utilizing e-government in a country can help in overcoming many problems, e.g., archiving important documents, a process that traditionally requires a great deal of storage space and costly maintenance; it would also enable an archive to be searched electronically, further reducing the amount of time required to access documents (West, 2004; Fang, 2002; Holmes, 2001). E-government can also help facilitate interaction between a government and its citizens, improving comfort of citizens in dealing with government-related administrative transactions. Such increased government-service quality would lead to a more transparent and accountable government (Weiss, 2000).

While Indonesia has already established early stages of e-government services in some departments, e.g., the national police (*polri.go.id*), the national treasury and taxes (*pajak.go.id*), and the national immigration service (*imigrasi.go.id*), some "online" services offered are not fully online, because they still require some offline interactions such as in-person interviews, and capability of making online payment is still unavailable (Susanto, 2015; Subriadi et al., 2015).

While benefits of successfully implementing e-government services include reduced office operational costs, improved archiving capability, enhanced service quality, and improvement in trust among citizens (West, 2004; Holmes, 2001). Such benefits can only be achieved through the complete adoption of e-government by the citizens.

While taking possible benefits of implementing e-government services into account suggest that Indonesia surely needs e-government services, many developing countries that have tried to deploy e-government services have failed to identify the gap between the need of e-government services and the existing condition of the country's development. This study is expected to provide important guidance by informing the Indonesian government about the need for implementing e-government services by measuring the intention to use e-government services and its predictive factors. This study will also add to the academic literature of technology adoption and diffusion of innovations by offering a suggestion in testing an existing model with added factors and possible relationship between the factors.

Previous studies of e-government adoption in Indonesia utilized the Technology Acceptance Model and Diffusion of Innovation as the base theory, with addition of some other factors such as Social Influence and Trust (Susanto & Aljoza, 2015; Rokhman, 2011). However, those studies did not consider the possibility of mediating effects and interactions among its predicting variables.

To achieve successful e-government implementation, we must identify factors that contribute to successful adoption of e-government services. By referring to the identified factors from previous studies of technology adoption, this study aims to apply factors that have been found important in technology adoption to the adoption model of e-government services in Indonesia. The central research question is therefore, "What factors influence citizen adoption of e-government services?"

The findings from this study can be used as principles for improving future development of e-government in Indonesia.

CHAPTER 2.   REVIEW OF LITERATURE

E-government is defined as the use of the latest technology to improve the quality and delivery of public services to the public while benefiting both the government and its citizens (Fang, 2002). Another simple interpretation of e-government is the use of tools and technology of e-commerce as a vehicle for delivering public services (Howard, 2001). E-government's sole purpose is to enhance government performance. By making the services more convenient and accessible, the government can focus more on the quality of a service rather than forcing citizens to come to government offices.

E-government services have strong potential in developing government systems for any country, including Indonesia. Studies indicate that e-government has the potential to transform government itself, thereby increasing service quality and boosting trust among citizens (West, 2004; Susanto & Aljoza, 2015). E-government also offers cost benefits and enhancement of comfort through public service (Holmes, 2001).

In a democracy, citizen representation and engagement with elected officials and governance are critical. The essence of democracy is gone without the participation of its citizens. The notion of liberal democracy is based on elected representation of government officials by the public. The citizens are expected to voice their opinions on issues and policies through their representatives (Clift, 2004).

In this information age, information related to anything is available online and accessible for all. E-government can be a tool to promote democratic engagement, by providing access for the citizens to communicate directly to the government and voice their opinions. With the transparency that is also offered by e-government, it is possible that the citizens can keep their elected officials works in check (Clift, 2004). Not only does e-government increase the accountability and transparency of the political process, it also brings cost-benefits and convenience to the public.

The development of e-government in Indonesia began with the President's 2003 executive order that described a long-term strategy for initiating development of e-government services in every department in the government body (INPRES no 3, 2003). That order reflected a movement inside the government to begin identifying requirements for developing e-government at a local level and reporting them to the central government. This order also included a detailed explanation of e-government implementation strategies so that government offices could easily implement the requirements, with specific policies to follow. In 2016, there was also an executive order from the President stating that e-government services must be improved (INPRES no 12, 2016). Even though this order did not describe in detail exactly how to improve e-government services, it was still a groundbreaking order. The development of e-government in Indonesia can thus be traced back to 2003, although its full potential is not yet realized.

One of the few studies of e-government in Indonesia found that the majority of Internet users would be willing to adopt e-government (Rokhman, 2011). From that study it is apparent that while e-government's potential is ready to be unlocked, such services have not become widespread or impactful due to various reasons, such as unawareness of e-government services. There are still many unknown factors in explaining e-government adoption in Indonesia, which may come from either the government side or the citizen side.

Regardless, there is a need for additional study of Indonesian e-government services. The purpose of this study is to try to determine which factors significantly impact e-government adoption in Indonesia, specifically among young adults, most of whom have adopted the Internet and use it on a daily basis (Puspitasari & Ishii, 2016).

2.1   Worldwide Development of E-government

Establishing e-government services globally began in 1999, considered to be the beginning of the era of earliest implementation of e-government. Mainly as an information channel, governments around the world began to establish web presence by providing government-related information via the World Wide Web (Norris & Lloyd, 2006). Regarded as the first stage of e-government

development, web presence is clearly a prerequisite for further e-government development inside a nation (Fang, 2002). The act of establishing Web presence by the government provides an alternate channel for citizens to reach their government, making public service easier to access. The early stage of e-government implementation was focused on creating awareness among citizens, without much effort to change organizational practices within the government itself (Fang, 2002; Norris & Lloyd, 2006; West, 2004; Reddick, 2005).

Early e-government research also focused more on possible benefits of e-government rather than aspects of development and the adoption processes (West, 2004). The lack of research related to the developmental aspect in e-government may also have led to ineffective e-government implementation. The next stage of e-government development require much more effort compared to establishing a web presence. A deeper engagement between the citizens and the government is essential to reap the full benefit of e-government implementation. E-government development that disregard the needs and requirements from its citizens is considered useless because it will be perceived as useless by the citizens (Norris & Lloyd, 2006; Davis, 1989; Fang, 2002).

In the United States, the e-government portal *firstgov.gov* was established in 2001, after which e-government sites began to evolve from information-only websites into websites with richer information and additional interactive services (West, 2004). The possibility of using online government services advances the benefit of the e-government service itself. Citizens no longer need to come to a government office to perform certain activities, such as paying utilities or getting a driver license, they simply can perform such transactions online.

Research on e-government systems in developing countries is still lacking, mostly because e-government development involves high risk, requiring a massive investment and intense maintenance. Developing countries have begun to identify problems and requirements prior to developing their e-government systems by adopting so-called e-strategies (Ndou, 2004). The UN Task Force for ICT and the G8 on Digital Opportunities Task Force was held in 2002 to address such problems.

While many countries have succeeded in implementing early stages of e-government, many also have failed in this regard (Heeks, 2003). Problems in implementing e-government services usually

arise because the government has failed to identify the gap between the need to use e-government and the country's existing condition (Susanto & Aljoza, 2015). In many cases, the government was too hasty in transforming e-government development decisions into advanced stage implementation while leaving the country's other urgent problems untouched, resulting in unsuccessful e-government implementation.

Ndou (2004) states that in order succeed with e-government, a country can not simply rely on best practices from another country but must also identify its own unique problems and context. Best practices from another country can still be used as a benchmark and for comparative reasons, but implementation of a particular technique most often be readjusted to the conditions of a particular country.

According to a 2016 United Nations survey, all countries had established online presence by 2014 (United Nations, 2017), a remarkable growth in e-government development. All countries have realized the importance of adopting e-government services and have begun providing essential information to citizens via the World Wide Web. Although there are differences across countries in the state of development, each country has begun to build some e-government programs. South Korea, the leading country in terms of e-government development, has established at least some online services as an example in their "Government 3.0" service. They introduced a people-centered architecture in their design, enabling a customized experience for every user of the services offered (United Nations, 2017).

Implementation of such people-centered architecture is only possible if the government agrees to a certain policy that enables data-sharing across internal departments. Such an open data policy, along with continuous interaction between the government and its citizens, also reportedly increases bonds of trust between the government and the public (Ndou, 2004; United Nations, 2017).

The UN has proposed that full integration in e-government services is needed to make the implementation complete (United Nations, 2017), and such an integration concept is also supported by Fang (2002) as the final phase of e-government development. To achieve this goal, it seems that guidelines on how government operates must be fundamentally changed, possibly by adopting new

policies, a new workflow system, and even a new organizational culture to successfully integrate a full range of e-government services.

We are still a long way from reaping the full benefits of e-government, and best practices from around the world can be studied, modified and implemented to further close the worldwide digital divide of e-government. Much more research also is needed to understand, measure, and predict the e-government development cycle.

2.2   E-government in Indonesia

Indonesia is a developing country in Southeast Asia. With a population of 258,705,000 in 2016 and an island geography, Indonesia faces significant challenges in adoption of e-government (Badan Pusat Statistik, 2017). But a well-developed e-government system in Indonesia might be beneficial to both Indonesian citizen and the Indonesian government in a way of more efficient and transparent government.

E-government was established as a priority in 2003 through an executive order by the Indonesian President, as noted earlier. Another order was issued by the current president in 2015, stating his intent to stop regional funding if the region failed to establish an e-government service portal by the end of 2015 (Susanto, 2015). Following this order, another official directive from the President was issued in 2016 instructing the local governments to improve and enhance the quality of e-government services across Indonesia (INPRES no 12, 2016). This order again stressed the importance of e-government at the highest levels of government.

Surabaya is one of the major cities in Indonesia that is leading in e-government implementation. A qualitative study demonstrated that Surabaya has implemented successful e-government in the form of a governmental service portal named *Unit Pelayanan Satu Atap* (UPTSA). The study enumerated several key success factors, including political environment, leadership, strategic planning, stakeholder commitment, transparency, budget, technology, and innovation (Farid & Fanida, 2015). But success is only measured from the government side and factors that may influence usage in e-government service from the citizen viewpoint remain unmeasured.

A survey related to Surabaya's UPTSA found that while UPTSA has succeeded in service delivery in terms of the amount of online services offered, it lacked IT staff and had an underdeveloped IT infrastructure, two factors identified as the biggest obstacles to properly delivering e-government services (Susanto, 2015). A lack of information about system usage made measuring use virtually impossible, so it may be important to establish a usage log to document the impact of e-government on citizens.

Another study measured Surabaya's UPTSA or *Surabaya Single Window* (SSW) using quantitative methods and compared it to the ISO/IEC 25022 standard, with that study more focused on measuring the effectiveness and efficiency of the offered service. The study found that, even though the partial service performed better than e-government portal, the overall performance was considered good for both services (Subriadi et al., 2015).

The study also indicated that users need significant adjustment to the new system and this shortcoming may bias the findings (Subriadi et al., 2015). The study also indicated that Indonesia as a developing country had already made a respectable effort in implementing e-government. While several other studies have measured e-government performance from the government perspective in Indonesia (Subriadi et al., 2015; Susanto, 2015; Farid & Fanida, 2015; Susanto & Aljoza, 2015), to develop a good e-government system, citizen feedback is needed. E-government development should be periodically evaluated and adjusted to reflect direct input from users.

2.3 Factors Influencing E-government Adoption

Several studies have identified factors that influence e-government adoption, both from the governmental and citizen perspectives. Many studies in this area rely on the Technology Acceptance Model (West, 2004; Susanto & Aljoza, 2015; Rokhman, 2011; Puspitasari & Ishii, 2016; Susanto, 2015; Susanto & Goodwin, 2013; Kumar et al., 2007; Dimitrova & Chen, 2006).

The Technology Acceptance Model (TAM) was first created to describe how new technologies such as computers are adopted by people. Davis (1989) focused mainly on psychological user-related factors rather than on technological aspects of the device, while factors that affect technology

acceptance can vary based on the individual case. TAM can also be applied to the adoption of e-government as a new technology. There may be other unknown factors that influence technology adoption or, in this case, e-government adoption. TAM defines Perceived Usefulness and Perceived Ease of Use as principal factors that influence technology acceptance (Davis, 1989).

Previous studies of technology adoption have often found Perceived Benefit to be one of the motivations in adopting new innovation. Perceived Benefit is defined as the expected advantage or positive outcome to be gained after using a technology compared to that before using it (Lee, 2009). In the case of e-government implementation, Ahn & Bretschneider (2011) stated that Perceived Benefit is one of the antecedents of e-government services adoption, so Perceived Benefit could be a possible factor in determining e-government services adoption.

In the Technology Acceptance Model, the theoretical definition of Perceived Usefulness is "the prospective user's subjective probability that using a specific application system will increase his or her job performance within an organizational context" (p.985) (Davis, 1989). Since this definition of Perceived Usefulness is closely related to Perceived Benefit in terms of gaining a positive outcome by adopting new technology (Dimitrova & Chen, 2006), this study will accommodate Perceived Benefit in the dimension of Perceived Usefulness in the conceptual model.

Because different technologies possess different characteristics, studies have identified a range of external factors that can influence adoption. A study of an Indonesian immigration service portal found two such factors, Trust and Social Influence, that affect e-government adoption and are in fact the most significant predictors of e-government adoption in the case of the online immigration service in Indonesia. The relationship is also in a positive direction, i.e., higher Trust is associated with higher intention to adopt the technology. Social influence is also a significant factor in adoption, meaning that greater influence from a social group will usually lead to an enhanced intention to adopt the technology (Susanto & Aljoza, 2015).

The Diffusion of Innovation theory also points out that one of the motivations for people to adopt an innovation is gaining social status (Rogers, 2003). Opinion leaders may tend to adopt a new technology simply because they want to share the experience to their community to help ensure

that their position as opinion leaders remain relevant. Considering social status as an important aspect of society can be interpreted in two ways, with people adopting a technology either because they want to be trendsetters, or because they feel persuaded by the opinion leaders.

The conceptual model shown in Figure 2.1 represents factors that influence e-government adoption. Figure 2.1 is derived from TAM, with Perceived Usefulness (PU) and Perceived Ease of Use (PEU) included. These were measured in the Susanto & Aljoza (2015) survey by the following: information completeness, reducing cost, saving energy, saving time, useful information, easy navigation, quick response, good and fit interface, accessible anywhere, accessible anytime. Several factors, including Trust and Social Influence, expected to affect e-government adoption, were also added to the model that was then tested to determine their influence (Susanto & Aljoza, 2015).

Susanto & Goodwin (2013) conducted a worldwide survey in 25 countries to determine influencing factors in SMS based e-government adoption and identified fifteen factors that influence adoption of e-government. Some of these factors include Trust in Government, Perceived Value of Money, Perceived Risk to User Privacy, and Perceived Convenience.

In user experience (UX) studies, two key factors are essential in predicting the complete adoption of a technology. The factors are: Performance and Satisfaction. Referring back to the Technology Acceptance Model, Performance and Satisfaction in UX research seem strongly related to the dimension of Perceived Usefulness. The logic is if the technology performs well, then it is useful and may decrease the user's workload, while how well it performs also contributes to the user's satisfaction (Roto et al., 2009).

Perceived Ease of Use is also often mentioned in UX research, mostly referring to the user interaction design of the application. UX research tends to overlap with user interaction research and cognitive psychology. Utilizing the knowledge of how human cognitive processes work, the user interaction design can be optimized in a way that increases the Perceived Ease of Use of an application (Barnard, 1995; Durrani & Durrani, 2009). Perceived Ease of Use is also related to Satisfaction in UX research in a way that if the effort required for performing a task using the

13

system is minimum, the user will be more satisfied because it is easier to complete the task (Roto et al., 2009).
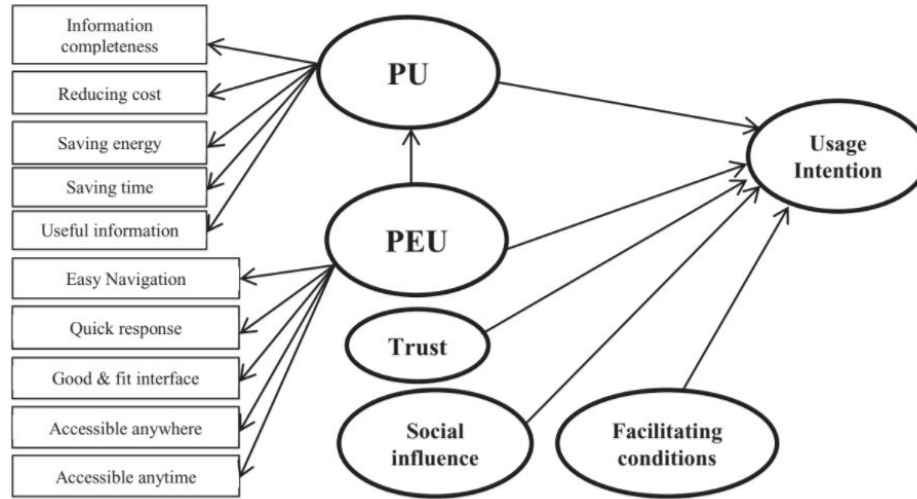
Figure 2.1   Conceptual model of e-government adoption

Other factors shown to influence e-government adoption are Perceived Uncertainty and Civic Mindedness. The role of mass media and interpersonal communication in e-government adoption may also play a significant role in e-government adoption. Civic Mindedness is closely related to Trust in government, i.e., people with higher Civic Mindedness tend to communicate with the government and express a great deal of interest in governmental affairs. Previous offline engagement with the government most likely provides motivation to try online services. (Dimitrova & Chen, 2006).

Al-Hujran et al. (2015) integrated cultural, social and political constructs into the TAM model for e-government adoption in Jordan. They found that a difference in national culture matters significantly because of the perception and attitude of citizens toward e-government services. In Arab culture, for example, the societal structure is tighter than Western culture in that peer pressure is higher, inducing a member of Arab society to more closely conform to their environment. In such a case, Social Influence might matter more than other variables.

Another type of culture condition also apparent in Indonesia, especially in rural areas, is that in many cases, neighbors are often considered blood relatives. Interestingly, Indonesians that live in rural areas are very keen to differences in wealth and social status due to inheritance of the caste system from older days (Kreager, 2006).

At the present time, honorifics and politeness are still very important in Indonesia, leading to a concept of Power Distance, which is related to perceived unequal share of power by the less influential member of the society (Al-Hujran et al., 2015). Thus, people with higher perception of Power Distance are more likely to be persuaded by their opinion leaders than taking the decision to adopt e-government services by themselves.

Furthermore, Perceived Risk has been identified in the literature as another factor that influences technology adoption (Featherman & Pavlou, 2003; Lee, 2009). Perceived Risk is defined as a feeling of uncertainty about receiving negative consequences after using new technology (Featherman & Pavlou, 2003; Lee, 2009). The feeling of fear or uncertainty in using new technology may negatively impact an intention to use such technology, fear of receiving more loss than benefit, fear of failing the task, or even fear of losing privacy.

It is important to note that Perceived Ease of Use may negatively influence Perceived Risk. When people find it easy to use a technology in completing required tasks, they tend to not be afraid of making mistakes when using the technology. Accordingly, Perceived Ease of Use was found to reduce Perceived Risk by minimizing fear of failure while using a technology (Featherman & Pavlou, 2003).

Featherman & Pavlou (2003) identified Perceived Risk in seven facets: performance risk, financial risk, time risk, psychological risk, social risk, privacy risk, and overall risk. These facets of Perceived Risk can be related to the kind of risk they represent, and breaking down risk categories can help a researcher identify specific kinds of risk that may influence technology adoption.

Notably, Perceived Risk is found to have an inverse relationship with Perceived Benefit (Alhakami & Slovic, 1994). People who recognize a technology to be very beneficial tend to minimize the possible risk, resulting in a decreased Perceived Risk. Conversely, people who perceive a technol-

ogy as risky tend to overlook the potential benefit to of using the technology. Thus, it is important to consider the relationship between these two concepts in the model.

A study for Canada's e-government system proposed that user perception with respect to adopting e-government should be more studied because it is vital to develop e-government systems that utilize human-centered design (Kumar et al., 2007). This finding is closely associated with Davis's (1989) concept of Perceived Ease of Use. By implementing a human-centered design, the e-government system will be able to reach different demographic groups of citizens and ultimately increase e-government service adoption.

Another way to increase e-government adoption factor is to raise public awareness. Studies by Indraningsih (2016); Strauss et al. (1991), and Hosen (2017) indicate that extension plays a big role in introducing new innovations to the public, possibly increasing their willingness to adopt such innovations. Venkatesh & Davis (1996) examined the possible factors that might predict Perceived Ease of Use and identified factors that not only incorporate technical variables of usability and user interaction, but also socio-psychological factors such as General Belief in Computer Use and Computer Self-Efficacy. Accordingly, their findings indicate that it is important to provide training intervention and extension to improve user acceptance consistent with improving user interaction.

The existence of extension services can therefore be viewed as one of the factors that influence technology adoption. For example, extension has been successfully used to raise awareness of agricultural technology, especially in rural areas (Indraningsih, 2016; Strauss et al., 1991; Hosen, 2017).

The existence of social media has also been found important in e-government development. If social media is properly utilized, e-government adoption is found to be significantly more likely. Social media is considered to be an efficient way to reach citizens from different levels of socio-economic status and digital literacy due to its broad accessibility. Considering that social media can enhance the quality of communication between individuals and businesses, the government should also take advantage in using social media (Sawalha et al., 2019).

16

While the government can use social media to widen its reach and empower its citizens through a display of soft power in their social network accounts (Sawalha et al., 2019), the utilization of social media for e-government is limited only to establish web presence, considering security and privacy issues that is not directly controlled by the government. Soft power refers to the use of cultural and entertainment element inside the message from the government to the citizens so that the message is perceived as non-authoritative, non-coercive and cold (Nye Jr, 2004).

Finally, while the use of online information and communication technology has already been widely accepted, because to unequal development of the infrastructure some people still have difficulty in accessing the technology required. Considering that the first stage of technology adoption is physical access, the first priority in e-government development should be infrastructure development.

However, even if physical access to the technology is readily available to everyone, e-government services will not necessarily be easily accepted by the citizens. Therefore, it is important to identify the various factors influencing e-government adoption in Indonesia.

CHAPTER 3.   METHODS AND PROCEDURES

The best approach in identifying the factors influencing the adoption of e-government services is to use a survey. Survey is able to identify and generalize its finding to the public. Due to the purpose of the study, which aims to grasp the public phenomenon, survey is a proper method. Such an approach has been used by several studies, and it has produced consistent results (West, 2004; Susanto & Aljoza, 2015; Rokhman, 2011; Puspitasari & Ishii, 2016; Susanto, 2015; Susanto & Goodwin, 2013; Kumar et al., 2007; Dimitrova & Chen, 2006).

3.1   Survey Method

The survey method directly addresses the main research question by asking a sample of the population about their willingness and underlying reasons for adopting e-government services. Surveys are relatively inexpensive compared to other methods. For the purpose of this study, generalization is required and it can be achieved by survey (Wimmer & Dominick, 2013). Since the target population for this study is the Indonesian public, an online survey was used.

Online survey services such as Qualtrics offer integrated tools for designing survey questionnaires, including question piping and logic-based questions. The survey form should also be designed to be adaptive to mobile device and maintain display consistency across a variety of web-browsers, so that all respondents will have similar experience when filling out the survey form (Hewson & Stewart, 2016).

Multiple language support is also needed in this study because the data collection is conducted in Indonesia. Since Bahasa Indonesia is the lingua franca for the archipelago, the survey must be available in that language, and administrative purpose require that the survey also must be available in English. Using an online format for the survey enables the researcher to provide options for the

survey language without need for providing two different paper-based forms, both reducing cost and increasing the reach of the survey (Lazar et al., 2017).

Online surveys are not only less expensive, but also can help researchers more effectively reach international audiences (Wimmer & Dominick, 2013). Online questionnaires also allows their data to be electronically downloaded directly without keying in the data from a paper questionnaire. It also requires much less time and virtually eliminates transportation time of delivering the response from Indonesia to the United States. Using an online questionnaire also helps research assistants during the collection process, because they can simply use their own mobile devices to collect responses (Wright, 2005; Wimmer & Dominick, 2013).

3.1.1   Sampling

E-government in Indonesia is still considered to be an early stage of development, so there are not yet any existing databases of e-government users. Since earlier adopters of technology would tend to have higher social status and thus greater access to educational and financial resources (Rogers, 2003), the population selected for this study consists of current college students in higher education and the sampling method used is purposive sampling.

The target universities have been chosen based on their popularity, performance ranking and geographic area. This selection was made to increase the probability that this group of college students reflected the diverse background of Indonesia. While the major area of study of the respondents are not specifically targeted, the information is still needed to serve as a demographic feature of the survey. Research assistants from each selected university were hired to gather data. Basic demographic features such as age, gender, and income are included in the questionnaire.

The selected universities are: Institut Teknologi Sepuluh Nopember, Universitas Indonesia, Universitas Airlangga, Universitas Hasanuddin, Universitas Diponegoro, and Institut Pertanian Bogor (as shown in Table 3.1). Five of these universities are located at Java island, and Universitas Hasanuddin is located at Sulawesi island.

Table 3.1 University details

Name of University	Major Focus	Representation
Institut Teknologi Sepuluh Nopember	Engineering and natural sciences	Higher digital literacy and male majority
Universitas Airlangga	Health and medicine	Suburban and rural areas of Java and Bali
Institut Pertanian Bogor	Agricultural technology	Suburban and rural areas of West Java and Sumatra, religious-conservative leaning
Universitas Hasanuddin	Economics and social sciences	Students from various areas of Sulawesi
Universitas Diponegoro	Health and social sciences	Female majority
Universitas Indonesia	Medicine, health, and social sciences	Urban metro areas near the capital, liberal leaning

3.2 Variable Definition

In theory, technology acceptance is directly associated with intention to use the technology (Davis, 1989), so e-government adoption can be defined as the intention to use or utilize e-government services in the near future and operationalized using a Likert scale ranging from 1-7 (from Strongly Disagree to Strongly Agree). This variable is the dependent variable (DV) in this study (3 items averaged scale, Cronbach's α= 0.72).

Perceived ease of use is defined by Davis (1989) as "the degree to which the prospective user expects the target system to be free of effort" (p.985), and it can also be defined as the degree to which a person believes that a new technology would be easy to learn and intuitive (5 items averaged scale, Cronbach's α= 0.79).

Davis (1989) also defined perceived usefulness as "the prospective user's subjective probability that using a specific application system will increase his or her job performance within an organizational context" (p.985), and in this study, this variable is defined as the degree to which a user thinks the e-government system would help them to satisfy their needs (5 items averaged scale, Cronbach's α= 0.86).

Trust is defined by Merriam-Webster (1983) as "assured reliance on the character, ability, strength, or truth of someone or something" (p.1344), and it can be defined in the context of this study as reliance on government to perform in a confidential and trustworthy manner. In this study,

trust is limited to an extent of trust given by the citizen to their government, not to be confused with trust in the infrastructure of the e-government (5 items averaged scale, Cronbach's $\alpha = 0.72$).

Influence is defined as "the act or power of producing an effect without apparent exertion of force or direct exercise of command" (p.641) by Merriam-Webster (1983). Social influence can be defined as the invisible social force connected to our surrounding social circle, including friend and acquaintances (5 items averaged scale, Cronbach's $\alpha = 0.83$).

Perceived risk is defined as a feeling of uncertainty that something negative will happen as a consequence of using a particular system (Featherman & Pavlou, 2003), so in this study, perceived risk is defined as the degree of uncertainty with respect to a negative outcome in using an e-government technology (5 items averaged scale, Cronbach's $\alpha = 0.78$).

To measure these five variables, a Likert scale ranging from 1-7 (from Strongly Disagree to Strongly Agree, with Neutral at the center) is used. The five variables outlined above are the independent variables (IV) in this study.
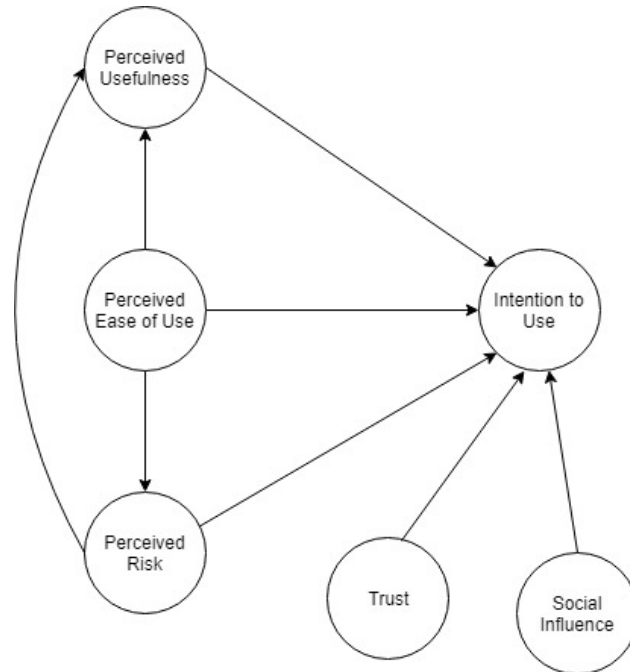

Figure 3.1   Conceptual model predicting intention to use e-government

The Conceptual model for this study shown in Figure 3.1, is derived from a previous study, but with the addition of perceived risk. The conceptual model displays the relationships among the variables as reflected in the hypotheses in this study (Davis, 1989; Susanto & Aljoza, 2015; Lee, 2009).

3.3   Data Analysis

This study uses structural equation modeling (SEM) to examine the relationships among the variables. SEM is a statistical technique that effectively combines path modeling, factor analysis, analysis of variance, and regression analysis. It can be used to test for relationships between multiple variables using regression coefficients and also can validate significance (Hox & Bechger, 2007). SEM is also beneficial through its capability of examining mediating relationship between variables.

SEM also enables researcher to reduce the number of measurement errors usually found in measuring unobservable psychological construct by explicitly relating unobservable constructs to different instruments. Compared to directly summing survey results to a composite variable, SEM creates dependence between unobserved construct variables and directly observed variables, providing a better estimate of their true value (MacLean & Gray, 1998).

The Bootstrapping technique included in SEM software is also beneficial because it resamples the data from the sample distribution, providing a better estimates to the generated population. It also increases the accuracy of the significance value since the calculation includes resampled data obtained from bootstrapping.

Another benefit of using SEM is that it can conduct confirmatory factor analysis (CFA) to ascertain that each instrument is providing a valid measure of the same dimension of the construct (Hox & Bechger, 2007). In summary, considering the purpose of this study, SEM is a most appropriate choice for data analysis.

3.4 Survey

The survey questions are based on previous studies by Dimitrova & Chen (2006); Lee (2009); Featherman & Pavlou (2003); Susanto & Aljoza (2015); Cheng et al. (2006), and grouped into categories respective to its IV and DV variables, as indicated in the Table A.1.

A total of 28 Likert scale questions were incorporated into an online survey using Qualtrics, a software tool provided by Iowa State University. Because there is a possibility that a particular respondent cannot understand the question in English, the survey was also provided in the Indonesian language (Bahasa Indonesia). To test whether the translation was easily understood, the translated survey was reviewed and revised by 5 other Indonesian graduate students at Iowa State University whose native tongue was Bahasa Indonesia. The study received an approval from the Institutional Review Board of Iowa State University with exemption letter included in the Figure A.1.

The survey was published on July 1st, 2018 and closed on August 15th, 2018. The survey link was distributed using an instant messaging app through local assistants hired at each selected university, each of whom sent the message to their contacts along with an invitation to complete the survey. The survey link was also distributed via Twitter through the university Buzzer account.

A total of 943 responses were captured in Qualtrics during the collection period. Only 472 of those responses were considered valid for analysis because the other responses were incomplete (completion rate 50%).

CHAPTER 4.   RESULTS

The online survey yielded 472 usable responses that were downloaded and analyzed using SPSS software for general statistical analysis purposes and SPSS AMOS for Structural Equation Modeling.

The descriptive statistics provided below reveal the characteristics of the collected data. The majority of respondents (70%) identified themselves as female while others identified as male. The average age of respondents was 23.3 years with (SD = 5.83) and ranged from 17 to 53 years, indicating that the respondent population most likely included graduate students as well. The income levels of the respondents also varied, with 158 respondents reporting their income as greater than 5.5 million rupiahs (suggesting that they have full time jobs aside from being college students), while 119 respondents indicated that their income was between one million and 2.5 million rupiahs (about the minimum amount needed for monthly living expenses). The descriptive statistics for the survey data are provided in Table 4.1.

Table 4.1   Respondent Demographics

Measures		Frequency	Percentage
Income			
	<Rp 1.000.000	44	9.4
	Rp 1.000.000 - Rp 2.499.000	119	25.5
	Rp 2.500.000 - Rp 3.999.000	75	16.1
	Rp 4.000.000 - Rp 5.499.000	71	15.2
	>Rp 5.500.000	158	33.5
	Total	467 (of 472)	98.9
Gender			
	Male	136	29.2
	Female	328	70.4
	Other	2	0.4
	Total	466 (of 472)	98.7

N=472

It is important to consider the particular universities represented in the sample, and these are shown in Table 4.2.

Table 4.2   Respondents' Universities

Name of University	Freq.	Percentage
Institut Teknologi Sepuluh Nopember	70	15.15
Universitas Airlangga	148	32.03
Institut Pertanian Bogor	35	7.58
Universitas Hasanuddin	59	12.77
Universitas Diponegoro	101	21.86
Universitas Indonesia	49	10.61

N=472

To test the hypotheses derived from the conceptual model, an extension of the SPSS software called AMOS was employed because of its SEM capability. The conceptual model (Figure 3.1) described in the previous section is recreated using AMOS, enabling the researcher to simultaneously test all hypotheses using structural equation modeling and also to determine model fit.

If the full model is to be properly analyzed, the measurement model must satisfy certain criteria to ensure data validity and reliability. SEM enables Confirmatory Factor Analysis (CFA) to ensure that the items used for measuring the unobservable variable are loading properly onto each latent variable. Each measurement item's factor loading and the corresponding latent variable's reliability are listed in Table B.1.

According to Hair et al. (1998), the factor loading for a measurement item should exceed 0.3 to be considered acceptable. As can be seen in Table B.1, all the measurement items yielded factor loadings greater than 0.3 and were all significant at $p<0.001$ level, indicating validity of the measurement model.

Measurement model reliability was also tested using Cronbach's alpha. According to Nunnally (1978), multi-item variables that have Cronbach's alpha values ≥ 0.7 are considered reliable. All variables in the model yielded an alpha value higher than 0.7, indicating that all measurement items are reliable.
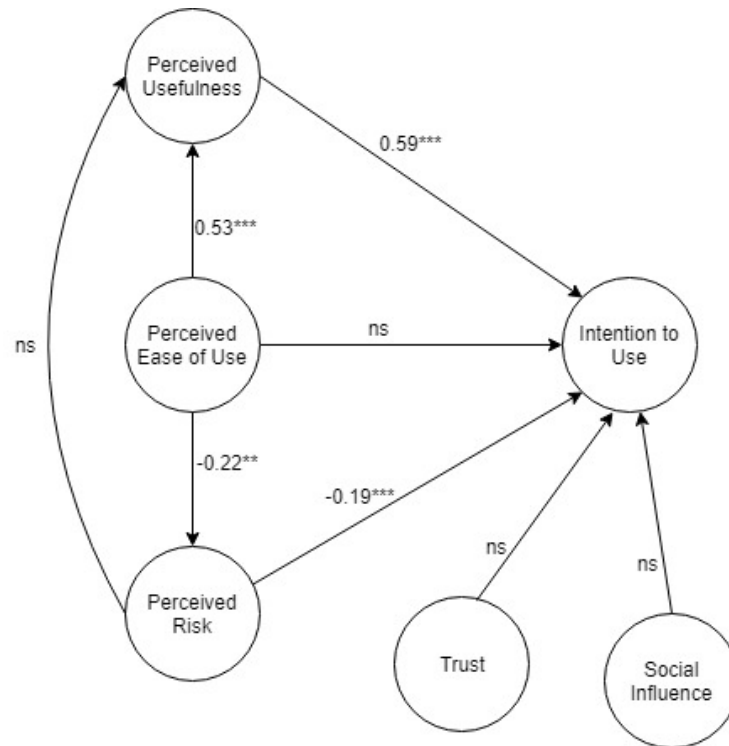
Figure 4.1   Tested relationship model

The hypotheses test results reported in Table 4.3 show that 4 of 8 hypotheses are supported. As expected, higher Perceived Usefulness is significantly associated with higher Intention to Use e-government services ($p<0.001$), and similarly, lower Perceived Risk is significantly associated with higher likelihood among the respondents of using e-government services ($p<0.001$). Even though Perceived Ease of Use is not directly associated with Intention to Use, higher Perceived Ease of Use is significantly associated with higher Perceived Usefulness ($p<0.001$) and lower Perceived Risk ($p<0.01$). As shown in Figure 4.1, however, there was no significant association between Trust and Social Influence and Intention to Use e-government services in our sample.

The relationships depicted in the conceptual model were tested using SPSS AMOS with bootstrapping setting of 1000 cases and bias-corrected confidence interval of 95%, producing the results displayed in Figure 4.1. The original Technology Acceptance Model (TAM) suggested that both Perceived Usefulness and Perceived Ease of Use influence the dependent variable – Intention to

Table 4.3   Hypotheses Tests

Parameter Estimates	β(SE)
Perceived Usefulness → Intention to Use	0.59(.067)∗∗∗
Perceived Ease of Use → Intention to Use	−0.02(.111)
Perceived Risk → Intention to Use	−0.19(.127)∗∗∗
Social Influence → Intention to Use	0.03(.067)
Trust → Intention to Use	0.14(.050)
Perceived Ease of Use → Perceived Risk	−0.22(.056)∗∗
Perceived Ease of Use → Perceived Usefulness	0.53(.163)∗∗∗
Perceived Risk → Perceived Usefulness	−0.02(.110)

Note: N=472. Table depicts standardized regression coefficients with standard errors in parentheses
∗p<0.05 ∗∗p<0.01 ∗∗∗p<.001

Use. In this study, however, the addition of Perceived Risk seems to have diminished the direct effect of Perceived Ease of Use on Intention to Use (β= -0.02, n.s.).

Consistent with the original model, individuals tended to accept technology if they find advantages in using it. Table 4.3 shows Perceived Usefulness with the strongest influence on Intention to Use (β= 0.59, p<0.001). The addition of Perceived Risk in the model added an interesting twist due to its significant negative relationship with Intention to Use, suggesting that perceived risk is an important factor in the decision-making process (β= -0.19, p<0.001).

Even though Social Influence and Trust were shown in a previous study in Indonesia to have significant effects (Susanto & Aljoza, 2015), both variables exhibited no significant effect in this study.

Using SEM to test the full model did not show strong fit for the data, model fit indices were all below the recommended thresholds (RMSEA = 0.075; CFI = 0.83; SRMR = 0.13). All three indices (RMSEA, CFI, and SRMR) are typically included when reporting model fit and the literature recommends that each index should satisfy a certain value, with the following cutoff values indicating a good fit: RMSEA < 0.08, CFI ≥ 0.90, SRMR < 0.08 (Kline, 2015; Hair et al., 2011; Hooper et al., 2008) .

This means that even though the hypothesis testing may show significant results, the model does not fit the data well.

To optimize the model fit, the two latent variables not exhibiting significant relationships (Social Influence and Trust) were removed, resulting in the reduced model shown in Figure 4.2.
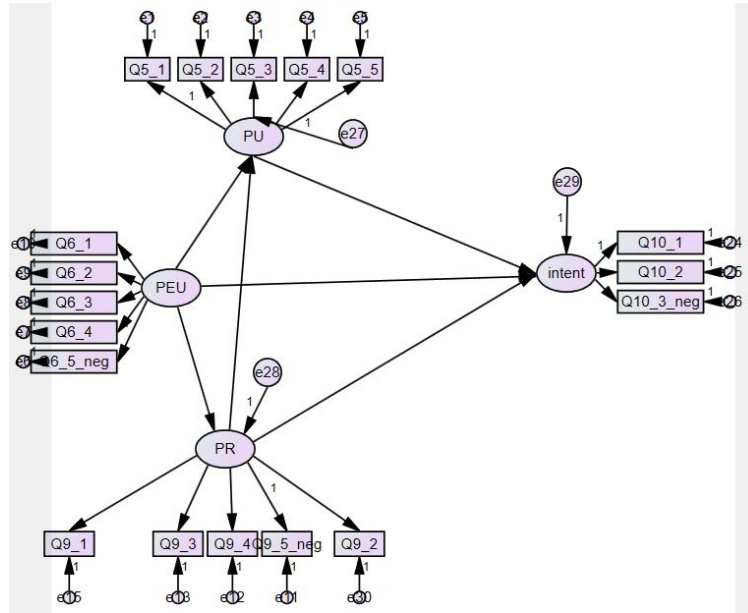
Figure 4.2   Reduced AMOS model

Table 4.4   Reduced Model Analysis Results

Parameter Estimates	β(SE)
Perceived Usefulness → Intention to Use	0.61(.068)∗∗∗
Perceived Ease of Use → Intention to Use	−0.005(.111)
Perceived Risk → Intention to Use	−0.21(.130)∗∗∗
Perceived Ease of Use → Perceived Risk	−0.22(.057)∗∗
Perceived Ease of Use → Perceived Usefulness	0.53(.162)∗∗∗
Perceived Risk → Perceived Usefulness	−0.02(.110)

Note: N=472. Table depicts standardized regression coefficients with standard errors in parentheses
∗p<0.05 ∗∗p<0.01 ∗ ∗ ∗p<.001

When Social Influence and Trust are removed from the full model, the reduced model, including only variables that have a significant effect on Intention to Use demonstrates proper fit to the data $(\chi^2$ (472) = 384.91, p<0.001; RMSEA = 0.06; CFI = 0.92; SRMR = 0.06). Using the reduced model, the relationship between variables was fitted to represent the data (Kline, 2015; Hair et al., 2011; Hooper et al., 2008). The standardized regression weights for each variables in the reduced model are shown in Table 4.4.

The next step in the data analysis involved performing mediation analysis to test for indirect effects among the variables. The first path is the indirect effect of Perceived Ease of Use (PEU) to Intention to Use (IU) through Perceived Usefulness (PU); the second path is the indirect effect of PEU to IU through Perceived Risk (PR). The other indirect effect, PR to IU through PU, was also tested. The results are shown in Table 4.5.

Table 4.5   Indirect Effects

Indirect Path	β
Perceived Ease of Use → Perceived Usefulness → Intention to Use	$0.32**$
Perceived Ease of Use → Perceived Risk → Intention to Use	$0.04**$
Perceived Risk → Perceived Usefulness → Intention to Use	-0.01

Note: N=472. Table shows standardized regression coefficients.
$*p<0.05$ $**p<0.01$ $***p<.001$

As shown in Table 4.5, there is no mediation between Perceived Risk to Intention to Use through Perceived Usefulness (β= -0.01, ns).

Interestingly, the indirect effect of Perceived ease of use to Intention to use through Perceived usefulness (β= 0.32, p<0.01) is statistically significant. Similarly, the indirect effect of Perceived ease of use through Perceived risk (β= 0.04, p<0.01) is also statistically significant. This indicates that both Perceived Usefulness and Perceived Risk are significant mediators in the model.

These findings are consistent with the theorized TAM model that specified Perceived Usefulness as a mediator of Perceived Ease of Use. With the addition of Perceived Risk to the model, PR emerged as another important mediator of e-government adoption.

The possible reasons for this relationship and its implications will be further discussed in the Discussion section.

CHAPTER 5.   DISCUSSION

This is one of the few studies to look into adoption of e-government services in Indonesia. Moving a step further beyond Susanto & Aljoza (2015), this study incorporates Perceived Risk as an element that interacts with the existing conceptual model. A high-population country like Indonesia could benefit by implementing e-government service in every aspect of the government. Such benefits include increasing citizen's trust in government, enhancing service quality, and boosting comforts with respect to governmental transaction (Holmes, 2001; West, 2004; Fang, 2002; Howard, 2001)

As technology continues to evolve and seamlessly become more integrated into our daily lives, the use of e-government services will soon become inevitable for Indonesian citizens. Several factors, including Perceived Usefulness and Perceived Ease of Use, have been found significant in previous studies that investigated technology adoption by the public (Davis, 1989; Dimitrova & Chen, 2006; Susanto & Aljoza, 2015; Lee, 2009). This study introduced other possible factors into the conceptual model to better explain the underlying processes of adoption and societal acceptance of e-government services.

Another contribution of this study was to take into account the interaction between different predictors (Dimitrova & Chen, 2006; Dilla & Setiawan, 2014; Susanto & Aljoza, 2015; Lee, 2009; Featherman & Pavlou, 2003; Kumar et al., 2007). Specifically, the thesis expanded the TAM conceptual model by addition of Perceived Risk and its association with Perceived Ease of Use. The findings of this study confirmed the importance of these factors in predicting Intention to Use e-government service, ultimately leading to behavioral change and adoption of e-government services.

Perceived Usefulness and Perceived Ease of Use have consistently been found to be significant in previous studies that used the Technology Acceptance Model as a main theoretical base. It is important to add other factors in the model to more completely explain technology acceptance in a

society. Other factors such as Social Influence and Trust in government have also been found to be significant predictors of e-government adoption in Indonesia (Susanto & Aljoza, 2015), and these social level factors were also added to the conceptual model.

E-government services differ from other technologies in their dimension of Perceived Risk. Government related services typically interact with aspects of personal and financial identity that are critical to a citizen. As theorized in previous studies related to financial technology acceptance, the perception of risk plays an important role in the adoption process (Lee, 2009; Featherman & Pavlou, 2003).

Structural Equation Modeling was employed to test whether Perceived Usefulness and Perceived Risk are significant predictors of Intention to Use e-government, and both variables were found to have significant direct effects. Interestingly, Perceived Ease of Use was found to have a significant indirect effect to Intention to Use through Perceived Usefulness and Perceived Risk.

The findings are consistent with the original technology acceptance model with Perceived Usefulness and Perceived Ease of Use as its important factors. Rogers (2003) and Davis (1989) both identified Perceived Usefulness (in Diffusion of Innovations, this is referred to as Relative Advantage) as an important motivating factor in adopting new technologies. This indicates that the individuals are willing to use new technology if they think it will benefit them in some way. The findings of this study support that notion, since higher Perceived Usefulness is associated with higher Intention to Use e-government services, suggesting that respondents look for possible benefits of using the services.

Davis (1989) also suggested that Perceived Ease of Use indirectly influences Intention to Use through Perceived Usefulness. Specifically, if people believe that e-government is difficult to use, they would most likely not find it beneficial for them, since the exerted effort in using the service simply counterbalances the benefits. The findings of this study support this line of reasoning and suggest that the relationship between Perceived Ease of Use and e-government adoption is mediated by Perceived Usefulness.

Another important finding of this research was the indirect relationship between Perceived Ease of Use and Intention to Use. While the addition of Perceived Risk seems to disrupt the association between Perceived Ease of Use and Intention to Use, this effect was found to be mediated by Perceived Risk. This study found that lower Perceived Risk is associated with higher Intention to Use, while higher Perceived Ease of Use is associated with lower Perceived Risk. These interesting associations support the study by Featherman & Pavlou (2003) that found that increased Perceived Ease of Use leads to decreased Perceived Risk. In other words, if a user thinks a particular technology is easy to operate, he or she also thinks the risk of making mistakes while using the technology would be minimized, leading to lower Perceived Risk.

Surprisingly, Social Influence and Trust had no significant effect on Intention to Use e-government, although Rogers (2003) identified gaining social status as one of the motivations for adopting new technology. Social Influence as a factor in the model incorporated this nuance by including a question related to becoming a social leader through using e-government services, but the data in this study did not support that hypothesis.

One of the survey questions asked about using e-government because of others' influence. There is a possibility that a third-person effect occurs in respondents to this study's survey. A third-person effect is defined as overestimation toward a specific persuasive communication to other people, in which the person affected feels that even though they will not be persuaded by that message, they think others will (Davison, 1983). In this study, if a Social Influence-related question asked whether respondents use e-government services because their friend also uses it, the respondents might refuse to acknowledge that they have been persuaded by their friend, suggesting a non-significant relationship.

Another possible underlying reason for the insignificance of Social Influence in this study is that the sample consisted only of higher educated people. The biggest difference between higher educated Indonesians who are used to living in a city and rural Indonesians who tend to be less educated is their perception of Power Distance (Al-Hujran et al., 2015). Rural Indonesians tend to completely trust their opinion leaders, making Social Influence the strongest factor. For example,

religious leaders in rural East Java, also known as Kiai, are often perceived as having absolute knowledge in everything, and are thus highly trusted by their communities. In this case, if the Kiai said something that makes e-government (or other technology) sound bad, then the community will surely reject it (Kreager, 2006; Al-Hujran et al., 2015).

Trust in government also exhibited no significant relationship to Intention to Use, although there may be a few possible explanations. Transparency in Indonesian government activity is relatively new. For a long time, citizens of Indonesia never knew how the national budget was used in the country's development. Moreover, numerous cases of corruption and nepotism in the New Order Era of President Soeharto (1966-1998) decreased the level of citizens' trust in the government system. With newly-developing e-government services, enhanced transparency of government activity may contribute to building trust toward the government within the Indonesian society, and it might also be possible to build trust if the government continues to display integrity in its services.

The influence of Trust on Intention to Use may also be taken over by Perceived Risk because of the nature of the questions asked, and confusion of Trust in government and Trust in the security of the system may further cloud the difference between Trust in government or Perceived Risk due to Trust in the security system of the e-government services.

5.1 Theoretical Implications

This study contributes to the pool of knowledge about e-government development in Indonesia, complementing previous studies of e-government adoption with an improved conceptual model and a larger sample size. Structural Equation Modeling successfully identified Perceived Usefulness and Perceived Risk as mediator variables between Perceived Ease of Use and Intention to Use, suggesting that Perceived Risk should be included in future studies related to e-government adoption and also considered in practical development of e-government services.

While the Technology Acceptance Model is robust enough to predict user acceptance of a new element of technology, other possible factors that may contribute to decision making process should not be abandoned. The Technology Acceptance Model must consider Perceived Risk, Social Influ-

ence, and Trust with a more complex relationship among the variables to improve understanding of technology acceptance.

5.2 Practical Implications

The findings of this study can benefit future development of e-government services in Indonesia in several possible ways.

First, with respect to the direct association of Perceived Risk to Intention to Use, a developer can focus on enhancing the security and the flow of the program, minimizing any possible risk from the back-end. Any efforts decreasing Perceived Risk through repeated use would be helpful to potential adopters.

Second, considering the direct effect of Perceived Usefulness on Intention to Use, an extension activity can be conducted with potential users. Such activities or public demos can try to educate individuals about possible benefits of using the services, resulting in higher Perceived Usefulness. Extension education programs, including training sessions and workshops, have been found effective in accelerating the adoption process and they continue to be used in the promotion of different technological innovations (Nakano et al., 2018; St. Pierre & Kaltreider, 2004; Jaeger & Bertot, 2009; Indraningsih, 2016; Strauss et al., 1991; Hosen, 2017).

Third, based on the indirect effects of Perceived Ease of Use to Intention to Use through Perceived Risk, developers should focus on improving user experience (UX) by seeking feedback from users and conducting studies about how people use e-government services. Continuing research using the System Usability Scales (SUS) provided by Usability.gov and other human-computer interaction experiments will provide information on how to increase Perceived Ease of Use, ultimately leading to increased Intention to Use (Brooke, 1996; Lazar et al., 2017).

Finally, the result of this particular research are not only applicable to Indonesia, but can be generalized to other country with similar level of economic development in the Southeast Asian region.

5.3   Limitations and Future Direction

There are some limitations to this study. One is the use of purposive sampling, that resulted in over-representation of more educated respondents with higher socio-economic status, which is considered an important demographic variable in influencing technology adoption. Individuals with higher socio-economic status tend to adopt technology earlier, and a more random distribution might produce different results by considering a wider spread of the respondents in this regard.

The dependent variable in this study also does not measure the actual use of e-government services, but rather measures only the intention to use, although in the original Technology Acceptance Model, Intention to Use as a variable is identified as an antecedent of Behavioral and Actual Use.

The survey instrument used in this study also requires some improvement, especially in the measurement of Social Influence and Trust. In this study, Trust captured mostly trust in the government. Future studies could incorporate broader definition of trust as a concept and connect it more directly to Perceived Risk. Similarly, additional questions to capture Social Influence can be included, especially as they relate to the early adopter category. Future studies should revisit the instrument and improve its dimensions so that the survey questions more thoroughly measure the construct.

There is also a concern about the priority of e-government development. Indonesia is a developing country with many important aspects to improve, mainly its infrastructure. The development of a high-end e-government service in Indonesia seems to be overshadowed by other aspects with respect to priority.

Future studies related to e-government should incorporate pre-survey priming by showing respondents available e-government services to ensure that they understand the context of the study. Pre and post survey design will allow scholars to identify more conclusive results. Other factors with more complex relationship related to technology adoption should also be included in the model.

Finally, a follow-up survey might also be considered for measuring the actual usage of e-government services. With cooperation from the government in logging the service usage, the need for further development of e-government service can be better evaluated.

REFERENCES

Ahn, M. J. & Bretschneider, S. (2011). Politics of e-government: E-government and the political control of bureaucracy. *Public Administration Review*, 71(3):414–424.

Al-Hujran, O., Al-Debei, M. M., Chatfield, A., & Migdadi, M. (2015). The imperative of influencing citizen attitude toward e-government adoption and use. *Computers in Human Behavior*, 53:189–203.

Alhakami, A. S. & Slovic, P. (1994). A psychological study of the inverse relationship between perceived risk and perceived benefit. *Risk Analysis*, 14(6):1085–1096.

Badan Pusat Statistik (2017). Statistical yearbook of Indonesia. *Badan Pusat Statistik, Jakarta, Indonesia.*

Barnard, P. (1995). The contributions of applied cognitive psychology to the study of human-computer interaction. In *Readings in Human–Computer Interaction*, 640–658. Elsevier.

Brooke, J. (1996). SUS-A quick and dirty usability scale. *Usability Evaluation in Industry*, 189(194):4–7.

Cheng, T. E., Lam, D. Y., & Yeung, A. C. (2006). Adoption of internet banking: An empirical study in Hong Kong. *Decision Support Systems*, 42(3):1558–1572.

Clift, S. L. (2004). E-government and democracy. *Representation and Citizen Engagement in the Information Age*, 40.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3):319–340.

Davison, W. P. (1983). The third-person effect in communication. *Public Opinion Quarterly*, 47(1):1–15.

Dilla, A. P. & Setiawan, B. (2014). Analisis keberhasilan implementasi rail ticket system menggunakan pendekatan technology acceptance model. *Seminar Nasional Sistem Informasi Indonesia*, 2014.

Dimitrova, D. V. & Chen, Y. C. (2006). Profiling the adopters of e-government information and services: The influence of psychological characteristics, civic mindedness, and information channels. *Social Science Computer Review*, 24(2):172–188.

Durrani, S. & Durrani, Q. S. (2009). Applying cognitive psychology to user interfaces. In *Proceedings of the First International Conference on Intelligent Human Computer Interaction*, 156–168. Springer.

Dwiyanto, A. (2013). *Mengembalikan kepercayaan publik melalui reformasi birokrasi*. Gramedia Pustaka Utama.

Fang, Z. (2002). E-government in digital era: Concept, practice, and development. *International Journal of the Computer, the Internet and Management*, 10(2):1–22.

Farid, M. & Fanida, E. H. (2015). Implementasi electronic government melalui surabaya single window di unit pelayanan terpadu satu atap kota surabaya. *Publika*, 3(5).

Featherman, M. S. & Pavlou, P. A. (2003). Predicting e-services adoption: A perceived risk facets perspective. *International Journal of Human-computer Studies*, 59(4):451–474.

Hair, J. F., Anderson, R. E., Tatham, R. L., & Black, W. (1998). *Multivariate data analysis*. Upper Saddle River, NJ: Prentice Hall.

Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. *Journal of Marketing Theory and Practice*, 19(2):139–152.

Heeks, R. (2003). *Most egovernment-for-development projects fail: How can risks be reduced?* Institute for Development Policy and Management, University of Manchester Manchester.

Hewson, C. & Stewart, D. W. (2016). *Internet research methods*. Wiley Online Library.

Holmes, D. (2001). *Egov: Ebusiness strategies for government*. Nicholas Brealey Publishing.

Hooper, D., Coughlan, J., & Mullen, M. (2008). Structural equation modelling: Guidelines for determining model fit. *Articles*, 2.

Hosen, N. (2017). Adopsi teknologi pengolahan limbah pertanian oleh petani anggota Gapoktan Puap di Kabupaten Agam, Sumatera Barat. *Jurnal Penelitian Pertanian Terapan*, 12(2).

Howard, M. (2001). E-government across the globe: How will 'e' change government. *E-government*, 90:80.

Hox, J. J. & Bechger, T. M. (2007). An introduction to structural equation modeling. *Utrecht University Repository*.

Indraningsih, K. S. (2016). Pengaruh penyuluhan terhadap keputusan petani dalam adopsi inovasi teknologi usahatani terpadu. *Jurnal Agro Ekonomi*, 29(1):1–24.

Internet World Stats (2017). Internet usage statistics the big picture: World internet users and population stats. *Internet World Stats*.

Jaeger, P. T. & Bertot, J. C. (2009). E-government education in public libraries: New service roles and expanding social responsibilities. *Journal of Education for Library and Information Science*, 50(1):39–50.

Kline, R. B. (2015). *Principles and practice of structural equation modeling*. Guilford publications.

Kreager, P. (2006). Migration, social structure and old-age support networks: A comparison of three Indonesian communities. *Ageing & Society*, 26(1):37–60.

Kumar, V., Mukerji, B., Butt, I., & Persaud, A. (2007). Factors for successful e-government adoption: A conceptual framework. *Electronic Journal of E-government*, 5(1):63–76.

Lazar, J., Feng, J. H., & Hochheiser, H. (2017). *Research methods in human-computer interaction.* Morgan Kaufmann.

Lee, M. C. (2009). Factors influencing the adoption of internet banking: An integration of TAM and TPB with perceived risk and perceived benefit. *Electronic Commerce Research and Applications*, 8(3):130–141.

MacLean, S. & Gray, K. (1998). Structural equation modelling in market research. *Journal of the Australian Market Research Society*, 6(1):17–32.

Merriam-Webster (1983). *Webster's ninth new collegiate dictionary.* Merriam-Webster.

Nakano, Y., Tsusaka, T. W., Aida, T., & Pede, V. O. (2018). Is farmer-to-farmer extension effective? the impact of training on technology adoption and rice farming productivity in Tanzania. *World Development*, 105:336–351.

Ndou, V. (2004). E-government for developing countries: Opportunities and challenges. *The Electronic Journal of Information Systems in Developing Countries*, 18.

Norris, D. F. & Lloyd, B. A. (2006). The scholarly literature on e-government: Characterizing a nascent field. *International Journal of Electronic Government Research (IJEGR)*, 2(4):40–56.

Nunnally, J. C. (1978). Psychometric Theory. *New York McGraw.*

Nye Jr, J. S. (2004). *Soft power: The means to success in world politics.* Public affairs.

Puspitasari, L. & Ishii, K. (2016). Digital divides and mobile internet in Indonesia: Impact of smartphones. *Telematics and Informatics*, 33(2):472–483.

Reddick, C. G. (2005). Citizen interaction with e-government: From the streets to servers? *Government Information Quarterly*, 22(1):38–57.

Rogers, E. M. (2003). *Diffusion of innovations.* Simon and Schuster.

Rokhman, A. (2011). E-government adoption in developing countries; the case of Indonesia. *Journal of Emerging Trends in Computing and Information Sciences*, 2(5):228–236.

Roto, V., Obrist, M., & Väänänen-Vainio-Mattila, K. (2009). User experience evaluation methods in academic and industrial contexts. In *Proceedings of the Workshop UXEM*, volume 9, 1–5. Citeseer.

Sawalha, S., Al-Jamal, M., & Abu-Shanab, E. (2019). The influence of utilising facebook on e-government adoption. *Electronic Government, an International Journal*, 15(1):1–20.

St. Pierre, T. L. & Kaltreider, D. L. (2004). Tales of refusal, adoption, and maintenance: Evidence-based substance abuse prevention via school-extension collaborations. *American Journal of Evaluation*, 25(4):479–491.

Strauss, J., Barbosa, M., Teixeira, S., Thomas, D., & Junior, R. G. (1991). Role of education and extension in the adoption of technology: A study of upland rice and soybean farmers in Central-West Brazil. *Agricultural Economics*, 5(4):341–359.

Subriadi, A. P., Herdiyanti, A., & Ayundari, S. R. (2015). Pengukuran efektivitas dan efisiensi e-government surabaya single windows. *Seminar Nasional Sistem Informasi Indonesia*, 2015.

Susanto, T. D. (2015). Measuring e-government implementation program: A case study of Surabaya city, Indonesia. *International Journal of Information Systems and Engineering*.

Susanto, T. D. & Aljoza, M. (2015). Individual acceptance of e-government services in a developing country: Dimensions of perceived usefulness and perceived ease of use and the importance of trust and social influence. *Procedia Computer Science*, 72:622–629.

Susanto, T. D. & Goodwin, R. (2013). User acceptance of SMS-based e-government services: Differences between adopters and non-adopters. *Government Information Quarterly*, 30(4):486–497.

United Nations (2017). *United Nations e-government survey 2016*. United Nations PUBN.

Venkatesh, V. & Davis, F. D. (1996). A model of the antecedents of perceived ease of use: Development and test. *Decision Sciences*, 27(3):451–481.

Weiss, T. G. (2000). Governance, good governance and global governance: Conceptual and actual challenges. *Third World Quarterly*, 21(5):795–814.

West, D. M. (2004). E-government and the transformation of service delivery and citizen attitudes. *Public Administration Review*, 64(1):15–27.

Wimmer, R. D. & Dominick, J. R. (2013). *Mass media research*. Cengage learning.

Wright, K. B. (2005). Researching internet-based populations: Advantages and disadvantages of online survey research, online questionnaire authoring software packages, and web survey services. *Journal of Computer-mediated Communication*, 10(3).

APPENDIX A. ADDITIONAL MATERIAL

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

Institutional Review Board
Office for Responsible Research
Vice President for Research
2420 Lincoln Way, Suite 202
Ames, Iowa 50014
515 294-4566

Date: 06/05/2018

To: Muhammad Fakhruzzaman   Daniela Dimitrova

From: Office for Responsible Research

Title: Factors Influencing E-government Adoption in Indonesia

IRB ID: 18-221

Submission Type: Initial Submission   Exemption Date: 06/05/2018

The project referenced above has been declared exempt from the requirements of the human subject protections regulations as described in 45 CFR 46.101(b) because it meets the following federal requirements for exemption:

2: Research involving use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observations of public behavior, unless (i) Information obtained is recorded in such a manner that human subjects can be identified, and (ii) Any disclosure of the human subjects' responses outside the research could reasonably place the subject at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

The determination of exemption means that:

- You do not need to submit an application for annual continuing review.

- You must carry out the research as described in the IRB application. Review by IRB staff is required prior to implementing modifications that may change the exempt status of the research. In general, review is required for any *modifications to the research procedures* (e.g., method of data collection, nature or scope of information to be collected, changes in confidentiality measures, etc.), modifications that result in the *inclusion of participants from vulnerable populations*, and/or any *change that may increase the risk or discomfort to participants*. The purpose of review is to determine if the project still meets the federal criteria for exemption.

  In addition, *changes to key personnel* must receive prior approval.

  Detailed information about requirements for submission of modifications can be found on our website. For modifications that require prior approval, an amendment to the most recent IRB application must be submitted in IRBManager. A determination of exemption or approval from the IRB must be granted before implementing the proposed changes.

  Non-exempt research is subject to many regulatory requirements that must be addressed prior to implementation of the study. Conducting non-exempt research without IRB review and approval may constitute non-compliance with federal regulations and/or academic misconduct according to ISU policy.

IRB 03/2018

Figure A.1   IRB Exemption Letter

Table A.1   Survey Questions

Question	Source
Perceived Usefulness	
I find that e-government sites (such as: imigrasi.go.id, pajak.go.id, indonesia.go.id) is beneficial.	Susanto & Aljoza (2015)
I think e-government services is enhancing my work performance.	
I think e-government services can reduce my workload.	
I think that searching for information about government in e-government sites would help me to accomplish my task.	Dimitrova & Chen (2006)
I think e-government sites is advantageous.	Lee (2009)
Perceived Ease of Use	
I think it is easy to navigate through e-government sites to find information.	Cheng et al. (2006)
I think that interaction with e-government sites does not require a lot of mental effort.	
I think that e-government sites is easy to use.	Susanto & Aljoza (2015)
I think that e-government sites menu and sub-menu is mapped clearly.	
I think that it is difficult to find information in e-government sites.	
Trust	
I trust the government.	Dimitrova & Chen (2006)
I believe that the government is corrupted.	
I believe that the information listed on e-government sites are accurate.	Susanto & Aljoza (2015)
I believe that e-government sites is closely monitored by the government.	
I trust the government to keep safe sensitive information about me.	

Table A.1   (Continued)

Social Influence

I use e-government services because my friend told me so.	Susanto & Aljoza (2015)
I use e-government services because my friend uses it too.	
I use e-government services because I feel left out if I don't use it.	
I use e-government services because it is popular among my coworkers.	
I use e-government services because I want to become the trendsetter.	

Perceived Risk

I am afraid that the information about my credit card would be unsafe while using e-government sites.	Featherman & Pavlou (2003); Lee (2009)
I am afraid that the e-government sites would fail while processing my transaction.	
I am afraid that my personal identity data would be misused while using e-government services.	
I think that using e-government services will compromise my private information.	
I think e-government website offers secure services.	

E-government adoption / Intention to Use

I intent to use e-government websites.	Dimitrova & Chen (2006); Susanto & Aljoza (2015)
I will keep using e-government services for future needs.	
I will not use any e-government services.	

APPENDIX B.   ADDITIONAL STATISTICS

Table B.1   Reliability and Confirmatory Factor Analysis of the model

Measurement Item	Factor Loading	Cronbach's α
Perceived Usefulness		0.79
I find that e-government sites (such as: imigrasi.go.id, pajak.go.id, indonesia.go.id) is beneficial	0.75	
I think e-government services is enhancing my work performance	0.85	
I think e-government services can reduce my workload	0.75	
I think that searching for information about government in e-government sites would help me to accomplish my task	0.67	
I think e-government sites is advantageous	0.73	
Perceived Ease of Use		0.86
I think it is easy to navigate through e-government sites to find information	0.76	
I think that interaction with e-government sites does not require a lot of mental effort	0.75	
I think that e-government sites is easy to use	0.83	
I think that e-government sites menu and sub-menu is mapped clearly	0.69	
I think that it is difficult to find information in e-government sites	0.35	
Trust		0.72
I trust the government	0.65	
I believe that the government is corrupted	0.43	
I believe that the information listed on e-government sites are accurate	0.67	
I believe that e-government sites is closely monitored by the government	0.53	
I trust the government to keep safe sensitive information about me	0.66	

Table B.1   (Continued)

Measurement Item	Factor Loading	Cronbach's α
Social Influence		0.83
I use e-government services because my friend told me so	0.85	
I use e-government services because my friend uses it too	0.87	
I use e-government services because I feel left out if I don't use it	0.56	
I use e-government services because it is popular among my coworkers	0.67	
I use e-government services because I want to become the trend-setter	0.46	
Perceived Risk		0.78
I am afraid that the information about my credit card would be unsafe while using e-government sites	0.75	
I am afraid that the e-government sites would fail while processing my transaction	0.59	
I am afraid that my personal identity data would be misused while using e-government services	0.84	
I think that using e-government services will compromise my private information	0.70	
I think e-government website offers secure services	0.33	
Intention to Use		0.72
I intent to use e-government websites	0.80	
I will keep using e-government services for future needs	0.83	
I will not use any e-government services	0.46	

Note: Factor loadings were standardized and were all significant at p<0.001   .