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Articles

E-Government Services Adoption in Uzbekistan: An Empirical Validation of Extended Version of the Unified Model of Electronic Government Acceptance (UMEGA)

Shokhrukh Avazov [a], Seohyun Lee [b]

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E-government is recognized as one of the top priorities among many countries and Uzbekistan is one such country that embarked on e-government implementation. Although a growing body of literature focused on the acceptance of e-government from the citizens' perspective in different countries, little is known about the Uzbek citizens' perceptions. In this context, this study aimed to investigate the underlying factors for citizens' intention to use e-government services called Single Portal of Interactive Public Services (SPIPS) in Uzbekistan. To that end, a theoretical model known as the Unified Model of E-government Adoption (UMEGA) was extended and employed. A survey was conducted for 390 Uzbek citizens to measure six constructs from UMEGA and two additional components, service quality and trust. Results from structural equation model showed that performance expectancy (β=0.680, $p < 0.001$) and trust (β=0.548, $p < 0.001$) had the greatest influence on intention to use e-government. These findings suggest policy recommendations for successful diffusion of e-government services in other developing countries and Central Asian countries including Uzbekistan.

Introduction

Nearly all countries around the world have put forward a long-term vision for e-government, with 126 (65%) of all 193 Member States of the United Nations (UN) representing high and very high E-Government Development Index (EGDI) groups in 2020 UN E-Government Survey (UN, 2020). Uzbekistan is one such country that showed significant improvement over the past decade as one of the high EGDI countries. Although the digital transformation in the public sector occurs in all parts of the world, its processes, implications, and motivations are largely contingent upon each country's context. For example, the background of e-government system in Uzbekistan should be discussed in association with the country's ongoing reform for the transition from a totalitarian state to a democratic one. Among various areas of reform, the use of information and communication technology (ICT) for an effective interaction between the state and the citizen has the potential for expanding the citizen engagement, transparency and accountability. On the other hand, scholars have argued that post-Soviet transition countries such as Uzbekistan may not necessarily promote citizen-oriented and transparent transformation of public services into e-government platform but rather, may reinforce the authoritarian government roles in the provision of public services (Johnson & Kolko, 2010).

In fact, a recent report from the Asian Development Bank Institute pointed out that the Uzbek citizen should engage more actively in the transformation towards the digital governance as indicated by the low level of citizen involvement from their e-government user experience survey (Kuldosheva, 2021). In this sense, examining the public acceptance is particularly important in the context of Uzbekistan e-government system as a means for modernizing the public sector and ensuring credibility towards e-government in general (Heeks, 2003). Therefore, this study seeks to examine the factors associated with the citizens' intention to use e-government services in Uzbekistan by extending one of the most comprehensive theoretical models for e-government acceptance, namely the unified model of electronic government adoption (UMEGA) and empirically validating it from the citizens' perspective. Specifically, this research aimed to add service quality and trust as two key variables and investigate how these two additional components along with other variables from the original

a Webster University; The Global Green Growth Institute; Department of Public Administration, Yonsei University Graduate School (Mirae), shokhrukh.avazov@yonsei.ac.kr

b **Corresponding author:**
Department of Global Public Administration, Yonsei University Mirae Campus Jeongui Hall # 415, Wonju 26493, Gangwon-do, Republic of Korea, leeesh@yonsei.ac.kr

UMEGA are associated with the attitude, which acts as a mediating variable for the behavioral intention to use e-government services.

To date, e-government literature has focused on service quality as an important component that explains the acceptance for or engagement with the e-government service. Due to its multidimensional nature, the issue of service quality has been one of the major concerns in public administration and policy studies as evidenced by the heated debate on the measurement and conceptualization. According to Osei-Kojo (2017), public service quality is a multifaceted concept and should not only assess the performance of public sector institutions but also embrace what the customers think and perceive (Osei-Kojo, 2017). In this regard, the theory known as expectation-disconfirmation theory (EDT) has been used in e-government acceptance studies, which hypothesizes the relationship between service quality and the satisfaction or trust by the clients (Sharma et al., 2018). Still another theory that emphasizes service quality as a key factor for public satisfaction and trust is SERVQUAL model developed by Parasuraman et al. (1985). SERVQUAL model has been widely adopted by the public administration literature in general as well as in the e-government field (Parasuraman et al., 1985). In discussing the local e-government services quality model, Sá et al. (2016) highlighted four dimensions of e-government quality, namely service quality, information quality, management quality, and technical quality (Sá et al., 2016). Some other aspects of e-government service quality can include efficiency, dependability, citizen support, simplicity of use, substance, and visualization of information (Papadomichelaki & Mentzas, 2012). In the previous literature, it has been emphasized that e-government service quality is one of the main factors that can determine the success or failure of an e-government project (Hien, 2014). Recent e-government acceptance studies also indicated that service quality is positively and significantly associated with the intention of citizens to use e-government services in various contexts (Li & Shang, 2020; Pramod, 2019)

Another key component that has been discussed in the e-government and the technology acceptance theory is trust. For instance, Alalwan et al. (2017) has extended the unified theory of acceptance and use of technology 2 (UTAUT2) by adding the trust variable and demonstrated how behavioral intention is significantly and positively influenced by trust (Alalwan et al., 2017). The application of UMEGA in Sub-Saharan African context has also demonstrated that trust has significant and positive influence on behavioral intention (Verkijika & De Wet, 2018). Another study on factors predicting e-government services acceptance in Mauritius has presented a positive and significant direct influence of trust on the behavioral intention to use e-government systems in Mauritius (Lallmahomed et al., 2017). Similarly, Nepalese case of online e-grievances system has demonstrated that trust is a strong predictor of behavioral intention of the citizens (Pramod, 2019).

Investigating the public acceptance for e-government is not new in the public administration and e-government literature. Over the past decade, "the great theory hunt" has been conducted in an attempt to employ various theoretical models for assessing e-government acceptance of the citizens (Bannister & Connolly, 2015). In reviewing the theoretical models in the field of e-government, Bannister and Connolly distinguished the *imported* theory from the *native* theory. By imported theory, they meant the adoption or adaptation of a theory borrowed from other academic fields such as sociology or information systems (IS). Numerous studies have applied the *imported* theoretical models to explain individuals' perception, attitude and acceptance for e-government. For example, the technology acceptance model (TAM) developed by Davis (1989) is one of the most widely used theories in the IS field and was employed by Dahi and Ezziane (2015) or ELKheshin (2020) in the e-government context (Dahi & Ezziane, 2015; Fred D. Davis, 1989; ELKheshin, 2020). TAM explains how perceived ease of use and perceived usefulness are two key variables that influence an individual's intention to use the new technology. Moreover, theoretical models from psychology and sociology have been extensively used in the e-government acceptance literature, such as the theory of planned behavior (TPB) developed by Ajzen (1991). TPB illustrates how attitude, subjective norms, perceived behavioral control influence an individual's intention for a certain behavior (Ajzen, 1991). TPB was employed by Rana et al. (2016) for Indian e-government context and its extended version, decomposed theory of planned behavior (DTPB), was tested by Zahid and Din (2019) for Pakistan's case (Rana et al., 2016; Zahid & Haji Din, 2019). The DTPB decomposes the constructs of TPB into multidimensional belief constructs.

Also, combinations of different theoretical models have been empirically tested, as in the case of a study by Wirtz and Piehler (2016) that used both TAM and the theory of reasoned action (TRA) in German context (Wirtz & Piehler, 2016). The TRA is one of the most influential theories in the social psychology that shows how attitude and subjective norm affect behavioral intention and in turn, actual behavior (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1977) Also, Liang and Lu (2013) employed two existing theories to explore the public's willingness to use e-government services in Taiwan (Liang & Lu, 2013). One is the contingency theory (CT) that emphasizes the explanatory power of environmental or situational factors and the other is social cognitive theory (SCT) that examines human behavior as a function of external stimuli and cognitive processes (Bandura, 1986; Fiedler, 1978). In addition, one of the most frequently employed theories –the unified theory of acceptance and use of technology (UTAUT) – was used by Kurfalı et al. (2017) in Turkey and by Lee (2020) in South Korea (Kurfalı et al., 2017; T. Lee, 2020). Relatively new to the scene, the UTAUT is literally a unified model that adopts conceptual and empirical similarities across the previously discussed theories (Rodrigues et al., 2016). Furthermore, its modified version UTAUT2 was utilized in the study by Alharbi et al. (2017) in Saudi Arabia (Alharbi et al., 2017). According to Verkijika and De Wet (2018), most of these theoretical underpinnings were modified from the mainstream e-commerce studies and have shown the close link between

e-commerce and e-government acceptance (Verkijika & De Wet, 2018).

On the other hand, a *native* theory is referred to as a theory specific to and created within the e-government context (Bannister & Connolly, 2015). For example, some researchers argued that there was a need for more comprehensive and sophisticated e-government acceptance models that were not simply adopted from e-commerce studies (Alghamdi & Beloff, 2014; Shareef et al., 2011; Verkijika & De Wet, 2018). One of the main arguments of these authors was that the existing models did not fully embrace and stipulate the nature of citizens' behaviors toward e-government acceptance. Considering these limitations, some scholars developed specific e-government acceptance models, such as the e-government adoption model (GAM) (Shareef et al., 2011), the e-government adoption and utilization model (EGAUM) (Alghamdi & Beloff, 2014), the democratic e-governance website evaluation model (DEWEM) (Lee-Geiller & Lee, 2019) and the UMEGA (Dwivedi et al., 2017).

The GAM illustrates that e-government adoption defined by the decision to accept and use an e-government system is affected by attitude, ability, assurance, adherence and adaptability to use (Shareef et al., 2011). The EGAUM is suggested for explaining the factors related to the e-government acceptance and utilization by the users from the business sector. Those factors include perceived benefits, awareness, previous experience, regulations and policies (Alghamdi & Beloff, 2016). The DEWEM is suggested as an overarching evaluation model for government websites and proposes transparency, service quality and citizen engagement towards the goal for democratization of e-governance (Lee-Geiller & Lee, 2019). Lastly, the UMEGA incorporated previous theories by evaluating nine prevailing theoretical models that have been widely used in the technology acceptance literature. According to the UMEGA, the performance expectancy, effort expectancy, social influence, facilitating conditions and perceived risks are significant determinants for an individual's attitude, which plays a role as a mediating variable for the behavioral intention to use (Dwivedi et al., 2017). Unlike other e-government acceptance models, UMEGA can be considered as a more "comparatively simpler model that balances the trade-off between model complexity and explanative power" (Dwivedi et al., 2017; Verkijika & De Wet, 2018). Moreover, in a study conducted in the context of India, the UMEGA demonstrated the highest explanatory power for the behavioral intention to use e-government services when compared with other existing e-government acceptance models (Dwivedi et al., 2017).

In line with the theoretical and empirical evidence discussed above, this study aimed to validate the extended version of UMEGA in the context of Uzbekistan e-government. To that end, this study attempted to modify the UMEGA by adding two additional components to the original theoretical model and then empirically test it to assess the acceptance of e-government services in Uzbekistan. Accordingly, the main goal of this research is to validate the extended version of UMEGA in Uzbekistan's context and fill the research gap in e-government of Uzbekistan. In 2013, Single Portal of Interactive Public Services (SPIPS) of Uzbekistan was established to provide online public services to the citizens but few studies have been conducted to evaluate the public acceptance of the system with a theoretical model. Examples of services provided in SPIPS include pension fund registration, business registration, background check certificate, traffic fine payment and tax clearance certificate. As of April 14, 2021, 210 public services are available through the SPIPS. In 2020 alone, more than 50 services were introduced and improved. With the enhancement to the SPIPS mobile application, the number of services in the mobile application has surpassed 66. In 2021, the Government of Uzbekistan planned to increase the number of public services on the SPIPS to 300 by introducing 60 popular e-government services on the SPIPS (E-government project management center, 2022).

Theoretical model and hypothesis development

Modification of the Unified Model of Electronic Government Adoption (UMEGA)

Building upon the previous theoretical models such as the UTAUT and UMEGA, this research attempted to integrate the fragmented theoretical models on the acceptance of Information Systems (IS)/Information Technology (IT) and particularly e-government system (Venkatesh et al., 2003). Specifically, the extended version of UMEGA with additional variables including trust and service quality was developed to capture the essential elements of the previously established models. A comprehensive adoption model was created based on the UMEGA, which included constructs from the TAM, the TPB, the Diffusion of innovation (DOI)/innovation diffusion theory (IDT), and UTAUT. The original UMEGA developed by Dwivedi et al. includes the constructs such as 1) performance expectancy, 2) effort expectancy, 3) social influence, 4) facilitating conditions, 5) perceived risk, 6) attitude, and 7) behavioral intention. In this model, the attitude was proposed as a mediating variable and modelled to mediate the effects of core constructs such as performance expectancy, effort expectancy, and social influence on behavioral intention. Unlike the UTAUT model that primarily theorized the organizational context, UMEGA focused on the e-government acceptance by the potential users at the individual level.

More recently, Lee-Geiller and Lee (2019) pointed out that, the UMEGA (Dwivedi et al., 2017) provides more satisfactory measurement scales than other models to understand how performance expectancy, effort expectancy, social influence, facilitating conditions and perceived risks affect citizens' attitudes as well as their behavioral intentions to use the e-government. Particularly, this framework specifies the significance of psychological elements in humans' attitudes by measuring a user's idea and experience on the e-government system. Each of these constructs are discussed below.

Performance expectancy

Performance expectancy is stated as the degree to which a person trusts that using the information system will assist

him or her in accomplishing improvements in job performance. The variables from the existing technology adoption models discussed above, including perceived usefulness (from the TAM and its modified version, TAM2), relative advantage (from the DOI and IDT), and outcome expectations (from SCT), are similar in nature to performance expectancy (Venkatesh et al., 2003). For example, usefulness and relative advantage (Davis et al., 1989), and usefulness and outcome expectations (Compeau & Higgins, 1995; Davis et al., 1989) have been regarded as similar constructs to performance expectancy across various studies. The theoretical foundations of the TAM by Davis et al. (1989) and the DTPB by Taylor and Todd (1995) demonstrated that perceived usefulness considerably determines an individual's attitude in the context of IS/IT acceptance (Davis, 1989; Taylor & Todd, 1995). Other studies on e-government acceptance showed that perceived usefulness has a positive and significant impact on attitude (Hung et al., 2006, 2013; Lin et al., 2011). While the UTAUT was evolved since its presentation in 2003, a considerable amount of studies have scrutinized the influence of performance expectancy on attitude (Koh et al., 2010; Pynoo et al., 2011). All of these studies proved that performance expectancy is associated with an individual's attitude toward accepting or using the corresponding IS/IT systems positively and significantly. Considering the above discussion, the following hypothesis was formulated:

> **H1.** Performance expectancy has a positive and significant influence on attitude toward using the SPIPS.

Effort expectancy

Effort expectancy is defined as the level of simplicity associated with the use of a system (Fred D Davis et al., 1989). The three variables including perceived ease of use (from the TAM and the TAM2), complexity (from the DOI and IDT), and ease of use (from IDT) well summarize the concept of effort expectancy (Venkatesh et al., 2003). Similarities among these variables have been found in prior studies (Davis et al., 1989; Park et al., 2007). The ease of use, which reflects the concept of effort expectancy, significantly predicted an individual's attitude in the previous technology acceptance research. The theoretical foundations of the TAM by Davis et al. (1989) and the DTPB by Taylor and Todd (1995) demonstrated and entrenched this (Fred D. Davis, 1989; Taylor & Todd, 1995). For example, this significant relationship was empirically justified in several studies (Park et al., 2007; Pynoo et al., 2011). Previous studies on e-government acceptance also demonstrated that ease of use has a positive and significant relationship with attitude (Hung et al., 2006, 2013; Lin et al., 2011; Lu et al., 2010). Another study on the Gambian citizens' acceptance of e-government services showed that perceived ease of use had a significant influence on the user's attitude (Lin et al., 2011). Still another research on the predictors for changes in Taiwanese taxpayers' willingness to use online tax filing (Lu et al., 2010) found that the perceived ease of use for the tax filing system significantly influenced a citizen's attitude. Hence, the following hypothesis was formulated:

> **H2.** Effort expectancy has a positive and significant impact on attitude toward using the SPIPS.

Social influence

When the social influence construct of the original UMEGA was first developed, the components from relevant theories were considered, including subjective norm (from the TRA, the TAM2, the TPB, and the DTPB), social factor and image (from IDT) (Venkatesh et al., 2003). To take account for the parsimony and the performance of the model, the UMEGA removed the lower loading items and retained two items for subjective norm and another two items for social factor. For one thing, the subjective norm is related to the extent to which a person recognizes the importance of using a new system because his or her important others believe so. The important others in this context include people who are important and influence the respondent's behavior (Dwivedi et al., 2017). Additionally, the social factor refers to the influence from the people with a certain sociopolitical position or the organization accountable for the adoption of a new system such as the department within the government authority. Therefore, the extended version of UMEGA in this study also incorporated the items for subjective norm and social factor for the social influence construct.

In the previous literature, the positive and significant association of social influence with attitude was verified in terms of technology acceptance (Park et al., 2007; Pynoo et al., 2011). For example, a study on Chinese consumers' acceptance of mobile technologies indicated that social influence has a positive role in a consumer's attitude towards the use of mobile technology (Park et al., 2007). The author also proposed that social influence of family members, close friends, and co-workers often has a positive and considerable association with an individual's decision and behavior towards the use of e-government services that are similar to the SPIPS in Uzbekistan. Based on the above discussions and evidence from empirical studies for this relationship, the following hypothesis was formulated:

> **H3.** Social influence has a positive and significant impact on attitude toward using the SPIPS.

Facilitating conditions

Facilitating conditions are defined as the level to which a person believes that an organizational and technical infrastructure is available to support the use of a system (Venkatesh et al., 2003). Therefore, it covers the concepts from other theoretical models, including perceived behavioral control (from the TPB and the DTPB) and compatibility (from IDT). While the TRA model included perceived behavioral control as a determinant for behavioral intention, Ajzen (1991) developed a new research framework called the TPB and verified that such addition directed to significant improvements of the model in terms of evaluating the individual's intentions (Ajzen, 1991). On the

other hand, Venkatesh et al. (2003) stated that facilitating conditions become trivial in predicting behavioral intention when variables including performance expectancy and effort expectancy were added to analyze the intention (Venkatesh et al., 2003).

In reference to the UTAUT, it has been argued that facilitating conditions were hypothesized to influence technology use in the organizational environment, where facilitating conditions can serve as the proxy for actual behavioral control and can influence behavior directly (Ajzen, 1991). Venkatesh et al. (2011) argued that facilitating conditions influence behavioral intention and work as perceived behavioral control (Venkatesh et al., 2011). Empirical evidence from a number of studies on technology acceptance by individuals have also supported the significant impact of facilitating conditions on behavioral intention (Chiu et al., 2012; V. Lee & Lin, 2008).

Moreover, the relationship between facilitating conditions and behavioral intention in e-government acceptance research has been explored across a reasonable number of studies (Carter et al., 2012; Schaupp et al., 2010). From the previous studies, it was found that facilitating conditions had a significant impact on an individual's intention to use a new system. For example, a study found that facilitating conditions had significant relationship with the intention to use e-files by US taxpayers (Carter et al., 2012). The following hypothesis was formulated based on the above discussions:

> **H4.** Facilitating conditions have a positive and significant impact on intention to use.

Additionally, the positive and significant impact of facilitating conditions on effort expectancy has also been supported by a number of studies on IS/IT acceptance (Alrawashdeh, 2012; Urumsah et al., 2011). In particular, Alrawashdeh et al. (2012) showed a newly found significant relationship between effort expectancy and facilitating conditions in the acceptance of a web-based e-learning system among public sector officials in Jordan (Alrawashdeh, 2012). In support of the previous argument, another study on Australian occupational therapists' IS/IT acceptance revealed that facilitating conditions had positive and considerable impact on effort expectancy (Schaper & Pervan, 2007). In this regard, the following hypothesis was proposed:

> **H5**. Facilitating conditions have a positive and significant impact on effort expectancy of users of SPIPS.

Perceived risk

Latest studies widely discussed that a main constraint to e-government services acceptance is an individual's perceptions concerning the risks associated with online transactions. Prior literature on perceived risk found that 80% of Internet users are concerned about making their personal identities known on the web (Schaupp et al., 2010). IT risks are related to the likelihood that a system is inadequately protected from different forms of damages (Straub & Welke, 1998). In this context, a user's perceived risk is defined as the conviction that he or she will suffer a loss while seeking an outcome (Warkentin et al., 2002).

Perceived risk consists of behavioral and environmental insecurity. Behavioral insecurity exists because of the unfriendly nature of the Internet, whereas environmental insecurity occurs due to the capricious nature of Internet-based technology (Zhang & Maruping, 2008). According to Gefen et al. (2003), perceived risk is an individual's personal belief of suffering loss in search of preferred results (Gefen et al., 2003). Empirical findings have also revealed that reduced perceived risk significantly influences the adopters' attitudes (Hung et al., 2006; Susanto et al., 2017). A study on the specific Malaysian e-government system so-called myEPF found that perceived risk was negatively but significantly linked with working adults' attitudes (Sulaiman et al., 2012). The theoretical models on e-commerce adoption have also found a negative and significant relationship between perceived risk and attitude (Hsu & Chiu, 2004; Teo et al., 2008).

Since the SPIPS provides the transactional e-government services, the perceived risk of e-government service users can be linked mainly with the risk involved in employing it. Specifically, when the users are relatively new to the system, such risks can be directly connected with the user's negative emotions about employing the IS. Therefore, it was hypothesized that:

> **H6.** Perceived risk has a negative and significant impact on an individual's attitude toward using the SPIPS.

Attitude

The attitude construct has been used across various theories of IS/IT acceptance research, including the TRA (Fishbein & Ajzen, 1977), the TAM (Fred D Davis et al., 1989), the TPB (Ajzen, 1991), and the DTPB (Taylor & Todd, 1995), to measure its influence on behavioral intention to use a system. Attitude toward behavior is defined as the level to which an individual has a positive or negative evaluation or appraisal of the behavior in question (Ajzen, 1991).

When Ajzen (1991) developed the TPB model, the researcher claimed that attitude toward behavior is commonly revealed to exactly predict the individual's behavioral intention. In the context of the TPB model, various studies have also verified this statement, implying that attitude can significantly impact the intention to use a new IS/IT (Pavlou & Fygenson, 2006; Taylor & Todd, 1995). In fact, comparable to the TAM, Taylor and Todd (1995) found a higher overall intention to use when the attitude was employed as a mediating variable.

Numerous studies in the public administration and e-government field have supported the correlation between attitude and behavioral intention (Hung et al., 2009, 2013; Lu et al., 2010). Furthermore, a study on Taiwanese mobile e-government services discovered that attitude is a critical determinant for defining and predicting the behavioral intentions of mobile users (Hung et al., 2013). In support of the above discussion, the following hypothesis was developed:

> **H7.** An attitude of individual toward using the SPIPS has a positive and significant relationship with intention to use.

Service quality

According to a previous study on service quality, the service quality can be described as a degree to which the delivered service matches the expectations of the customers (Hien, 2014). In fact, the perceived quality became one of the main predictors for success in service provision and business activity (Connolly, 2007). In support for this, another study emphasized that a higher quality level could be achieved with the ability to measure the service quality (S. Y. Lee & Kim, 2014). Additionally, the researchers should take into account the client or citizen perspectives to assess the service quality.

Recently, service quality has become one of the important factors in marketing research as well as IS studies. The well-known measurement scale SERVQUAL developed by A. Parasuraman et al. (1985) to study the service quality helped critically identify some dimensions that reveal the main elements of business services (Parasuraman et al., 1985). These five dimensions are namely, tangibles, reliability, responsiveness, assurance, and empathy. Based on the multi-item scales of SERVQUAL, researchers and practitioners have examined customer's perceptions on service quality either to test the scale on specific field (e.g. e-commerce, web services, etc.) or to extend it to fit with overall online services in general (Parasuraman et al., 2005; Zeithaml et al., 2002).

In e-government context, the quality of service might be a significant determinant to explain citizen's e-government acceptance. The users' perceived service quality in an online environment can differ from that of the conventional face-to face environment. Hence, examining the quality of web service could provide insights into whether users intend to use the system continuously or not. These arguments can lead to the following hypothesis:

> **H8.** Service quality will positively determine an intention to use of the SPIPS.

Trust

The dimensions of trust could be the factors associated with the citizen's intention to use e-government system. Trust is a central issue in all daily business interactions, communications, transactions, and practices, especially when it is done remotely, through the internet. Although there is little agreement in the literature about how to define citizen's trust in government context or how it is gained and lost, most researchers agree that it is an important determinant of public action and cooperation (Pavlou & Fygenson, 2006; Thomas, 1998; Welch & Hinnant, 2003).

Rotter (1971) defined trust as "an expectancy that the promise of an individual or group can be relied upon" (Rotter, 1971). This definition has helped explain the citizen's trust in e-government context. Furthermore, Zucker (1986) divided trust into three modes, which include; characteristics-based trust, process-based trust, and institution-based trust (Zucker, 1986). First, the characteristics-based trust refers to the trust produced from the individual's characteristics such as age, gender, socioeconomic status and other factors. Second, process-based trust is a trust based on individual's prior experience when dealing with government. This mode of trust can be created in e-government context if the government could prepare and maintain the e-government technologies with the high level of security. Third, institution-based trust is associated with individual perceptions of the institutional environment such as the structure, regulation and legislation that make individuals feel safe and build trust. Belanger and Carter (2008) suggested two types of trusts in e-government context; namely, trust in the internet and trust in the government (Bélanger & Carter, 2008).

Trust was identified as a factor that determines consumers' attitudes (Bomil & Ingoo, 2003; Liang & Lu, 2013). Specifically, Liang and Lu (2013) explored the users of an online discussion forum and found that trust in an online forum positively influenced users' attitudes toward the forum. Their study scrutinized users' security, trust, and privacy concerns on using social networking sites and found trust has a significant, positive effect on users' attitudes towards the service. In a Web survey of 502 Internet banking users, Bomil and Ingoo (2003) found that trust positively affects customers' attitudes toward using e-commerce for trade transaction. Therefore, the argument has led to set the following hypotheses:

> ***H9.*** Citizens' trust will positively influence intention to use the SPIPS.

> ***H10.*** Citizens' trust will positively influence attitude to use the SPIPS.

Behavioral intention and the proposed research framework

According to Lee-Geiller & Lee (2019), one of the UMEGA's contributions to the e-government literature is that it integrated the psychological elements of citizens' attitudes and demonstrated how the attitude acts as a mediating variable for the intention to use e-government system (Lee-Geiller & Lee, 2019). While the question items for attitude from the original UMEGA simply measure the feelings of want or interest such as "I would like working with" the e-government system, the question items for behavioral intention covers the issue of planned actions or goals with a certain level of likelihood for carrying out something. In other words, the intention to use from the UMEGA do not equate to the actual usage in this context. Rather, the model captures the predictive aspect of the behavior or the plans for the near future. In this regard, the behavioral intention in the proposed theoretical model used the same measurement items from the original UMEGA, by measuring intention, prediction, and plans for using the e-government service at the individual level.

By expanding the citizens' perspectives in service quality and trust for e-government services, this study suggested the extended version of UMEGA as a research framework illustrated in Figure 1. The integration of service quality and

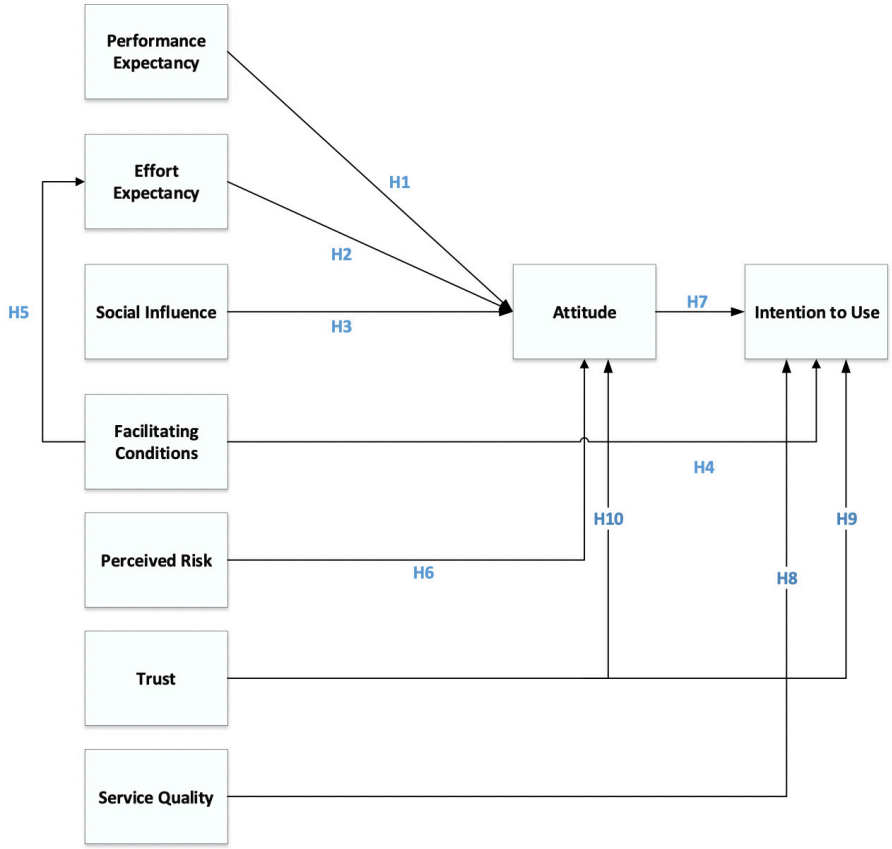

Figure 1. Proposed Research Framework

trust into the original UMEGA is expected to improve its applicability in the context of Uzbekistan and other countries.

Data and methods

Sampling and study setting

A survey was conducted to measure the constructs of the extended version of UMEGA in the context of Uzbekistan. Potential participants of the survey were approached at five one-stop shops located in Tashkent City, the capital of Uzbekistan during October 2019 to January 2020. The visitors of one-stop shops are mostly Uzbek citizens with the intent to get access to a wide range of public services such as government-issued certificates at one place. One-stop shops were used as a venue for the survey administration because this study investigates the behavioral intention of the public service users. Also, it was made sure that the participants have used or at least heard about SPIPS before taking part in the survey. In this sense, this study adopted the non-probability, purposive sampling technique. Participation in the study was voluntary and the participants were asked to complete the survey based on their views and beliefs towards the acceptance of the SPIPS.

As part of a pilot survey, 120 questionnaires were distributed, of which 101 were returned with complete responses. The pilot survey was conducted from July 2019 to August 2019 to make sure that the respondents clearly understand the questions and to confirm internal consistency or reliability of the proposed questionnaire adapted from previous literature. The reliability analysis of the pilot test with responses from 101 participants demonstrated that all the measurement items had a high level of reliability, with Cronbach's alpha of over 0.7 for all constructs shown in Table 1.

After the pilot study, a total of 500 questionnaires were distributed near each of the five one-stop shops. Of those, 416 (83.2%) respondents agreed to participate. 26 out of 416 cases had missing data. Therefore, the data for 26 cases were removed and 390 cases were included in the analysis. According to the State Committee of the Republic of Uzbekistan on Statistics (2019), the total population of Tashkent city reached to 2,510,800, in that case, the sample size of 384 would have been adequate (Statistics, 2019).

Age, gender, educational profile, and occupation were asked as part of the demographic characteristics. In addition, the respondents were asked about their experience with the internet and computer use because the actual use of and intention to use the e-government services is generally linked with these factors.

Table 1. Question items for the extended version of UMEGA measured in 7-point Likert scale

Construct	Question item	
Attitude (8)	AT1	Using the SPIPS would be a good idea
	AT2	Using the SPIPS would be a wise idea
	AT3	I like the idea of using the SPIPS
	AT4	Using the SPIPS would be pleasant
	AT5*	I would like working with the SPIPS
	AT6*	I would look forward to those aspects that require me to use the SPIPS
	AT7*	Using the SPIPS would be interesting to me
	AT8*	If I started working with the SPIPS, I would find it hard to stop
Performance Expectancy (14)	PE9	If I used the SPIPS, I would increase my effectiveness of working with the Internet
	PE10	If I used the SPIPS, I would spend less time on routine tasks
	PE11	If I used the SPIPS, I would increase my quality of output
	PE12	If I used the SPIPS, I would increase my quantity of output for the same amount of effort
	PE13	If I used the SPIPS, my friends/colleagues would perceive me as competent
	PE14*	If I used the SPIPS, I would increase my chances of receiving honor in my society (or promotion)
	PE15*	If I used the SPIPS, I would increase my chances of getting recognized (or a raise in my job)
	PE16	Using the SPIPS would enable me to accomplish tasks quicker
	PE17*	Using the SPIPS would improve my overall performance
	PE18*	Using the SPIPS would increase my productivity
	PE19	Using the SPIPS would enhance my effectiveness
	PE20	Using the SPIPS would make it easier to get my certificates done
	PE21	I would find the SPIPS useful for obtaining different certificates
	PE22	Using the SPIPS would improve the quality of the work I do
Effort Expectancy (10)	EE23	I would find the SPIPS easy to use
	EE24	Learning to operate the SPIPS would be easy for me
	EE25	I would find it easy to get the SPIPS to do what I want it to do
	EE26	My interaction with the SPIPS would be clear and understandable
	EE27	I would find the SPIPS flexible to interact with
	EE28*	It would be easy for me to become skillful at using the SPIPS
	EE29*	Using the SPIPS would take too much time from my normal duties
	EE30*	Working with the SPIPS would be so complicated that it would be difficult to understand what was going on
	EE31*	Using the SPIPS would involve too much time doing mechanical operations
	EE32*	It would take too long to learn how to use the SPIPS to make it worth the effort
Social Influence (8)	SI33	People who influence my behavior think that I should use the SPIPS
	SI34	People who are important to me think that I should use the SPIPS
	SI35*	The Government is helpful in the use of the SPIPS
	SI36*	The designated government official would be very supportive of the use of the SPIPS
	SI37*	I would use the SPIPS because of the type of people who use the system
	SI38*	In general, the government would support the use of the SPIPS
	SI39	People who use the SPIPS would have more prestige than those who don't
	SI40	People who use the SPIPS would have a high profile
	SI41	Using the SPIPS is a status symbol

Construct	Question item	
Facilitating Conditions (8)	FC42*	I would have command over using the SPIPS
	FC43	I would have the resources necessary to use the SPIPS
	FC44	I would have the knowledge necessary to use the SPIPS
	FC45	Given the resources, opportunities and knowledge, it would be easy for me to use this system
	FC46	The SPIPS would be compatible with the other systems I use
	FC47*	Guidance would be available to me in the use of the SPIPS
	FC48*	Specialized instruction concerning the SPIPS would be available to me
	FC49*	A specific person (or group) would be available for assistance with SPIPS difficulties
Perceived Risk (4)	PR50	Use of SPIPS may cause my personal information to be stolen
	PR51	I would feel uneasy psychologically if I used the SPIPS
	PR52	I think that it is unsafe to use the SPIPS because of the privacy and security concerns
	PR53	I believe that there could be negative consequences by using the SPIPS
Service Quality (12)	SQ54*	Offer language or geographic options
	SQ55*	Information contained on the web site is current and timely
	SQ56	Information contained on the web site is accurate and relevant
	SQ57	Information contained on the web site is rich in detail
	SQ58	This site is always available at all time for transaction
	SQ59	This site launches and runs right away
	SQ60	This site does not crash
	SQ61	Pages at this site do not freeze after I enter my information
	SQ62	Information at this site is well organized
	SQ63	This site makes it easy to find what I need
	SQ64	It makes it easy to get anywhere on the site
	SQ65	It enables me to complete a transaction quickly
Trust (4)	TR66	I think I can trust our government in providing services through SPIPS
	TR67	Our government can be trusted to carry out online transactions faithfully in SPIPS
	TR68	I trust our government to keep my best interests in mind in SPIPS
	TR69	In my opinion, our government is trustworthy in providing services through SPIPS
Behavioral Intention (3)	BI70	I intend to use the SPIPS
	BI71	I predict that I will use the SPIPS
	BI72	I plan to use the SPIPS in the near future

*Items that were removed after exploratory factor analysis (EFA)

Survey design

A questionnaire was developed to analyze the hypotheses based on the suggested modification of the UMEGA discussed above. The 72 question items regarding the perceptions on SPIPS were adapted from the existing studies. These items attempted to measure 1) performance expectancy, 2) effort expectancy, 3) social influence, 4) facilitating conditions, 5) perceived risk, 6) trust, 7) service quality, 8) attitude, and 9) behavioral intention to use SPIPS. All items for the survey were adapted from the previous studies by Dwivedi et al. (2017), and scholars have employed seven-point Likert-scale questions with indicators ranging from strongly disagree (1) to strongly agree (7) for all non-demographic items in their study on the UMEGA (Bélanger & Carter, 2008; Dwivedi et al., 2017; Hussein et al., 2011). Therefore, this study aimed to follow the original scale from the study by Dwivedi et al. (2017). Table 1 shows each construct and the question items used for the survey.

Data analysis and statistical model

Upon completion of the survey administration, data was coded for further analysis using statistical software, including SPSS and AMOS. First of all, exploratory factor analysis (EFA) was performed to examine the structure of the observed variables and to explore the latent variables. EFA is a critical part of theoretical model validation for preliminary model testing purposes (Morgeson et al., 2010). The question items with factor loadings less than 0.5 were removed.

The total variance from the 9 constructs was satisfactory with the level of 72.04%. Also, the reliability test was performed by calculating the Cronbach's alpha (α) values. Internal reliability involves the issue of whether the indicators that make up the scale are consistent or not. As a rule of thumb, $\alpha \geqslant 0.90$ is excellent reliability, 0.70 - 0.90 is high reliability, 0.50 – 0.70 is moderate reliability, and $\leqslant 0.50$ is low reliability (Hinton et al., 2004).

In addition, the convergent validity and discriminant validity were assessed to ensure that the measurements of the construct accurately represent the concept of interest they stand for. Convergent validity is defined as the extent to which observed variables of a particular construct share a high portion of the variance in common (Hair et al., 2010). Convergent validity is assessed by employing three criteria: factor loading, average variance extracted (AVE) and composite reliability (CR). Also, the discriminant validity is defined as "the degree to which two conceptually similar constructs are distinct" (Hair et al., 2010). It is established by comparing the AVE values for any two constructs with the square of correlation estimate between these two constructs. And then, the measurement model for the variables was tested using the confirmatory factor analysis (CFA) to ensure the validity of all constructs identified in the EFA. CFA was used to test the relationship between the observed variables and to investigate if their fundamental latent constructs exist (Suhr, 2006).

In order to test and validate the extended version of UMEGA, a structural equation model (SEM) was established. SEM estimates the relationships among the latent variables, drawn from the observed variables. It has an advantage over linear regression by analyzing path diagrams when these include latent variables with multiple indicators and by integrating the measurement model and the structural model into a simultaneous evaluation (Gefen et al., 2003). Also, SEM is considered to be relevant to address the proposed research question that aimed to empirically validate the extended version of a theoretical model in a real-world setting. SEM has been employed by a number of e-government literature as well as public administration or policy studies to analyze a theoretical model measuring multi-item constructs (Kim & Lee, 2012; Morgeson et al., 2010)

Analysis and Results

Descriptive statistics

Of 500 questionnaires distributed, 416 (83.2%) were returned and eventually, 390 (78%) were considered valid for further analysis after thorough data cleaning process. Table 2 illustrates the demographic characteristics and the respondents' experience with internet, computer and SPIPS. Among 390 participants of this study, 79% of the respondents were male, with the age varying from 20 to 79 years old. Over half of the respondents (56.9%) were in their 20s and had bachelor's degree (51.5%). Comparatively, the result of the age distribution is reasonably similar to that shown in the original study of UMEGA as 61% of their respondents were below 30 years old (Dwivedi et al., 2017). The respondents were mostly public sector employee (32.3%) or students (26.7%).

In terms of experience with internet and computer, the largest proportion of the people responded that they have been using internet (43.6%) or computer (47.4%) for more than 9 years. Also, those who access the internet and computer at home were 45.4% and 50% respectively. The majority of the respondents said that they always use the internet (72.1%) and only 1 person never used it while only 3.8% said that they use SPIPS always. 37.9% of the respondents reported that they never used SPIPS. To crosscheck the data representativity, the most recent statistics from the United Nations Economic Commission for Europe (UNECE) and the World Bank were compared with the descriptive statistics results presented in Table 2 (World Bank, 2022; Europe, 2022). Since the purposive sampling technique was used for this study, the age and gender distributions of our sample do not adequately represent the entire Uzbek population, but at least the representativeness in terms of internet or SPIPS usage were retained to some extent. According to the World Bank, the percentage of individuals using the internet in Uzbekistan was 70.4% in 2019 and those who responded that they always use the internet in our study was 72.1% (Bank, 2022). Additionally, statistics on SPIPS showed that the 67% of the SPIPS users were male while 79% or the respondents of this study were male (Bitto, 2019). The largest number of SPIPS users in 2019 were registered in Tashkent or Tashkent region (31.8%), which represent our study sample (Bitto, 2019).

Exploratory factor analysis and reliability

Table 3 shows the results of EFA and reliability of the measurement items. After removing question items with factor loading smaller than 0.5, 49 out of 72 items remained. The Kaiser-Meyer-Olkin (KMO) measure was 0.950 and the Bartlett's test result was significant at $\alpha<0.05$ level for all factor of measurement items ($p<0.001$). KMO of greater than 0.6 and the significant result of Bartlett's test indicate that the sampling is appropriate for factor analysis.

Cronbach's alpha was used as a tool to measure the reliability of the questionnaire (Table 3). This study adopted the four cut-off criteria of Hinton et. al (2014, p.359), namely, excellent (0.90 and above), high (0.70 - 0.90), high moderate (0.50 - 0.70), and low (0.50 and below). According to these criteria, six constructs demonstrated excellent reliability and the other three confirmed high level of reliability. The reliability scale indicates the internal consistency of the measurement items measuring the same content.

Convergent and discriminant validity

Table 4 demonstrates the results of convergent and discriminant validity analysis. As discussed, the convergent validity was assessed by the three tests, including the factor loadings, composite reliability (CR) and average variance extracted (AVE). The factor loadings were found to be significant, and the CR was also beyond the minimum limit of 0.7. Furthermore, the AVE, which measures the variance explained by the latent variable as compared with random

Table 2. Demographic characteristics and experience with internet, computer and SPIPS

Demographic characteristics		N (%)	Experience with internet, computer and SPIPS		N (%)
Age	20-29	222 (56.9%)	Internet experience (in years)	None	6 (1.5%)
	30-39	120 (30.8%)		1-3 y	43 (11%)
	40-49	28 (7.2%)		4-6 y	97 (24.9%)
	50-59	15 (3.8%)		7-9 y	74 (19%)
	60-69	4 (1%)		> 9 y	170 (43.6%)
	70-79	1 (0.3%)	Computer experience (in years)	None	15 (3.8%)
Gender	Female	82 (21%)		1-3 y	62 (15.9%)
	Male	308 (79%)		4-6 y	69 (17.7%)
Education	None	8 (2.1%)		7-9 y	59 (15.1%)
	High School	17 (4.4%)		> 9 y	185 (47.4%)
	College	18 (4.6%)	Internet access location	No Access	2 (0.5%)
	Bachelor's Degree	201(51.5%)		Home	177 (45.4%)
	Master's Degree	123 (31.5%)		Office	129 (33.1%)
	Doctorate Degree	23 (5.9%)		Internet Cafe	33 (8.5%)
Occupation	Student	104 (26.7%)		College/ University	49 (12.6%)
	Employee – Private Sector	73 (18.7%)	Computer access location	No Access	6 (1.5%)
	Employee – Public Sector	126 (32.3%)		Home	195 (50%)
	Employee – International Organization	18 (4.6%)		Office	137 (35.1%)
	Self-employed	26 (6.7%)		Internet Cafe	27 (6.9%)
	Unemployed	20 (5.1%)		College/ University	25 (6.4%)
	Pensioner	6 (1.5%)	Internet use frequency	Never	1 (0.3%)
	Other	17 (4.4%)		Very rarely	5 (1.3%)
				Rarely	6 (1.5%)
				Occasionally	13 (3.3%)
				Very frequently	84 (21.5%)
				Always	281(72.1%)
			SPIPS use frequency	Never	148 (37.9%)
				Very rarely	89 (22.8%)
				Rarely	49 (12.6%)
				Occasionally	58 (14.9%)
				Very frequently	31 (7.9%)
				Always	15 (3.8%)

measurement error, was greater than the minimum recommended cut-off value of 0.5 for all constructs. Therefore, the results of all three tests indicated that the convergent validity was supported.

Table 3. Exploratory factor analysis and reliability of the measurement items

Construct	Question item	Factor Loading	Cronbach's α
Service Quality	SQ64	.934	.964
	SQ63	.894	
	SQ62	.890	
	SQ60	.869	
	SQ61	.847	
	SQ65	.836	
	SQ59	.822	
	SQ58	.819	
	SQ57	.772	
	SQ56	.740	
Performance Expectancy	PE20	.889	.940
	PE16	.882	
	PE19	.862	
	PE12	.819	
	PE22	.790	
	PE21	.741	
	PE11	.694	
	PE13	.626	
	PE10	.533	
	PE9	.480	
Social Influence	SI41	.882	.887
	SI40	.859	
	SI39	.746	
	SI33	.584	
	SI34	.532	
Effort Expectancy	EE26	.894	.911
	EE27	.874	
	EE25	.754	
	EE24	.490	
	EE23	.484	
Facilitating Conditions	FC44	.929	.871
	FC45	.835	
	FC43	.719	
	FC46	.448	
Perceived Risk	PR52	.928	.888
	PR53	.823	
	PR50	.759	
	PR51	.699	
Trust	TR68	.732	.938
	TR69	.677	
	TR67	.571	
	TR66	.548	
Attitude	AT2	.909	.944
	AT1	.876	
	AT4	.820	

Construct	Question item	Factor Loading	Cronbach's α
	AT3	.777	
Behavioral Intention	BI3	.783	.904
	BI1	.771	
	BI2	.715	

In addition, the discriminant validity was assessed based on the Fornell-Locker scales. According to this scale, discriminant validity can be attained if the square roots of AVE are greater than the paired inter-factor correlations between the latent constructs (Ab Hamid et al., 2017). The values in diagonal cells in bold from Table 4 are the square roots of AVE and by comparing each construct in the relevant rows and columns of Table 4, it is clear that all the square roots of AVE on the diagonal cells are greater than the corresponding off-diagonal correlation coefficients. This provides evidence of the discriminant validity of the scales.

Measurement model testing with CFA and SEM

The constructed measurement model displays the 49 observed variables and 9 latent constructs. All constructs were allowed to correlate with other constructs in the CFA stage. As a standard, at least three determinants are recommended for each. In this stage, several indices were calculated, including Chi-square/degrees of freedom (CMIN/DF), Goodness of Fit Index (GFI), Normed Fit Index (NFI), Comparative Fit Index (CFI), Tucker–Lewis Index (TLI), and Root Mean Square of Approximation (RMSEA). The observed model fit values of the extended UMEGA were in the range of commonly accepted cut-off values as summarized in Table 5. The chi-square value of measurement model was 1.783, which is less than the cut-off value of 3 and indicates the good model fit. All the given values of absolute fit measures (GFI and RMSEA) and baseline model comparisons (CFI, NFI and TLI) were satisfactory in relation to the generally accepted cut-off points, thus indicating an acceptable model fit.

Figure 2 illustrates the results of the hypothesis testing that have been examined for the extended version of UMEGA proposed in this research. As shown in Figure 2, two of the ten hypotheses were not supported by the collected data. However, the rest of the 8 hypotheses were found to be supported from our analysis. First of all, performance expectancy (H1, β = .680, p<.001) and effort expectancy (hypothesis H2, β = .156, p<.01) had a positively significant impact on attitude while social influence had a significant negative effect on attitude, contrary to the H3 which assumed the positive and significant impact (H3, β = -.284, p<.001). Also, facilitating conditions had positively significant impact on intention to use (H4, β = .253, p<.001) and effort expectancy (hypothesis H5, β =.670, p<.001). The effect of perceived risk on attitude was found to be insignificant (H6, β = .055, p>.05). Attitude was found to have a significantly positive effect on behavioral intention, which was confirmed by the results of the path analysis (H7, β = .317, p<.001). Service quality was also found to have a significantly positive effect on behavioral intention (H8, β =.20, p<.05). Furthermore, H9 and H10 were (trust positively impacts behavioral intention, β = .548, p<.001; and attitude, β = .213, p<.001) confirmed by the analysis results.

Discussion

Building upon the previous work by Dwivedi et al. (2017), this study aimed to extend the original UMEGA by adding trust and service quality components and empirically test it in the context of Uzbekistan. In doing so, this study explored the factors that are important in e-government services acceptance among Uzbek citizens. The findings of this research suggest that performance expectancy, effort expectancy, and trust had a statistically significant positive association with the attitude toward e-government services portal known as SPIPS, which in turn, had positive effect in behavioral intention to use it. Additionally, facilitating conditions had significant and positive relationship with effort expectancy and behavioral intention to use the SPIPS. Two additional factors – trust and service quality – were also positively associated with the behavioral intention.

First of all, performance expectancy and effort expectancy were found to be two important factors that have a positive impact on the attitude toward SPIPS. This result implies that the perception on usefulness and ease of use for SPIPS can lead to positive attitude. To be specific about the performance expectancy, the citizens will be more likely to have positive attitude toward e-government portal services when they perceive it to be associated with their improved work performance. Notably, the magnitude of effect for effort expectancy or ease of use was the lowest (β = 0.156, p<.01) among other factors, which may have resulted from the high level of technology literacy among younger generations that constitute the majority among our study participations (Verkijika & De Wet, 2018). Similar results were found in other developing countries' context, including Tanzania and Mauritius (Komba & Ngulube, 2015; Lallmahomed et al., 2017). Accordingly, the perceived level of easiness for e-government service use played a lesser role towards the attitude than other factors.

On the other hand, social influence was found to have a negative association with the attitude towards e-government in contrast to our hypothesis. Interestingly, the question items for the subjective norm portion of the social influence were removed after EFA and the remaining items mainly deal with the social factor, which is the influence of people who are considered to be important as an agent who uses SPIPS and has more prestige, a higher profile or status. In this sense, question items for the social in-

Table 4. Results of convergent and discriminant validity

	CR	AVE	SQ	PE	SI	AT	PR	FC	EE	BI	TR
SQ	0.934	0.704	**0.839**								
PE	0.917	0.652	0.526***	**0.807**							
SI	0.815	0.524	0.604***	0.603***	**0.724**						
AT	0.945	0.811	0.439***	0.719***	0.314***	**0.900**					
PR	0.887	0.723	0.170**	-0.078	0.321***	-0.081	**0.850**				
FC	0.876	0.639	0.590***	0.577***	0.427***	0.531***	-0.097	**0.799**			
EE	0.906	0.707	0.625***	0.696***	0.566***	0.574***	0.048	0.613***	**0.841**		
BI	0.926	0.808	0.554***	0.717***	0.419***	0.647***	-0.089	0.606***	0.544***	**0.899**	
TR	0.935	0.782	0.826***	0.544***	0.547***	0.524***	-0.001	0.578***	0.588***	0.707***	**0.884**

CR: composite reliability; AVE: average variance extracted; SQ: service quality; PE: performance expectancy; SI: social influence; AT: attitude; PR: perceived risk: FC: facilitating condition; EE: effort expectancy; BI: behavioral intention; TR: trust

Table 5. Model fit summary of the research model

Fit index	Recommended value	Source	Value from the model
Chi-Square (χ2)/Degree of Freedom (DF)	≤ 3.0	Bentler & Bonett, 1980	1.783
Goodness-of-Fit Index (GFI)	≥ 0.80	Zafiropoulos et al., 2012	.853
Root Mean Square Error Approximation (RMSEA)	≤ 0.08	McQuitty, 2004	.049
Tucker–Lewis Index (TLI)	≥ 0.95	Hu & Bentler, 1999	.950
Normed Fit Index (NFI)	≥ 0.80	Chin & Todd, 1995	.909
Comparative Fit Index (CFI)	≥ 0.90	Hu & Bentler, 1999	.957

fluence in this study emphasize the social factor part of the social influence derived from otherness rather than the one originated from what Uslaner (2000) termed "particularized trust" among close familial ties or friends (Uslaner, 2000)." To explain this negative relationship between social influence and the attitude towards e-government services, Uzbekistan's sociodemographic and political aspect can be taken into account. Since its independence from the USSR in 1991, Uzbekistan has been home to different ethnic groups such as Russian, Tajik, Kazakh, Karakalpak, and Tatar in addition to the majority Uzbeks. Historically, these ethnic groups have experienced "partiality, injustice, and corruption" that fostered "reduced trust among other citizens (Gleave et al., 2011)." A study on social trust in Uzbekistan also demonstrated the inner oriented tendency and the high level of distrust towards other members of the society (Dadabaev, 2007). Based on the above discussion, the effects of the social influence from the people who have higher sociopolitical status than themselves may be reversed for the Uzbek context. Therefore, it can be suggested that future studies investigate subjective norm and social factor as a separate construct rather than as social influence construct.

In addition, the perceived risk did not show statistically significant relationship with the attitude towards e-government. From the extensive literature on technology acceptance over the past decades, the effects of perceived risk indeed showed mixed results. For example, a study on the acceptance for online banking system in South Korea demonstrated the insignificant association between perceived risk and the acceptance (K. S. Lee et al., 1970). Also, Shareef et al (2011) showed the unusual case of negative relationship between perceived uncertainty and trust in e-government, acknowledging this result to be confusing (Shareef et al., 2011). In explaining this unexpected result, Shareef et al. (2011) explained that the risks associated with uncertainty in the virtual environment are already a very well-known "psychological phenomenon," to the extent that it did not impede the trust in e-government (Shareef et al., 2011). In this context, further investigations into the statistically insignificant effect of perceived risk on the attitude from this study are warranted.

With regard to the facilitating conditions, they positively influenced both effort expectancy and behavioral intention. In the previous literature, facilitating conditions are defined as the level to which a person believes that an organizational or technical infrastructure and relevant environment are available to support the use of e-government services (Kurfalı et al., 2017; Venkatesh et al., 2003). In this study, the facilitating conditions were assessed by examining the perception of having resources and knowledge or understanding the SPIPS' compatibility with other systems. Based on our analysis, facilitating conditions were associated with the effort expectancy, which have been evidenced in other studies as well (Carter et al., 2012; Schaupp et al., 2010). This result is not very surprising because technological and organizational support, access to knowledge such as training, guidelines and instructions offered by the government can generally have positive impact in changing perception towards e-government services. Dwivedi et al. (2017) also agreed that having training programs, organizational structures, and technology infrastructure can help people accept e-government services. Furthermore, the findings suggest that facilitating conditions had positive and statistically significant association with behavioral intention to use SPIPS. This result is similar to the findings from the original UMEGA study that established a direct link between facilitating conditions and behavioral intention.

Furthermore, it was observed that attitude influences positively on behavioral intention to use e-government services portal in Uzbekistan context. The strong and significant effect of attitude on behavioral intention suggests that individuals might expect to use the SPIPS based on their attitude. Many previous e-government acceptance studies in general have also demonstrated this strong and significant relationship (Dwivedi et al., 2017; Hung et al., 2006; Rana et al., 2016; Verkijika & De Wet, 2018).

When it comes to the two additional components added to the extended version of UMEGA, both service quality and trust were found to be positively associated with behavioral intention to use SPIPS. First, the issue of service quality covers diverse aspects of e-government services such as reliable, well-organized, quick and transparent service delivery. In line with this, Hussein et al. (2011) argued that citizens will value e-government services when they have confidence that the information system could function as it was designed (Hussein et al., 2011). Apart from the early studies of e-government that mostly emphasized the accessibility of services, service quality has been considered as

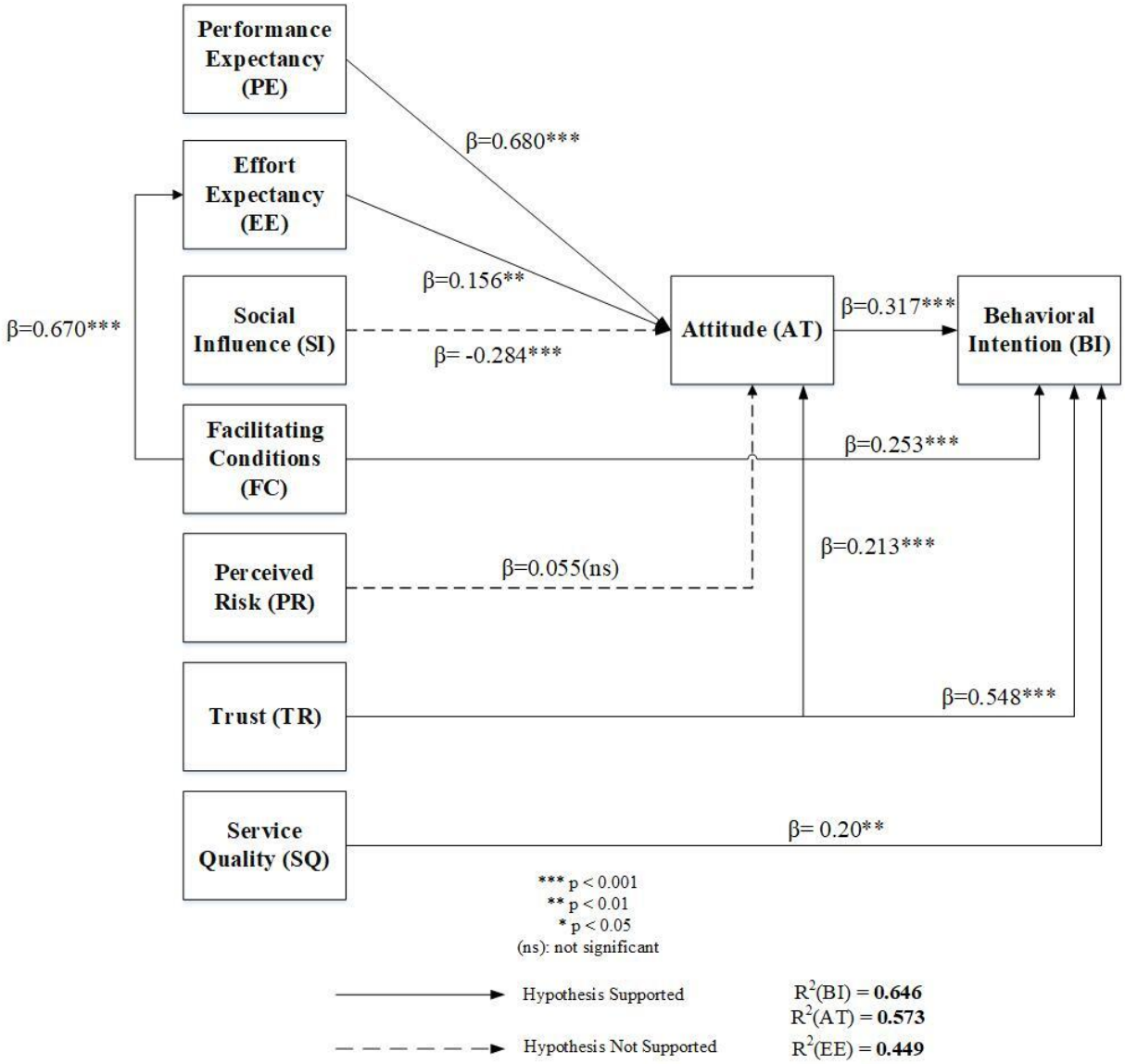

Figure 2. Results of hypothesis testing

one of the most important factors in e-government services acceptance (Papadomichelaki & Mentzas, 2012). Al-Hujran et al. (2015) also found that service quality increases the citizens' satisfaction with e-government services (Al-Hujran et al., 2015). Additionally, Rotchanakitumnuai (2008) concluded that high level of e-service quality can lead to value creation for the users. Also, one of the ultimate goals of e-government deployment is to increase the quality of services offered, and any e-government service that can guarantee the delivery of high-quality public services would have a direct impact on users' behavioral intentions to use and recommend the system (Rotchanakitumnuai, 2008). To meet the quality expectations of citizens, government entities in charge of the e-government programs must focus on delivering quality public services through e-government. Any departure from the quality standards will have a detrimental effect on the behavioral intention to use and recommend e-government services to others.

Additionally, trust is another important determinant for acceptance towards e-government services (Al-Khouri, 2012). In this research, we hypothesized that trust has significant and positive associations with both attitude and intention to use, which was supported by our study results. In fact, trust (β = 0.548, p<.001) showed stronger effect on behavioral intention to use than the attitude (β = 0.317, p<.001). Carter and Weerakkody (2008) agreed that despite cultural differences in the acceptance of e-government across countries, trust is a universal factor influencing the acceptance for e-government (Carter & Weerakkody, 2008). Also, similar results can be seen in other studies on e-government as well (Alsaif, 2014; Kurfalı et al., 2017; Lean et al., 2009). Future e-government efforts therefore, should focus on building trust with the citizens and engaging them actively for further improvement of e-government services.

Policy Recommendations

From the significant and positive relationships among the key variables demonstrated in this study, the following policy recommendations can be suggested. First, belief in

the usefulness of the e-government, trust in the e-government system, the perceived ease of use should be established among citizens to enhance the positive attitudes and thus behavioral intention for e-government. To that end, citizen-centric design for the e-government portal, reductions in system error, or public campaigns can be considered to improve user experience and raise awareness. Another key variable that had significant and positive relationship with the effort expectancy and behavioral intention was the facilitating conditions. In this regard, countries should continue their effort by ensuring stable internet access throughout the country, particularly in rural areas to facilitate the e-government services acceptance. According to a study in Nepal for example, the lack of ICT infrastructure or access to electricity was one of the most significant barriers identified by the bureaucrats and private sector experts in the e-government (Basyal & Seo, 2016). Similarly, some countries including Uzbekistan, Kyrgyzstan (Warf, 2017) and Qatar (Al-Shafi & Weerakkody, 2011) recognized the importance of internet access as a core facilitating condition for e-government and started to provide free internet connection for the public. The Uzbek government accepted a decree that provides free traffic data to e-government websites through private mobile companies and fixed broadband internet around the country. Lastly, the service quality also showed positive and significant association with the behavioral intention, implying the need for quality improvement process. According to a study that explored the barriers to adequate service quality in e-government of a developing country, the digital divide, limited technological infrastructure, lack of funding and regulatory frameworks are some of the challenges that the government should monitor (Garad & Qamari, 2021). Given the low-resource setting in Uzbekistan, these issues should be the priority areas to improve upon.

Contribution of the present study

Key contributions of this study can be summarized as follows. First, to the best of our knowledge, this is the first study that empirically tested the citizens' acceptance of e-government system in Uzbekistan based on the comprehensive review of relevant theories. In fact, previous studies on e-government in Uzbekistan descriptively discussed the barriers to implementation or legal grounds but little empirical evidence exists (Amanulla Zakirovch, 2020; Rakhmanov, 2009). Therefore, this study can lay the groundwork for future empirical and theoretical foundations for e-government studies in Uzbekistan. Assessing the citizen-level acceptance of e-government and its determinants is particularly pertinent to the current COVID19 pandemic because first, the "new normal" of social distancing and limited accessibility to face-to-face interaction largely push the governments to ensure the public acceptance of e-government system for public service delivery (Ibad & Lolita, 2020). Additionally, this crisis calls for generating more empirical evidence that can inform the "knowledge of crisis management" of a specific country (Boin & Lodge, 2016).

Second, the results from this study confirmed and extended the theoretical contributions of the previous theories in e-government acceptance studies. In other words, the directions of the key variables in this study were largely in line with the previous literature on e-government acceptance, except for two variables, namely social influence and perceived risk (Dwivedi et al., 2017; Lee-Geiller & Lee, 2019). Considering that these previous studies were conducted in countries that are politically, economically and socially distinct from Uzbekistan, our findings can provide insights into not only Uzbekistan context, but also other Central Asian countries that share similar legacy from the Soviet Union (Perlman & Gleason, 2007; Spechler, 2007).

Third, given the dearth of empirical evidence on e-government in Uzbekistan, this study can open the window of opportunity for Uzbekistan to join the discussions around the practical role of e-government as a vehicle for the participatory model of interaction in e-governance as suggested by Chadwick and May (Chadwick & May, 2003). Considering the history of authoritarian regime and centralized political system in Uzbekistan, its e-government system is currently more geared towards managerial or at best, consultative stage defined as being regulatory or efficiency-oriented (Chadwick & May, 2003). Also, conversations on the role of e-government as a tool for improving trust in government should continue in Uzbekistan as well as other Central Asian countries that aim for administrative reform (Perlman & Gleason, 2007; Spechler, 2007). In effect, the evidence on the mechanism for the relationship between e-government and the trust in government largely depends upon the specific context, as shown in two opposite pieces of evidence from the US that demonstrated either positive association between e-government satisfaction and trust or insignificant relationship between e-government acceptance and trust in government (Morgeson et al., 2010; Welch & Hinnant, 2003).

Limitations and future research

The current study has the following limitations. First, the sample of this study may limit the external validity to some extent. In fact, the data was collected in the capital city, Tashkent of Uzbekistan, and particularly at one-stop shops where citizens get access to different public services in one place. Therefore, the participants of this study are confined to the visitors of one-stop shops – mostly urban, young, highly educated people with fairly good accessibility to internet and computer. Therefore, future research should address how representative sample of Uzbek populations perceive the SPIPS. Notwithstanding this limitation, the results from this study can be generalized for large cities in other developing countries as well as other Central Asian countries that have undergone rapid urbanization. In case of the Central Asian countries, the urbanization was executed under the Soviet rule and showed similar urbanization trends with densely populated cities (UNESCAP, 2013).

The second limitation is that the SPIPS of Uzbekistan was taken as a general concept to represent all e-government services provided by the Uzbek government. The reason for this is because SPIPS is the primary provider of e-

public service within Uzbekistan. For prospective studies however, detailed definition of diverse e-government services can be investigated.

Lastly, the possible effect of common source bias on the internal validity can be discussed. Public administration literature has raised the issue of common source bias mainly due to the extensive use of surveys as a tool to measure the core concepts and use them as both independent and dependent variables (George & Pandey, 2017; Meier & O'Toole, 2012; Podsakoff et al., 2003). Although claims around the common source bias draw attention to the potential problem caused by the inflated correlations among those variables, the conclusions on the potential common source bias in this study are still pending, suggesting the need for future research based on the arguments made by Favero and Bullock (2014) and George and Pandey (2017). On the one hand, perceptual variables by their very nature, should be appropriately measured by a survey (Podsakoff et al., 2003). The variables analyzed in this study are intrinsically perceptual, including the dependent variable intention to use which should be distinguished from the actual use. In providing a systematic evaluation of remedies proposed for potential common source bias problem, Favero and Bullock (2014) argued that no technical remedies presented by the public administration scholars sufficiently fixed the problem. Instead, they suggested that independent data source should be introduced to compliment the single survey (Favero & Bullock, 2014). Similarly, George and Pandey also advised that distinct source should be incorporated in addition to a survey if relevant (George & Pandey, 2017). Therefore, future studies should explore the archival measures in addition to the self-reported survey even though the archival data is not a panacea either. Specifically, intention to use, which is the perceptual dependent variable in this study, can be translated into the actual use data that can be accessed through administrative system.

Despite these limitations, this research provides preliminary evidence on the Uzbek e-government services acceptance by ascertaining and determining main factors that affect the acceptance based on the extended version of UMEGA. The findings of this study validated and confirmed the significant role of trust and service quality as additional latent factors that influence the behavioral intention to use the e-government services in Uzbekistan. These results can inform Uzbek government sectors as well as other developing countries that launch various e-government services.

Conclusion

This study attempted to conduct empirical validation of the extended version of UMEGA in the context of Uzbekistan. In doing so, factors that influence the citizens' attitude and the acceptance of e-government services were investigated. This research responded to the call for additional validation of technology acceptance models in different country contexts and the expansion of previous theoretical models by validating the extended version of UMEGA in Uzbekistan. To our best knowledge, this is the first empirical study conducted in Uzbekistan regarding e-government service acceptance among its citizens. According to the findings of this study, performance expectancy, effort expectancy, and trust have positive associations with attitude toward e-government services portal known as SPIPS. Moreover, attitude, facilitating conditions, trust, and service quality have positive relationship with behavioral intention towards using the SPIPS. On the other hand, hypotheses on the associations of social influence and perceived risk with the attitude were not supported by the findings. Empirical tests with the extended version of UMEGA can be implemented in other Central Asian contexts to examine this issue further.

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