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An Empirical Examination of E-Government Virtual Services and the Mediating Role of Users' Perceived Usefulness

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Abstract

Government websites are repositories of information where citizens can timely access substantial and reliable information. It is usual to find antagonism between the formulators and users of e-government virtual services (EGS). This study is designed to assess the quality of virtual services provided by the Pakistani government websites. Data was collected from 278 university graduates using the simple random sampling technique. The results of Smart PLS showed that the survey respondents exhibited a positive attitude towards the perceived system quality (PSQ) and perceived information quality (PIQ) of the websites. They also perceived e-government websites as useful and displayed their satisfaction towards e-government virtual services. Finally, the findings provided support to the mediating role of users' perceived usefulness (UPU). Policymakers and practitioners can take advantage of the findings to design more citizen centered government websites in order to optimize their satisfaction with mandatory services.

Keywords: e-government, quality, users' level of satisfaction (ULS), users' perceived usefulness (UPU), virtual services

Introduction

Advancements in technology impart revolutionary changes in organizational procedures and transform organizational structures to gain competitive advantage. Businesses acknowledge the benefits of the internet and the expediency it brings in conducting business. Salient features of the internet include quick access to information and connectivity that allows organizations to use modern technology in their business operations (Gohdes, 2020). In the modern world, communication technology plays a key role in optimizing organizational performance. It also facilitates organizational activities and businesses by increasing their capabilities (Mensah, 2019). The adoption of advanced technologies by the firms has made it relatively easier to efficiently coordinate their organizational activities. These technologies assist organizations to perform business operations swiftly, exceeding

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the limitations imposed by geographical boundaries. Owing to this structural transformation, e-businesses bring enhancement in their value chain (Prodani et al., 2019; Wigand et al., 1997).

Public and private sector businesses incorporate contemporary technologies to transform their operations. However, it is observed that this transformation process is relatively slow in the public sector (Agostino et al., 2021). E-Government was initiated by the public sector organizations with the objective to exploit the same level of effectiveness and increased performance as the privately owned commercial businesses, worldwide. Consequently, publicly owned businesses started using the internet to build their on-line presence (Manoharan & Melitski, 2019; Melitski, 2001). Advancements in communication and information technologies came forth with a system comprising transparency, interactivity, decentralization and interconnectivity (Ameen et al., 2019; Yildiz, 2007). E-Government develops interaction with both citizens (G2C) and businesses (G2B) by introducing more transparency at less cost (Costake, 2008; Fang, 2002). In the public sector, the use of technology was proceeded to improve the managerial operations of the government owned enterprises. In the 1980s, the introduction of personal computers in government agencies played a pivotal role in imparting decentralized technology management. However, the integration of core functions was developed to address issues that emerged owing to the decentralized character of communication technologies (Farida et al., 2020).

In the government sector, the diffusion of advanced technology begins with the reengineering of internal processes and new reforms are introduced afterwards to restructure external linkages and optimize the service quality. The reforms are useful to provide citizens with an easy interaction with public administrators (Homburg & Stock, 2004). E-government brings quick interaction with the public through online services. It plays a significant role in diffusing organizational boundaries, making it possible to include citizens in government management and brings more transparency in public administration (Axelsson et al., 2010; Twizeyimana & Andersson, 2019). Sarker and Pathak (2000) determined that "New Public Management" (NPM) emerged in response to various environmental hindrances that governments used to face during the past few decades. In the current era of competition, people demand good quality products and services. This forces the government sector to adopt modern technologies to enhance the productivity and efficiency of government programs (Park et al., 2020). Digital transformation of processes shifts organizational communication to electronic mail (e-mail) through use of internet (Khan & Khan, 2019).

To deal with the requirements of the modern era, organizations are automating the record keeping processes and it results in the termination of various clerical positions (Girasa, 2020; Pollitt, 2007). In developed countries, governments use e-website portal and their citizens can directly contact them at any given time. Contrarily, it is difficult in developing countries to establish such efficient and flexible portals (Mutimukwe et al., 2017). In Pakistan, the government has taken various initiatives and developed websites of different departments to follow the global trend of digital government. Through the diffusion of modern technology, the government aims to achieve efficient and effective business processes.

This study is based on the evaluative framework of public policy. Globally, governments are going virtual with the idea of bringing the government and governmental organizations or services closer to the citizens (Lee & Schachter, 2019). The recent pandemic has furthered the need for such initiatives. However, although all such initiatives are important yet their importance or significance remains an open question if they are not used optimally and effectively. For any public policy program, service and initiative, it is imperative to look into it incrementally and monitor its progress, otherwise the way forward cannot be determined (Sideridis et al., 2011). For this purpose, an evaluative study is the most useful. Hansen (2005) argued that reform evaluation has been partial, non-focused and even rare and that speaks for itself, why reform or policy failure dynamics are not fully understood by the stakeholders. Without the understanding of the post-implementation implications and without getting feedback from the public or end-users, service delivery cannot be improved. For that matter, it is a necessity that reform or process evaluation should be conducted in the public sector and this research contributes by evaluating the virtual aspect of the government sector as an example. Moreover, the study in general suggests that the positive perceptions of users related to the information and system quality of an organization lead towards their satisfaction with the online services of that organization. According to (Shih, 2004; Chang et al., 2005), three factors including perceived information quality (PIQ), perceived service quality (PSQ) and perceived system quality (PSQ) determine the success of e-services in organizations. These three factors can positively or negatively affect the consumers' attitudes and behavioral intentions and can ultimately affect their decisions. Moreover, the model presented in this study can be useful for managers when taking decisions about their respective organization's virtual services.

The current study aims to examine the association between perceived information quality (PIQ), perceived system quality (PSQ), users' perceived usefulness (UPU), and users' level of satisfaction (ULS) with e-government virtual

services (EGS) with the help of the expectancy theory and the theory of planned behavior, as both theories discuss the behavior of individuals at different levels. The current work is important to bring cognizance about a variety of government websites including e-tax, e-rozgar scheme, NADRA e-services and others among people. It also contributes to the literature by investigating the mediating role of UPU in e-government virtual services. Prior studies failed to unearth UPU as a mediator especially in the Asian context (Akram & Malik, 2012; Falco et al., 2020; Jacob et al., 2017; Khan et al., 2020). Alkraiji (2020) proposed and conceptualized the indirect impact of PSQ and PIQ through UPU, however, the study did not test this relationship empirically. Hence, the existing literature shows that little scholarly work has been conducted on its mediating role. The current work is aimed to addresses this gap by assessing the indirect effect of UPU. Hence, this study has two-fold research objectives. Firstly, it is aimed to determine the relationship among PSQ, PIQ, UPU and ULS regarding EGS. Secondly, it is aimed to investigate the mediating impact of UPU in the area of EGS.

Literature Review and Theoretical Underpinnings

The expectancy-value theory presented by Vroom (1964) aids in enhancing the theoretical understanding of the current research because it explains that people learn to perform certain behaviors which they expect will translate into positive events. In other words, it suggests that individual behaviors are stimulated by their anticipated consequences. If a certain object supports an individual in achieving their goals, the individual develops a supportive and favorable attitude towards that object. A pioneer study conducted by Palmgreen (1984) adapted the expectancy-value model to media studies. It described that particular beliefs developed by individuals regarding a specific information medium can be negative or positive and determine their potential to continue using that medium. New technologies such as e-services provided by governments give individuals and audience members more control over information processes and shape their attitudes depending upon their positive or negative experiences associated with those information mediums.

This research measures users' perceived usefulness (UPU) and their level of satisfaction (ULS) on the basis of perceived information quality (PIQ) and perceived system quality (PSQ), respectively. Likewise, the expectancy-value theory as well as the theory of planned behavior (TPB) presented by Ajzen (1991) also supports the conceptual basis of this research. TPB suggests that three components, that is, subjective norms, attitude and perceived behavioral control shape the intentions of individual behaviors. These three components serve as the

potential base underlying the explicit attitudes and behaviors of individuals related to a particular event. It explains that the behavioral motivation of individuals rests on their intentions and behavioral controls, that is, a person willingly decides either to perform or not to perform a specific behavior. On the basis of these two theories, the current study theorizes that perceived information quality (PIQ) and perceived system quality (PSQ) can act as individuals' behavioral intentions and their potential behavioral controls respectively. Moreover, PIQ and PSQ can assist their attitudes towards assessing the usefulness, that is, the UPU of certain governmental e-services which eventually may determine their level of satisfaction, that is, ULS depending upon their evaluations.

Importance of Digitization in E-Governance

The notion of e-government emerged with the inception of communication technologies and globalization. The traditional governmental system was transformed by using advanced technologies. E-Government provides services to the public in more cost-effective and efficient ways using multimedia, databases, the internet and other electronic sources (Almaiah & Nasereddin, 2020; Bouaziz & Fakhfakh, 2007). E-Government is also categorized as the virtual state or digital government (Fountain, 2004; Prodani et al., 2019). With the infusion of technology, the systems and procedures of government dealing with the public and the business community have also modernized and the compulsion to visit government offices in person to avail a particular service is over. In this regard, citizens can use electronic means of communication to get prompt access to government services (Fang, 2002). With the ongoing revolution in modern technology, the mode of government dealing with the public has also transformed. It has resulted into an uninterrupted interaction between the government and the citizens. Consequently, it encourages the public to access the facts about government functioning (Ashaye & Irani, 2019). It further increases transparency in the government sector. Similarly, the emergence of the virtual state can also be made conducive for citizens by establishing public service centers close to their homes (Basu, 2004; Tan et al., 2020). Resultantly, the scope of digital government goes beyond the mere use of advanced technology to provide convenience for the public at large by ensuring them easy access to government services (Li & Shang, 2020). Working on personal computers and desktops has replaced paper-based work. In the same way, new modes of businesses and new leadership approaches are also encouraged to deal with the public in novel ways (Lewis et al., 2018).

Prior studies in the area of e-government envisaged a growth model that entails the cataloguing stage, transaction stage, vertical integration stage and horizontal

integration stage (Layne & Lee, 2001). Firstly, the cataloguing stage ensures the sufficient flow of information to online users. Secondly, the transaction stage includes the development of online databases that allow the direct interaction of the government with its citizens. The government actively responds to its users through confirmation messages. The public can also actively participate by submitting online forms. As a result, two-way interaction can be achieved through the online interface. Thirdly, in the vertical integration stage local bodies, provincial and federal governments can interact with each other using a central database. Lastly, horizontal integration aims to integrate all departmental services by developing a database to ensure timely communication among all functional areas within the same government (Reffat, 2003). Previous studies emphasized that digitalization and automation play a pivotal role in the delivery of services by the government to the public. They also result in more effective governance, transparency and accountability in government operations (Wimmer & von Bredow, 2001). Pakistan is among those developing countries that face various hindrances in the adoption of advanced technologies. It is primarily due to having a low literacy rate and poor technology infrastructure (Khan et al., 2020).

Hypotheses Development

E-Government websites empower their citizens to participate in the decision-making process and disseminate information swiftly and openly to them (Curtin, 2006). The most promising features of such websites include easy navigation and search function. The key factor of any website is that how user friendly it is. It can be inferred that government administrators have a prime interest in the optimal use of the internet and hence they emphasize the provision of digital services (Saha et al., 2012). Literature suggests that mostly the available EGS are used by the citizens only sporadically. Notably, it is due to the paradox between the perspectives of the formulators and users. This antagonism affects the utility of EGS when the users find out that they do not work according to their expectations (Hammouri & Abu-Shanab, 2018). Over the course of time, scholars recognized quality issues as among the major obstacles in the field of government, health, manufacturing and education. Quality is connoted as the response of the stakeholders to the quality of the system, services and information because these aspects of quality are imprinted on their minds (Wilkin & Hewitt, 1999). It is the need of time to scrutinize the quality of EGS owing to little prior research conducted in this area (Ray & Rao, 2004).

Previous stream of literature envisioned PSQ and PIQ as the key determinants used to assess the usefulness of EGS (Hien, 2014). PSQ is defined as the

dissemination of information, while PIQ denotes the quality of a content (Alenezi et al., 2015). This bifurcation is essential because web users cannot be attracted simply because of a conspicuous web design or the ease of browsing, as the poor quality of content available on the portal can change their mindset. On the contrary, if the quality of the content available on portals is good but the users face problems in navigating the web page, it increases the chances of users quitting the website (McKinney et al., 2002). Literature exhibits a direct influence of PIQ and PSQ on UPU (Seddon, 1997). Based on the aforementioned discussion, the following hypotheses are formulated:

H1: PSQ of EGS has a positive impact on UPU.
H2: PIQ of EGS has a positive impact on UPU.

Prior studies revealed interactivity, usability, navigation and access as the key dimensions of PSQ (McKinney et al., 2002). When the system is flexible, reliable and well-integrated, it subsequently improves ULS (Wang & Wang, 2009; Zahid & Din, 2019). Delone-McLean (D&M) model is used to determine the interplay of PSQ, PIQ and ULS (DeLone & McLean, 1992). This model has been applied and tested by a large number of scholars in different contexts (Rana et al., 2015; Veeramootoo et al., 2018; Wu & Wang, 2006). In this regard, a study conducted in the Serbian municipality found PSQ a more important determinant of ULS than PIQ (Stefanovic et al., 2016). The existing literature further shows that with the acceptance of modern technology, citizens find it easy to connect with the government. Sometimes, citizens are co-engaged with the government and give ideas to optimize EGS in a timely and convenient manner (Hu et al., 2019). Based on the aforementioned discussion, the following hypothesis was developed:

H3: PSQ of EGS has a positive impact on ULS.

PIQ is the interplay of timeliness, accuracy, precision, completeness and relevance (Bailey & Pearson, 1983; Doll & Torkzadeh, 1988). Prior literature revealed that accurate and reliable information is considered as PIQ. The matter of PIQ gains extra attention when the government uses the internet to deliver its services to the public. Information ought to be complete, economical, relevant, and accurate to rationalize its quality. Literature singles out PIQ as the chief indicator that can affect the extent of the users' satisfaction, either negatively or positively (Lee & Levy, 2014; Rasool & Warraich, 2018). High PIQ of the government websites ensures users' trust towards EGS. PIQ is an important dimension as it plays a pivotal role in building the users' intentions to use or reuse public web portals (Jacob et al., 2017; Qutaishat, 2012). Hence, the information delivered by

e-government influences ULS. Based on the above argument, the following research hypothesis is proposed:

H4: PIQ of EGS has a positive impact on ULS.

The literature of behavioral intentions showed that they have a critical impact on one's inclination to perform a certain behavior. People use a software or website when they perceive that it is useful or easy to use (Wang & Liao, 2008). Davis (1989) defined perceived usefulness as the extent to which one's performance is increased by employing a certain system. The study highlighted that a system is perceived significantly useful when it makes a positive impact on the performance of its users. In addition, the existing literature shows a significant influence of UPU on the public adoption of EGS.

H5: UPU of EGS has a positive impact on ULS.

Prior stream of studies found that UPU is an important antecedent to the users' adoption of EGS. UPU is defined as the users' perceptions with respect to the usefulness of e-government portals as compared to offline government services (Khan et al., 2020). Citizens avail EGS when they find them easy to operate. Prior studies lend support to a positive association between UPU and ULS with EGS (Jacob et al., 2017). Existing literature also lends support to UPU as one of the important determinants behind the users' adoption of EGS. Chen and Aklikokou (2020) examined the indirect effect of trustworthiness, degree of openness, technological risk and facilitating conditions on the intentions to use e-government portals based on UPU. They deduced a partial or full mediation in their study among these variables.

H6: PSQ of EGS has a significant indirect relationship with ULS through UPU.
H7: PIQ of EGS has a significant indirect relationship with ULS through UPU.

The study of the existing stream of literature makes it clear that there are few studies available that empirically investigated the mediating effect of UPU in determining ULS with EGS (Chen & Aklikokou, 2020; Chirchir et al., 2019). Consequently, the current work contributes to the existing literature by examining the indirect effect of PSQ and PIQ on ULS through UPU. Thus, the research model of the current study comprises the exogenous variables (PIQ and PSQ), the mediating variable (UPU) and the endogenous variable (ULS) as presented below in Figure 1.

Figure 1

Conceptual Model
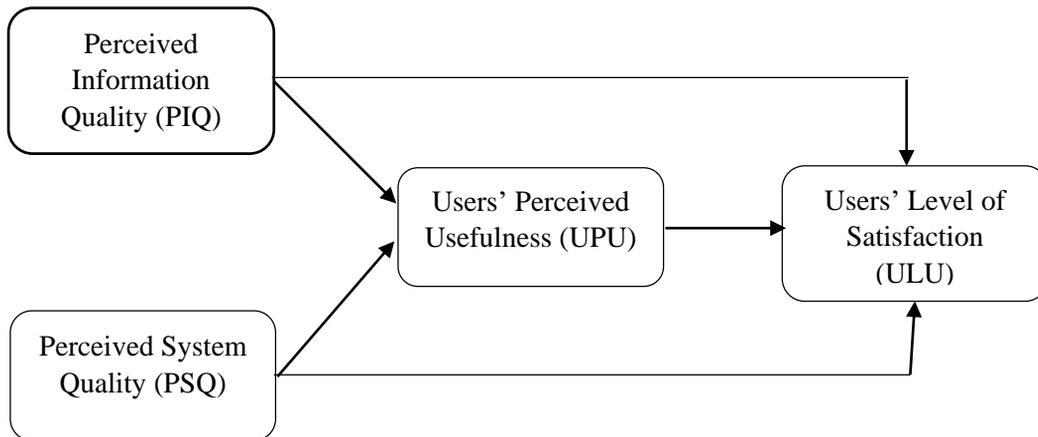
Research Methods and Materials

The current study followed the survey research design owing to a widely dispersed population. The target audience consisted of university graduates because they frequently use technology and have ample exposure to the internet. The population of interest comprised the students enrolled in the bachelor's program of the Faculty of Economics and Management Sciences, University of the Punjab, Lahore, Pakistan. The total population consisted of 1412 students. This information was obtained from the university website and confirmed by the registrar office of the said university. By employing Yamane's (1967) formula, the minimum sample size of 312 was used. Questionnaires were distributed using the simple random sampling technique. The data from 278 questionnaires was used to carry out the data analysis, while 34 questionnaires were discarded due to non-response from the designated respondents. The response rate of 89.1% was recorded.

Data was collected by randomly distributing questionnaires through the internet. Online data collection is useful for targeting a large number of individuals that form a dispersed population in an economical way (Bryman, 2016). Moreover, students were confined to homes due to the COVID-19 pandemic and were not allowed to attend the university. Using Google forms, an online questionnaire was prepared. The questionnaire was shared with the university graduates through their official email addresses obtained from their respective departments. Data was further analyzed by performing frequency distribution analysis of demographic variables. Further, Smart PLS was used to test the hypotheses owing to the non-normal distribution of the data.

Research Measures

In order to develop the questionnaire, the current study adopted research tools developed by various researchers. As far as perceived system quality (PSQ) scale is concerned, eight items of Aladwani and Palvia (2002) were used and the responses were recorded using a seven-point Likert scale ranging from 1= Strongly Disagree to 7= Strongly Agree.

Perceived information quality (PIQ) was evaluated by adopting nine items of Doll and Torkzadeh (1988). All nine items were evaluated on a seven-point Likert scale ranging from 1= Strongly Disagree to 7= Strongly Agree.

In order to determine the users' perceived usefulness (UPU), that is, the mediator used in this study, four items were taken from Cao (2005) which were evaluated on a seven-point Likert scale as stated above.

Lastly, the current study adopted four items from Seddon and Kiew (1996) to evaluate the user's level of satisfaction (ULS), that is, the dependent variable using a seven-point Likert scale ranging from 1= Strongly Disagree to 7= Strongly Agree. Detailed items are presented in Table 2.

Sample Characteristics

Table 1 depicts the descriptive analysis of demographic variables including gender, age group, education level, computer experience and internet usage. It shows that almost 53% respondents were male, while almost 47% were female. With respect to age group, the table exhibits that 52% respondents were in the age group of 25-29 years. Regarding the education level of respondents, almost 40% respondents were enrolled in the MA program and almost 37% were enrolled in MS or MPhil program. Table 1 further exhibits that the majority respondents had been using computer for 3-6 years. The table also mentions that 48% respondents displayed 4 and more than 4 hours of internet usage.

Table 1

*Demographic Statistics of the Respondents*

Variable Categories	n=278 (100%)
Gender	
Male	148 (53.2)
Female	130 (46.8)
Age group	
20-24	92 (33.1)

Variable Categories	n=278 (100%)
25-29	144 (51.8)
30-34	37 (13.3)
35 and above	05 (1.8)
Education level	
Bachelor	58 (20.9)
Master	110 (39.6)
MS or MPhil	103 (37.1)
Others	07 (2.50)
Computer usage	
Less than 1 year	8 (2.9)
1-2 years	42 (15.1)
3-4 years	88 (31.7)
5-6 years	80 (28.8)
7 and above years	60 (21.6)
Internet usage	
Less than half hour	5 (1.8)
1/2 hour-1 hour	23 (8.3)
2-3 hours	116 (41.7)
4 and above hours	134 (48.2)

Results

In this study, partial least square (PLS) technique was applied to curb the problem of non-normal distribution of the collected data. The results were analyzed in two phases. Firstly, a measurement model was developed and used to evaluate the convergent validity and composite reliability of the research instrument. Secondly, a structural model was developed for using the path coefficients to check the hypotheses of the current study.

To determine the validity and reliability of the research instrument, a measurement model was developed which is depicted in Figure 2. The figure highlights that all the loadings are above 0.70, which shows that all the items are retained in the study.

Figure 2

Measurement Model
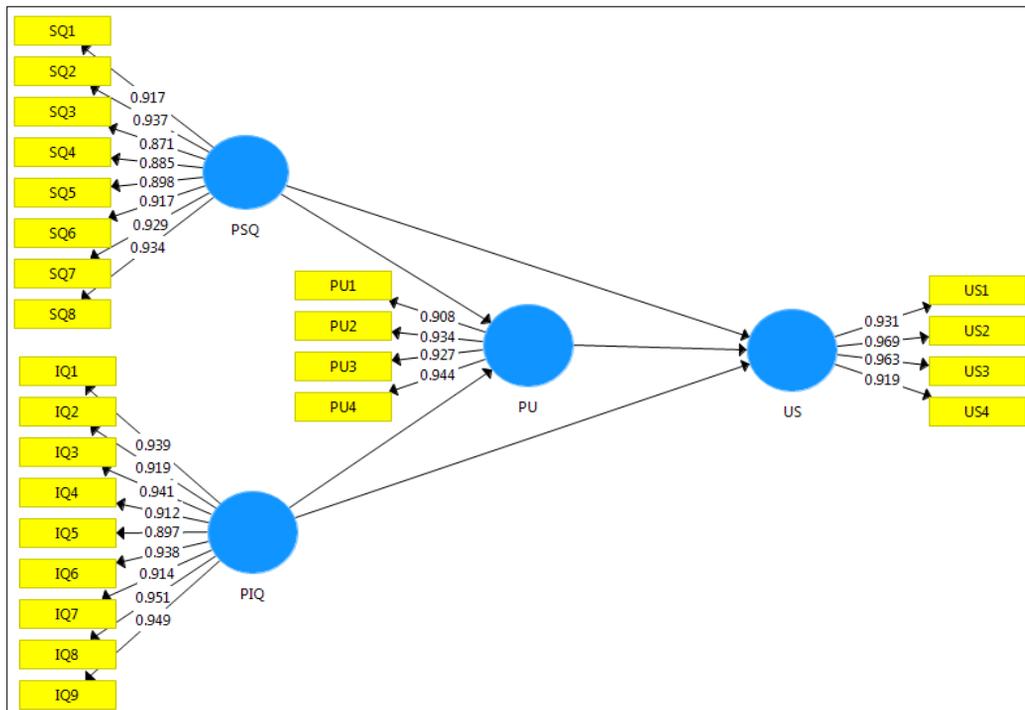
Table 2

Composite Reliability and Convergent Validity

Latent Construct	Items	SFL	α	CR	AVE
PSQ	1. The website provides security for your personal data.	0.917	0.975	0.975	0.830
	2. Navigation through the website is easy.	0.937			
	3. The website is always accessible.	0.871			
	4. The website provides workable links.	0.885			
	5. The website clearly indicates its content map.	0.898			

Latent Construct	Items	SFL	α	CR	AVE
	6. The response time of the website is appropriate.	0.917			
	7. Searching is fast on the website.	0.929			
	8. The loading time of the website is reasonable.	0.934			
PIQ	1. The website provides useful information.	0.939	0.983	0.983	0.863
	2. The website provides accurate information.	0.919			
	3. The website provides adequate information.	0.941			
	4. The website provides up-to-date information.	0.912			
	5. The website provides the information timely.	0.897			
	6. The information content matches your needs.	0.938			
	7. The information content is easy to understand.	0.914			
	8. The information content is clear.	0.951			
	9. The website provides the information in a proper format.	0.949			
UPU	1. The website is easy to use.	0.908	0.961	0.962	0.862
	2. The website is user friendly.	0.934			
	3. It is easy to find the information on the website.	0.927			
	4. Using the website saves my time.	0.944			
ULS	1. I find the website very helpful to fulfill my information processing needs adequately.	0.931	0.971	0.971	0.894
	2. The website is very efficient.	0.969			
	3. The website is very effective.	0.963			
	4. Overall, I am satisfied with the working of the website.	0.919			

Note: SFL= Standardized Factor Loading; α=Cronbach's alpha; CR= Composite Reliability; AVE= Average Variance Extracted

In order to determine the convergent validity, Smart PLS was used. Chin (1998) mentioned that factor loadings should be beyond 0.60. Table 2 shows that all the factor loadings are more than the threshold, that is, 0.80. In the case of PSQ, PIQ, UPU and ULS, all factor loadings are greater than 0.80. The same pattern was observed with respect to reliability as shown in Table 2. The value of composite reliability should be greater than 0.70 in order to calculate the construct validity. Table 2 revealed that the composite reliability of all latent constructs is more than 0.90. In case of average variance extracted (AVE), Hair (2019) stated that the value beyond 0.50 is considered better for convergent validity. Table 2 further shows that the values of AVE for all latent constructs are beyond the threshold value.

Figure 3
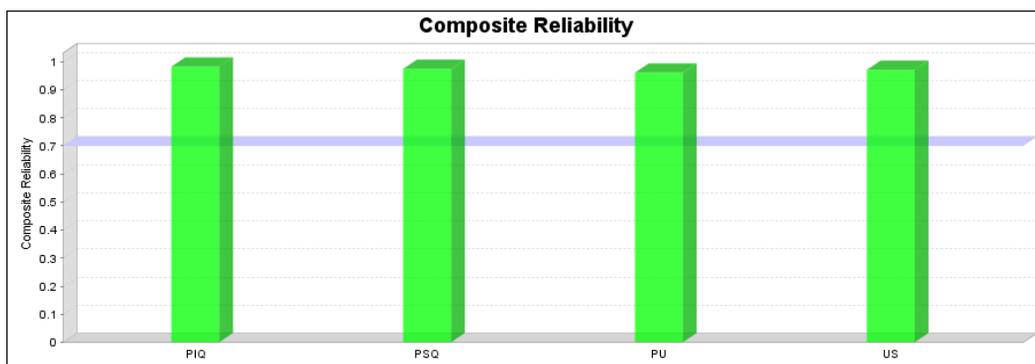
Composite Reliability

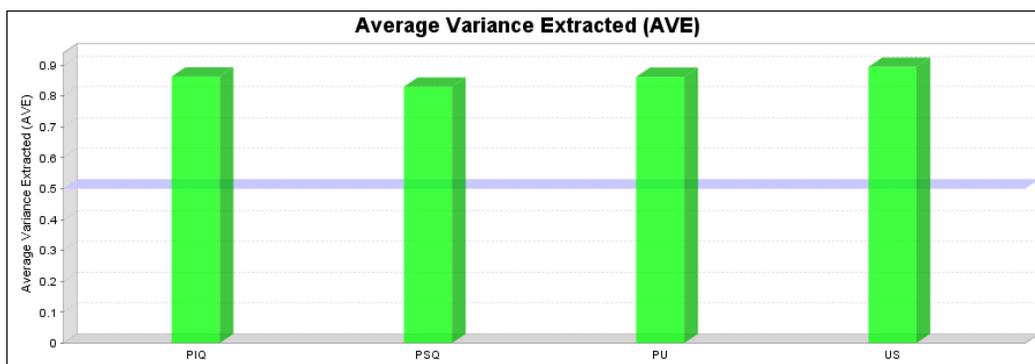

Figure 4

Average Variance Extracted

Figure 3 shows the graphical presentation of composite reliability. It shows that there is internal consistency among the items of the latent constructs. AVE is

graphically presented in Figure 3 which shows that all the values are more than 0.70. It confirms the existence of construct validity in the study.

Table 3

Discriminant Validity

	PIQ	PSQ	UPU	ULS
PIQ	0.929*			
PSQ	0.428	0.911*		
UPU	0.379	0.456	0.928*	
ULS	0.441	0.579	0.448	0.946*

Table 3 confirms the existence of discriminant validity as the values of √AVE of all constructs fall in the range of 0.911-0.946. On the other hand, the maximum value of correlation is 0.579. It shows that all latent constructs are distinct.
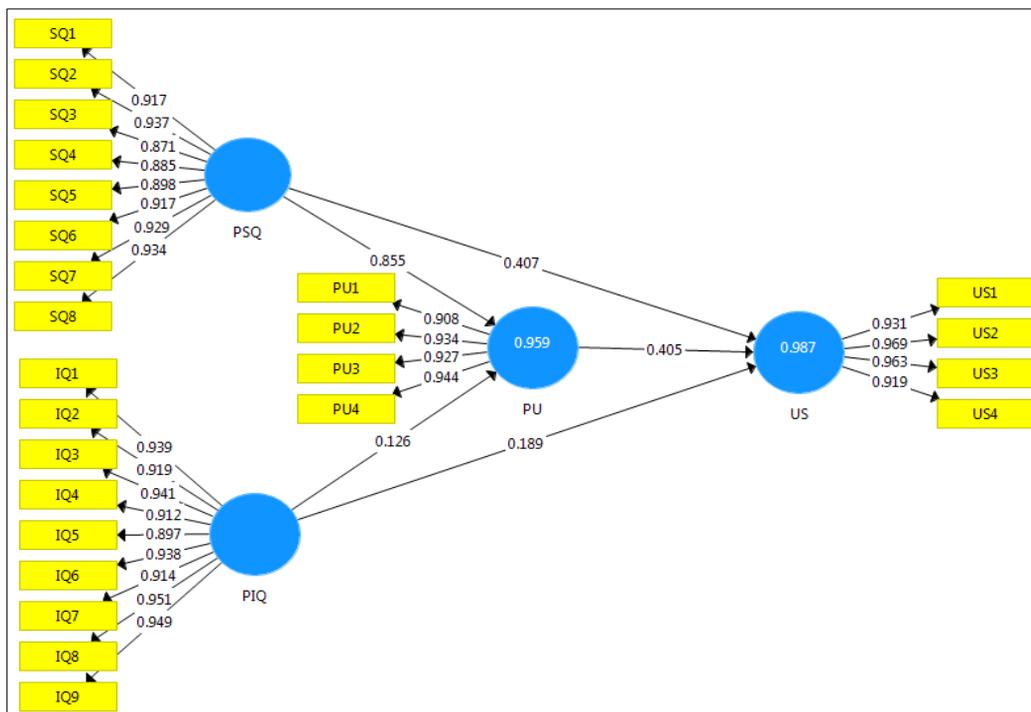
Figure 5

Structural Model

Figure 5 exhibits the structural model of the study. Structural model helps to determine R-square, path coefficients and effect size. In order to test the hypotheses, path coefficients were used.

Table 4

Analysis of the Structural Model

Hypo-thesis	Paths	Original Value	T-Value	P-Value	Results	VIF	F-Square	R-Square	Q-Square
H₁	PSQ→UPU	0.855	3.975	0.000*	Accepted	1.112	0.806*	UPU 0.959	0.761
H₂	PIQ→UPU	0.126	1.990	0.049*	Accepted	1.672	0.018*	ULS 0.987	0.817
H₃	PSQ→ULS	0.407	3.112	0.002*	Accepted	1.441	0.316*		
H₄	PIQ→ULS	0.189	2.011	0.040*	Accepted	1.744	0.121*		
H₅	PU→ULS	0.405	2.899	0.004*	Accepted	1.655	0.513*		
H₆	PSQ→UPU →ULS	0.347	2.579	0.012*	Accepted				
H₇	PIQ→UPU →ULS	0.051	1.988	0.047*	Accepted				

Table 4 shows 7 path coefficients: PSQ→UPU, PIQ→UPU, PSQ→ULS, PIQ→ULS, UPU→ULS, PSQ→UPU→ULS and PIQ→UPU→ULS. All paths are significant having *p*-values < 0.05. Drawing upon the prior stream of studies, the current study empirically examined PSQ, PIQ, UPU and ULS of EGS. The findings provide positive and significant support to all the hypotheses of the current research work. H1 of this study proposes that PSQ has a direct and significant impact on UPU. The results depicted in Table 4 support H1 (β-value=0.855, p-value<0.05). Moreover, the findings provide support to H2 of the current study by depicting a positive relationship of PIQ with UPU (β -value=0.126, p-value<0.05). Table 4 further provides support to H3 of this study (β -value=0.407, p-value<0.05). Thus, the empirical findings confirm the existence of a causal relationship between PSQ and ULS. They also support H4 (β -value=0.189, p-value<0.05). Hence, it is suggested that PIQ is a significant antecedent of ULS. Table 4 also affirms H5 of the current study (β -value=0.405, p-value<0.05), which supports a causal yet positive link between UPU and ULS.

In case of mediation, Hair et al. (2013) recommended compliance with the instructions of Preacher and Hayes (2004, 2008) for mediation analysis and model bootstrapping for determining the indirect effects. Preacher and Hayes (2008) asserted the mediation procedure to be followed by providing two rules, that is,

bootstrapping confidence interval and bootstrapping the indirect effect which states that the *p*-value must be less than 0.05. The findings depicted in Table 4 lend support to H6 and H7 of the current study. As a result, UPU significantly mediates the relationship between PSQ and ULS (β-value=0.347, p-value<0.05) using bootstrapping technique. Finally, UPU also significantly mediates the relationship between PIQ and ULS (β -value=0.051, p-value<0.05) using the same technique.

Table 5

GoF Index

Latent Constructs	AVE	R Square
Perceived System Quality	0.830	
Perceived Information Quality	0.863	
Users' Perceived Usefulness	0.862	0.959
Users' Level of Satisfaction	0.894	0.987
Average Scores	0.862	0.973
AVE * R Square	0.838	
(GoF= √AVE * R Square)	0.915	

For testing the robustness of the statistical techniques opted for this research, PLS-algorithm was employed to calculate the values of R^2. Falk and Miller (1992) argued that in order to accept the predictive relevance of the model, the value of R^2 should be greater than 0.10. In this article, the values of R^2 are beyond the threshold value. Moreover, the values of VIF are also within the acceptance criteria of 5 and it exhibits the absence of multicollinearity among the exogenous variables. The value of F-square is used to calculate the effect size. If it is below 0.10, the effect size is viewed as small. Values ranging from 0.10 to 0.35 depict a medium size effect. However, if the value of F-square is beyond 0.35, the effect size is viewed as large. In this article, the F-square values of PSQ→UPU, PSQ→ULS, and UPU→ULS are 0.806, 0.316 and 0.513, respectively. It shows a large effect size. While the F-square value of PIQ→UPU is 0.018, which shows a small effect size. Lastly, the F-square value of PIQ→ULS is 0.121, which shows a medium effect size. Table 4 further exhibits Q-square that shows the path model's predicative relevance. The threshold value of Q-square is zero (Fornell & Cha, 1993). The value of Q-square in Table 4 is positive which shows a significant predictive relevance of the path model of this study. Lastly, 'goodness of fit' was also tested. According to Wetzels et al. (2009), the allocated GoF values of model fitness are

as follows "GoFsmall = 0.1, GoFmedium =0.25, GoFlarge= 0.36". In Table 5, GoF formula (GoF= $\sqrt{AVE} * R2$) yielded a GoF value of 0.915, which is higher than GoFlarge= 0.36. This means that the model fits well as compared to the GoF values mentioned above.

Discussion and Conclusion

Numerous scholars and researchers have investigated the area of e-government virtual services (EGS). However, the existing studies mostly treat UPU either as an independent variable (Alkraiji, 2020; Khan et al., 2020) or a dependent variable (Falco et al., 2020). There have been a few studies conducted to examine the mediating role of UPU, especially in the area of EGS. This study is important because it allows us to determine the indirect effect of PSQ and PIQ on ULS through UPU. All hypotheses were empirically tested and accepted. The first hypothesis proposes a positive impact of PSQ on UPU which is supported by the empirical findings. These findings corroborate the prior literature that also exhibits the direct influence of PSQ on UPU (Hien, 2014; McKinney et al., 2002; Zahid & Haji Din, 2019). The H2 of this study that proposes a positive impact of PIQ on UPU was also accepted. This result is in line with prior studies that found PIQ as among the important antecedents of UPU because it plays a significant role in building the user's intentions to use or reuse e-government portals (Jacob et al., 2017; Qutaishat, 2012).

The inferential findings further support H3 and H4 of the current study. Hence, PSQ and PIQ were also found to be important indicators of ULS. These findings also gain support from the existing stream of studies. Previous authors suggested that when the system is flexible, reliable and well-integrated, it improves ULS (Rana et al., 2015; Veeramootoo et al., 2018; Wang & Wang, 2009). Rasool and Warraich (2018) also affirmed PIQ as the chief antecedent of ULS, hence information delivered by e-government influences ULS. Moreover, H5 of this study also gains support from the empirical findings. Hence, it was concluded that UPU of EGS is a significant stimulus of ULS. The empirical findings of the current study are in line with the extant literature. People use a software or website when they perceive it as useful or easy to use (Alkariji, 2020; Wang & Liao, 2008).

Finally, the findings provide support to H6 and H7 of the current study. These results affirm the mediating role of UPU which is the chief contribution of the current work. The findings of this study indicate that the respondents have a positive inclination towards using e-government portals. The users entrust the PIQ and PSQ of the government websites. Further, they affirm that the e-services of the government satisfy their emergent needs. As a result, public was better served by

e-government when it sought reliable information 24/7 without having to visit government offices physically. With the diffusion of technology in government offices, it can simplify administrative procedures and may also help to create a better business environment by creating transparency and accountability. The public at large can obtain information easily through the e-government portals and can become an active partner of government in making public policy. To provide the advantages of modern technologies to the masses, the government can incorporate new training modules in the education system. E Government of Pakistan (GOP) launched e-rozgar scheme to train the youth so they can earn by freelancing. Pakistan has the 4th position in the world ranking of freelancing (Javed, 2020). However, many more steps need to be taken. For instance, local governments or ministries rarely employ computer and information technology in rendering public services. By using advanced technologies, the government can optimize the speed of communication with the public. Lastly, this study helps to develop the evaluation of public policy programs and at the same time, it also helps in stressing the importance of monitoring the evaluation framework.

Theoretical Implications

This study is based on the expectancy-value theory and the theory of planned behavior. The findings of the current study suggest that innovative and new technologies such as e-services provided by the government give citizens more control over information processes and shape their attitudes depending upon their positive or negative experiences associated with these information mediums. In case of a positive experience with the disseminated information and system quality of the websites, citizens become satisfied with the performance of the government. However, in case of a negative experience, citizens show distrust with the government which eventually leads to dissatisfaction with its performance.

The model developed in this research may be used for implementing and evaluating e-government initiatives that improve public service delivery. It is not a "silver bullet" in the manner that it does not ensure the success of e-government activities, although it does show a higher possibility of success.

Practical Implications

This study has further implications for public sector managers and policy makers. The findings imply that government officials should place greater emphasis on building an appropriate IT infrastructure to address technological demands for effective e-government implementation. Furthermore, professional change management should accompany this process, guiding and supporting

administrative employees in going forward with creative methods of working and with new processes.

Government agencies can take this study as a guide and can try to bridge the gap between the citizens and government by adopting e-governance initiatives taken by the government and explicated through the websites and procedures of various government departments. This all needs a high level of awareness by based on the proper access to information at citizens' level. Abdelghaffar et al. (2010) highlighted that awareness is a key element in understanding government activities and if governments use mass media and other platforms to increase awareness among citizens regarding its initiatives, it can do the needful in an effective manner.

Also, it is important to involve citizens in the developmental and evaluative process of e-government through electronic feedback sessions. Srivastava and Teo (2009) highlighted that if citizens are involved in such phases, it enhances users' satisfaction which eventually leads to better service delivery by the government. According to Chun et al. (2010), citizens are not at the receiving end in terms of the relationship between government and public; rather, they can guide in better policy formulation. Hence, this study broadens the horizons for policymakers to better develop the information and system quality websites which may induce citizen satisfaction and thus better functioning of the state. Lastly, the model and research design followed in this study can be used for further evaluative studies in the domain of e-governance owing to its importance and future implications.

Future Recommendations

The current study carries some important practical implications for policy makers and practitioners by defining the ways that may increase citizens' willingness towards online interaction. It further suggests a new avenue in order to facilitate the public by proclaiming that the government may launch awareness campaigns through TV ads, social media and e-mail services. Moreover, it also suggests that government websites be designed in Urdu and other local languages as a lot of people still cannot comprehend English in Pakistan properly. A complete users' browsing guide about "how to use a website" may help the beginners to easily navigate through government websites. However, the current study also has some limitations. Firstly, it ignored multi-group analysis such as university, culture, gender and others to probe how the traits of users can influence EGS. In order to investigate the effect of sample diversity, future scholars may carry out research in this area. Secondly, the current work did not examine the impact of demographic variables including age group, educational level, computer experience and internet usage. Hence, future researchers may investigate the effect of demographic

variables on EGS. Lastly, future studies may advance the current research by employing a longitudinal research design for better empirical understanding of EGS and its antecedents.

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