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An empirical study into the effect of the digital divide on the intention to adopt e-government

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A B S T R A C T

This study investigated the relationship between the digital gap and the intention of Jordanians towards e-government usage. It focused on three components of the digital divide namely access, skills, and innovativeness. In addition, the research investigated how socio-demographic factors influence this connection. Data comprised 620 valid replies to questionnaires issued to 700 Jordanian citizens aged 22 and older who resided in urban and rural areas. Statistical Package for the Social Sciences (SPSS) version 26 and Analysis of Moment Structures (AMOS) version 24 were employed in data analyses and hypotheses testing. The results showed that all three aspects of the digital divide had a significant influence (access, skills, and innovativeness) on the intent of Jordanian citizens to utilize e-government, and the dimension of access imparted the strongest impact, followed by the dimension of skills and then the dimension of innovativeness. Additionally, it was discovered that gender, age, and education were the socio-demographic factors that could weaken the impact of the digital divide on the intentions of user to access e-government services. Contrariwise, the factor of income did not show a similar impact. Furthermore, perceived security significantly impacted the propensity towards e-government usage. Trust played a significant role in mediating the link between perceived security and the intention to engage in e-government.

1. Introduction

The use of information and communication technologies (ICTs) has changed society worldwide. Consequently, governments worldwide are striving to offer efficient services to their citizens through digital platforms, as exemplified by initiatives offered by e-government. E-government utilizes ICTs as a cost-effective alternative to traditional service delivery methods (Pieterson & Van Dijk, 2007), to provide effective governance for citizens (Saxena, 2005). Governments everywhere are embracing e-government to establish direct connections with their citizens (Bertot et al., 2010). Everywhere in the world, e-government services are increasing in number, fueled by widespread internet connectivity (Zhao et al., 2012). Similarly, Jordan's government has taken significant steps to leverage e-government to provide accessible and efficient public services while improving transparency and accountability. Countries exhibit varying degrees of success with their e-government projects. For instance, many developing countries often experience either complete failure, leading to project abandonment, or partial failure, where the intended goals are not fully achieved (World Bank Group, 2023). Recognizing that successful e-government adoption necessitates competent service providers and user approval (Mkude & Wimmer, 2015), emerging nations are actively improving their e-government systems, and the United Nations E-government Survey from 2023 has confirmed this. Accordingly, policymakers must pinpoint the barriers preventing people's acceptance of e-government,

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particularly in developing nations. This was to ensure extensive and successful system usage. In reality, Dwivedi et al. (2016) found that developing nations are still setting up the required infrastructure for e-government projects, underscoring the importance of addressing the issues related to e-government acceptance.

The gap between individuals who have access to IT knowledge and resources and those who do not is known as the "digital divide" (Mason & Dodds, 2005). impacts the non-acceptance of e-government among some citizens. Scholars have suggested that this divide may impede online services, like e-government. These services heavily rely on ICT tools such as the internet and mobile technologies. Even if adequate e-government infrastructure is provided, its success may still be hindered if citizens are reluctant to embrace digital technologies. Therefore, as indicated by Abu-Shanab et al. (2013), governments must ensure citizens' active involvement in governance. Additionally, in addressing the digital divide issue, it is crucial to include citizens from all backgrounds. Governments should be mindful of the challenges brought by the digital divide, as these challenges may impede access to e-government services. Owing to the condition of e-government deployment today, the present work examined how the digital divide affects citizens' e-government usage, for the situation of developing countries. The study particularly examined the first-order divide, which is access-related, and the second-order gap, which is related to digital skills and usage. The first-order difference, according to Dewan and Riggins (2005), is the access barrier, whereas the second-order divide concerns skills and competence in digital technologies. Additionally, in the existing literature, the innovativeness divide has been inadequately investigated as a component of the digital divide. This topic was also discussed by Rahman (2015).

According to socio-demographic criteria including gender, age, educational level, income, The digital gap may limit how people use e-government depending on their geographic location and residential setting (almajali et al.,2023). Somehow, as reported by Rahman (2015), It has not been thoroughly examined how these socio-demographic factors affect the relationship between the digital gap and Jordanian residents' propensity to use e-government. The following two research questions served as a guide for the examination of the current study:

1. How do the varied elements of the digital divide affect citizens' intentions to use e-government?
2. Is the impact of the digital divide on the citizens' intentions to use e-government moderated by socio-demographic factors?

Jordan has been selected as the study context, representing a developing nation, and the conclusions might apply to other nations, developing nations especially. Accordingly, the situation of e-government and the digital divide in Jordan as a developing nation is discussed in this section. In the ensuing section, the results of earlier research used to create the study hypotheses are presented. This is followed by a section that elaborates on the methodology used in this study. A brief description of the sample's profile is also presented. Study results produced from statistical analysis are discussed in section . The ramifications and restrictions of the study and the study conclusions are provided in the last section.

2. Literature review and hypothesis development

The digital gap can be understood as a disparity between those who have access to and knowledge of ICT and those who do not (Bélanger & Carter, 2009; Almajali et al., 2023). In addition to what has already been said (see: Mason & Dodds, 2005; AL-Rababah & Abu-Shanab, 2010), the access divide and the use (or skills) divide can be divided into two groups. The gap caused by a lack of access to necessary ICT tools (e.g., the Internet and computers) is called the access divide (almajali et al.,2023), while the use divide refers to the gap brought on by a lack of technical knowledge or digital skills required when using the ICT (Van Deursen & Van Dijk, 2011; Masa'deh et al., 2023). The outcome divide as the third order of the digital divide was coined by Wei et al. (2011) and this type of divide refers to the discrepancy in ICT usage outcomes.

Within the context of e-government, the digital divide consists of two elements (Khan et al., 2012): the access divide and the social divide. Specifically, the access divide comprises three sub-dimensions namely e-service accessibility, the quality of e-service access, and the skills required for e-service usage, while the social divide can be broken down into three sub-dimensions of social support, e-service awareness, and e-service culture. Rahman (2015) conducted an independent study and presented comprehensive framework for the digital divide with five dimensions: economic (related to socioeconomic factors), access (focused on users' physical access to ICT), demographic (in regards to users' demographic characteristics), capability (relevant to users' self-efficacy in ICT use), and innovativeness (related to users' openness to experimenting with new and innovative ICT arrangements).

Socio-demographic factors, for instance, the factors of gender, ethnicity, The digital gap is greatly shaped by factors such as economic level, work position, geographic location, physical capabilities, and handicap (Khan et al., 2012). Contributing to the access gap, Bansode and Patil (2011) highlighted factors like the absence of ICT competencies and assistance, internet, and computer accessibility, as well as affordability. Age, race, education, and income were noted as significant determinants of the access difference by Bélanger and Carter (2009) . The skills divide was influenced by factors such as computer experience, internet usage frequency, online purchase frequency, and online information searches. Globally, the digital gap exists, even in industrialized nations with high levels of digital technology adoption, where internal concerns about the digital divide continue because of socio-demographic criteria such as gender, level of education, income, and location of the user (Chipeva

et al., 2018). Khanra and Joseph (2019) accordingly emphasized the value of examining the digital divide in diverse national settings. Bélanger and Carter (2009)'s study highlighted the significant effects of the digital divide on e-government and the utilization of online services in developing countries. The adoption of e-government services has been hindered by the digital divide, as reported during the European Union Ministerial Conference in 2006. Okunola et al. (2017) emphasized the need for further investigation into the direct impact of various aspects of the digital divide on e-government usage in developing countries. Examining Jordan, Abu-Shanab and Al-Jamal (2015) discovered that the digital divide has limited the Jordanians from fully benefiting from e-government services; in this study, the authors were focusing on the element of the "gender digital divide (GDD)". Within the context of Afghanistan, Khan et al. (2012) discussed two aspects of the digital divide in the intentions to use e-government services: the access divide and the social divide. The aspects of "access divide" and "social divide" in this study each have three sub-dimensions: social support, awareness, and culture. The element of "access divide" covers service access, access quality, and access skills. The study found strong connections between e-government usage intentions and the countless dimensions of the digital divide. This study, however, did not explore how this link differs across different socio-demographic groups.

2.1 Access divide

The concept of access has been discussed and described in various studies. In Mehra et al. (2004), it was elaborated as the availability of essential ICT resources like computers and internet access. The access divide, on the other hand, is caused by uneven ICT infrastructure distribution, according to Bélanger and Carter's (2009) explanation. This type of divide prevents some people from using the resources. This disparity is glaring between and within nations, particularly in developing nations. Rahman (2015) noticed a bias in ICT availability towards metropolitan areas, but Wei et al. (2011) recognized it as a significant factor influencing ICT usage. During their examination of e-government, Bélanger and Carter (2009) found a favorable impact of users' ICT tools access level on their intention to utilize e-government services. Additionally, individuals with ICT access are very likely to utilize the e-government services, as demonstrated by Khanra and Joseph (2019) and Alhadid et al. (2022). The evidence supports the notion that the access divide influences citizens' intentions to adopt e-government services. This study proposes the hypothesis below:

H_1: *Access divide has a significant impact on citizens' intentions to use e-government services.*

2.2. Skills divide

The gap in skills between people possessing essential digital abilities, or e-skills, in the usage of ICT, and those who do not is called the skills divide (Dewan & Riggins, 2005). Technical skills required to use ICT-enabled services are called digital skills, or e-skills (Mossberger et al., 2003; Almajali et al., 2022). Additionally, Khan et al. (2012) mentioned that e-skills entail a collection of fundamental competences, ideas, and knowledge required to use e-government services. Digital skills, or e-skills, have a beneficial impact on the intention to use e-government services, according to Chen et al. (2006) . Relevantly in their study, Khan et al. (2012) indicated that skilled human resources are necessary in the achievement of successful diffusion of e-government services, leading to the following hypothesis:

H_2: *The skills divide has a significant impact on citizens' intentions to use e-government services.*

2.3. Innovativeness divide

Innovativeness refers to a user's readiness to explore and adopt new and novel ICT approaches as indicated by Agarwal and Prasad (1998) and other researchers. Users who embrace the latest technologies early on are considered "innovative," while those who adopt them later are categorized as "non-innovative" (Rogers, 1995). Rahman (2015) defined the innovativeness divide as the difference between innovative users and others. Citizens reject change in many developing nations and this rejection prevents them from embracing breakthroughs like ICT improvements. Regarding ICT innovation, Agarwal and Prasad (1998) emphasized the importance of personal innovation. Rahman (2015) reported a significant impact of the innovativeness divide on e-government services intention. Therefore, it was expected that:

H_3: *Citizens' intentions to use e-government services are significantly impacted by the innovativeness divide.*

2.4. Trust

Trust has been examined and described from a variety of angles (Daellenbach & Davenport, 2004; Maqableh et al., 2021). James (2002) defined trust in economics as an expectation when agents take risks in incomplete and uncertain surroundings. Giaretta (2014) viewed trust as a crucial factor in relationships and an essential element in technology transfer. Alkraiji and Ameen (2021) discovered that trust contributes to increased loyalty to e-government services. Furthermore, trust has been widely incorporated into the Technology Acceptance Model (TAM). Trust was highlighted in relation to robot technology and research in interactions involving human and robot by Heerink et al. (2010). Trust seemed to significantly affect citizens' behavioral control and adoption of electronic government services , as concluded by Warkentin et al. (2018). Khan et al. (2021) added that trust can reduce uncertainties and risks, aside from impacting citizens' system usage behavior positively.

Clearly, a significant connection between trust and acceptance towards technology can be established, leading to the formulation of the hypothesis below:

H_4: *Trust positively influences e-government usage.*

In their research, Zhao and Bacao (2021) discovered that during a pandemic, perceived security considerably mitigates transactional uncertainties. This finding aligns with the work of Arnott et al. (2007) that emphasized the importance of perceived security in fostering trust and in positively influencing customers' behavioral intentions. Furthermore, perceived security was found to have a substantial impact on supplier trust, as indicated by Wimmer and Bredow (2002). Given that people can influence their peers, Jeon et al. (2018) also concluded that a greater number of people using a new system with behavioral objectives can produce social influence. This study hence proposed the hypothesis below:

H_5: *Trust is strengthened by perceived security.*

Trust, which was not initially a component of TAM, has frequently been added by researchers as an extension of TAM (Venkatesh et al., 2016; Almajali et al., 2023). Kamarudin et al. (2021) appositely investigated the possibility that system trust could serve as a mediator between behavioral intention and actual use. They saw that this link was partially mediated by systemic confidence. Ooi et al.'s (2021) study on the correlation between perceived security and Bitcoin usage also looked at the mediating effect of perceived trust. Observing these findings, the current study suggested the following:

H_6: *Trust mediates the relationship between perceived security and e-government usage.*

2.5. Sociodemographic factors

Previous research has identified several socio-demographic characteristics of users that impart substantial impact on their (users') e-government usage. The existing literature indicates that the use of e-government services is more likely among men than among women (Choudrie & Dwivedi, 2005), and younger individuals are more inclined towards e-government usage as opposed to their older counterparts (Colesca & Dobrica, 2008). Additionally, according to Choudrie and Dwivedi (2005), adults over 55 do not use e-government services much. Income of user also affects e-government use. According to research by almajali et al.,2023, people with greater income levels are more at ease accessing e-government services and performing transactions online. Additionally, users' geographical location affects their e-government service adoption. People who live in cities and towns are very probable to use e-government services early, whereas people who reside in remote areas, smaller towns, and villages later embrace electronic government services (almajali et al., 2023).

Sociodemographic factors, as found in various studies, have emerged as robust indicators of the digital divide. Gender (Agarwal et al., 2009; Wei et al., 2011), age (Agarwal et al., 2009), education (Wei et al., 2011; Rahman, 2015), residence location (Stern et al., 2009), and income level (Hsieh et al., 2008), are all characteristics that affect the digital gap. In particular, Rahman (2015) emphasized the necessity for additional investigation into these aspects, particularly their role in mediating the connection between e-government use intentions and the digital divide. Existing research suggests that users' gender, age, education, and income level can influence the digital divide on e-government use intentions.

Taking into account these past findings, the present study had constructed the hypotheses below:

H_{7a}: *Gender influences the relationship between e-government use intention and the access divide.*
H_{7b}: *Gender modifies the relationship between e-government use intention and the skills divide.*
H_{7c}: *Gender modifies the relationship between e-government use intention and the innovativeness divide.*
H_{8a}: *Age modifies the relationship between e-government use intention and the access divide.*
H_{8b}: *Age modifies the link between e-government use intention and the skills divide.*
H_{8c}: *The link between e-government use intention and the innovativeness divide is moderated by age.*
H_{9a}: *Education moderates the link between e-government use intention and the access divide.*
H_{9b}: *Education modifies the relationship between e-government use intention and the skills gap.*
H_{9c}: *Education moderates the link between e-government use intention and the divide in innovativeness.*
H_{10a}: *Income moderates the link between e-government use intention and the access divide.*
H_{10b}: *Income moderates the link between intention to use e-government and the skills divide.*
H_{10c}: *Income moderates the link between e-government use intention and the divide in innovativeness.*

Khanra and Joseph (2019) examined the digital divide's function as an intermediary between service quality and e-government services intention in Jordan and reported that the digital divide partly mediates the connection between service quality and e-governmental adoption. Nevertheless, the authors did not explore the direct influence of specific digital divide dimensions on e-governmental system use. Moreover, the authors perceived the digital divide as a one-dimensional concept, neglecting its distinct components. To address these gaps, this present study examined how the digital divide influences individuals' intentions to use e-government services, considering three aspects: "the access divide, the skills divide, and the innovativeness

divide". This study also explored the moderating role of socio-demographic factors on the relationship between the digital divide aspects and e-government use intention (see Fig. 1). The hypotheses supporting the proposed model can be found in the subsequent section.

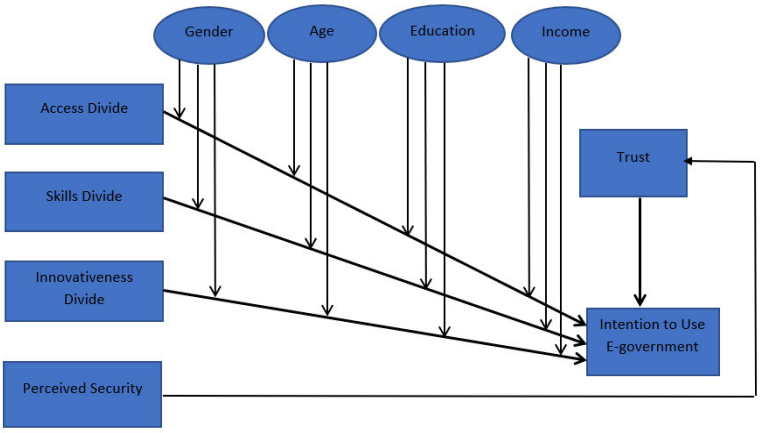

Fig. 1. Research Model

3. Methodology

This study made use of primary information that was gathered through in-person interviews in both urban and rural settings. The current study chose survey sites using judgmental sampling to make sure both areas were fairly represented. The respondents were adults who had adequate e-government experience and were at least 22 years old. These respondents were chosen using the convenience sampling technique. They (the respondents) were asked to complete a structured questionnaire consisting of two sections. Section 1 focused on obtaining data on demographic characteristics of the study respondents - these data were on the respondents' gender, age, education, and income. On the other hand, Section 2 addressed the respondents' perceptions concerning various factors related to e-government services, including access level, digital skills, innovativeness, perceived security, trust, and intention to use these services. The questionnaire items used in the study were drawn from existing literature.

The variables in Section 2 were represented by four items each, except for the variable indicating a desire to employ e-government services, which was represented by three items. Section 2 therefore contained 23 items representing six variables. A seven-point Likert scale was employed to collect correct responses on these variable items, with 1 signifying the response of "Strongly Disagree" and 7 signifying the response of "Strongly Agree". Prior to the main poll, 30 respondents took part in pilot testing. These respondents comprised academicians, management students, and civilians. The questionnaire was originally in English language but was translated into Arabic to ease the process of answering the items, because the respondents were more fluent in Arabic. In the actual survey, 700 respondents willingly participated and provided informed consent. Nonetheless, 80 questionnaires were excluded from the analysis due to incompleteness or ambiguous responses. Hence, the analysis was performed on 620 valid responses. Table 1 presents sample profile details.

Table 1
The respondents' demographic information

Category	Category	Frequency	Percentage %
Gender	Male	420	0.68
	Female	200	0.32
	Total	620	100%
Age	22-less than 26	180	0.29
	26-less than 31	120	0.19
	31 and above	320	0.52
	Total	620	100%
Academic Level	Bachelor	100	0.16
	Master	450	0.73
	Others	70	0.11
	Total	620	100%
Income (JD)	260-300	20	0.03
	301-400	110	0.18
	401-500	390	0.63
	501 and above	100	0.16
	Total	620	100%

4. Analysis and findings

The structural equation modeling technique (SEM) was used for data analysis, and AMOS software version 23 was used for statistical analysis. Prior to employing SEM, the univariate normality of the variables was ascertained utilizing the skewness-kurtosis method recommended by Hair et al. (2006) and Byrne (2006). All variables exhibited skewness and kurtosis values below the 3 cutoff recommended by West et al. (1995), confirming their univariate normality. The measurement model and structural model proposed in this study were both tested using a two-stage SEM approach.

4.1. Measurement model

Appendix 1 describes the model of measurement, which comprises 23 items representing six latent components. The model was evaluated using confirmatory factor analysis (CFA), which included the following latent constructs: access divide (AD), skills divide (SD), innovativeness divide (ID), perceived security (PS), trust (TR), and intention to use e-government (IE). All fit indices, met their respective fit criteria, as recommended by Hair et al. (2006). Based on Hair et al. (2010), the model demonstrated an excellent fit.

The constructs in the model were thoroughly tested for validity and reliability. Table 2 shows that all latent factors demonstrated acceptable convergence validity. According to Anderson and Gerbing (1988), the factor loadings of the various items were greater than 0.5 with a significance level of 1%. Additionally, the discriminant validity was confirmed based on Fornell and Larcker (1981), whereby the square root of the average variance extracted (AVE) for each latent construct was compared with the correlations between components. For each component pair, the square root of AVE was greater than the correlation between the two measures, as presented in Table 3. This provided support for their discriminant validity. Additionally, the composite reliability (CR) values were above the Bagozzi and Yi's (1988) threshold of 0.6. Additionally, Nunnally (1978) recommended Cronbach's alpha coefficient values greater than 0.7 as affirmation of measurement reliability. Furthermore, all AVE values were higher than 0.5, as per Bagozzi and Yi's 1988 guidelines, further confirming the measurement reliability of all the constructs employed in this study - there were six of them.

Table 2
Properties of the final measurement model

Constructs and Indicators	Factor Loadings	Std. Error	Square Multiple Correlation	Error Variance	Cronbach Alpha	Composite Reliability*	AVE**
Access Divide (AV)					0.822	0.82	0.85
AV1	0.777	0.011	0.731	0.441			
AV2	0.568	0.035	0.601	0.332			
AV3	0.557	0.045	0.511	0.412			
AV4	0.670	0.033	0.632	0.308			
Skills Divide (SV)					0.834	0.84	0.87
SV1	0.660	0.022	0.661	0.510			
SV2	0.821	0.040	0.507	0.445			
SV3	0.544	0.012	0.621	0.330			
SV4	0.901	0.058	0.569	0.367			
Innovativeness Divide (IV)					0.901	0.85	0.87
IV1	0.629	0.032	0.512	0.333			
IV2	0.711	0.070	0.513	0.540			
IV3	0.809	0.022	0.538	0.312			
IV4	0.777	0.011	0.544	0.377			
Perceived Security (PS)					0.884	0.84	0.87
PS1	0.653	0.057	0.680	0.221			
PS2	0.580	0.044	0.766	0.110			
PS3	0.702	0.078	0.816	0.320			
PS4	0.504	0.021	0.747	0.450			
Trust (TR)					0.864	0.85	0.87
TR1	0.765	0.023	0.852	0.342			
TR2	0.555	0.069	0.850	0.330			
TR3	0.604	0.041	0.311	0.344			
TR4	0.794	0.055	0.639	0.328			
Intention to Use E-government					0.865	0.85	0.88
IG1	0.922	0.048	0.624	0.419			
IG2	0.805	0.077	0.744	0.322			
IG3	0.718	0.066	0.544	0.325			

* The formula proposed by Fornell & Larcker's (1981) is employed. The composite reliability is computed as below:
Composite Reliability = $(\Sigma L_i)^2 / ((\Sigma L_i)^2 + \Sigma \text{Var}(E_i))$
where Li signifies the standardized factor loadings for each indicator, while Var (Ei) signifies the error variance related to the individual indicator variables.
** The variance extracted is computed as below:
Average Variance Extracted = $\Sigma L_i^2 / (\Sigma L_i^2 + \Sigma \text{Var}(E_i))$
where Li signifies the standardized factor loadings for each indicator, while Var (Ei) signifies the error variance associated with the individual indicator variables.

* The formula proposed by Fornell and Larcker (1981) was utilized to compute both the composite reliability and the average variance extracted. The computation of composite reliability was based on the following:

Composite Reliability = $(\Sigma Li)^2 / ((\Sigma Li)^2 + \Sigma Var(Ei))$

Here, Li stands for the standardized factor loadings of each indicator, while Var (Ei) denotes the error variance related to each variable of the indicator.

Similarly, the extracted variance is calculated using the formula shown below:

AVE = $\Sigma Li^2 / (\Sigma Li^2 + \Sigma Var(Ei))$

Once more, Var (Ei) signifies the error variance pertaining to the various indicator variables, and Li denotes the standardized factor loadings for each indicator.

Table 3
Correlations and validity of constructs

Constructs	AV	SV	IV	PS	TR	IG
AV	**0.90**					
SV	0.822	**0.93**				
IV	0.803	0.806	**0.88**			
PS	0.820	0.731	0.719	**0.89**		
TR	0.651	0.651	0.604	0.829	**0.94**	
IG	0.704	0.704	0.633	0.801	0.661	**0.90**

4.2. Structural model

With IE acting as the endogenous variable and AD, SD, ID, TR, and PS acting as exogenous variables, the structural model examined the linkages between the four constructs. These findings met the suggested criteria and were remarkably similar to those found in the measurement model. Results demonstrated a significant fit between the structural model and the data.

Furthermore, as depicted in Table 4, each of the suggested independent factors significantly impacted the intention to adopt e-government services. Also, results showed that perceived security had a significant impact on trust.

Table 4
Summary of proposed results for the theoretical model

Proposed Paths	Coefficient Value	t-value	p-value	Evidence
H1: AV → IG	0.235	7.221	0.030	Supported
H2: SV→ IG	0.401	11.335	0.017	Supported
H3: IV→ IG	0.022	2.225	0.023	Supported
H4: TR → IG	0.018	3.678	0.004	Supported
H5: PS→ TR	0.468	12.445	0.013	Supported

Hypothesis 6 proposes that perceived security and trust mediate the intention to use e-government services. When the indirect effect outweighs the direct effect, according to Hair et al. (2010), full mediation is evident. Mediation test results are shown in Table 5.

Table 5
Results of mediating effect

Hypothesis	From	Mediation	To	Direct effect	Indirect effect	Mediation
H6	PS	TR	IG	0.038	0.441	Mediation

4.3. Socio-demographic factors' moderating influence

With the exception of income, and socio-demographic factors moderated, Table 6 below provides moderation test results. The study revealed that gender moderates the connection between the three dimensions of the digital divide and the intention to utilize e-government services, indicating that the intensity of this association varies notably between women and men. Specifically, the impact of access and skills gaps on e-government usage intentions seemed more pronounced among males. Conversely, the correlation between the innovativeness gap and e-government use intention seemed significant for females but not for males, indicating that male users' inclination to employ e-government services is predominantly influenced by the accessibility of essential resources and skills, such as infrastructure and technical expertise. In contrast, females' intention to use e-government services appeared to be mainly impacted by their level of innovativeness. This finding aligns with a relevant study by Rahman (2015), which also reported similar outcomes regarding gender as a moderating variable. It is clear that both genders display distinct behavioral tendencies in e-government services utilization. In Indian households, for instance, it is more common to see men utilizing e-government services for financial transactions and sharing private information. Furthermore, when individuals have all the information they need, it is more likely that they will use these services. Unlike females,

their use intention is not caused by innovativeness. To summarize, the study reveals distinct differences in e-government service use between males and females, influenced by various factors with association with the digital divide.

Table 6
Moderation analysis

			Gender		
	Females (200)		Males (420)		Critical ratio for difference (z)
Path	β	SE	β	SE	
AV→IG	0.133	0.021	0.421	0.031	4.331
SV→ IG	0.119	0.033	0.504	0.054	5.776
IV→ IG	0.722	0.056	0.011	0.019	–5.110
			Age		
	Young (300)		Old (320)		Critical ratio for difference (z)
Path	β	SE	β	SE	
AV→ IG	0.556	0.022	0.390	0.028	3.222
SV→ IG	0.134	0.050	0.671	0.011	4.566
IV→ IG	0.460	0.033	0.03	0.038	–4.114
			Education		
	Low (100)		High (520)		Critical ratio for difference (z)
Path	β	SE	β	SE	
AV→ IG	0.221	0.011	0.422	0.022	3.221
SV→ IG	0.345	0.023	0.115	0.035	–3.667
IV→ IG	0.230	0.017	0.331	0.081	0.119
			Income		
	Low (130)		High (490)		Critical ratio for difference (z)
Path	β	SE	β	SE	
AV→ IG	0.331	0.09	0.266*	0.011	–0.12
SV→ IG	0.117	0.026	0.222	0.049	0.44
IV→ IG	0.245	0.038	0.769	0.050	0.650

Results showed age moderating correlations between the digital divide's dimensions and intention to access e-government services. Among older users especially, the access divide and skills divide played a more significant role in influencing the intent of user to use e-government services, whereas among younger users, the innovativeness divide had a greater impact on their intention to access e-government services (with no notable influence of the innovativeness divide observed among older users). For older users, their intention to use e-government services seemed to be primarily determined by their access to and skills in using technology, while for younger users, innovativeness played a more significant role in their e-government use intention. This outcome can be justified by Morris and Venkatesh (2000) research, which indicates that young individuals have generally been exposed to information and communication technology (ICT) from a very young age, unlike their older counterparts. As a result, young people tend to be more open to new technologies, including e-government services. Contrariwise, older individuals may lack confidence in e-government services usage due to their limited exposure to ICT unless they possess the necessary skills and tools, as noted by Forte-Gardner et al. (2004).

It was clear how education affected the correlation between the access difference, the skills divide, and the propensity to utilize e-government. Additionally, more educated individuals appeared to be more impacted by the access divide, whereas people with lower levels of education were more impacted by the skills divide. Education did not, however, act as a moderator in the relation between the innovativeness gap and intention to use e-government. Education greatly affects the use of e-government services. As described by Stern et al. (2009), individuals acquire the necessary skills for using e-government services. Hence, those with lower qualifications may lack the essential skills required for using the online services of the government. Further, people with higher education place more importance on access than skills when using e-government services. This is because they already possess the necessary skills due to their education level. Their focus was on accessing the right infrastructure to utilize these ICT-enabled services. Interestingly, the impact of the innovativeness divide on e-government services usage did not vary based on education level; both highly educated and less educated individuals were similarly affected by this factor. These findings oppose Rahman's results in 2015, wherein individuals with a lesser educational background perceived inventiveness as a more influential factor when adopting e-government. Hence, education seems a crucial factor influencing the relationship between two dimensions of digital divide namely the access divide and the skills divide, and e-government use intention.

5. Discussion and conclusion

According to the findings, the intent of Jordanians towards the use of e-government services was significantly influenced by the digital divide factors examined in this study namely the access divide, the skills divide and innovativeness. Among these dimensions, access to e-government services had the most substantial impact on users' intentions to utilize them. In other words, when users considered adopting e-government services, their main concern was whether or not they could easily access necessary resources like computers and the internet. The ability of people to use e-government services is restricted when access is split or ICT resources are unequally distributed. This result is consistent with studies on e-government adoption by Rahman (2015) and Gupta et al. (2016a, 2016b). According to Khan et al. (2012), when the necessary facilitating conditions,

for instance, computers and internet access, are in place, the likelihood of people to use e-government services would increase. In contrast, the absence of such facilitating conditions hinders e-government services adoption and usage. ICT infrastructure is regarded by the United Nations (UN, 2010, 2012) as a crucial indicator of e-government uptake and use.

People's aspirations to use e-government services proved to be significantly impacted by the skills gap., implying the inclination of consumers towards the exploitation of e-government services if they possess the right digital and technical skills, whereas users who lack these skills are less likely to use the services. These findings highlight the significance of the skills gap in e-government usage. Comparatively, Bélanger and Carter (2009) and Khanra and Joseph (2019) who studied the topic of digital divide, reported positive impact of the digital skills on people's use of e-government. Additionally, Gupta et al. 2016 found significant impact of ICT skills on individuals' intents to adopt e-government.

The intention to use e-government services was also found to be highly impacted by the innovativeness difference. Somehow, this dimension's influence on people's intents to use e-government services was minimal in comparison to that of the other two dimensions (access and skills). The findings revealed that people's willingness to try new technology influenced their utilization of e-government. Those with an innovative nature are more likely to be interested in utilizing e-government services. Contrariwise, individuals lacking innovation may be more hesitant to adopt upcoming technologies, leading to reduced interest in e-government services. This result is consistent with earlier studies by Rahman (2015) and Agarwal and Prasad (1998), who discovered that innovativeness is a factor in the use of e-government. These studies emphasized the importance of the gap in innovativeness as a factor that impacts the adoption of e-government.

Additionally, a number of studies have repeatedly highlighted the critical role that perceived security plays in enhancing both user and supplier trust toward e-government. Security assurance draws users and strengthens social media effects according to a study by Jeon et al. (2018). Additionally, it has been discovered that trust has a substantial impact on the purpose and acceptance of new skills, such as e-government (Sebetci, 2015; Warkentin et al., 2018; Khan et al., 2021), which is a result consistent with the findings of the present study. Moreover, trust can serve as a mediating factor in the positive correlation between perceived security and adoption of e-government.

5.1. Implications

The present work accordingly has several significant implications for policymakers, particularly those involved in e-governance. Firstly, to build sustainable e-governmental systems, the government should give priority to initiatives to close the access gap. Uneven access to information and communication technology (ICT) may make it more difficult for citizens to use e-government services. Therefore, ensuring that ICT infrastructure is accessible to all citizens is crucial. By providing free internet access in public spaces like airports, which are often frequented, train stations, recreational parks, and retail centers will encourage more people to utilize e-government services.

To facilitate e-government services, citizens need digital skills, and so, the government should enhance the citizens' digital skills, increasing their confidence in using these services. Furthermore, citizens should be informed of available e-government services and the benefits of such services. Government advertisements in print and in electronic media can play a significant role in spreading awareness about e-government services. Raising awareness among citizens can foster a positive attitude towards using them, motivating them to explore and benefit from these services. To encourage wider usage, e-government services need to be user-friendly and easily accessible. Ensuring a seamless and effortless user experience will pique citizens' interest and willingness to access the services.

It is crucial for the government to recognize that citizens exhibit diverse behavioral patterns, demographics, and needs, among others. Therefore, generic policies may not address the digital divide. In addressing this challenge, the government should prioritize rural areas, where the necessary infrastructure for e-government services may be lacking. Providing free or subsidized e-government services facilities in rural areas would benefit citizens. By doing so, the access divide between rural and urban areas can be reduced, leading to increased e-government services usage. To bridge the skills divide, especially among older and less educated individuals, the government can offer various digital skills learning programs through support centers or help groups. These training initiatives would empower individuals to utilize e-government services more comfortably and confidently. By addressing the distinct needs of citizens in different areas and demographics, the government can effectively reduce the digital divide. This will ensure more equitable access to e-government services.

5.2. Limitations and future scope

Regarding limitations, several key points should be emphasized. Firstly, this study focused on specific parts of the digital divide (ICT digital skills, access, and innovativeness) as perceived by citizens. Subsequent research might investigate the real disparity among users, especially regarding aspects such as internet connectivity (volume), internet proficiency, and internet usage frequency, among others. Examining these actual divisions would provide a more comprehensive understanding of the digital divide.

Second, just three dimensions of the digital divide were considered in this study.: access, skills, and innovativeness. To gain a more complete picture, future research could encompass additional aspects such as the social divide, outcome divide, capability divide, awareness of e-government, etc. Another problem lies in not accounting for citizens' income level as a potential moderator in relation to the digital divide and e-government use intentions resulting from the use of convenient sampling methods in selecting the study respondents. The moderating effect of income on the relationship between the digital divide and plans to exploit the internet for the government should be investigated in further research. Furthermore, the present study solely looked into the use intention of e-government services without considering actual usage. Results may differ if actual usage behavior is also considered. Therefore, future studies should include an analysis of citizens' current usage of e-government services to gain deeper insights into the impact of the digital divide. Lastly, the sample for this study was selected through convenience sampling, involving 620 respondents. To achieve more generalizable outcomes, future studies should employ more diverse and larger random samples. This would enhance the overall validity and reliability of the obtained findings.

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Appendix 1

Measurement items

The items pertaining to Access divide were adapted from Rahman (2015) and Khan et al. (2012) and are as follows:
AD1: I have access to the internet.
AD2: I can easily access the internet at all times.
AD3: Gaining access to information and communication technology (ICT) is easy for me.
AD4: I feel comfortable accessing ICT.

The items below were modified from Rahman (2015) and Wei et al. (2011) to reflect the Skills divide:
SD1: I possess the skills required in the use of ICT-enabled services.
SD2: I am generally aware of how to use services that are supported by ICT.
SD3: I am comfortable using these ICT-enabled services.
SD4: I don't need help from others to operate ICT-enabled services.

The items used to assess the Innovativeness divide construct were adapted from Rahman (2015) and are presented below:
ID1: I actively look for opportunities to experiment with new information and communication technology (ICT) when I am exposed to it. .
ID2: I frequently test out new information and communication technology (ICT) before my peers do.
ID3: When considering experimenting with new information and communication technology (ICT), I have some reluctance.

ID4: I am curious to learn more about cutting-edge information and communication technology.

Following are the items representing the intention to use e-government, which were taken from Rahman (2015) and Khan et al. (2012):
IE1: I have the intention to regularly use e-government services.
IE2: I have the intention to utilize e-government services in the future.
IE3: I have the intention to suggest e-government services to other people.

Four items representing Perceived security were adapted from Khan et al. (2021), as follows:
PS1: I have assurance that the personal data I gave to e-government services is safe.
PS2: I am certain that the data I provided through e-government services are not going to be shared with others if I don't allow it.
PS3: Security elements are built into e-government services to guard against unwanted access to user information.
PS4: I have confidence that I am able to use e-government services.

The construct of Trust was measured using four items adapted from Khan et al. (2021), as presented below:
TR1: When I use e-government services, I can be sure that the government won't misuse my personal information.
TR2: Surely, the e-government services will be dependable.
TR3: Surely, the use of e-government services will not have any negative effects on me.
TR4: Surely, the e-government services can be trusted.

A seven-point Likert scale was used to score each item that represented a research construct, with 1 denoting "Strongly Disagree" and 7 denoting "Strongly Agree."