Factors affecting e-government adoption in the UAE public sector organisations: the knowledge management perspective

Ahmed Juma Al Sayegh, Syed Zamberi Ahmad, Khadeeja Mohsen AlFaqeeh and Sanjay Kumar Singh

Abstract

Purpose – *This study aims to investigate factors that influence e-government adoption among public sector departments with the view to determine how such factors may be used to better facilitate e-government adoption across United Arab Emirates (UAE) public sectors. The use of e-government is advocated for the central government in the UAE.*

Design/methodology/approach – *Using random sampling, a total of 172 participants from ten departments and organisations in Dubai and Sharjah completed the online survey for this pilot study.*

Findings – *The authors found that performance expectancy and facilitating conditions have positive effects on e-government adoption. Furthermore, this study revealed the factors that encourage more e-government adoption between government organisations in the UAE. This study reveals three facilitating conditions may encourage e-government adoption in UAE public sector organisations when short- and long-term performances have positive effects on e-government usage.*

Practical implications – *This study provides middle managers clarity on factors that would influence government-to-government (G2G) uptake in more government organisations across the country. For uniformity and consistency, middle managers are now better informed as a result of this study to determine how best to use the six factors to motivate subordinates for more effective G2G.*

Originality/value – *The scope and results of this study is a contribution to e-government studies because it identifies the factors that positively influence G2G adoption. This scope exceeds the studies by Chan et al. (2021) and Habib et al. (2020) which focuses on the use of e-government for citizens or the public. This study focuses on the use of e-government within the government and between government departments.*

Keywords G2G, Performance expectancy, Facilitating conditions, Leadership support, UAE, Government-to-government

Paper type Research paper

Introduction

In most places across the globe, information and communication technology (ICT) has become a part of everyday life, impacting how people live, how they work, how companies do business and how governments serve their people (Majeed and Ayub, 2018). ICT, particularly websites, have become the cornerstone of every modern organisation including government, helping to overcome geographical limitations and time constraints and aiding the provision of immediate, user-specific responses to the needs of customers (Hadi *et al.*, 2018). At the individual level, information systems have empowered citizens, facilitating access to all kinds of information such as shopping, politics and social activity (Pereira *et al.*, 2018). With the world becoming increasingly digital orientated, governments can no longer continue to function the way they did 20 years ago.

Ahmed Juma Al Sayegh is based at Dubai Police Force, Dubai, United Arab Emirates.
Syed Zamberi Ahmad is based at College of Business Administration, Abu Dhabi University, Abu Dhabi, United Arab Emirates.
Khadeeja Mohsen AlFaqeeh is based at Department of Digital Strategy, Abu Dhabi Digital Authority, Abu Dhabi, United Arab Emirates.
Sanjay Kumar Singh is based at School of Business, Maynooth University, Maynooth, Ireland.

Worldwide, governments have begun to seek ways to update their systems to deliver more efficient and cost-effective services to their citizens (Reggi and Gil-Garcia, 2021). As more and more governments recognise the power of the internet, the use of e-government has risen globally (Kurfalı *et al.*, 2017). Several governments are turning to ICT to provide better services and to link governmental organisations to the consumers (G2C) (Kumar *et al.*, 2017), to businesses (G2B) (Basahel and Yamin, 2017) and other governments (G2G) (Abdulla and McArthur, 2018). Such versatile application of technology for implementation of ideas, goals and services for government meant that it is important to identify factors that may lead to more successful adoption of e-government in UAE government departments.

Therefore, this study aims to identify and critically assess factors that influence e-government adoption for innovation governance in UAE public sector. Studies indicate different factors such as knowledge management practices, IT infrastructure and administrative issues (Abu-Shanab and Shehabat, 2018) but emphasised having policies to enforce the adoption of e-government to achieve success. Chan *et al.* (2021) explained that service design is crucial to citizen satisfaction and use of e-government, whereas Habib *et al.* (2020) determined the influence of seven factors on residents' decision to adopt smart city technologies. While studies by Chan *et al.* (2021) and Habib *et al.* (2020) focused on factors that may influence adoption, their studies address adoption concerns of citizens and not between government departments as done in this study. This study addresses the gaps in literature by exploring technology adoption theories that provide theoretical explanations for the relevance of the 10-factor and unified theory of acceptance and use of technology (UTAUT) theories to this study. These two theories support this study and the formulation of a conceptual framework that inform the choice of quantitative research and deductive approach for this study.

Furthermore, the question; "what factors influence e-government adoption for innovation governance in UAE public sector?" is answered to generate empirical findings that inform practice for UAE public sector. Knowledge gained from this study addresses the limited focus of studies on knowledge management in the public sector as identified by Mc Evoy *et al.* (2019). According to Mc Evoy *et al.* (2019), knowledge management in the public sector is relatively under-researched when compared with the private sector. Therefore, the benefit of any empirical finding especially in UAE context is to provide evidence-based explanations for sharing e-government information and resources between government departments. The purpose of this study is to encourage more government departments to adopt e-government services for innovation governance. It is envisaged that the study outcomes would address reluctance of most government departments towards e-government for intra-operational services. The ineffective use of e-government services is also addressed by recommending factors that may lead to consistent e-government adoption across UAE public sector.

Literature review

E-government is perceived differently, and it has been defined in a number of ways partly because of the different fields of practice of different authors (Kumar *et al.*, 2017; Basahel and Yamin, 2017; Abdulla and McArthur, 2018; Reggi and Gil-Garcia, 2021). In a broad sense, DeBenedictis *et al.* (2002) describes e-government as all government activities that are conducted digitally or more specifically as the use of internet-based information technology (IT) to improve the delivery of government services, access to information and participation of citizens and organisations in government. The use of the internet to create "citizen-centric" government was also emphasised by Misra (2006). In this sense, e-government is used to refer to remote access and activities that are undertaken without human contact or face-to-face interactions.

The working definition of e-government for this research is drawn from Fang (2002) who defined e-government as the way in which governments use the most innovative ICTs, particularly internet applications to provide citizens a more convenient access to

government information and services. This definition is selected because of its reference to government's use of information and communication in relation to internet usage in relation to citizens having more and better access to government information and services. Based on this information and background, e-government is about improving the quality of government services and providing more opportunities for citizens to participate in government (Fang, 2002; Komito, 2005). The extent to which this is done by citizens effectively, or the level of access provided by the government is subjective.

E-government is being used to deliver services and information around the clock, making governments more efficient, responsive and transparent to the public through a variety of communication options that are quicker and more convenient for users (Schmeida and McNeal, 2009). Therefore, this background indicate that e-government is prominently and successfully used for providing public service. Subsequently, it is used for providing decentralised information for the public through digital platforms (Kassen, 2022). E-governments have encouraged increase in IT literacy level in countries where e-government was first adopted and have helped government to provide information, engage with business and citizens regardless of their needs and promote inter-agency information sharing between government agencies (Gilbert et al., 2004; Malanga and Kamanga, 2019). However, it remains challenging to implement e-government in small countries (Glyptis et al., 2020), without critical success factors that focused on information system development (Guntur et al., 2018).

This fundamental operational principle of e-government is important and have been provided to reveal what e-government was designed for and have been historically and successfully used for. This informed the quest and desire for e-government adoption in the UAE. However, challenges abound. Perhaps, this may be linked to limited understanding of the concept and stages required to attain maturity. The underlying reasons for the slow adopt is unclear, but effort is made in this study to explain and better understand the concepts, maturity and theoretical explanations for factors that may influence better adoption of e-government in the country.

E-government concept

E-government has been used to refer to online government services or the exchange of information and services electronically with citizens, businesses and other arms of government (Twizeyimana and Andersson, 2019). The United Nations E-government Knowledgebase (2019) originally defined e-government as the use of ICTs for improving the efficiency of government agencies and providing government services online. This definition has now been expanded to include the use of ICT by government for conducting a wide range of interactions with citizens and businesses as well as open government data and use of ICTs to enable innovation in governance (UNeGOVK, 2019). The Organization of American States defines e-government as the application of ICT to government functions and procedures with the purpose of increasing efficiency, transparency and citizen participation (OAS, 2010).

According to OECD (2014), e-government is the use of ICT by governments particularly the internet, as a tool to achieve better government. E-government can be classified into four types based on interactions between government agencies and members of the public. According to authors such as Fang (2002), Moon (2002), Huang and Bwoma (2003), Affisco and Soliman (2006), Belanger and Hiller (2006), Heeks (2008), Gil-Garcia and Martinez-Moyano (2007), Heni, Mellouli, Karuranga and Poulin (2011), Rana et al. (2015), Kumar et al. (2017), Basahel and Yamin (2017) and Abdulla and McArthur (2018), these various classifications prioritise different mediums and mode of operations to achieve its purpose. The four types of e-governments are government-to-citizen (G2C), government-to-business (G2B), government-to-employee (G2E) and government-to-government (G2G). They are examined further.

Government-to-citizen – The key feature of the G2C model is that it provides information and online access to public services for citizens (Kumar *et al.*, 2017). This includes services such as licence renewals, filing of income taxes, school registration, health-care information, libraries and birth/marriage certificates for the citizens (Affisco and Soliman, 2006). The SmartPass project of the UAE is an example of G2C service. It provides an opportunity for unified data entry of online government transactions for UAE residents (UAE, 2019). Users are provided with a SmartPass ID number after registration; this number is used to access all eServices of the federal and local government entities including payment of traffic fines, renewal of Emirates ID card, application for vehicle licence and payment of electricity and water bills. The portal also offers the opportunity for a user to access all previous interactions and transactions (UAE, 2019).

Government-to-business – G2B refers to using the internet, government agencies are able to seek bids to sell or buy goods and services (e-procurement), announce changes in regulations or disseminate policies (Basahel and Yamin, 2017). Businesses are also able to apply for business registration, renew licences, obtain permits or pay taxes (Belanger and Hiller, 2006). The ease of transaction that is possible with G2B portals leads to many benefits including better decision-making, better data on business transactions and taxes (Moon, 2002).

Government-to-employee – In this context, services include the features of G2C services as well as specialised services that cover only government employees, such as the provision of human resource training and development that improve day-to-day functions and work processes of employees (Heeks, 2008). Services may include e-learning sites where public sector employees can exchange information, intranet systems personnel records, policies and information (Fang, 2002). An example of G2E services in Dubai is the Ministry of Human Resources and Emiratisation where government employees can access their payslips, view and renew employment contracts, apply for work permits for expatriate staff, etc. (MOHRE, 2019).

Government-to-government– This e-government type involves services that are at the local or international level, between national and state governments (Abdulla and McArthur, 2018). It can also be between different agencies and bureaus in the same municipality. The aim is to coordinate activities between government agencies to serve citizens better (Heni *et al.*, 2011). Huang and Bwoma (2003) suggested that the interrelationship and intercommunication that occurs in G2G e-services could improve the management and utilisation of public resources. By linking sites together, integrating services and grouping all services under a single government service portal, citizens are able to access more services in less time.

E-government maturity

The use of the term maturity in e-government is to characterise the level of implementation and the complexity of an e-government process (Andersen and Henriksen, 2006). The main benefit of maturity models is to offer a way to rank e-government portals. Maturity models can also serve as a guide to improve existing e-government services (Fath-Allah *et al.*, 2014). Layne and Lee (2001) suggested that e-government is an evolutionary phenomenon, and they developed a comprehensive four-stage model following the study of various government websites and e-government initiatives to capture these stages. The proposed model depicts the multi-perspective transformation that may occur within government structures and functions as they transition to e-government (Layne and Lee, 2001).

The four stages of growth of e-government presented in the model are cataloguing, transaction, vertical integration and horizontal integration of G2G e-services depending on the public sector's readiness for e-government and the ability to change the modes and structures of public administration agencies (Gil-Garcia and Martinez-Moyano, 2007;

Abdulla and McArthur, 2018). An example of G2G services is the UAE Government portal U.ae (previously government.ae) that provides access to all government services including those of federal and local government entities for individuals, visitors, businesses and government from a single portal. Many of the previous studies that have explored e-government adoption have looked at the government-to-citizen dimension of e-government (Rana *et al.*, 2015). Depending on the level of e-government maturity, e-government may have all the four types operating in a country. Though this study explores G2E and its dimension, the next section further critically examines the scope of e-government and the classification of e-government services.

E-government follows a process to attain maturity. Integration is attained after transaction but acknowledged that elements of catalogue and transaction stages contribute to make integration possible (Layne and Lee, 2001). For instance, catalogue is the first stage in the implementation of e-government. Here, the initial effort is to establish an online presence for the government (Fath-Allah *et al.*, 2014). This includes online forms that can be downloaded on a website with information on government services. This first stage is called "cataloguing", because efforts are focused on cataloguing government information and presenting it on the Web. Transaction is the second stage where initiatives are undertaken to connect the internal government system to online interfaces for electronic transactions (Kumar *et al.*, 2017). There are live databases with links to the online interfaces used for payments like licence fees or to pay fines online with minimal interaction with government staff (Andersen and Henriksen, 2006). At the integration (vertical and horizontal) stage, the government goes further to link different levels of government and also different functions of government such that a citizen can contact one point of government to complete several levels of governmental transactions – a "one-stop shop" concept (Layne and Lee, 2001).

Thus, integration may happen in two ways: vertical and horizontal. In vertical integration, local, state and federal governments connect to facilitate the same functions or services. In contrast, horizontal integration involves integration across different functions and services (Layne and Lee, 2001). However, critics of the work of Layne and Lee have argued that e-government should also facilitate the participation of citizens in government. A civic dimension called "participation" was therefore added as the fifth stage of the Layne and Lee's model (Andersen and Henriksen, 2006). Moon (2002) included a civic stage that includes political participation through e-governance, thereby adding political maturity alongside administrative maturity of e-government.

There are other maturity models used to illustrate the phases of e-government implementation (Fath-Allah *et al.*, 2014). Others have further simplified the stages of maturity into three major classifications for e-government dimensions: e-information, e-services and e-participation (Ingrams *et al.*, 2018; Lee, 2010; Nam, 2014). These stages as explained by these authors suggest that maturity of e-government can be determined or assessed based on the interactions between e-information, e-services and e-participation, and how e-information facilitates e-participation. This explanation portrays e-government maturity as a process, not an end. Theoretical background to adoption and application of e-government further supports effective and successful e-government as a process.

Theoretical background

The works of Rogers (1995) and Kotler and Armstrong (2003) have allured to factors that influence technology adoption. Whether it is the five attributes such as relative advantage, compatibility, complexity, trialability and observability or five stages such as awareness, interest, evaluation, trial and adoption, it is evident from literature that it supports the explanation of e-government adoption. For instance, Rehman *et al.* (2012) explain that their study provided that awareness influences intention of citizens to use e-government services in Pakistan. Similarly, Huang *et al.* (2002) identified key factors influencing e-government adoption in Australian public sectors. In this study, interviewees in four organisations

identified perceived usefulness and perceived ease of use, accessibility and fast and easy to access as key factors that influence e-government adoption in Australia. They also identified facilitating conditions such as support, availability of helpdesk and service response as conditions that encourage use of government services especially the websites and return to use them (Huang *et al.*, 2002).

Though a small scale of study, the study by Huang *et al.* (2002) provides insight into how e-government adoption in the public sector can be influenced. In this study, factors embedded in technology theories are examined and considered. Lallmahomed *et al.* (2017) used the unified theory of acceptance and use of technology and the e-government adoption model to determine factors that influence the e-government services adoption in Mauritius. Lallmahomed *et al.* (2017) further revealed that trustworthiness is inversely related to resistance to change, but awareness campaigns of e-government services offered with a focus on citizens aged 18–39 years old, it is important to obtain a critical mass of users. They recommended that website design and information quality should be improved paying particular attention to security and privacy, thereby increasing trust and reducing resistance to change (Lallmahomed *et al.*, 2017). Factors identified and recommended in their study were also factors by Rogers (1995) and Kotler and Armstrong (2003).

Though most studies used technology adoption theories, other variables such as trust (Alzahrani, Al-Karaghouli and Weerakkody, 2017; Sang, Lee and Lee, 2010; Al Hujran, Aloudat, and Altarawneh, 2013), cultural and social influences, technology issues (AlAwadhi and Morris, 2009) have been studied inadequately. All studies on influencing factors tend to investigate citizens' adoption of e-government services except Huang *et al.* (2002). This exposes gaps that exist in this study area and an indication that G2G is perhaps under-researched. Studies on factors influencing e-government or e-service adoption in the public sector tend to incorporate theories of technology adoption. Theories that have been used in studies of the adoption of e-government services include technology acceptance models (TAM) (Davis, 1989), the theory of reasoned action (Douglass, 1977), the innovation diffusion theory (Rogers, 2010), the e-government adoption model (GAM) (Shareef *et al.*, 2011), the 10-factor model (Hossan and Ryan, 2016) and the UTAUT (Venkatesh *et al.*, 2003).

The UTAUT consists of four predictors: performance expectancy, effort expectancy, social influence and facilitating conditions. Effort expectancy which is explained as the degree of ease associated with consumers' use of technology is an important predictor for technology acceptance model. However, social influence is often subjective, as it relates to the extent to which consumers perceive technology (Venkatesh *et al.*, 2012). In this sense, it is important for people to believe they should use a particular technology before accepting to do so. Both effort expectancy and social influence are often interchangeably used to explain adoption of technology in studies, as people may fail to use technology if they believe it is difficult to use.

However, performance expectancy and facilitating conditions are stronger predictors that can be objectively assessed in organisational context since they are more central to organisation-level factors that the organisation can directly improve if need be. According to Venkatesh *et al.* (2012), performance expectancy can be described as "the degree to which using technology will provide benefits to consumers or people when performing certain activities either for organisational tasks or for regular activities" (Venkatesh *et al.*, 2012; p. 159). Facilitating conditions are defined as "the consumers' perceptions of the resources and support available to users to perform a task or behaviour" (Venkatesh *et al.*, 2012; p. 159). These two predictors are crucial to this study because they provide a link between the domains of e-government and factors that may potentially influence adoption of e-government by the public sector officials and sector.

This understanding led to the selection of the 10-factor model of eService utilisation in the public sector in Australia. Proposed by Hossan and Ryan (2016), the 10-factor model is derived from theory of interpersonal behaviour based on an empirical examination of factors that influence voluntary e-Service adoption in Australian public sector. In their study, Hossan and Ryan (2016) discovered organisational conditions such as leadership support ($\Lambda = 0.716$), training support ($\Lambda = 0.681$) and organisational preparedness ($\Lambda = 0.562$) were significant predictors that led to the success of e-Service adoption. Therefore, these three factors were selected from the 10-model factor and incorporated as the dimensions of facilitating conditions for G2G in this study. The UTAUT and 10-factor model were selected and adapted in this study because the UTAUT is well-researched technology adoption model that is applicable in any organisation type and context. The 10-factor model is also selected and combined with some elements of UTAUT to create a hybrid model that well suited to the UAE public sector context. Further explanations of both theories are provided to highlight the importance and relevance of influencing factors, and the formulated hypotheses from the theories.

Factors influencing e-government adoption

An investigation of the success factors at different stages of e-government maturity across 100 cities found that all stages had mostly uniform drivers: population size, Gross domestic product and regional competition had a positive association across all stages of maturity. However, the influence of democracy level varied, with an impact in some higher stages in large countries but with a negative association in smaller countries (Ingrams *et al.*, 2018). Environmental and internal capacity factors were significant at all stages of maturity. Institutional factors (competition and learning from other governments in the region) impacted at the e-service level of maturity. The second institutional factor is the governance factors, including democratic level and transparency norms. These institutional factors have impact at the higher levels of e-government development, e-services and e-participation.

However, the quality of public servants determines the overall administrative efficiency of public sector services. Employee involvement is therefore critical after electronic service policies are enacted to ensure adequate policy implementation. It is important that barriers and facilitators of frontline workers be identified to ensure effectiveness of the e-services. There are very few studies that have explored the public servant's adoption of e-government. A study to investigate the factors based on the UTAUT model that influences the behavioural intention of public servants regarding their use of e-government learning reported that employees' attitude, policy environment and performance expectancy facilitated the adoption (Chung *et al.*, 2016). While the reported lack of learning time, inability to adapt to the learning environment, being unaccustomed to the e-learning methods and frequent interruptions during training were barriers.

In terms of the training content, lack of relevance between the courses and the work of the learners, and boring course content were learning obstacles. The study also found that incentives and accountability from senior management facilitated the adoption of e-government, and attitude, obstacles, encouragements and pressure are closely related to learning. In summary, key, influential factors were "performance expectancy", "barrier factor", "policy factor" and "behavioural attitude", influencing the e-learning intention of public servants in China (Chung *et al.*, 2016). A systematic review of the factors affecting employees' adoption of e-government using an integration of UTAUT and task-technology fit (TTF) found only one article in this category of interest but not related to the employee perspective (Amrouni *et al.*, 2019).

Furthermore, in the study of the barriers to e-government adoption by Ebrahim and Irani (2005), organisational issues were identified as an important factor in the successful deployment and use of e-government services, thus, alluring to the role of organisational factors in facilitating the adoption of e-government. However, in spite of the robustness of

the UTAUT model, it is also geared towards the citizen context (Venkatesh *et al.*, 2014). Within the context of the UAE, the cost, infrastructure and IT skills have all been prioritised by the government and the voluntariness component of the UTUAT models is not a major factor as the use of e-government services is mandated.

Study hypotheses

E-government adoption is influenced by several factors. Rodrigues *et al.* (2016) indicated in their study that the determinants of e-government services utilisation in the UAE were confidentiality and trust, facilitating conditions and attitude towards technology use. They further revealed that performance expectancy and effort expectancy were the predictors of user satisfaction and behavioural intention to use e-government services. Therefore, factors tested in this study are classified under two broad categories: performance expectancy and facilitating conditions.

Facilitating conditions such as organisational factors become priority areas to test and examine in this research based on the explanation of robustness of the UTAUT model revealed by Rodrigues *et al.* (2016), Dahi and Ezziane, (2015), Rabaa'i (2017) and AL-Mutairi *et al.* (2018). The UTAUT combines the main features proposed by eight technology acceptance models such as reasoned action theory (Davis *et al.*, 1989) , TAM (Davis, 1989), model of motivation (Davis *et al.*, 1992), planned behavioural theory (Ajzen, 1991), combination of TAM and theory of planned behaviour (Taylor and Todd, 1995), personal computer utilisation (Thompson *et al.*, 1991), diffusion of innovation (Rogers, 1995) and theory of social cognition (Compeau and Higgins, 1995). All these authors identified relationships between performance expectancy and adoption of technology in either public or private sector.

Aforementioned authors found performance expectancy as instrumental to positive perception of technology or e-government by employees, and this indicates that relationship exists between independent and dependent variables when it comes to e-government adoption. This is reinforced in more recent studies by authors such as Hossan and Ryan (2016), Thao (2017), Rehman *et al.* (2012) and Al-Shafi and Weerakkody (2010) which identified factors that affect or influence e-government adoption in government sector or government. Evidence from recent studies align with, and strongly support that performance expectancy such as short- and long-term performance and client impacts influence the utilisation of e-service or e-government. Based on this, it is proposed that:

H1. Short-term job performance influences adoption of e-government services.

H2. Long-term job performance influences adoption of e-government services.

H3. Client impact influences adoption of e-government services.

Lallmahomed *et al.* (2017) revealed that performance expectancy, facilitating conditions and perceived value were the antecedents of the intention to use e-government services. These hypotheses are tested in the UAE to determine which is accepted or rejected. Regarding other factors that influence the adoption of e-government services, Thao (2017) justified through his study that performance expectancy, effort expectancy and social influence were the significant factors in the intention to use and the actual use of e-government services. More facilitating conditions have been identified to enable e-government adoption by authors such as Weerakkody *et al.* (2013), Kurfalı *et al.* (2017) and Rokhman (2011). Adoption of e-government is researched to be influenced by elements of technology acceptance models, facilitating conditions such as support, training and increased awareness of the benefit of using technology or e-services. This notion supports the next hypothesis which focuses on factors that facilitate e-government usage in the UAE which is under-researched, but well founded in the Arab countries. For instance, Alomari *et al.* (2010) researched social factors that influence e-government adoption in Jordan.

It is noticed from literature that the preparedness and support are important in the use of e-government. Using the UTAUT, Al-Sobhi *et al*. (2011), Rana *et al*. (2013), Weerakkody *et al*. (2013), Kurfalı *et al*. (2017), Thao (2017), Lallmahomed *et al*. (2017) and Rokhman (2011) all strongly explained that performance expectancy, effort expectancy and social influence are significantly related to behavioural intention to adopt e-government. Given that Hossan and Ryan (2016) in their 10-factor model clearly indicated that leadership support, training support and organisational preparations are organisational conditions that act as facilitating conditions for e-government adoption. Rabaa'i (2017) further explained using a modified version of UTAUT that performance expectancy, effort expectancy, social influence, facilitating conditions and behavioural intentions were significant factors in the adoption of e-government services. Based on arguments presented by authors and the theoretical explanations, the facilitating conditions selected for this study are leadership support, employee training and organisational preparedness support. Therefore, the following direct hypotheses are derived:

H4. Leadership support influences adoption of e-government services.

H5. Employee training influences adoption of e-government services.

H6. Organisational preparedness support influences adoption of e-government services.

Therefore, the conceptual framework developed from the six hypotheses is:
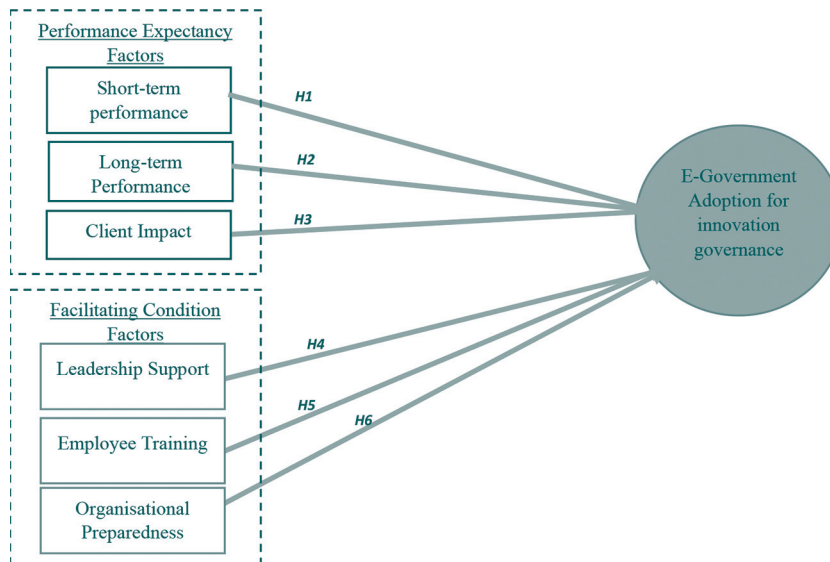
The conceptual framework shows direct relationship between performance expectancy factors and e-government adoption. It further illustrates the direct link between facilitation condition factors identified through the 10-factor model and G2G adoption for innovation governance. The six hypotheses and conceptual framework are tested by using appropriate methods and data collection instrument.

Methods

Instrument

According to Sreejesh *et al*. (2014) a meaningful questionnaire is designed to draw information that will fulfil research aim and is non-intrusive, well-structured and lucid. Questions also need to accurately measure the issue under investigation (Burton and Mazerolle, 2011). It is, therefore, recommended that, when possible, to use already

validated questionnaires used in relevant research studies that is being undertaken (Sreejesh et al., 2014). Using already validated, previously used survey is also supported by authors such as Burton and Mazerolle (2011). As a result, measures of instrument used by Hossan and Ryan (2016) is adapted to develop the instrument for this study. Six constructs are adapted from the literature review and were adapted to design the questionnaire. The six measures are short-term job performance, long-term job performance, client impact, leadership support, training and organisational preparedness. From these elements, a structured 58-item questionnaire with closed-ended questions, including questions aimed at gathering demographic information is designed and used for this study. A six-point Likert scale; 1 = strongly disagree to 6 = strongly agree was used for respondents to rate the extent of their agreement with each statement relating to each construct.

Sample

The population for the study is the UAE government departments. The departments were selected because of their use of e-government services, and facilities such as electronic government infrastructure, provision of e-government services and the willingness to participate in the survey. The survey was sent to over 5,000 employees in government departments in Dubai and Sharjah because of the proximity of both Emirates to each other. Once the data collection is completed, it was discovered that respondents were from the following departments: Dubai Municipality, Ministry of Education, Sharjah Municipality, Central Bank, Ministry of Health, Roads and Transport Authority, Telecommunications Regulations Authority, Dubai Health Authority and Digital Literacy Department. A total of 178 participants participated in the study. After outliers and cleaning done, six were considered invalid. Table 1 shows management level of study participants.

As shown in Table 1, among the 172 participants 10.5% (n = 18) were holding top-level management positions. However, most, 48.3% (n = 83) were middle-level managers while 27.3% (n = 47) were executive/administrative-level managers (Table 2).

In terms of length of service in government establishments, 14.1% (n = 26) have worked for less than a year in government organisations while 31.4% (n = 54) had been in public service for more than 7 years. The rest of the respondents had spent between one and seven years in the government organisations.

Table 1 Management level of study participants		
Management level	*Frequency* n = 172	*(%)*
Top management	18	10.5
Middle management	83	48.3
Executive/administrative	47	27.3
Other	24	14.0

Table 2 Years of participants' experience		
Years in public service	*Frequency* n = 172	*(%)*
Less than a year	26	14.1
1 to 3 years	44	25.6
3.1 to 7 years	48	27.9
More than 7 years	54	31.4

The population and demographic information indicate that participants have good level of experience, familiarity and knowledge of the subject being investigated, thereby suggesting that they are able to answer questions in the survey. This level of exposure to the public sector and e-government evolvement in the sector is relevant to this study, especially in drawing quality data from responses.

Data collection and analysis

Data is gathered using online survey administered to participants. Convergent and discriminant validity are both considered subcategories of construct validity (Bryant, 2000). Convergent validity estimates how much scale items are related to each other using the correlation coefficient. The patterns of intercorrelations for all the scale items in each of the constructs being studied were therefore determined. High correlations between scale items indicate that they measure the same construct (Bryant, 2000). Discriminant validity demonstrates that items for each construct are not related and measure different constructs. This is based on the principle that measures of theoretically different constructs should not correlate highly with each other (Bryant, 2000). Confirmatory factor analysis was used to assess both discriminant and convergent validity in this study. This study posits that there are six factors accounting for the covariance in the measures, and that these factors are unrelated to one another. The pathway analysis with the corresponding coefficient is presented to depict the direct relationships between the dependent and independent variables. The hypothesised relationships between dependent variable and two constructs (facilitating conditions and performance expectancy). Parameter estimates (β), critical ratio (CR), standard error (SE) and p-values for pathways were defined in the structural model. For a significance level of 0.05, CR that exceeds 1.96 was considered significant. The analysis assumed a fit between facilitating conditions, performance expectancy and e-government adoption.

Results

Results concerning effects of performance expectancy on e-government adoption

The coefficients between Leadership Support (LEADSupport), Training Support (TRAINSupport); Organisational Preparation (ORGPrep) and the Facilitating Condition (FacCon) latent construct were all positive and significant ($p < 0.001$). None of the three observed variables (short-term job performance, long-term job performance and client impact) under the latent construct of performance expectancy significantly loaded on this construct ($p > 0.05$).

As shown in Table 3, the regression coefficient of the association between Short-term Job Performance (ShortjobPer) and adoption construct, indicates that Short-term Job performance (Shortjob) construct was a significant factor influencing the adoption of e-services ($\beta = 0.45$, p-value = 0.000). This finding supports H1. Similarly, Long-term Job Performance (LongJobPer) emerged as a significant explanatory variable for adoption of e-government ($\beta = 0.317$, p-value = 0.049). This finding is consistent with H2. Further to this, we assumed a fit between Client Impact (ClientImpact) and adoption construct. The regression coefficient between Client Impact (ClientImpact) and adoption indicates that

Table 3 Findings for *H1–H3*					
Direct effect	*Estimate*	*SE*	*CR*	*Level*	*E-government adoption*
Adoption of e-government services <— short-term job performance	0.485	0.106	4.586	$p < 0.000$	*H1 accepted*
Adoption of e-government services <— long-term job performance	0.317	0.161	1.973	$p < 0.049$	*H2 accepted*
Adoption of e-government services <— client impact	−0.325	0.162	−2.007	$p < 0.045$	*H3 accepted*

Client Impact (ClientImpact) measurement model negatively and significantly influenced adoption ($\beta = -0.325$, p-value = 0.045). The model fit indices reveal that the model is a good fit to the data comparative fit index (CFI), normed fit index (NFI), NFI values were all >0.9. This finding was consistent with *H3*.

H1, *H2* and *H3* results align with the argument presented by Al-Sobhi *et al*. (2011), Rana and Dwivedi (2015), Weerakkody *et al*. (2013), Hossan and Ryan (2016), Kurfalı *et al*. (2017), Thao (2017), Lallmahomed *et al*. (2017) and Rokhman (2011). These authors all strongly explained that performance expectancy, effort expectancy and social influence are significantly related to behavioural intention to adopt e-government. In alignment with this, the study finding shows a positive correlation between performance expectancy and e-government adoption in UAE government departments. Therefore, it can be inferred that G2E would thrive with the understanding that short-term job performance, long-term job performance and client impact are all significant for the adoption of e-government usage in UAE public sector researched in this study and others in the country.

Results concerning effects of facilitating conditions on e-government adoption

The coefficient between facilitating conditions latent construct and adoption of e-government services indicates that facilitating conditions significantly and positively influenced the adoption of e-government ($\beta = 1.003$, p value = 0.004) (Table 4).

A fit between variables categorised under Organisational Facilitating Conditions and Adoption of e-service construct is assessed next. The regression coefficient of the association between Leadership Support (LeadSupport) was a significant factor influencing the adoption construct. This finding supports *H4*. The regression coefficient of the association between employee training was also a significant factor influencing the adoption of e-services which supports *H5*. It is seen that Training Support (TrainSupport) and Organisational Preparedness (OrgPrep) significantly and positively influenced the adoption construct. The model fit statistics demonstrate that this model is a good fit (NFI = 1.000, CFI = 1.000 and incremental fit index (IFI) = 1.000). Leadership Support (LeadSupport); Training Support (TrainSupport) and Organisational Preparedness (OrgPrep) significantly and positively influenced the adoption construct. The model fit statistics demonstrate that this model is a good fit (NFI = 1.000, CFI = 1.000 and IFI = 1.000) which supports *H6*.

Similar to the first three set of hypotheses, the second set of hypotheses also generated a result similar to literature deductions. *H4*, H5 and H6 particularly sought to identify facilitating conditions that may enable better e-government adoption among government departments. In light of this, the influence of leadership support, employee training and organisational preparedness support e-government adoption in UAE public sector departments. Showing a positive correlation confirms the main proposal that a positive relationship exists between facilitating conditions and e-government adoption in UAE government departments.

The results for *H4*, *H5* and *H6* are also confirmed by the explanations provided by Rokhman (2011), Hossan and Ryan (2016), Rabaa'i (2017), Thao (2017) and Lallmahomed *et al*. (2017). All these authors argue that performance expectancy, facilitating conditions and

Table 4 Findings for *H4–H6*

Direct effect	Estimate	SE	CR	Level	e-government adoption
Adoption of e-government services <— leadership support	0.222	0.111	2.008	*p* < 0.045	*H4 accepted*
Adoption of e-government services <— employee training	0.290	0.098	2.949	*p* < 0.003	*H5 accepted*
Adoption of e-government services <— organisational preparedness	0.285	0.110	2.597	*p* < 0.009	*H6 accepted*

other UTAUT factors influence behavioural intention to adopt e-government. While such behavioural intention and facilitating condition factors may vary significantly, it has been objectively decided through this study that leadership support, employee training and organisational preparedness support are the main factors that influence adoption of e-government services in UAE.

Discussion of findings

This study is undertaken because of the importance of e-government especially in a fast-paced developing country like the UAE. The influence of performance expectancy factors like short-term job performance, long-term job performance and client impact are seen to be significant in this study. Leadership support, employee training and organisational preparedness are also confirmed to have positive correlations with G2G adoption in UAE government departments. Since most of the participating departments are located in Dubai which is the most advanced Emirates in the UAE in terms of technology adoption and e-services, these results are not surprising. It is, however, surprising that more government departments in Dubai and staff within public sector departments in Dubai did not participate in this study which suggest that several departments are still not committed to G2G in spite of the efforts of the government.

Like any technology adoption and usage, factors influencing any e-government type may also be influenced by trust (Belanche *et al.*, 2012; Alzahrani *et al.*, 2017; Lallmahomed, 2017; Shagdarjav and Hwang, 2019). Deductions can, therefore, be made that the six factors identified and assessed in this study may be further influenced by trust for positive correlation that exists between the performance expectancy and facilitating conditions factors. Given that different government departments in Dubai and Sharjah operate under slightly different local governmental system, it appears that the potential impact of trust is at the forefront of the technology usage (Alzahrani *et al.*, 2017; Sang *et al.*, 2010; Al Hujran *et al.*, 2013).

Performance expectancy factors identified in this study have been predicted by Sanmukhiya (2020) to likely influence e-government usage in Mauritius. This shows that the performance expectancy factors may be applied in different countries regardless of their level of resources. Though Alqudah and Muradkhanli (2021) indicate that e-government performance needs to be developed through electronic management, this study has found that with certain facilitating conditions, government departments are likely to adopt e-government. The observation from this study results is that the facilitation conditions may be subjective, yet instrumental to successful G2G adoption. As explained by Sarabdeen (2014) privacy and security concerns may also be a problem especially within government and in restricting G2G adoption. However, the facilitating condition factors such as leadership support, employee training and organisational preparedness for G2G are essential in achieving the goal of G2G for innovation governance as realised during this study.

Therefore, the application of the six factors identified in our study need to be better understood and managed by all public sector organisations committed to G2G to advance e-government maturity level in the country as recommended by Shareef *et al.* (2011). No doubt, e-government has its challenges (Abdulla and McArthur, 2018), but measuring success of e-government adoption (Basahel and Yamin, 2017) and promoting it could be essential in expanding e-government programme. A critical analysis of findings indicates that understanding that issues such as trust and perceived risk may fundamentally influence the adoption of e-government (Xie *et al.*, 2017) than resistance to change and e-government implementation (Elgohary and Abdelazyz, 2020).

Such understanding and premise by past e-government studies make this study important because it identifies factors that may potentially help to mitigate the negative effects of

hindering factors. The key findings of this study are short-term job performance influences adoption of e-government services; long-term job performance influences adoption of e-government services; client impact influences adoption of e-government services; leadership support influences adoption of e-government services; employee training influences adoption of e-government services; and organisational preparedness support influence adoption of e-government services. These findings have implications for theory and practice which are further discussed.

Implications for theory

The study advances existing studies on technology adoption in the public sector (Hossan and Ryan, 2016) as well as UTAUT by Venkatesh *et al.* (2014) which focused on technology adoption models. It indicates that performance expectancy factors like short- and long-term job performances and client impact positively influence e-government adoption in government departments and organisations. By combining elements of the theoretical models by Hossan and Ryan (2016) and UTAUT, this study provides context for a new theory that combines three performance expectancy factors with three facilitating conditions.

Another theoretical implication of this study is that it establishes the premise for assessing e-government adoption and implementation from a theoretical perspective. To mitigate the challenges identified by Abdulla and McArthur (2018), e-government adoption may be more objectively assessed when three performance expectancy factors and three facilitating condition factors are combined as done in this study. Though this finding differs from that of Elgohary and Abdelazyz (2020), Kurfalı *et al.* (2017), Thao (2017), Shareef *et al.* (2011) and Shagdarjav and Hwang (2019) who all allure to the use of technology adoption models and influencing factors. It further strengthens the position that e-government models and theories need to be tailored to local context as well as levels of technology development (Ingrams *et al.*, 2018; Lallmahomed *et al.*, 2017; Rodrigues *et al.*, 2016; Nam, 2014).

The theoretical implication of the findings for management is that e-government models may be adapted to encourage better and more effective G2G adoption through the facilitating role of middle managers. While Abdulla and McArthur (2018) indicated that three facilitating conditions encourage e-government adoption, this study advances theory by recommending that middle managers are well positioned to manage and monitor all three facilitating conditions to ensure their positive influence for G2G. From theoretical perspective, this study findings advance any organisational management theory by highlighting the role of managers as leaders and facilitators of successful technology adoption especially in G2G usage in the UAE.

The relevance of this study to theory is that it clarifies the interactions between performance expectancy and G2G adoption, as well as the interactions between facilitating conditions and G2G adoption. This is an extension on current e-government adoption models because it highlights the role of leadership support in addition to other facilitating conditions which are usually possible through middle managers' efforts. Therefore, the G2G adoption model which comprises six influencing factors proposed by this study is a significant contribution to knowledge. Our study reveals that a context that combines six factors as done in this study to form a G2G adoption model is posed to determine status of e-government among government department. This implication for theory further supports practical implications of this study.

Implications for practice

Our study indicates that the impact of six factors on G2G is positive in UAE public sector. Being able to identify and determine the influence of these six factors is significant for

encouraging more effective adoption of G2G for innovation governance in more government departments. In policy-related terms, determining factors that positively influence G2G adoption as done in this study may encourage government to invest in strengthening these six factors across all government departments and organisations. Such policy-related actions would empower and encourage team and leaders to create training models that increase capability of public sector staff to be better trained to use technology for G2G. Benchmarking the six factors tested in this study against current status of innovation governance in departments not committed to G2G would help strengthen the case for G2G adoption with better clarity around factors that make positive adoption possible.

Therefore, the practical implication of this finding for management, especially middle managers, is that, this study has provided clarity on factors that would influence G2G uptake in more government organisations across the country. For uniformity and consistency, middle managers are now better informed as a result of this study to determine how best to use the six factors to motivate subordinates for more effective G2G. Similarly, the six factors can be instrumental in helping middle managers in different government organisations to integrate systems for better outcomes. Middle managers are also better positioned to advise senior managers and executives to use the six factors to inform policy to ensure more result-driven outcomes for their organisations. The three level ways in which middle managers can use the six factors identified in this study advance current practice of G2G in the UAE and makes middle managers the actors of G2G adoption in the public sector.

Furthermore, the practical implication of this findings for the whole of public sector organisation is that it may serve as benchmark for assessing successful and effective G2G adoption in government departments. The six factors identified and assessed in this study provide empirically based evidence that the factors lead to effective e-government practices. Encouraging the adoption of G2G using the six factors would facilitate more effective government operations and implementation of government goals which is core basis of innovation governance. For government job and operations in the UAE, effective government operations through G2G, between government departments working towards achieving the same goal is important in a country committed to excellence and growth.

Contributions of study. This section compares research results with previous studies to highlight the contribution of this study to knowledge. The scope and results of this study is a contribution to e-government studies because it identifies the factors that positively influence G2G adoption. This scope exceeds the studies by Chan *et al.* (2021) and Habib *et al.* (2020) which focuses on the use of e-government for citizens or the public. This study focuses on the use of e-government within the government and between government departments. While studies by Nam (2014) determine the e-government types used by government for the public, and that of Abu-Shanab and Shehabat (2018) as well as Albreiki and Bhaumik (2019) examine the influence of knowledge management practices on e-government success, all establish the premise in which e-government operate. This particular study is a contribution to knowledge because of its focus on government departments.

It also focused on specific factors that may encourage public sector officials to adopt and successfully use e-government for operational tasks that focus on achieving government mission and goals which is the essence of innovation governance. No doubt this study advances existing studies in the field of technology adoption especially on G2G studies. Although Ali *et al.* (2018) and Xing *et al.* (2021) researched on e-government, it was to determine the relationship between e-government and digital economy (Ali *et al.*, 2018) and government's macro-control for relief supply for dealing with public crisis knowledge management. While studies by Bansal *et al.* (2022), Habib *et al.* (2020), Chan *et al.* (2021) and Stratu-Strelet *et al.* (2021) acknowledge that certain factors influence the successful

adoption of e-government, this study went further by identifying the factors that lead to successful and effective adoption of e-government for innovation governance, a unique contribution with implications for both theory and practice in governance and public sector departments.

Conclusion

We acknowledge the limitations of our work which include sample size and data collection technique. It is possible that the results may have been different if the sample was larger to cover more Emirates and participants from other public sectors. Based on this possibility, we have generalised cautiously to infer that what works in Dubai, with similar conditions and support may potentially lead to similar outcomes in UAE in general. Nonetheless, having several participants from government departments in Dubai which is the most advanced in G2G adoption provides an objective scenario of possible factors that may influence and encourage G2G adoption in other UAE public sector organisations if similar level of support is provided. Combining survey with other data collection such as semi-structured interview data collection technique may have enriched this study. Having more in-depth interviews at middle and lower management levels may have helped to better understand the factors of preference at each level. While it is acknowledged that this may have enriched the study, but understanding each factor or preference is not the focus of this study rather validating whether the factors influence G2G adoption in the UAE public sector. Regardless, we hope that the limitations identified in this study present opportunities for future scholars to further enhance understanding and research on factors influencing G2G.

The UAE is advanced in the use of e-government as acknowledged by several authors who researched on adoption of e-government in the country. E-government studies have become popular in the country in the last five years because of the governments' commitment in improving its global ranking and raising awareness of benefits of technology. However, this study has been undertaken to further understand the limited use of e-government services within the public sector department in spite of its adoption by citizens. This research has also explored the reasons why the political will that motivated the rapid growth and advancement of e-government is yet to generate similar level of traction within the public sector in terms of e-government adoption. These problems informed the research question to assess the factors influencing e-government adoption in UAE public sector organisations to determine the dominant factors that contribute to successful e-government adoption in other public sector departments and organisations.

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Corresponding author

Sanjay Kumar Singh can be contacted at: profsanjaysingh16@gmail.com