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Analysing the critical factors influencing trust in e-government adoption from citizens' perspective: A systematic review and a conceptual framework

Latifa Alzahrani*, Wafi Al-Karaghoudi, Vishanth Weerakkody

College of Business, Arts and Social Sciences, Brunel Business School, Brunel University London, Uxbridge, UB8 3PH, United Kingdom

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ABSTRACT

Although the success adoption of e-government contingent upon citizens' trust and their willingness to use it, little consideration has been paid to explore the adoption of e-government from citizens' trust perspective. This paper provides a critical and systematic review of the current literature on citizens' trust in e-government, with a particular focus on the most critical factors influencing citizens' trust in respect of the adoption of e-government. The extant literature was identified through six electronic databases, from 2000 to 2014. Academic articles were reviewed if they contained a relevant discussion of the antecedents or factors influencing citizens' trust in e-government adoption. The findings of this review reveal that several studies have been conducted in the area of trust in e-government (particularly trust in government and trust in the internet) with limited consideration paid to citizen's aspects of trust (such as personality, culture, gender, experience, education level, beliefs and value of systems). Based on the findings of the critical review, a conceptual framework is proposed by developing further the updated DeLone and McLean IS Success Model, which presents the antecedents of trust in e-government adoption.

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1. Introduction

The electronic government or e-government encompasses the utilization of information and communication technology (ICT) to provide effective delivery of government's services and information to citizens, businesses and other government agencies (Bélanger & Carter, 2008; Carter & Weerakkody, 2008; Layne & Lee, 2001; Moon, 2002; Rose, Persson, Heeager, & Irani, 2015). Many scholars (e.g. Weerakkody & Dhillon, 2008; Bannister & Connolly, 2011; Janssen & Shu, 2008; Lips, Gil-Garcia, & Sorrentino, 2012; Weerakkody, Janssen, & Dwivedi, 2009) argue that the successful adoption and acceptance of e-government provides potential advantages for citizens, business and other government agencies. However, in many countries, some citizens still do not trust using online services and e-government applications, which impact the adoption of e-government (Al-Busaidy & Weerakkody, 2009; Cullen & Reilly, 2007; McLeod & Pippin, 2009; Ndou, 2004;

Palanisamy, 2004; Seifert & Petersen, 2002). In addition, Khasawneh and Abu-Shanab (2013) and Al-Hujran, Al-Debei, Chatfield, and Migdadi (2015) highlight that despite the advantages of e-government, there is still some rejection or even fear of e-government applications by the public. Therefore, trust is one of the most significant aspects in the implementation of e-government strategies, which will lead to recommendations from the users/citizens who experienced it to other citizens. According to Carter and Belanger (2005) and Colesca (2009), governments require to understand the factors influencing trust of citizens and other governments' agencies in e-government in order to achieve successful adoption of e-government services.

Trust in e-government services is a complex relationship because it includes many complicated issues that affect citizens' trust in government services (Alshehri, Drew, & Alfarraj, 2012; Chopra & Wallace, 2003; Bélanger & Carter, 2008; Colesca, 2009; Mahmood, Osmani, & Sivarajah, 2014). Trust in the context of online transactions has been discussed in e-commerce (Chang & Cheung, 2005; McKnight, Choudhury, & Kacmar, 2000); however, few studies have analysed the role that trust plays in e-government services (Gefen, Rose, Warkentin, & Pavlou, 2005; Horst, Kuttschreuter, & Gutteling, 2006; Joison, 2009; Schaupp, Carter, & Hibbs, 2009). Carter and Weerakkody (2008) agreed that despite cultural

* Corresponding author.

E-mail addresses: Latifa.Alzahrani@brunel.ac.uk (L. Alzahrani), Wafi.Al-Karaghoudi@brunel.ac.uk (W. Al-Karaghoudi), Vishanth.Weerakkody@brunel.ac.uk (V. Weerakkody).

differences in the adoption of e-government across countries, "trust" is a universal factor influencing the adoption of e-government. Before using e-government services, it is important that citizens believe that their government will provide the effective managerial and technical resources that are required to implement and secure these online systems (Alshehri & Drew, 2010; Colesca, 2009; Dwivedi, Weerakkody, & Janssen, 2011). Moreover, citizens must be confident to use e-government and they must have the intention to engage in e-government services.

In the existing literature, several studies (Carter & Belanger, 2005; Khasawneh & Abu-Shanab, 2013; Navarrete, 2010; Teo, Srivastava, & Jiang, 2008; Wang & Lo, 2013; Wang & Lu, 2010; Welch, Hinnant, & Moon, 2005) have been conducted in the area of trust in e-government (particularly trust in government and trust in the internet) with limited consideration to citizen's aspects of trust (such as personality, culture, gender, experience, education level, beliefs and value systems etc). Al-Hujran et al. (2015) agreed that the existing literature focuses only on how the technical aspects of technology and government reputation influence citizens' trust at the adoption stage which is believed to be the major barrier to e-government adoption. Thus, studying the concepts of trust in e-government from citizens perspective is considered to have a major consideration as citizens' adoption is the major objective of e-government (Welch et al., 2005; Teo et al., 2008; Rehman, Kamal, & Esichaikul, 2012; Khasawneh & Abu-Shanab, 2013). Consequently, a lack of clear understanding of the factors and issues that influence trust in e-government from citizens' perspective is one of the main motivations of this research.

The aim of this paper is to investigate, examine and identify the critical factors influencing citizens' trust in e-government adoption from citizens' perspective. It also aims to develop a conceptual framework for trust in e-government based on DeLone and McLean IS Model which studies the influence of information quality, system quality and service quality in intention to use and users' satisfaction. The paper is structured as follows: Section 2 provides a background of the concept of trust. In Section 3, a methodology of the review is explained. Section 4 presents a reported analysis of the data conducted in Section 3. Section 5 presents the finding of the systematic review. In Section 6, based on the finding of the review, the D&M IS Success model is developed as a framework to the antecedents of citizens' trust in e-government. Section 7 presents the theoretical and practical implications of this study. The final section concludes, with a presentation of the limitations and contributions of the research.

2. Background

2.1. Definition of trust

The concept of trust has appeared over the past 50 years with the development of human and social interaction (Paliszewicz, 2013). Trust is considered as an important part of a relationship because it shows how people interact and build relationships positively (Lewicki & Wiethoff, 2000). Trust refers to a willingness to depend on an unfamiliar trustee where the trustor does not have "credible, meaningful information about, or affective bonds" for the trustee (McKnight, Choudhury, & Kacmar, 2002). Mayer, Davis, & Schoorman, 1995, p.712) also define trust as "the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party". However, many researchers have difficulty defining this concept because of the multi-dimension nature of trust. For example, McAlister (1995, p. 25) reported that "although trust's importance has been

acknowledged, the matter of how it develops and functions has received little systematic theoretical attention". In addition, Karvonen (1999) agreed that a lack of careful analysis of the concept of trust in sociological, philosophical and technical factors is one of the fundamental causes of the confusing picture of trust.

Researchers (e.g. Chopra & Wallace, 2003; Colesca, 2009) have studied this concept in a many disciplines, including psychology, sociology, economics, computer science, organizational science and business and marketing. Each discipline focuses on different aspects of trust that cause complexity in defining trust.

- **Psychological approach;** According to psychology, trust is the psychological state of the individual in which the trustor risks being exposed to the trustee based on positive expectations and the intention of the trustee (Rotter, 1980; Rousseau, Sitkin, Burt, & Camerer, 1998). In addition, Hamshar et al. (1968) Hamshar, Geller, & Rotter (1968) agreed that trust is based on perceived control of the individual over their environment. Trust has three aspects: cognitive, emotional and behavioural. Cognitive trust is when the trustor makes a coherent decision to place his trust in the trustee. Emotional trust is when trust is built in the trustee in an emotional way; and behavioural trust is when trust is built on the basis of commitment (Schlenker et al., 1973).
- **Sociology approach;** According to sociologists, trust is the property pivotal to both individuals and social groups (Lewis & Weigert, 1985). Consequently, culture, ethnicity and religious affiliation are important factors influencing trust (Rotter, 1971). According to Sherchan et al. (2013), trust in sociology is based on two viewpoints: individual and societal. The individual level is similar to its perception from psychology. On the other hand, the societal level focuses on a collective psychological state of the group.
- **Economical approach;** In this approach, trust focuses on the reputation of the trustee and the benefits or risks that will come from the trusting relationship. In order to earn a good profit and build the company reputation, it is important that everyone trusts each other (Ouchi, 1980; Dyer, 1997)
- **Computer Science;** There are two components of trust in computer science: user trust and system trust. The concept of user trust is extracted from psychology and sociology, according to which it is a subjective expectation an entity has about another's future behaviour (Mui, 2003). However, in e-commerce businesses, such as Amazon and eBay or on social media, trust is based on user feedback and past interactions between customers. This indicates that trust is based on rationality. Moreover, in such circumstances, trust in user feedback increases in response to positive experience and decreases otherwise. Trust in online systems was found to be of two types: direct and recommendation. Direct trust is developed by personal experience while recommendation trust is developed on the basis of someone else's experience. (Sherchan, Nepal, & Paris, 2013)

The concept of system trust is based on its reliability, effectiveness and security (Sherchan et al., 2013), according to which the expectation is that a device or system will faithfully behave in a particular manner to fulfil its intended purpose (Yao et al., 2010). For instance, the trustworthiness of a computer device would depend upon the reliability and effectiveness of its hardware and software to perform the expected functions (Moreland et al., 2010). Moreover, according to Srivastava and Teo (2009), there are two risks associated with trust in technology: privacy and security risks.

- **Organizational Science approach;** Organizational science is a field of study which deals with the functionality of an

organisation (Beatty, Reay, Dick, & Miller, 2011). In an organizational science approach, trust operates at multiple levels. According to Rousseau et al. (1998), trust in an organisational context is based on a combination of institutional structures, group dynamics, and individual psychological processes. It was found by Beatty et al. (2011) that in organisations, trust exists at two levels: trust between two different organizations and the interpersonal trust that exists between two employees of two different organizations. Trust between organizations was found to be different from that of interpersonal trust between employees. However, both were found to play a significant part in bargaining and negotiation between two organizations.

The organisational science approach to trust also highlights that within an organisation, individuals, by virtue of the nature of their job function/designation and trusting relationships, are supposed to act in a trustworthy manner (Beatty et al., 2011). For example, office assistants have the authority to sign specific documents on behalf of their supervisors. In this example, trust was created not due to interpersonal relationships but in response to the office assistants' job function (Beatty et al., 2011).

- **Business and marketing:** Trust focuses on the relationship between users and service providers. Thus, in this approach, trust is studied in relation to the influencing factors such as, in the context of e-government, the factor of ease of use, the interface design and perceived usefulness increase trust between trustor and trustee (Gefen et al., 2005; Horst et al., 2006; Lee & Rao, 2007, 2009).

Table 1 below, presents a sample of definitions of the term trust by some scholars 2008–2013.

2.2. Types of trust

Investigating the concept of trust from different disciplines leads to many types or dimensions of trust. The different types of trust include the following:

- A **Knowledge-based trust:** based on the knowledge available to the trustor about the capabilities of the trustee. According to Wang (2010), knowledge-based trust comes from familiarity and past experience with the other party, leading to the building of trust between two parties through reducing uncertainty.
- B **Institution-based trust:** defined as "the belief that needed structure conditions are present (e.g. on the Internet) to enhance the probability of achieving a successful outcome" (McKnight et al., 2002). Some researchers (Abu-Shanab & Al-Azzam, 2012; Karvonen, 1999; Srivastava & Teo, 2009) also believe that, when dealing with an unfamiliar trustee, cognitive-based trust is implemented instead of knowledge-based trust.

C **Alsaghir, Ford, Nguyen, & Hexel, 2009; Srivastava & Teo, 2009** divided institution-based trust into structural assurance, defined as "guarantees, regulations, promises, legal resources, or other procedures . . . in place to promote success" (p. 339), and situational normality, defined as "one's belief that the environment is in proper order and success is likely because the situation is normal" (p. 339).

D **Calculative-based trust:** based on people's calculations of the benefits and costs that the other party will face if engaged in an opportunistic behaviour. So citizens tend to trust when the other party has nothing to gain, or if the cost is higher than the benefit of an opportunistic behaviour (Dashti, Benbasat, & Burton-Jones, 2010; Li, Hess, & Valacich, 2008).

E **Relation-based trust:** based on the past relations between trustor and trustee. According to Rousseau et al. (1998), trust can also derive from repeated interactions between the trustor and trustee.

F **Personality-based trust:** based on belief in the other party, that is, the other party has specific attributes (Wang, 2010) such as competency – the skills, abilities, expertise to satisfy their needs; integrity – the belief that the online trader will behave in an honest way and will adhere to principles and standards; benevolence – whether the vendor focuses on making a profit or on customers' interest (Lean, Zailani, Ramayah, & Fernando, 2009).

G **Cognitive-based trust:** refers to a situation where people build trust in the trustee based on their first impression rather than any previous interactions they have had (Wang, 2010). According to Li et al. (2008), people resort to using cognition or first impressions if they have not had a prior experience with the trustee. Some researchers (Abu-Shanab & Al-Azzam, 2012; Karvonen, 1999; Srivastava & Teo, 2009) also believe that, when dealing with an unfamiliar trustee, cognitive-based trust is implemented instead of knowledge-based trust.

H **Disposition to trust:** refers to a general propensity to trust others. Rotter (1971) states that a disposition to trust includes generalized expectations about the trustee, and whether the trustor has information or past experience or not.

3. Methodology of the systematic review

In order to study the role of trust in e-government, a desk-research was carried out, leading to the systematic review of the published literature relevant to trust in e-government. This review is based on a literature review methodology proposed by Brereton, Kitchenham, Budgen, Turner, and Khalil (2007). According to Brereton et al. (2007), three significant phases were adopted to identify relating articles to IS research: review planning,

Table 1
Definitions of trust.

Source	Definition of Trust
Teo et al. (2008)	Trust is defined as a set of anticipations as shared by the people involved in an exchange.
Alsaghir et al. (2009)	Trust refers to the expectation or belief of a person that another entity will be able to perform a valued action for them in the absence of their control over the entity's performance.
Colesca (2009, p 32)	"Trust involves the belief that others will, so far as they can look after our interest, that they will not take or harm us. Therefore, trust involves personal vulnerability caused by uncertainty about the future behaviour of others, we cannot be sure, but we believe that they will be benign, or at least not malign and act accordingly in a way which may possibly put us to risk".
Carter and Belanger (2005)	Trust is defined as perception of confidence in both the integrity and reliability of the electronic marketer.
Chee-Wee et al. (2008: 1)	"Trust is the subjective assessment of one party that another party will perform a particular transaction according to his or her confident expectations in an environment characterized by uncertainty".
Tolbert and Mossberger (2006)	Trust is an evaluation as to whether or not institutions or political authorities discharge their responsibility as per the normative expectations of the public
Moorman, Deshpande and Zaltman (2013)	Trust means the willingness of a person to rely on an exchange partner in whom the person has confidence

Table 2
Summary of Previous Studies on Trust in E-government.

Author/Year	Aim of the Study	Antecedents of citizens' trust (independent variable)				Dependent Variable	Research Approach and Design	Research Finding
		Citizen's Aspects	Technology	Government Agencies	Risk			
Warkentin et al. (2002)	This study presents how government can encourage citizen's adoption of e-government by building trust	Experience, disposition to trust, characteristic-based trust	Institution structure assurance	×	×	Intention to use e-government	Quantitative. A survey of over 1,000 taxpaying citizens in United States, Latin America, Africa	The study presents several ways in which governments can increase citizen trust, which include cultural, risk, and technology acceptance variables.
Carter and Belanger (2005)	Study factors that influence citizen adoption of e-government initiatives.	×	Trust in technology, perceived usefulness, ease of use, compatibility, perceived quality	Trust in government	×	Intention to use e-government	Quantitative approach. A survey to 105 citizens in US	Perceived ease of use, compatibility and trustworthiness are significant predictors of citizens' intention to use an e-government service.
Welch et al. (2005)	Studying how Internet uses, citizen satisfaction with e-government and citizen trust in government is interrelated.	×	Internet use	Overall Satisfaction with government	×	Trust in e-government	Quantitative approach. A survey with a sample of 806 US citizens	Government website use is positively associated with e-government satisfaction and website satisfaction and that e-government satisfaction is positively associated with trust in government
Bélanger and Carter (2008)	Analysing impact of trust and risk perceptions on one's willingness to use e-government	Disposition to trust	Trust in technology	Trust in government	×	Trust and risk affect intention to use e-government	Quantitative approach. Survey for 214 citizens in USA	Citizen confidence in government and technology is imperative to the wide-spread adoption of e-government
Teo et al. (2008)	Examining the role of trust in e-government's success using the updated D&M IS success model	×	Trust in technology, information quality, system quality, service quality	Trust in government	×	Trust in e-government and user satisfaction	Mixed approach Focus group and online survey of 214 Singapore e-government website users.	The results show that trust in government, but not trust in technology, is positively related to trust in e-government websites.
Chee-Wee et al. (2008)	This research studies the relationship between citizens' trust and website quality	×	Quality of website, ease of use, usefulness	×	×	Citizens' trust in e-government	Quantitative approach. Survey of 689 US citizens	High quality e-government websites, factors of ease of use and usefulness have a positive effect on citizens' trust in e-government.
Alsaghir et al. (2009)	Conceptualizing citizens' trust in e-government: application of Q methodology	Disposition to trust, familiarity	Trust in technology, perceived usefulness, ease of use, website quality	×	×	Trust and risk leading to intention to use e-government services	Mixed Approach Survey for 402 citizens, interviews and focus group in Saudi Arabia	The factors that influence trust in e-government are disposition to trust, familiarity, trust in internet, website quality and perceived ease of use
Colesca (2009)	Identify the determinants of trust in e-government	Individual demographic, propensity to trust, internet experience	Trust in technology, perceived usefulness, perceived quality	Perceived organizational trust	Risk perception, Privacy concern	Trust in e-government	Quantitative approach. Survey of 793 citizens in Romania.	Technical and organizational trustworthiness, the quality and usefulness, internet experience and propensity to trust, directly enhanced trust in e-government, while age and privacy concerns have a negative influence on trust.
Srivastava and Teo (2009)	Citizen trust development for e-government adoption and usage.	×	Trust in technology	Trust in government	×	Trust in e-government	Qualitative approach Focus group and interviews	High level of trust in government and in technology leads to citizens' trust in e-government.
Abdelghaffar et al. (2010)	The impact of citizens' trust on using e-government services.	Characteristics of the individual	Trust in technology	Trust in government	×	Trust in e-government	Quantitative approach. A paper-based survey to 2023 students in Egypt.	Internet security and credibility of e-government services are significant factors that contribute to citizens' trust towards e-government
Liu and Zhou (2010)	Establishing an e-government trust model from the behavioural perspectives of citizen.	×	Perceived usefulness, perceived ease of use	×	Perceived security, perceived risk	Satisfaction and trust	Quantitative approach. Online Survey from 304 citizens in China	It is important to consider the role of trust as well as various website quality attributes in understanding e-government success.

Morgeson, VanAamburg, and Mithas (2011)	This study explores the structure of the e-government-citizen trust relationship	Age, internet use, education, income and gender	×	×	Satisfaction, confidant and trust	Quantitative approach. Telephone survey for 787 users of US federal government	E-government does not yet lead to greater satisfaction with an agency interaction nor does it correlate with greater generalized trust in the federal government overall.
Navarrete (2010)	Investigating differences in trust and consumption of public services by citizens across two settings: México and the US	×	Trust in technology	Trust in government	×	Trust in e-government transactional services Mixed approach. focus group, interview & questionnaire A total of 455 surveys, from Mexico and US	The effect of trust on the utilization of e-government services varies depending on the cultural settings.
Wang and Lu (2010)	Trust in technology and trust in government as two main factors that determine trust in e-government	×	Trust in technology, perceived usefulness, perceived ease of use	Trust in government	×	Trust in e-government Narrative literature review	Trust in internet and trust in government are important factors leading to the development of trust in e-government
Beldad et al. (2012)	Factors influence internet users' trust in government organizations	Disposition to rust, internet experience	Website quality	Government reputation, past experiences	Security, privacy	Trust in e-government Mixed approach. Online survey to 1,156 citizens and focus group	The quality of online government transaction and organizational reputation increase trust in government organizations
Bannister and Connolly (2011)	Studying trust and transformation for government, governance and administration	Characteristics of the individual	Trust in technology	Trust in government	×	Trust in e-government Systematic literature review	Technology enabled change has the ability to increase citizen trust, Also, a framework is developed to examine trust in ICT enabled changes.
Horsburgh et al. (2011)	Relationships between public trust in government and e-government	×	×	Trust in government	Security	Trust in e-government Quantitative Telephone survey to 438 in Australia and 498 in New Zealand	No relationship between trust in government institutions and in various e-government functions.
Rehman et al. (2012)	Determinants of trust in e-government adoption:A case study of Pakistan	×	Trust in technology	Trust in government	Perceived risk, security	Trust in e-government Quantitative approach. Online survey from 150 citizens in Pakistan	Perceived risk, trust in the internet, trust in the government, information security and transaction security influence the citizens' intention to adopt e-government.
Abu-Shanab and Al-Azzam (2012)	The effect of trust and risk on the intention to use e-government websites	×	Trust in technology	Trust in government	Perceived risk	Trust in e-government Quantitative approach. A paper-based survey for 105 citizens in Jordan	The results supported trust in government and the internet and did not support perceived risk.
Wang and Lo (2013)	Studying the determinants of citizens' intent to use e-government websites in Taiwan	×	Trust in technology, perceived, usefulness, perceived, ease of use	Trust in government	×	Citizens' intention to use government websites Quantitative approach. 200 surveys from 104 Online Survey Company	Trust in the government, perceived usefulness, perceived ease of use, and attitudes toward the use of government websites have positive effects on intent to use e-government
Ayyash et al. (2013)	Investigation into the relationship between information system and trust in e-government	×	Perceived usefulness, Ease of use, Information quality, System quality, Service quality	×	Security, privacy	Trust in e-government and then intention to use Quantitative approach. Survey of 364 employees in ten ministries in Palestine	Quality of information, system, and service with perceived usefulness, perceived ease of use, and security privacy contributed positively to trust in e-government
Khasawneh and Abu-Shanab (2013)	E-government acceptance factors: trust and risk	×	Trust in internet	Trust in government	×	Trust and risk affect the intention to use e-government Quantitative approach. Survey to 149 students in Jordan	Trust and risk as important factors that could affect the usage of e-government application
Abu-Shanab (2014)	Studying antecedents of trust in e-government	×	Trust in technology, information quality	Trust in government	Privacy and security	Trust in e-government Quantitative approach. A survey of over 759 Jordanians	Trust in government, trust in technology, information quality, internet familiarity and privacy and security influence trust in e-government

conducting the review and review's documentation. Figure presents the major steps required to each phase.

3.1. Planning the review

The first step to plan an effective review is to specify the research question. In this study, the research question is:

What are the critical factors influencing citizens' trust to adopt e-government services? And why?

In order to develop the review's protocol, a search was conducted in April 2014 for literature published in English between 2000 and 2014. Keywords were chosen in respect of the critical factors influencing citizens' trust in e-government, which include: "trust", "e-government", "factors", "adoption", "citizens' perspective" and "antecedents of trust". Published studies were identified through six electronic databases: Scopus, Summon, Proquest, ACM, ScienceDirect and Google Scholar. This resulted in the initial identification of 237 articles.

3.2. Conducting the review

The process of selecting relevant studies involved systematic analysis for each article by reading abstracts to ensure they met specific criteria, as follows: published in English, published after 2000, and containing a relevant discussion of factors influencing citizens' trust in e-government. Articles that focused on the implementation of e-government or had a limited discussion of factors influencing citizens' trust in e-government were excluded.

Of the articles studied, 20 were found to meet the requirements of this study. In addition, reference lists of these articles were scanned in order to identify any further relevant articles that were not found in the initial search. Thus, two more articles were found relating to this research. Also, one unpublished study was involved as grey literature which meets the requirement of this review. A final number of 23 articles were found to be relevant to the aim of this study (see Table 2). Each article was read carefully to identify the important factors discussed as the antecedents of trust in e-government. These antecedents of trust were then grouped as common factors. The groupings were reviewed by all participating authors to validate the chosen factors. Four factors emerged from these articles: citizens' aspects, technology, government agencies and risk factors. The articles associated with each theme are listed in Table 2.

3.3. Data reporting

In order to report the data collected from the 23 articles, a six-column table was designed to investigate the antecedents of trust in e-government in each article (see Table 2). The columns detail author and year, aim of study, antecedents of trust, dependent variable, research design & research approach, and findings of each study. The column concerning antecedents of trust classifies on four factors: citizens' aspects, technology, governmental agencies' factors and risk factors. Each article is grouped into the type of antecedents focused upon in their studies (note: the "x" mark represents the absence of the correspondent factor in the article analysed), see Table 2.

4. Data analysis

4.1. Antecedents of trust in e-government

Most of the published academic articles addressed technical factors and government agencies factors as important antecedents of trust in e-government (see Table 3). In addition, some studies

Table 3

Findings of antecedents of trust in e-government.

Antecedents of trust	Number of Articles
Psychology	1
Government + Risk	1
Technology	1
Technology + Government	8
Technology + Risk	2
Technology + Citizens	2
Technology + Government + Risk	3
Technology + Government + citizens	3
Technology + Government + Risk +Citizens	2

identified perceived risk as a factor influencing citizens' trust. Perceived risk was studied along with other factors such as technical, and/or government agencies aspects. Furthermore, citizens' aspects were also discussed by many researchers as significant factors leading to trust in e-government. However, only two papers out of the 23 studied found to address all of the four factors influencing citizens' trust. The research studies by Beldad et al. (2012) and Colesca (2009) addressed factors, such as technology, government agencies, perceived risk and citizens' aspects as major factors influencing trust. However, the two studies by Beldad et al. (2012) and Colesca (2009) did not support their studies by theoretical context. They investigated the factors influencing trust in e-government with general expectations according to these factors. In addition, both studies did not examine the influence of trust in e-government with respect to citizens' satisfaction, intention to continue using and then the successful adoption of e-government.

4.2. Theoretical foundation

Regarding the use of a theory or model to develop the research model of trust in e-government, the majority of existing studies (11 studies) are not based on a theory or a model. Table 4 shows those studies, which are based on a model or a theory in their research studies. Most studies that use models utilize a Technology Acceptance Model (TAM) to explore the roles of trust in e-government, by testing the factors of usefulness and ease of use as technical factors. This study also found that only two studies use D & M IS Success Model to explore those factors influencing trust in e-government. Table 4 also presents some studies which utilized more than one model (e.g. Ayyash, Ahmad, & Singh, 2013; Carter & Belanger, 2005; Morgeson et al., 2011; Wang & Lo, 2013).

4.3. Research approaches

Table 5 illustrates the research approach of the relevant papers that were reviewed. From the table, it is clear that quantitative methods have been the dominant methods used in most of the research studies. However, the review of the literature has shown that Qualitative methods were used by only one study, while four studies used a mixed methods approach (both quantitative and qualitative).

Table 4

Findings of Theoretical Foundation.

Theory/Model	Number of Articles
Technology Acceptance Model (TAM)	8
Diffusions of Innovation theory (DOI)	3
Theory of Planned Behaviour TPB	1
D&M IS Success Model	2

Table 5
Results of Research Approaches.

Research Approach	Number
Quantitative Approach	18
Qualitative Approach	1
Mixed (Quantitative + Qualitative)	4

5. Finding

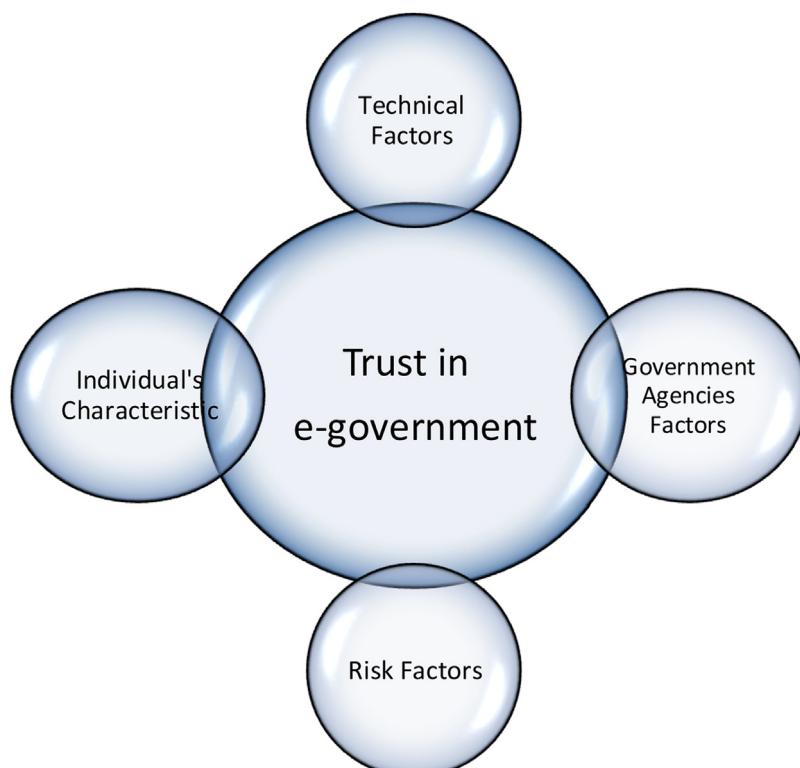
The systematic review that was conducted has covered qualitative, quantitative and mixed methods approaches, with the major focus on quantitative approaches. It is worth mentioning that the studies included in this review were conducted in a number of developed and developing countries, e.g. the USA, Romania, China, Singapore, New Zealand, Egypt, Saudi Arabia, Pakistan, Jordan and Africa (see Table 2). The findings of this review demonstrate that most researchers focused in their studies on technical and government agencies factors (Carter & Belanger, 2005; Khasawneh & Abu-Shanab, 2013; Navarrete, 2010; Teo et al., 2008; Wang & Lo, 2013; Wang & Lu, 2010; Welch et al., 2005). From the above findings, we can conclude that, this indicates there is a missing gap of the research in the antecedents of trust, which leads to the successful adoption of e-government services. Therefore, the antecedents of trust in the context of e-government should be studied in more detailed and analysed with reference to the four dimensions, i.e. technology, government agencies, citizens' aspects and risk. Each of these four dimensions may affect e-government adoption, as shown in Fig. 1. Thus, more research should be done to aim at addressing the factors of risk and citizens' aspects as these have been somewhat ignored by the extant research on this topic. Dwivedi et al. (2011) and Gefen (2002) also agree that it is important to study the issue of trust in e-government from a multi-dimensional construct in order to have a clear understanding of the

concept of trust in e-government, and to address the issue of trust as a whole successfully.

5.1. Technical factors

In order to investigate the level of the citizen's confidence to use technology to interact with government agencies, several technical factors were identified as an important parameter. These factors also relate to the citizen's belief that using technology for governmental services will provide effective services, accurate information and ensure safe transactions (Carter & Belanger, 2005; Moon, 2002; Pavlou, 2003). Technology has been studied by most researchers (Abu-Shanab & Al-Azzam, 2012; Alsaghier et al., 2009; Ayyash et al., 2013; Carter & Belanger, 2005; Liu & Zhou, 2010; Navarrete, 2010; Rehman et al., 2012; Teo et al., 2008; Wang & Lo, 2013; Khasawneh & Abu-Shanab, 2013; Wang & Lu, 2010; Warkentin, Gefen, Pavlou, & Rose, 2002; Welch et al., 2005) because it is considered to be one of the primary antecedents of trust in e-government adoption.

The literature reveals that the technical factors of an e-government service have a major impact on the citizens' beliefs when they interact with e-government services. Some studies use the Technology Acceptance Model (TAM) to identify the technical factors influencing citizens' trust (Carter & Belanger, 2005; Chee-Wee, Benbasat, & Cenfetelli, 2008; Alsaghier et al., 2009; Liu & Zhou, 2010; Morgeson et al., 2011; Wang & Lu, 2010; Wang & Lo, 2013; Ayyash et al., 2013). In the TAM, factors of usefulness and ease of use are the major technical factors that impact individual beliefs. Few studies utilize the D&M IS Success Model to analyse the technical factors (Teo et al., 2008; Ayyash et al., 2013). The D&M IS Success Model identifies three technical factors as major contributors to the success of IS projects: information quality, service quality and system quality. The existing literature also shows that while some studies use a model or theory to identify

**Fig. 1.** Antecedents of Trust in e-government.

the technical factors, most studies provides the overall aspect of trust in technology to predict citizens' trust in e-government.

5.2. Factors relating to government agencies

Government agencies were identified as factors to explore citizens' trust and their willingness to expose vulnerabilities regarding the government that depend on the level of citizens' confidence and belief in the ability of governments to provide affective services to their citizens. Papadakis (1999) demonstrates that citizens' confidence in their governments depends on their confidence in the performance of different government institutions. Many researchers (Ganesan & Hess, 1997; Jarvenpaa, Tractinsky, & Saarinen, 1999; McKnight et al., 2002) agree that trust in the government, which refers to the citizens' perceptions of the ability and integrity of governments to provide effective services to their citizens, is a significant dimension leading to the successful adoption of e-government services.

In e-government research, trust in the government is influenced by the reputation of governmental agencies (Srivastava & Teo, 2009; Beldad, van der Geest, de Jong, & Steehouder, 2012). Reputation refers to the citizens' belief that an agency is honest and concerned about its citizens (Jarvenpaa et al., 1999). Thus, agencies with a good reputation are perceived to be reluctant to jeopardize their reputational assets by acting opportunistically (Beldad et al., 2012; Srivastava & Teo, 2009). In addition, past experience with a government agency's website is an important factor influencing trust in the government. Information that is provided by past experience affects citizens' confidence to use e-government services (Beldad et al., 2012).

5.3. Perceived risk

Perceived risk is defined as the “consumers’ psychological perception of risks in the process of online shopping, the subjective forecast about the likelihood and the seriousness of loss” (Wang, 2010, p. 342). Many researchers (Liu & Zhou, 2010; Horsburgh, Goldfinch, & Gauld, 2011; Abu-Shanab & Al-Azzam, 2012; Rehman et al., 2012; Ayyash et al., 2013) agree that there is a strong correlation between trust and risk. A large body of research (Rotchanakitumnuai, 2007; Ruizhong, Xiaoxue, & Zixian, 2010; Wang, 2010) discusses the various dimensions of perceived risk, such as financial risk – the loss of money through online services; time risk – the loss of time in search or ordering a service; and finally, technology risk – which considers security and privacy as

important issues (Rotchanakitumnuai, 2007; Ruizhong et al., 2010).

5.4. Citizens' aspects

From the existing literature, it can be seen that the citizens' aspects (trustor) and their beliefs regarding another party significantly influences trust. Some researchers (Warkentin et al., 2002; Colesca, 2009; Beldad et al., 2012) highlight the factors of disposition to trust and internet experience as important factors that affect citizens' trust in adopting the services of e-government. Individuals vary significantly in their levels of trust (Mayer et al., 1995). Disposition to trust refers to "a tendency to be willing to depend on others" (McKnight et al., 2000), where some people are more naturally inclined to trust anything and anybody, including online entities, despite having limited information about them, while others require a great deal of information on the trust target before placing their trust in them. Consequently, low levels of disposition to trust decrease the level of trust in e-government, while high levels of disposition to trust increase the level of trust in e-government. Many studies highlight disposition to trust as an important factor influencing trust in e-government (Warkentin et al., 2002; Belanger & Carert, 2008; Alsaghier et al., 2009; Colesca, 2009). In addition, some studies report that internet experience can affect one's tendency to trust in Internet technology, which influences citizens' trust in e-government services (Alsaghier et al., 2009; Beldad et al., 2012; Colesca, 2009).

6. The conceptual framework and hypotheses

In this section, a framework has been developed based on the relevant literature, for the antecedents of citizens' trust in e-government. This framework is specifically based on DeLone and McLean's IS success model (2003), also referred to as the D&M model.

The D&M model is widely referred to in the IS literature, which provides a comprehensive model related to information systems success. DeLone and McLean (1992) demonstrate that there are six factors influencing IS success: system quality, information quality, use, user satisfaction, individual impact, and organizational impact. Following the above, DeLone and McLean (2003) updated the D&M IS Success model by using “intention to use” with the factor “use” and adding the factor service quality too. Thus, system quality, information quality and service quality were important technological factors in the IS success model, see Fig. 2.

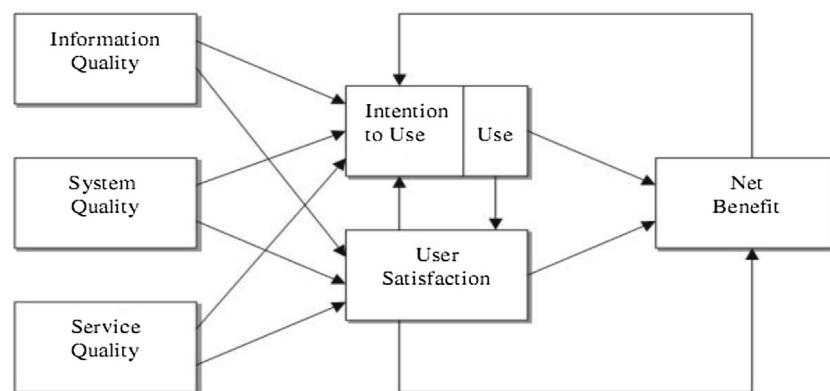


Fig. 2. DeLone and McLean's Updated Model

Source: DeLone and McLean (2003)

In 2009, Teo et al., utilised the D&M IS Success Model to study the concept of trust in e-government. Their study confirms a significant relationship between trust and intention to use and user satisfaction. However, their study was limited to the technical factors and trust model without consideration to the multidimensional nature of trust. This paper will advance and develop their study by combining it with the study of [Beldad et al. \(2012\)](#). [Beldad et al. \(2012\)](#) identify three significant determinants influencing trust in online organization which are: internet user-based determinants of trust, organization-based determinants of trust and web-based determinants of trust.

In this paper, a proposed framework is developed by combining the both studies of [Teo et al. \(2008\)](#) and [Beldad et al. \(2012\)](#) with the major consideration of risk factors. Thus, in the proposed framework, four factors refer to the antecedents of trust in e-government, i.e. technical factors, government agencies factors, risk, and citizens' aspects. These four antecedents impact trust in e-government, intention to continue use and citizens' satisfaction, while the organizational impact refers to the adoption of e-government services. [Fig. 3](#) presents the proposed research framework based on the government-to-citizen (G2C) situation. The following subsections define each component of the research model.

6.1. Antecedents of trust

Antecedents of trust refer to the groups of factors that influence citizens' beliefs in using and adopting e-government services. From the systematic review, four factors were identified as influencing citizens to trust e-government: technical factors, government agencies factors, citizens' aspects and risk factors. Each of these factors is explained below.

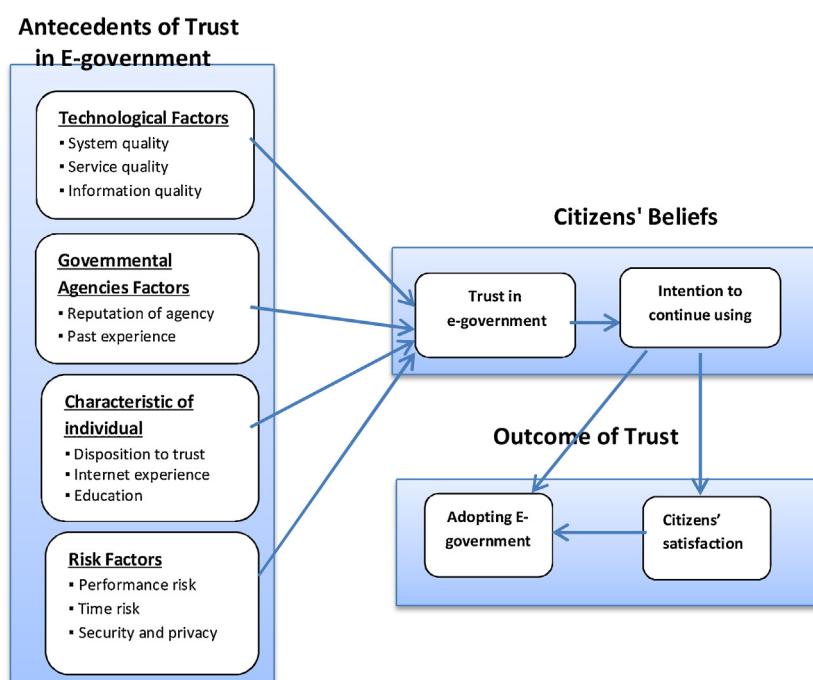
- Technical factors:** the D&M model identifies three technological factors that influence citizens' beliefs: system quality, service quality and information quality. Information quality considers the accuracy, completeness and timeliness of the information on the e-government's website. System quality refers to the

performance of the system and its reliability and accessibility. Service quality reflects the citizens' evaluation of the service quality with respect to the service that they actually receive and what they expect ([Wang, 2010](#)).

- Government agencies' factors:** the reputation of an agency and past experience are fundamental factors of government agencies ([Beldad et al., 2012](#)). A good reputation will develop a citizen's trust to adopt e-government services. In addition, the past experiences of citizens and their satisfaction with respect to online services provided by government agencies are found to influence trust in e-government.
- Citizens'Aspects:** Citizens' aspects are important factors influencing citizens' trust. In this research, gender, education, disposition to trust and internet experience are considered as citizens' aspects influencing trust in e-government.
- Risk factors:** risk is a significant factor that impacts citizens' trust in e-government. Technological risk, such as security and privacy, and performance risk are considered as important types of risk impacting trust to adopt e-government.

6.2. Citizens' belief

- Trust in e-government:** Trust in e-government refers to an individuals' beliefs and their expectation about e-government. [Fig. 3](#) shows that trust in e-government is influenced by technical, government agencies, risk and citizens' aspects. [Fig. 3](#) also shows that trust in e-government influences citizens' intention to use e-government.
- Intention to use:** Intention to use an online website presents the citizen's willingness to engage in government services through that online website. Intention to use is influenced by acitizen's trust in e-government services. The D&M model (2003) indicates that intention to use influences the individual's belief. In this model, intention to use e-government services influences citizens' satisfaction and their adoption of e-government services.



[Fig. 3](#). Conceptual Framework for Antecedents of Trust in E-government.

6.3. Outcome of trust

- **Citizens'satisfaction:** The extent to which an e-government service helps a citizen to achieve his/her needs. Citizens' satisfaction is influenced by their intention to use e-government. The D&M model (2003) indicates that a citizen's satisfaction influences his/her individual belief which is, in this framework, the adoption of e-government services (see Fig. 3).
- **Adoption E-governmnet:** the success outcome of citizens's trust in e-government is successful adopting of e-government services. Adopting e-government is influenced by citizens' satisfaction and their intention to use e-government services.

7. Research implications

This study provides four significant implications for research. Firstly, this study extends the literature of trust in e-government by providing comprehensive and a systematic literature in trust in e-government with major consideration to technical and non-technical dimensions. The result reveals that trust in e-government is a multidimensional relationship as many factors influencing this relationship including technology, government agencies, citizens' aspects and risk factors. While the majority of researches in trust in e-government focus on trust in technology and trust in government agencies, citizens' aspects such as gender, education level, internet experience and disposition to trust are another significant dimensions influencing their trust in e-government.

Second, this study has developed a conceptual framework to address the critical factors influencing citizens' trust in e-government as the primary theoretical contribution of this study. The conceptual framework was developed based on the updated D&M IS Success Model (2003) and [Beldad et al. \(2012\)](#). As most of studies in the field of trust in e-government use TAM model, this study utilizes D&M Model because it is more related to IS projects as it has three significant factors influencing IS success such as information quality, system quality and services quality. However, TAM model is limited to study the influence of two factors, i.e. usefulness and ease to use which are more related to any technology not IS projects. Thus, D&M IS Success Model is more suitable for e-government research as IS projects.

Third, the updated D&M IS Success Model is developed to consider not just technical factors, but also to investigate other factors such as government agency, risk and citizens' aspects. [DeLone and McLean \(1992\)](#) identified six factors for IS success which are: system quality, information quality, use, user satisfaction, individual impact, and organizational impacts. In 2003, DeLone and McLean updated D and M model by using "intention to use" in place of "use" and adding the factor service quality. However, the updated D&M model still just focuses on technical factors for IS Success. This study developed this model to include other factors influencing trust in e-government as a multidimensional relationship.

Fourth, this study also provides some fundamental implications for practitioners, including government agencies. Government agencies need to consider some strategies to empower their citizens and increase their awareness about e-government systems. [Abdelghaffar, Kamel, and Duquenoy \(2010\)](#) mention that awareness increases the understanding of the activities that government agencies have. Thus, government agencies particular in developing countries are required to use the mass media for educative purposes and introducing the concepts of e-government. In addition, the government agencies could carry out seminars and training of their public service and encourage citizens to use the

online applications and dissemination of web-based documents to ensure that this technological use is embraced. It could also carry out individual meetings and show support for the program through monitoring and evaluating sectors that have adopted e-government use ([Srivastava & Teo, 2009](#)). In effect, publishing such information in newsletters, magazines, and holding presentations are some of the ways that government organizations attain knowledge of technological use. Further, [Colesca \(2009\)](#) agree that creating awareness is one way through which the government can enforce public enforcement of e-government. Essentially, individuals are willing and ready to take up change if they are aware of the benefits the systems they are adopting. Thus, awareness creates positive sentiments to enforce e-government.

Also, it is important to involve citizens in the development processes of e-government by soliciting their feedback. When users are involved in the development process and constantly asked how to improve the system and process, their level of satisfaction will be increased ([Srivastava & Teo, 2009](#)). Having the users participate in the process, as well as consulting them for their views is an imperative approach to creating trust in e-government usage. According to [Chun et al., 2010](#), citizens are not only recipients of e-government services, but they are also the key chain that guides policy formulation through their opinion and views. In addition, [Carter and Bélanger \(2005\)](#) demonstrate that 74.2% of government agencies in UK have a web site. However, 90.5% have not conducted a survey to see what online services citizens and businesses actually want. Thus, the citizens' level of trust in the institution increases when they are informed about the actions and the processes of the government.

8. Conclusion

8.1. Summary of the research

A systematic and critical review was conducted to provide an in-depth analysis of the factors influencing citizens' trust in the adoption of e-government services. The literature review of relevant academic articles has identified three significant issues. First, there is little evidence of research studies that identify the factors of trust in e-government from the multidimensional nature of trust. Most researchers ([Khasawneh & Abu-Shanab, 2013; Wang & Lo, 2013; Abu-Shanab & Al-Azzam, 2012; Rehman et al., 2012; Bannister & Connolly, 2011](#)) focus on two dimensions of trust in e-government, which are trust in technology and trust in government, with little consideration of other factors such as the psychology of citizens and any risk factors. Second, the literature review revealed that the existing studies investigating the factors that influence citizens' trust are limited to the theory of the Technology Acceptance Model (TAM) or Diffusion of Innovation Theory (DOI), which again both focus on technology. In addition, most of the conceptual frameworks used in these studies were conceptualized with a general approach and limited focus on the specific nature of trust. Third, in the existing studies of trust in e-government, there is a lack of research regarding the concept of trust, the multidimensional nature of trust, and the properties and types of trust. Thus, the majority of the extant research studies focus on the technology or government factors, without giving more consideration to the trust dimensions.

This paper suggests a conceptual framework for the antecedents of trust in e-government based on the literature gap and the D&M IS Success Model, which yet to be tested. It is hoped that the proposed framework extends the D&M IS Success Model to include not only technological factors. But, other factors that should be considered, such as government agencies factors, risk, and citizens' psychologies as antecedents of trust in e-government.

8.2. Research contributions

Four primary contributions are the result of this research. First, this study reviews literature that informs on trust in e-government by exploring the concept of trust and the concept of e-government. By integrating the literature on the concepts of trust and e-government, this study provides a comprehensive understanding of trust in e-government. Second, this study highlights the antecedents of citizens' trust in e-government by a systematic review of the literature on trust in e-government. In this paper, four types of antecedents influencing citizens' trust to adopt e-government are investigated: technology, government agencies, risk, and citizen's aspects. Finally, a conceptual framework is proposed based on the D&M IS Success Model, which explores the technical factors for IS Success and explains how these factors influence citizens' beliefs. This study developed this conceptual framework by integrating other factors (such as organizational factors, risk, and citizen's aspects) that influence trust in e-government and the subsequent adoption of e-government services.

8.3. Limitation and further research directions

Like any other study, this study had limitations, especially, as it is an ongoing research. The first, is that, the results of this study are based on secondary data analysis of citizens' trust in e-government. Therefore, the results of this research cannot be considered as complete unless the proposed framework is justified with the support of primary data. The second limitation is that the review of the existing literature was identified from six electronic databases, with consideration of the keywords: "trust"; "e-government"; "adoption"; "citizens' perspective"; and "antecedents of trust". Future researchers might explore additional related journals and databases with the use of other combinations keywords such as "digital" and "culture".

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